MATAKANUI

GOLD LIMITED

Landscape and Ecological Rehabilitation Management Plan: Part A

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Disclaimer

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1. INTRODUCTION

Manaaki Whenua Landcare Research (MWLR[1]), Habitat NZ and Boffa Miskell Limited (BML) have prepared this Landscape and Ecological Rehabilitation Management Plan (LERMP) for the proposed Bendigo-Ophir Gold Project (BOGP) within the Dunstan Mountains, Central Otago (the site). This plan is intended to manage impacts on the landscape and ecology associated with the proposed mine and its ancillary infrastructure. This plan therefore includes the direct disturbance footprint (DDF) and areas immediately adjacent to the DDF, excluding predator-proof sanctuaries and the majority of Ardgour Station (which have their specific management plans).

1.1. Purpose

The purpose of this LEWRMP is to effectively rehabilitate mining activity within the Dunstan Mountains Outstanding Natural Landscape (ONL) by establishing a mosaic of natural ecosystems, enhancing habitat diversity, and supporting native species through strategic revegetation within a reinforced conservation setting. This will include substantial changes to the physical landform and associated vegetation disrupted by mining activity, as well as associated changes to the surrounding landcover including through ecological restoration. This involves creating varied but typically deep root zones, applying ecological restoration methods, and creating rehabilitated landforms that visually integrate with the existing landscape character and transition between the south and north Dunstan Mountains.

1.2. Long-term Integrated Vision

The vision of the LERMP is to facilitate a rehabilitated landscape that integrates mining activity with the Dunstan Mountains ONL while delivering enhanced ecological outcomes through:

- **Landscape Integration:** Rehabilitated landforms that respect characteristic skylines, ridgelines, and cultural heritage values
- **Stable Landforms:** Geotechnically stable, natural-appearing landforms supporting long-term ecosystem development except for highwalls
- **Diverse Habitats:** Resilient vegetation mosaics of native-dominated Central Otago ecosystems that include threatened and palatable plants

[1] from July 1 2025 Manaaki Whenua – Landcare Research is an internal group of the Bioeconomy Science Institute, New Zealand Institute for Bioeconomy Science Limited

- **Enhanced Ecology:** Improved habitat for native tussock and shrubland, including threatened and culturally significant taxa, with resilience to drought and fire. An Applied Research Plan for cushionfields and spring annuals aims to establish rehabilitation methods for these threatened ecological elements
- **Regional Benefits:** A landscape that strengthens biodiversity conservation and maintains important cultural values and heritage associations.

1.3. Mine Elements

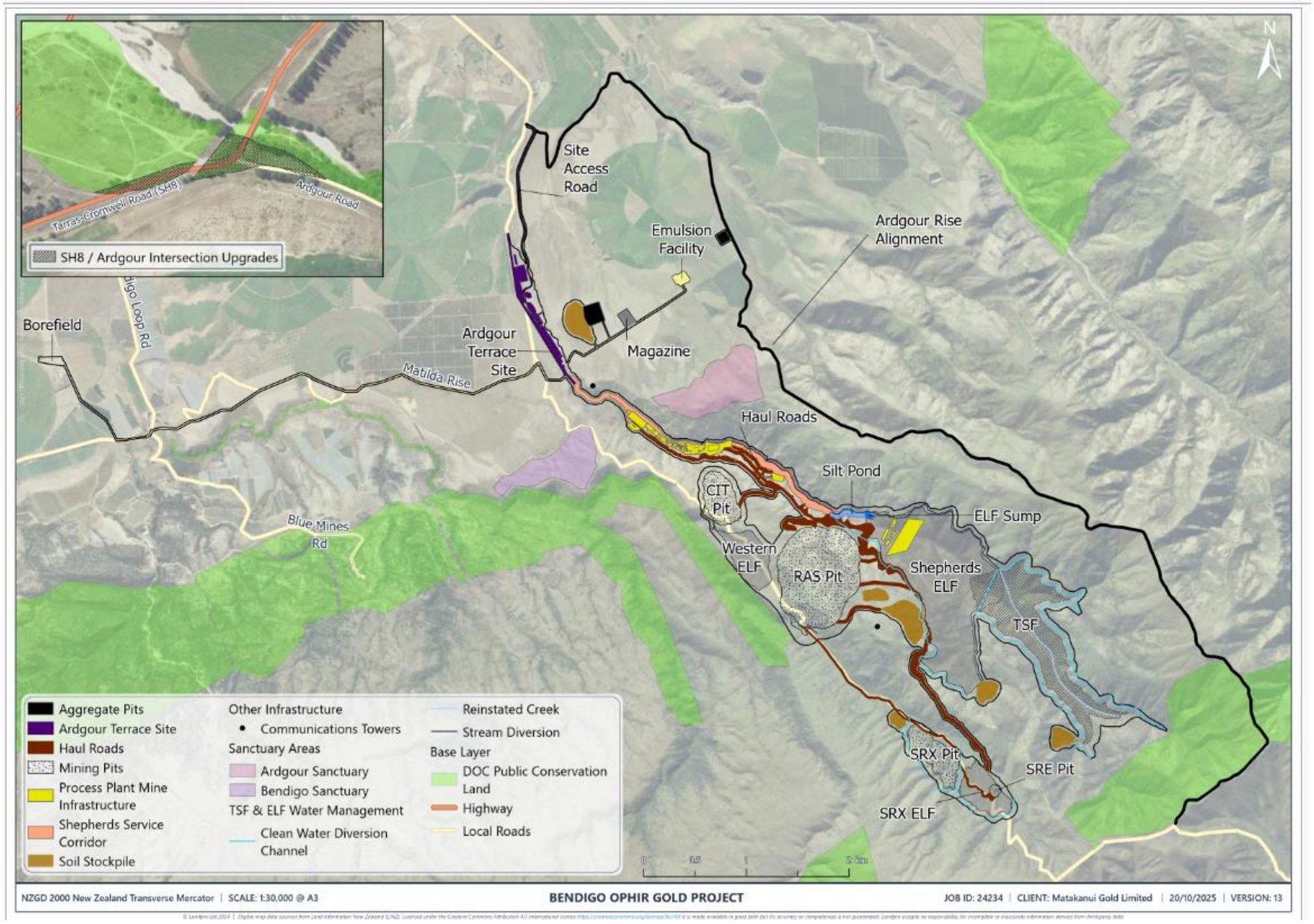
The proposed mine includes the following key elements that are proposed to be rehabilitated in accordance with Map 1 & 2 (reproduced in Appendix G) which describes the Land Management Units:

- Permanent pits
- Pit lakes: Rise and Shine (RAS) and SRX
- Engineered landforms (ELFs): Western ELF, Shepherds ELF, SRX ELF
- Tailings Structure (TSF embankment and pond)
- Stockpiles for soils and habitat rocks
- Haul roads and Plant Infrastructure
- Gravel pits and sediment ponds
- Temporary infrastructure
- Diversion drains, temporary and permanent.

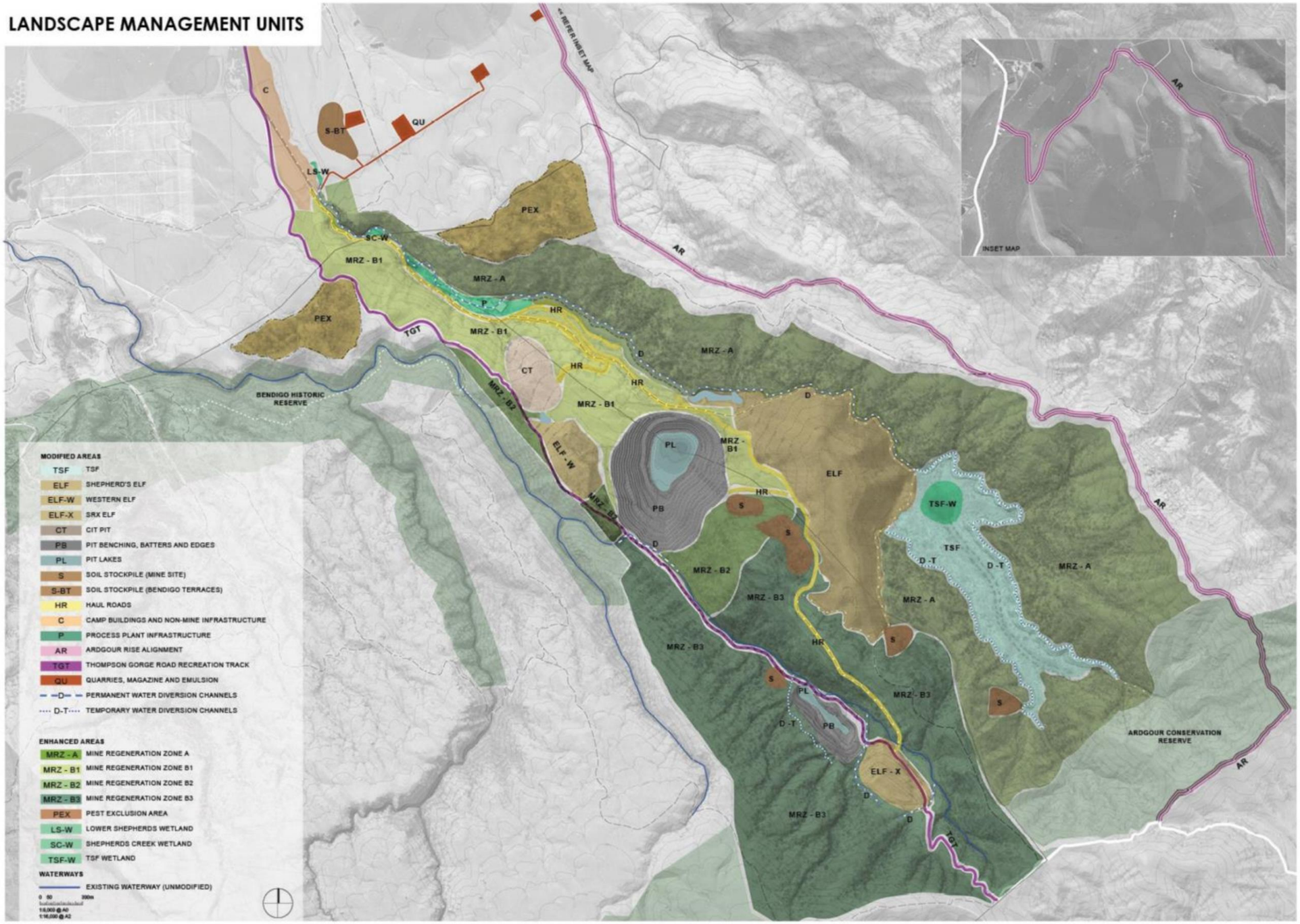
These elements are ‘wrapped’ by Mine Regeneration Zones (MRZs) which are managed to deliver an enhanced diversity and abundance of native plant and animal propagules into rehabilitated mined areas. The four MRZ are:

- MRZ A, Ardgour Station southern slopes shrubland, taramea and snowgrass
- MRZ B1, Bendigo Station cushionfields
- MRZ B2, Bendigo Station cushionfield buffer
- MRZ B3, Bendigo station shrubland and mixed tussock.

Map 1: Mine elements and associated infrastructure proposed as part of the Bendigo Ophir Gold Project. Landpro, 2025.



Map 2: Bendigo-Ophir Gold Project Land Management Units (LMUs).



2. STATUTORY AND POLICY CONTEXT

The proposed mining application is being lodged under the Fast Track Approvals Act (FTAA) 2024, which facilitates infrastructure and development projects with significant regional or national benefits.

The Assessment of Natural Character, Landscape and Visual Effects (Boffa Miskell, 2025) identifies key landscape outcomes relevant under Resource Management Act (RMA) direction within the FTAA framework:

- **Natural Character Protection (RMA s 6(a)):** The Site contains waterbodies including Rise and Shine and Shepherds Creek, requiring preservation of natural character and protection from inappropriate development
- **Outstanding Natural Landscape Protection (RMA s 6(b)):** The Site forms part of the Dunstan Mountains ONL, requiring protection from inappropriate subdivision, use and development as a matter of national importance
- **Amenity and Environmental Quality (RMA s 7(c) and 7(f)):** Requirements for maintaining and enhancing amenity values and environmental quality, where amenity values are defined as natural or physical qualities contributing to an area's pleasantness, aesthetic coherence, and cultural and recreational attributes.

3. SITE CONTEXT

3.1. Location

The BOGP is located on the western Dunstan Mountains slopes, 19km from Cromwell and 10km from Tarras, within the Dunstan Mountains ONL (Map 3).

3.2. Landscape Character

The site spans Rise and Shine Creek and Shepherds Creek catchments, featuring schist tor landscape with mixed pasture, tussockland, grey scrubland, and historic mining remnants. Battery Hill forms a prominent skyline separating the catchments. A detailed understanding of the landscape characteristics and values which make up the Dunstan Mountains is set out within the Landscape, Natural Character and Visual Effects Assessment included with the FTAA application (Boffa Miskell, 2025).

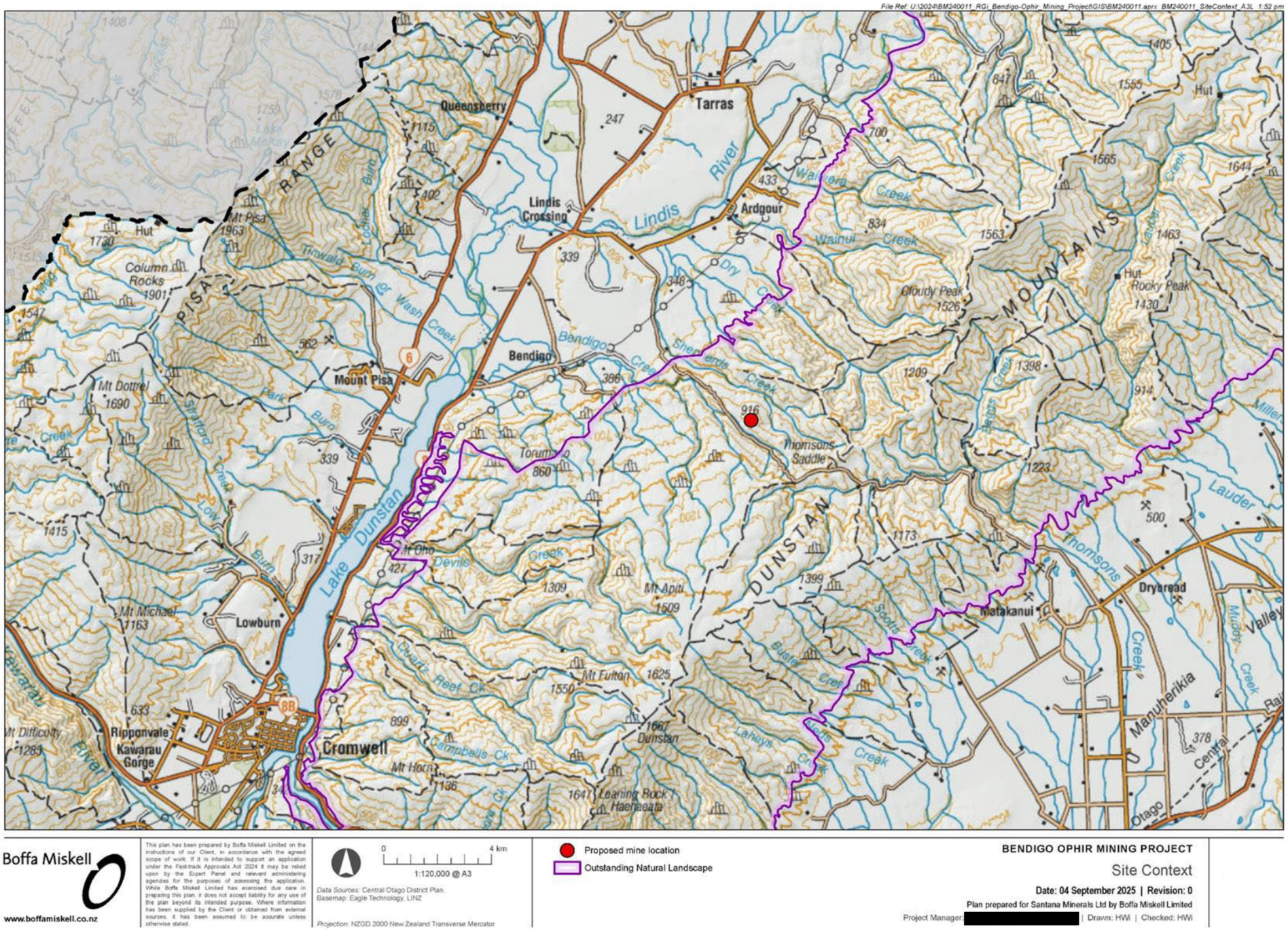
3.3. Cultural Heritage

Matakanui (Dunstan Mountains) formed part of traditional mana whenua travel routes via Thomsons Saddle for seasonal kai gathering. European settlement established extensive gold mining operations from 1862, with Bendigo becoming one of Otago's most prolific mines by 1875. Heritage sites and mining remnants remain throughout the area. European settlement from the 1850s also saw the establishment of large high-country stations and pastoral grazing.

3.4. Current Ecosystem

Historic disturbance from fires, grazing by stock, rabbit plagues, and pastoral intensification has transformed the landscape from dense native shrublands to non-native pastures scattered within degraded grey scrub and cushionfields. Human-induced pressures have completely transformed ecosystems across approximately 45% of the project area, with native vegetation diversity severely depleted, vegetation structure simplified, and species vulnerable to fire or grazing restricted to rocky refugia. In some areas, however, these pressures have allowed cushionfields and spring annual herbs to develop and persist.

Map 3: Bendigo-Ophir Gold Project Site Context.



4. ENVIRONMENTAL CONTROLS ON REHABILITATION

Rehabilitation success is governed by three key environmental stressors: fire, climatic stress (drought and cold), and mammalian browsing. Site-specific factors including geology, soils, aspect, slope, elevation, and vegetation cover moderate the intensity of these interactions.

4.1. Fire Impact

Fire was rare pre-settlement but increased with Māori clearing and dramatically increased with European settlement from ~1850, when annual burning for grazing eliminated tall tussocks and converted them to grasslands and cushionfields. Fire combined with browsing created ideal rabbit habitat. While deliberate fires are now rare, climate change will likely increase future fire risk, especially near roads and tracks and for highly flammable vegetation such as kanuka shrublands.

4.2. Climatic Stress

Central Otago's semi-continental climate creates severe stress from hot, dry summers combined with strong north-west winds and harsh winter frosts (-2°C average min). The low annual rainfall of 450-650mm varies greatly year to year and month to month. Drought stress peaks on north to north-west facing slopes where soils are eroded and cushionfields dominate, while taller vegetation grows in less drought-stressed, shadier slopes and sheltered areas with deeper soils. Rock tors provide critical winter refugia (and probably drought and browser protection) for wildlife and plants.

4.3. Geology and Soils

Otago Schist shaped by glacial erosion and tectonic activity, with elevated tors and the inactive Thomson Gorge Fault. Loess cover from Quaternary ice ages overlies parts of the area but has been eroded. The dominant Pallic and Semi-Arid Soils have low organic matter, weak structure, and are vulnerable to erosion when vegetation is removed. Many native plants develop deep root systems that follow cracks to access water and invest in very large root systems – with relatively small leaves and stems. Many plants have roots that extend 1 to over 3 m depth.

4.4. Topography and Aspect

North to north-west aspects support Raoulia cushionfields on moderate slopes between 400 and800m that have experienced erosion. South-facing slopes favour woody regeneration. Elevation also influences precipitation and temperature which drives vegetation transitions from matagouri/olearia at lower levels to short

tussocklands above 800m and taramea herbfields on higher ridgelines. None of the original snow grass remains at high altitudes.

4.5. Slope and Microtopography

Mining will reshape the landscape by creating open pits, engineered fill landforms, and temporary stockpiles with varying slopes and gradients. These new landforms—such as steep, benched pit faces, haul roads, and a near-flat tailings pond—affect airflows, moisture storage and availability, and temperature, which combine with root zone depths to shape the ecosystems that can develop. Gentle slopes beneath steeper slopes, swales, rocks, and small surface depressions are microtopographic features that help concentrate and trap water and shelter plants, allowing more diverse, taller native vegetation to grow in these areas.

Ecological restoration will focus on designing landforms with a high degree of naturalness that have varied shapes and microtopography to support a range of habitats. These habitats include wetlands and valley floors for less climate-tolerant species. An exception is current areas in pasture and crops on lowland terraces outside the mined area. These areas will largely be re-established for agricultural use, with a small gully converted from pasture to a fenced wetland with adjacent riparian zone planted in native species.

5. CURRENT ECOLOGICAL CONDITIONS

5.1. Vegetation Communities

The site supports a mosaic of the following distinct vegetation communities shaped by 150+ years of disturbance and distinctive climate and topography, all of which contain a substantial cover of non-native species.

5.1.1. Non-native (exotic) pastures

Pastures dominated by non-native species dominate terraces and lower elevations (20%+ of study area) but also on gentle to moderate south-facing slopes at high elevations with sweet vernal, cocksfoot, browntop, and legumes. Remnant native tussocks and shrubs are present in uncultivated areas. Non-native pasture species are also present within all other vegetation communities

5.1.2. Native dominant tussockland

Tussockland occurs at higher elevations on gently sloping sites and covers just 4% of the DDF. Native tussocks are conspicuous (20% of cover) and taramea (*Aciphylla aurea*) can be locally common. Shrubs are sparse.

For the purposes of this report, this unit includes native taramea herbfield and shrubland which is mapped in 2 ha of the DDF at the highest elevations.

5.1.3. Mixed tussock shrubland/grassland

Mixed tussock shrubland and exotic grassland covers nearly half the DDF area, with silver tussock generally on sunny northerly aspects (600-800m) and Festuca/blue tussock on shaded southerly slopes with scattered to patchy shrubland. Average tussock cover within this vegetation community is less than 20% and clovers are often present among the non-native grasses that dominate the vegetation cover.

5.1.4. Cushionfields

Cushionfields, mapped as ‘mixed depleted herbfield (cushionfield) and grassland’, are the most biodiverse ecosystem present, covering 10% of the area. Cushionfields support disproportionately high numbers of Nationally Threatened and At-Risk species (21+ plant species, plus at-risk invertebrates and lizards). Cushionfields occupy the driest, most degraded slopes and are mainly below about 700 m. They have a high proportion of rock and bare ground and are dominated by raoulia (scabweed). They contain threatened native spring annual herbs and *Pimelea aridula*.

5.1.5. Mixed scrubland

Mixed scrubland is an important landscape component covering about 20% of the DDF occurring mainly in gullies below 700 m and grading into native scrubland at higher elevations and shadier aspects. Dense scrub patches (39% of cover) are separated non-native grassland (34% of cover) and bare ground (11% of cover).

5.1.6. Native Shrubland

Native dominant shrubland covers 12% of the study area. Matagouri, olearia, and Coprosma dominate 2-3m canopies in deep gullies and south-facing slopes. Vines are occasionally present. About 12 kowhai patches containing about 40 sapling and trees survive within or near the footprint — remnants of historically more widespread and dominant communities.

5.2. Ecological Values

Despite degradation, each vegetation type supports distinctive native species assemblages. Olearia shrubland has highest invertebrate diversity, tussocklands support threatened grass skinks, taramea herbfields support threatened invertebrates, and cushionfields have the highest native plant values as they support spring annuals, lizards and at-risk invertebrates. The native ecosystem mosaic with rocks and tors creates diverse habitat conditions.

5.3. Hydrology and Wetlands

Small areas of wetlands are present in this dryland environment, with a total area estimated at 3.12 ha. The most numerous wetlands are scattered, small fens (0.49 ha) and seepages (0.13 ha). Shepherds Creek contains seepages feeding ephemeral to perennial streams with gentle reaches, riffle-pools, and a rocky gorge with waterfalls. Rise and Shine Creek has steep tributaries and a boulder-strewn gorge. Historic gold workings created broader valleys with accumulated sediment that support the largest wetlands (approximately 2 hectares), including areas with threatened sedge species from sluicing activities.

6. REHABILITATION APPROACH

6.1. Implementation Strategy

Rehabilitation is designed to establish a sustainable vegetation mosaic through natural establishment from seed spreading from conventionally planted 'nodes', enriched MRZs and enhanced areas of the ‘contingency zone’ that are immediately adjacent to stripped areas. Surface rock and deep root zones are re-established into mined areas and fire buffers underpin the mosaic. This approach responds to key environmental influences, refined through ongoing ecological surveys and applied research on cushionfields and spring annual herbs. Areas on Ardgour Terraces will largely be returned to dense pasture species on ploughable soils to enable ongoing intensive agricultural use.

The MRZs will strengthen existing native vegetation with targeted historic ecosystem components, prioritising indigenous outcomes and building resilience to fire and drought. This is delivered by comprehensive plant pest and browser management, strategic planting and plant establishment programs, targeted habitat creation and integrated fire protection strategies as core management approaches. This will enhance opportunities for expanded areas of native vegetation and habitats within LMUs as part of closure. There is no single, historic "pre-degradation state" that is suitable as a target for rehabilitated areas under a future of increased drought stress.

6.2. Landform Design

The topography and surface treatments of engineered features support their effective integration into the natural landscape and rehabilitation. Geotechnically-stable, natural slopes are mimicked and linear landforms avoided (except in open pits). Natural refugia are mimicked to reduce climatic stress: spot mounding, ripping, and scalloping are used to create undulating surfaces; localised areas of deep root zones interact with these to create localised areas with higher water storage; rock stacks and rubble pits replicate natural rock tor functions. These rock structures are designed to provide winter refuges for wildlife while creating microsites with higher moisture, shelter and plant diversity.

7. REHABILITATION OBJECTIVES

7.1. Overall Landscape Objectives

The rehabilitation strategy is guided by the following overarching landscape objectives that include public access:

- Recognise and protect backdrop and skyline integrity when shaping mine elements within the context of an ONL
- Ensure rehabilitated and closure landforms (including rock stacks) remain responsive to the underlying ONL context
- Create safe, stable engineered landforms with high erosion resistance
- Address heritage place loss through maintaining public vehicle access over Dunstan mountains during and following mining via Ardgour Rise Road (replacing Thomson Gorge Road)
- Identify and respond to cultural values including mana whenua
- Provide for waterway ecological and instream values
- Reinstate public recreation access to Rise and Shine Creek valley and through the natural low point of Thomson Saddle at closure for walking.

7.2. Rehabilitation objectives

The rehabilitation strategy is guided by the following overarching rehabilitation objectives:

- Create landforms and land covers that reflect coarse, heterogeneous mosaics characteristic of native-dominated Central Otago ecosystems
- Enhance ecological values and resilience across MRZ
- Support native plants, invertebrates, birds and lizards, including nationally threatened, at-risk, or socially/culturally important species.

Rehabilitation includes objectives for the establishment and maintenance of infrastructure:

- Retain or repurpose selected built infrastructure post-mining where beneficial (such as parts of gravel pits and plant areas which do not detract from the underlying landscape)
- Maintain or establish light-vehicle tracks for ongoing ecological management
- Provide truck access, storage, and turn-around areas for decades until water treatment facilities and passive wetlands are decommissioned.

7.3. Post-mining Land Uses

Ecological conservation will be established as the primary and dominant post-mining land use within the DDF and adjacent MRZs. Sheep grazing in these areas will be limited to that required to support ecological values, and this will be primarily areas managed for cushionfield and spring annual herb conservation. No cattle, horse, or deer grazing will occur throughout the BOGP site Mine Regeneration Zones (MRZ). Defined existing agricultural areas on Ardgour Terraces will be returned to conditions that support continued agricultural use, including intensive crop production.

7.4. Regulatory compliance

The rehabilitation strategy is guided by the following overarching regulatory compliance objectives:

- Meet all rehabilitation requirements specified in proposed consent approval conditions for the BOGP project
- Integrate rehabilitation with mining operations across RAS, CIT, and SRX Pits, and ELFs, the TSF, and road and water course construction areas
- Implement a staged rehabilitation plan throughout the project duration.

8. IMPLEMENTATION TIMELINE AND SEQUENCING

8.1. Sequential Implementation

Effective rehabilitation outcomes require careful sequencing aligned with mining phases. The quality of closure outcomes is strongly influenced by actions in the early stages of mining, including the quality and quantity of materials salvaged and stored, the sharpness of stripped area edges, native dominance and diversity in adjacent areas, and the extent of stripped footprint. Rehabilitation of the BOGP will be undertaken throughout the following stages:

Phase 1 (Years 0-1) - Initial Startup

Establish mine infrastructure, construction camp, process plant and TSF embankment. Critical early activities include identifying permanent edges to avoid high-value species impacts, enriching areas along those permanent edges (with tussock and rock), initial plant pest control, salvaging high-value vegetation (as live direct transfer and as dead material), and stockpiling vegetation with soils, as rocks and overburden suitable for root zones ('brown rock). The Western ELF will be completed as the first major rehabilitation area with suitable slopes for cushionfield and spring annual herb trials. The Western ELF will also be used to establish rock stacks, rock pits, and associated planting which will then be monitored to assess natural development. At least 1 ha of wetland vegetation communities from Shepherds Creek will be transferred to create permanent wetland (e.g. Ardgour Terrace wetland) and at least 25,000 tussocks transferred to live storage for replanting on rehabilitated surfaces. Permanent and temporary stream diversions and sediment treatment ponds will be constructed, with permanent diversions enhanced for aquatic invertebrate values, including enriching adjacent undisturbed edges with translocated rock, tussock and sedges at the time diversions are constructed.

Phase 2 (Years 1-10) - Main Mining

Complete RAS and SRX pits with progressive rehabilitation of pit edges and available final landforms on Shepherds ELF and SRX ELF as they become available. Complete CIT if conditions related to cushionfield and spring annual herbs are met. The temporary Site Workers Camp will be dismantled and reinstated to productive pasture during this phase. Most of the enrichment planting and regeneration of MRZs occurs during this phase to develop the diverse, native dominant ecosystems wrapping around the mined areas. This phase focuses on maintaining rehabilitation momentum while active mining continues, tracking the quality and quantity of rehabilitation resources in stockpiles to ensure adequacy for closure, monitoring development of early rehabilitation to optimise

techniques used in final closure, and monitoring regeneration in MRZ to ensure meeting closure conditions.

Phase 3 (Years 10-30) - Final Closure

Implement the final closure sequence with the largest areas of rehabilitation occurring on TSF, Shepherds ELF, main haul roads, RAS and SRX pit haul roads and associated stockpiles. Substantial areas of final landforms cannot be completed until tailings deposition stops and workshop facilities on Shepherds ELF are decommissioned. This phase represents the most intensive rehabilitation period.

8.2. Critical Implementation Requirements

- **Infrastructure Development:** Light vehicle access roads, wetlands and tussock storage areas, soil and rock storage areas, Ardgour Terrace wetland base, nursery hardening-off facilities, and biosecurity treatment areas
- **Environmental Management:** Seepage and sediment capture, water treatment, erosion control, dust control, hydroseeding required areas, and artificial light controls
- **Ecological Preparation:** High-resolution mapping of cushionfield and taramea areas, specific plant pest removal or soil quarantining and fauna salvage prior to stripping, resource salvage and storage systems
- **Ongoing Management:** Mammalian pest management, pest plant identification and control, reticulated stock water supply installation and maintenance for areas that may be grazed with sheep.

8.3. Climate and Adaptive Management

The harsh climate with unpredictable spring/early summer drought and cold severity will likely result in years with lower planting survival (dry years) and higher pasture competition (wet years). Rehabilitation management in the MRZ will commence outside the mine footprint during operation and continue for minimum 20 years after mining completion, with total approval duration of 35 years. This extended timeframe allows for ‘waves’ of planting and adaptive management. Since the program includes components completed early, some rehabilitation measures should meet closure standards during mining operations or shortly after mining ends. This includes Ardgour Terrace and Shepherds Gully wetlands, pasture on Ardgour Terraces, parts of MRZs, Western ELF.

9. VISUAL AMENITY AND LANDSCAPE INTEGRATION

9.1. Visual Context

A key rehabilitation outcome is reintegrating mining activity within a coherent natural mountain backdrop as viewed from surrounding public and private viewpoints. During operations, aspects of both CIT and RAS pits and associated overburden will be visible from parts of the Upper Clutha Basin, typically against Battery Hill's skyline. The nature of available views is set out in detail within the Assessment of Natural Character, Landscape and Visual Effects (Boffa Miskell, 2025).

9.2. Progressive Visual Mitigation

Landscape mitigation has been undertaken in two stages. Project shaping has included influencing the location of mine elements in response to the underlying landscape characteristics and values. This has included maintaining the locally distinctive skyline associated with the Dunstan Mountains, including the local form of Battery Hill, and reinstating Thomson Gorge Road as a walking track through Thomsons Saddle.

Secondary mitigation measures have been adopted to ensure mine elements are progressively mitigated within the surrounding rehabilitated landscape context. The Western ELF will be completed during initial mining and immediately rehabilitated, commencing with hydroseeding. This will require input from landscape architects, including in the location of rock stacks on this landform. Temporary stockpiles below Battery Hill and parts of the Shepherds ELF will be visible along the skyline until rehabilitation reduces visual impacts. The Process Plant, SRX and TSF remain contained within the folded landform west of Thomsons Saddle, where rehabilitation emphasizes ecological functions within permanent modifications during mine closure. Conversely, the edges of RAS and SRX Pit high walls will be treated to assist with integration within the surrounding landform and reinforced vegetated context.

9.3. Landscape Integration Strategy

Landform rehabilitation focuses on areas where visible mining activity could create adverse visual impacts in the context of more extensive ecological rehabilitation and reinstated recreation access. Final landforms will be contoured to integrate with the existing landscape character, responding to the natural transition between the south and north Dunstan Mountains while maintaining the integrity of characteristic skylines and ridgelines. This means rehabilitated engineered landforms will avoid benching and minimise the extent to which permanent highwalls will remain visible in the context of an enduring broader visible mountain backdrop. Landscape integration is also delivered by enhancing diversity of plant community and structural diversity across the

otherwise uniform TSF seen in the context of the broader MRZs. Varying the depth of root zone capping, creating swales and creating wetlands enables shrubland, wetland and tussockland to be established across the TSF. Linear features such as the TSF embankment and haul roads will also be disrupted during rehabilitation using variable backfill and root zones.

10. REHABILITATION PRINCIPLES

10.1. Overview

The LERMP responds to landscape and ecological assessments while considering the broader Dunstan Mountains ONL context and its specific ecological values. Its aim is to create resilient native ecosystems, not to restore current or historic past conditions. After 150 years of farming and mining with introduced mammals altering vegetation, ecosystems have fundamentally changed to a range of currently degraded states. Mining is being used as an opportunity to enhance unmined areas and rehabilitate mined zones by: gradually replacing non-native pasture grasses and herbs with native vegetation site-wide; enriching native plant species diversity and structural diversity combined with browser control to allow use of palatable species; removing invasive species in targeted areas; enhancing resilience to fire; and strengthening connectivity between areas managed for native biodiversity around the mined areas. The project will remove cushionfields and threatened spring annual herbs for which rehabilitation techniques are untested and speculative. These techniques will be developed in an Applied Research Plan for cushionfields and spring annual herbs.

10.1.1. Implementation Timeline

This document guides development of detailed final site rehabilitation plans, specifying procedures to maintain and enhance landscape values while preserving natural character. Success depends on immediate actions during mining and stripping, in particular: the quality and quantity of salvaged materials, the precision of boundaries with high-quality native seed sources, native species preservation, and minimizing the disturbance footprint. Actions in the first two years of project development will impact overall rehabilitation success.

Rehabilitation in the DDF begins when final landforms are available, starting with stream diversions, enhancement of permanent edges, and construction of Ardgour Terrace wetland with at least 0.5 ha of salvaged wetland. The Western ELF completes in years 2-3 at which point rehabilitation of this area can commence, with additional large areas able to be rehabilitated following SRX mining completion. MRZ enhancement runs throughout the approval period with most enrichment planting and intensive plant pest interventions in the first 10 years (i.e., during active mining when DDF planting is low), but this may be ongoing in some areas depending on success of outcomes. Most rehabilitation in the DDF occurs post-mining, culminating with the TSF and stockpile areas. The Foundation phase (Years 0-2) establishes systems and infrastructure, followed by Main Implementation (Years 2-10) to rehabilitate most mined areas, and Completion and Monitoring (Years 10-30) for long-term management and monitoring.

10.1.2. Management Complexity and Key Challenges

This management plan covers a portion of the BOGP site and complements other management plans that guide activities across different areas of the site. These include the Ardgour Restoration Area Management Plan (managing restoration across most of Ardgour Station) and the Matakanui Sanctuary Management Plan (setting out the management of two predator-proof sanctuaries; one on Ardgour station and one on Bendigo Station).

This management plan establishes the strategic framework and required outcomes for terrestrial ecological management for the area it covers, providing methodologies for physical rehabilitation activities and detailing the overarching conservation direction for the area.

The plan operates in conjunction with several specialised management plans that address specific threats and species groups. Invasive species control is managed through the Mammalian Pest Management Plan (MPMP) and Biosecurity and Pest Plant Management Plan (BPPMP), which implement coordinated measures for mammal and plant pest species respectively, ensuring alignment with the broader conservation and rehabilitation objectives.

Species-specific protection is addressed through targeted management plans. The Lizard Management Plan (LMP) and Terrestrial Invertebrate Management Plan (TIMP) detail measures to avoid or minimise effects on indigenous lizards and terrestrial invertebrates through salvaging and relocation operations. The Avifauna Management Plan (AMP) focuses on protecting indigenous birds, particularly through avoiding active nesting sites during operations.

Supporting these species-focused plans, the Habitat Impact Management Plan (HIMP) and the Applied Research Plan for Cushionfields and Spring Annual herbs (ARP). The HIMP provides measures to minimise vegetation impacts through salvaging operations and serves as the central reference for effects management during vegetation clearance activities. The ARP establishes a research and monitoring framework to improve cushionfield ecosystems and create new cushionfield and kōwhai shrubland areas in managed and mined landscapes. Results from this program will inform LERMP processes and practices to achieve optimal outcomes for cushionfield and spring annual herb populations in rehabilitated areas.

Monitoring and adaptive management are addressed through the Biodiversity Outcome Monitoring Plan (BOMP), which establishes the monitoring framework and contingency measures to ensure that stated ecological outcomes for rehabilitation, offset and compensation of terrestrial ecology values are achieved.

While this plan describes specific outcomes for wetland areas within the terrestrial management scope, freshwater ecological management is principally addressed through the separate Freshwater Ecology Management Plan.

Different Land Management Units (LMUs) require tailored approaches since each LMU contains multiple vegetation types and management will enhance some species but negatively impact others. Removing browsing mammals (stock, deer, goats, possums, pigs, hares, most rabbits) enables native plant and invertebrates to regenerate and also allows establishment and growth woody plant pests (brier, gorse, willow, poplar) and competing pasture species. Where browsing mammals are removed (specifics of this is described in the MPMP), short-stature plants that are currently present as minor components will likely be supressed / shaded out by taller native and non-native plants and area of bare ground will reduce, impacting species that use these habitats.

Some ecosystems like Raoulia-dominated cushionfields and spring annual herbs may not be able to be fully rehabilitated (as there have been few attempts to rehabilitate them and techniques need to be developed. Both cushionfields and spring annua herbs appear to be maintained in areas that have not been cultivated and have had minimal fertiliser and/or pasture oversowing combined with by rabbit browsing and/or sheep grazing, which together slow woody plant and tussock establishment. However, mammalian grazing degrades other native plant communities by removing palatable species, limiting recruitment (seedlings are often more palatable), reducing mature biomass and physically damaging soil (especially in wetlands, seepages and stock camps). Applying different managements across LMUs is designed to enhance overall landscape ecological values at a scale that is practical to manage using sheep grazing.

10.1.3. Climate Considerations

The harsh climate, especially unpredictable spring/early summer drought variability, will create years with poor planting survival (dry years) and increased pasture competition (wet years). The rehabilitation response to this is to establish rehabilitation with deep, variable root zones and with many sheltered pockets that include rock stacks. This surface will be stabilised using a low rate of non-native grasses. Relatively small ‘nodes’ of native plants established in the most favourable sites. These nodes and the adjacent MRZs will provide seeds that will establish in years with favourable conditions. Planting density/diversity or control of competing vegetation will be increased if the natural spread in rehabilitated areas is not fast enough. This approach is based on rehabilitation management beginning outside the mine footprint during operations and continuing for minimum 20 years after mining completion and throughout the 35-year approval duration.

The following principles guide how we achieve our rehabilitation objectives while balancing practical mining needs, safety requirements, and ecological goals.

10.2. Core Principles

10.2.1. Minimise Impacts

Goal: Minimise the mine footprint while protecting adjacent areas from indirect impacts like dust, sediment, noise, vibration, and artificial lighting that degrade and disrupt wildlife and ecosystems.

What this means:

- Minimise the mine footprint that gets stripped of plants and soil or covered over
- Reduce edge effects like dust, sediment, light and vibration
- Prioritise biodiversity for avoidance that has:
  - Highest threat-ranking plant species (e.g., spring annual herbs)
  - Highest value ecosystems (e.g., cushionfields)
  - Lowest re-establishment potential / highest uncertainty (e.g., spring annuals, seepages)
  - Greatest age (e.g., kowhai trees, large-basal diameter shrubs)
  - High ecosystem values (e.g., rock outcrops, seepages)
  - High cultural values (e.g., taramea).

How to achieve it:

- Identify high value individuals and ecosystems in areas along the edges of cleared areas in the DDF in undisturbed ground (i.e. the Contingency Zone)
- Identify options to avoid or limit the footprint (e.g. rock abutments)
- Prioritise minimising disturbance footprint by steepening slopes over laying back slopes (which increases footprint)
- Focus protection on ecosystems and species that are hardest to replace.

10.2.2. Start Early

Goal: Begin rehabilitation actions in Year 1 of mining to establish the foundation for successful long-term rehabilitation outcomes.

Year 1 priorities are to:

- Establish MRZs
- Start weed control prioritising low-density, palatable species and edges

- Exclude stock and farm vehicles from defined areas
- Install edge protection for MRZs and in contingency zones to identify and avoid high-value plants and ecological features
- Enrich edges by transplanting tussocks and sedges and weathered rock into areas where there is non-native pasture species. Transplant taramea into suitable areas (as an inoculation and enrichment method for invertebrates, while not expecting survival of taramea)
- Take cuttings from the oldest individual in each kowhai cluster to provide at least 20 nursery seedlings from each cluster of kowhai that will be removed (i.e. up to 12 kowhai trees total)
- Translocate (direct transfer) at least 0.5ha of wetlands to Ardgour Terrace wetland and establish the riparian zone on either side of the gully (Appendix D).
- Construct permanent and temporary stream diversions with permanent diversions specifically treated to enhance aquatic invertebrate values
- Salvage, stockpile and protect high quality soil, resource and reuse material, segregating soils that contain long-lived plant pests such as gorse to Ardgour Terrace quarantine zone and salvage surface soil containing spring annual herbs for propagation/research.

10.2.3. Create Safe and Stable Landforms

Goal: Build safe, stable landforms that protect people, livestock, and farm equipment and create surfaces that are resistant to wind and water erosion.

Safety considerations:

- Manage highwall risks near public access areas
- Ensure safety for stock and farm vehicles in potentially grazed areas
- Create stable surfaces resistant to wind and water erosion
- Restrict access to pit lakes by vehicles, people and stock
- Prevent access beyond mine portal (i.e. no underground access)
- Ensure ongoing stability of diversions.

Design approach:

- CIT pit, if mined, will be completely backfilled to near-natural landforms
- Some uppermost SRX areas may be 'laid back' to more gentle slopes to enable dense shrubland and tussocks by allowing a placement of a root zone
- Strategic root zone placement on edge of haul roads bases where adjacent cuts are >3 m height

- At least 20m of pit benches adjacent to natural ground provided with root zone that will support shrubland and tussocks (Appendix D, Figure D-1)
- Establish riparian and emergent vegetation across the predicted intersection of haul road and pit lake in RAS and SRX, using boulders to limit vehicle access and enhance riparian and aquatic ecosystem values
- Exclude cattle from mined areas including stream diversions in perpetuity
- Prevent establishment of tall trees on TSF and ELFs in perpetuity (e.g. willows).

10.2.4. Create Diverse, Natural-Looking Surfaces

Goal: Create rehabilitated landscapes that mimic natural terrain through heterogeneous landforms with varied slopes, aspects, micro-topography and growing conditions

How to create heterogeneous surfaces:

- Develop varied slopes, micro-topography, aspects and root zone depths to support native vegetation, to infiltrate rain and thereby minimise erosion risk. Root zones are detailed in Appendix D
- Ensure minimum rock cover and construct >500 rock stacks and >100 rubble pits (detailed in Appendix C)
- Establish nodes of native vegetation as soon as possible after final surfaces are present targeting rock stacks, rubble pits and favourable microsites (detailed in Appendices C and E)
- Remove non-native tree species site-wide, including from TSF and ELFs, to minimise treefall risk and capping exposure while maximising ecological values
- Ensure suitable hydrology in rehabilitated wetlands.

How to deliver natural landforms:

- Prioritise high public visibility areas (CIT pit, ELFs) for backfill and creation of natural forms to minimise impacts
- Break up and disrupt extensive linear features like roads and stockpiles and avoid permanent terracing on ELFs
- Cover outer 20 m (minimum) of pit benches to enable plant growth
- Minimise uniform slope areas by creating varied aspects and root zone depths.
- Place rock stacks and rubble pits in consultation with landscape architect to deliver natural appearance
- Establish coarse, heterogeneous mosaics of native vegetation associations across ELFs, TSF and decommissioned infrastructure.

Exception: This objective excludes permanent pit lakes and benched pit landforms. North and west-facing RAS pit walls will develop very sparse vegetation very slowly. This objective also excludes gravel pits within the Ardgour Terrace agricultural area.

10.2.5. Protect, Enhance and Re-Establish Ecological Values

Goal: Work within mine plan, schedule, and safety requirements to enhance ecological values where this can be achieved or provide offset or compensation for effects on native plants, invertebrates, birds and lizards.

Target improvements:

- Where possible enhance ecological values overall for native plants, invertebrates, birds and lizards
- Include functionally absent plants (e.g., palatable species with little recruitment under current management and/or that are now absent or in very low densities, threatened and at-risk species, snow tussock), and taramea (high cultural importance)
- Include species that reinstate key ecological functions such as structural diversity (vines and emergent trees) and nectar/pollen (taramea and olearias)
- Salvage and translocate tussock to 'inoculate' mined areas.

How to protect and enhance through MRZ:

- Establish MRZs around project north, south and east margins
- Enhance MRZs through pest plant and mammalian pest control and targeted native species planting
- Permanently exclude stock from key areas (MRZ A and B3) including seepage headwaters, streams and riparian zones
- Manage grazing timing and intensity in MRZ B1 and B2 to support cushionfields and spring annual herbs
- Stop over sowing and top dressing with fertiliser.

Management priorities for each MRZ are summarised in Appendix A.

Exception: Spring annual herbs and cushionfields require ongoing research through Applied Research Plans.

How to re-establish ecological values in mined areas:

- Salvage and conserve plants and soil stripped from mined areas, so they are in good condition for re-use in rehabilitation. This includes small areas of direct

transfer (tussock and wetland), and larger areas of living soils and native plants at the surfaces of soil stockpiles. It includes also includes taramea

- Salvage wood and weathered rock stripped from mined areas
- Create suitable topographies, root zone depths and surfaces including rock placement, rock stack and rubble pit construction
- Use short-term erosion control with low rates of non-native grasses that have low competitiveness with native species
- Support native species expansion from initial plantings, including through control of competing non-native species
- Prevent invasion and/or spread of competing plant and animal species, and new non-native species through biosecurity controls (includes removing soils containing gorse to Ardgour terrace).

10.2.6. Conserve Local Genetic Resources

Goal: Salvage, protect, and for specific species enhance, local genetic resources to ensure that rehabilitated ecosystems maintain genetic characteristics of populations specifically adapted to Upper Clutha (i.e. 'local') conditions.

This approach ensures rehabilitated ecosystems maintain the genetic characteristics of local populations, except where local populations are depleted. It avoids introducing external genetic material that may not be adapted to local conditions.

What to salvage:

- Minimum proportions and diversity of specified native plants, wetlands and animals from stripped areas
- At-risk and threatened species (or equivalent), notably spring annuals as informed by the Cushionfields and spring annuals Applied Research Plan
- Species with low local genetic diversity, notably kowhai
- Species that can be successfully relocated including lizards, some tussocks and sedges
- Species likely to support threatened invertebrates in their leaves, stems or roots (taramea, native brooms, *Olearia bullata* and *Olearia odorata*). Only parts of plants may be salvaged (e.g. stem galls).

Sourcing policy:

- Only native plant species local to the Upper Clutha used for establishment (except erosion control species). Species are listed in Appendix E.

- Includes native species likely to have been naturally and historically present in the area (see Appendix B which describes vegetation successions).

10.2.7. Conserve Soils and Surface Rocks

Goal: Maximise the recovery and protection of valuable soils and rock materials. Soils include all materials that can be components of root zones: plants, topsoils, most subsoils, organic-enriched layers from current and historic wetlands, all surface (weathered) rock and boulders >0.5 m diameter and weathered brown rock.

Resource management:

- Strip upper soils (topsoils) together with vegetation in a way that maximises retention of structure (i.e. using back acters, not bull dozers). Transport this material in discrete truckloads and preferentially place on the surface of stockpiles. Ensure stockpiles are no greater than 1.5m in height
- Identify and avoid incorporating soils with gorse into general stockpiles
- Identify areas of wetland or organic-enriched soils and where practicable, stockpile in discrete areas at the edges of stockpiles or immediately use for wetland rehabilitation
- Salvage, strip and stockpile soils from SRX separately and do not use outside SRX valley (they may have elevated levels of arsenic and are to be managed in accordance with the Soil Management Plan)
- Manage stockpiles to protect soil quality and plant life, e.g. establishing and maintaining a vegetation cover, managing plant pests
- Maintain records of stockpile volumes by type and soil stockpile surface vegetation cover condition
- Immediately use fresh (not stockpiled) soils where possible for rehabilitation. This avoids double-handling and maximises quality of soils.

10.2.8. Enhance Resilience to Drought

Goal: Create drought-resilient landscapes that support native plant establishment and long-term survival under increasingly variable rainfall and drought-stress. (Appendix A, Table 8).

Water management techniques:

Use techniques that accentuate 'wetter' and 'drier' areas at fine scale and avoid large, smooth, homogeneous areas. These techniques include the following:

- Create rough, 'dimpled' or 'scalloped' topography and swales to slow, infiltrate and locally ‘harvest’ rainfall and snowfall

- Establish minimum areas of deep soil (1-3m rooting depth) through ripping, spot mounding, and soil replacement to provide for deep rooting depths (Appendix D)
- Establish rock stacks and rubble pits, and deliver rehabilitated surfaces with minimum rock cover, except for areas rehabilitated to high-producing pasture on Ardgour Terraces (Appendix C)
- Use organic-enriched soil for wetlands where possible and use organic mulches in key areas
- Install low-permeability sub-grades and/or other methods of creating hydrologies that support wetland and establish topographic variation and taller plants in adjacent areas to enhance shelter (to help reduce evaporation losses).

Planting strategy:

- Use nursery plants that are very well hardened-off, so they already have leaves and roots that are resistant to moisture stress
- Plant in self-sheltering clusters concentrating plants in the most favourable micro-sites
- Plant low overall densities of seedlings (~1500 plants/ha in mined areas)
- Keep fertility levels low initially to encourage deep root development
- Investigate amendments and establishment techniques that enhance resilience or can be applied after planting in years when drought stress is earlier than usual.

10.2.9. Enhance Resilience to Fire

Goal: Establish fire protection measures to safeguard native vegetation communities that are most vulnerable to fire damage and would take decades to recover if lost (Appendix A, Table A-1)

Fire buffer strategy:

- Create low-biomass fire buffers using grazing and/or rocky surfaces and/or cushionfields
- Strategically place fire buffers along ridgelines and roads, using cushionfields and permanent pit walls (SRX and RAS)
- Strategically protect shrubland/tussock areas retired from grazing
- Create and maintain a network of vehicle access tracks.

Specific fire management:

- Low-vegetation biomass strips for access through rehabilitated areas based on rehabilitated haul roads

- Special protection for kowhai areas and valley forest (very vulnerable to fire being slow growing and long-lived).

Fire break locations:

- Public tracks and roads (key risk areas)
- Strategic ridgeline positions

  Around high-value, slow-growing vegetation.

10.2.10. Control Pest Plants

Goal: Control and effectively eliminate reproducing non-native plant species that degrade native ecosystems to ensure successful rehabilitation outcomes, by MRZ.

Target species for elimination of reproductive plants:

- Gorse, broom, willow, poplar, buddleia, wilding conifers, thyme, sedums, non-native vines, male fern and bird dispersed plants throughout MRZ and DDF
- Maintain outcomes for project duration (at least 10 years post-closure)
- Control existing environmental and agricultural pest plants and exclude new pest plants
- Control non-native plants that degrade native ecosystems in soil stockpiles
- Deliver targeted pest plant control recommended by the Applied Research Plan for Cushionfields and spring annual herbs.

Management approach:

- Specific pest plant lists developed through Applied Research Plan for cushionfields and spring annual herbs for this ecosystem and these native species
- Evidence-informed management based on monitoring results
- Prevention of new pest plant establishment.

10.2.11. Use Evidence-informed Management

Goal: Enhance ecological values through systematic monitoring and research by using evidence-informed management of high-value ecosystems and individual management units.

Research components:

- Applied Research Plan for Cushionfields and Spring Annuals

- Optimisation of specific rehabilitation methods (e.g. rock stacks, rubble pits, invertebrate inoculation using salvaged taramea and native broom, tussock seeding using drilling and encapsulation, management of mammalian browsers).

Adaptive management:

- Record management practices and monitor outcomes in MRZs and DDF across shrubland, tussock, and taramea herbfield and adjust methods
- Assess outcomes against closure requirements
- Start with recommended techniques and low-risk, low regrets techniques
- Refine approaches based on results.

10.2.12. Achieve Closure Within 20 Years

Goal: Meet ecological closure criteria within realistic timeframes

Timeline expectations:

- MRZ closure criteria achieved within 20 years of mine start
- Rehabilitation criteria in stripped (mined areas) within 20 years of initial revegetation, i.e. by year 22 for Ardgour Terrace wetland and Western ELF and later for areas revegetated at mining end (TSF, parts of the Shepherd's ELF, associated stockpiles and plant area)
- TSF rehabilitation starts after tailings deposition finishes, allowing capping with brown rock and soil.

Success measures:

- Ecological criteria met within 20 years of initial revegetation treatment
- Self-sustaining native ecosystems established over most of the site (nearly all shrubland, tussock and taramea ecosystem) not requiring grazing by sheep
- Minimal ongoing (i.e. in perpetuity) intervention required. These interventions will include removal of tall trees from TSF and most ELFs in perpetuity, maintenance of fire buffers, and exclusion of cattle. Ongoing pest plant and mammalian pest management is required to maintain 'closure' ecological values.

11. MINE REHABILITATION ACTIONS

11.1. Overview

To facilitate rehabilitation plan implementation, the project area has been divided into LMU. The LMUs group together modified landforms (disturbed areas in the DDF) with common attributes and describe MRZ (undisturbed areas) to enable systematic rehabilitation and management approaches. Nearly all LMUs will be rehabilitated to a mosaic of up to four vegetation associations (and wetlands) based on modified pre-mining vegetation associations:

- Cushionfields (depending on the Applied Research Plan for Cushionfields outcomes)
- Tussock
- Grey shrubland
- Taramea shrubland.

Specific LMUs are rehabilitated to other outcomes, including Pit lakes, highwalls, wetlands and terraces currently in high-productivity pasture (construction camp and associated infrastructure).

Table 1 describes each landscape management unit, its current ecological state, primary use, key features and ecological state on closure. Table 2 sets out the key rehabilitation actions that will occur in each management unit, while Table 3 presents a risk management matrix for key rehabilitation risks in each LMU, including mitigation measures and contingency plans to deal with these risks should they arise. Table 4 shows the comprehensive success criteria and monitoring framework for each landscape management unit, defining measurable targets for vegetation establishment, habitat functionality, and infrastructure performance. The monitoring schedule ensures regular assessment of rehabilitation progress across all management units through systematic surveys and inspections. A detailed breakdown of the management actions to be undertaken within each LMU is set out in **Appendix A**.

Appendix B provides further context in relation to vegetation successions and target ecosystems. **Appendix C** sets out further detail relating to the methods for lizard habitat rehabilitation including figures showing a) the typical form and distribution of rock stacks and rubble pits which integrate within this landscape context and b) the treatment of highwalls and their buffer zones. **Appendix D** summarises the root zones for each unit with supporting figures; **Appendix E** provides information on vegetation associations and plant species used for revegetation in the DDF and MRZs. **Appendix F** provides a photographic summary of rehabilitation objectives and outcomes.

11.2. Management Actions Summary – Overview

Table 1: Landscape Management Unit Characteristics and Ecological Transitions.

Unit Code	Management Unit	Initial Habitat Area (ha)	Primary Objective	Timeline	Key Features
TSF	Tailings Storage Facility	75	Native vegetation establishment with large wetland. Ecosystems protect capping to prevent exposure of tailings. Landform integration.	Years 10-12	Tussock shrubland vegetation mosaic with 6ha wetlands, 0.5ha open water, 137 rock stacks above 1 in 10-year ponded area
ELF-S	Shepherds ELF	116	Landform Integration. Native revegetation and habitat enhancements. A fire break and long-term light vehicle access	Year 10-12	Vegetation mosaic with 212 rock stacks, 60 rubble pits and fire buffer across ridgeline
ELF-W	Western ELF	18	Landform Integration. Trial site for rehabilitation techniques	Years 2-3	Cushionfield and general rehabilitation trials, 33 rock stack and rubble pit refinement (min 10 rubble pits)
ELF-X	SRX-ELF	15.8	Landform Integration, Native revegetation and habitat enhancements	Years 8-12	Vegetation mosaic with 29 rock stacks and 8 rubble pits, taramea
PB	Pit Benching & Batters	92	Highwall vegetation establishment on benches at edges; rough surfaces	Years 1-8	Root zone wedges 0.1 to 4 m depth extend along benches ≥ 20 m from natural ground

Unit Code	Management Unit	Initial Habitat Area (ha)	Primary Objective	Timeline	Key Features
CT	CIT Pit (backfilled)	13.8	Landform integration. Spring annual herbs & cushionfield over minimum 4.5 ha, small patches of palatable species	Years 8-12	Native herbfield, specialized grazing, 25 rock stacks, 7 rubble pits: patches of kowhai, native broom
PL	Pit Lakes	18.1	Haul road vegetation establishment with riparian grey shrubland. Restrict human access	Years 8+	Emergent aquatic vegetation on haul road, kowhai patch. Boulder placement
S	Soil Stockpiles (Mine site)	24	Landform rehabilitation Native revegetation and habitat enhancements.	Throughout	Staged removal and rehabilitation, 44 rock stacks, 13 rubble pits
S-AT	Soil Stockpile - Ardgour Terraces	6.8	Agricultural restoration	Years 1-3	Agricultural production (tillable, homogenous soils) and infrastructure capability
HR	Haul Roads	50	Landform and native revegetation that disrupts linear form. Some fire breaks and long-term light vehicle access	Throughout	Light vehicle access; low biomass fire buffers; targeted deep spot mounding, root zone wedges against cuts >2 m height
C	Construction Camp & Ancillary	1.2	Site rehabilitation to agriculture, with Ardgour Terrace wetland and riparian strip in gully	Years 4-10	Complete removal and restoration to support productive, tillable pasture

Unit Code	Management Unit	Initial Habitat Area (ha)	Primary Objective	Timeline	Key Features
P	Process Plant Mine Infrastructure	4.3	Mixed rehabilitation with small wetlands, small forest, water treatment plant and truck access/turnaround	Years 10+	Area of wetland, 0.5 ha trees in deep soils, enable water treatment infrastructure
AR	Ardgour Rise Alignment	Variable	Alternative vehicle access to Thomson Saddle	Years 1-2	Vehicle Access Rehabilitated fill batters
TGT	Thompson Gorge Recreation Track	Variable	Historic connection through Dunstan Mountains	Years 10-12	Walking access, revegetation enhances safety and minimises fire risk
QU	Quarries, Magazine & Emulsion	6.56	Agricultural/infrastructure restoration	Years 1-5	Gravel pit development, magazine restoration
W	Wetlands	7	Wetland ecosystem establishment; conservation of wetland species as >0.5 ha direct transfer (* sites)	Years 1-30	TSF wetlands, Ardgour Terrace*, Lower Shepherds* and Process Plant wetlands
D	Clean Water Diversion Channels	Variable	Water management. Aquatic and riparian habitat creation for permanent diversions. Terrestrial vegetation for temporary diversions	Throughout	Permanent access along some diversions, habitat enhancement
Mine Regeneration Zones					

Unit Code	Management Unit	Initial Habitat Area (ha)	Primary Objective	Timeline	Key Features
MRZ-A	Mine Regeneration Zone A	434	Native regeneration & connectivity, taramea enhancement	Years 1-35	Stock exclusion, snow tussock planting, taramea expansion
MRZ-B1	Mine Regeneration Zone B1	69	Cushionfield & spring annual protection, kowhai patches	Years 1-35	Controlled grazing, species protection
MRZ-B2	Mine Regeneration Zone B2	30	Buffer to MRZ-B1 cushionfields. Shrubland and tussock expansion and enhancement, kowhai patches	Years 1-35	Controlled grazing, enrichment planting, plant pest and competition management
MRZ-B3	Mine Regeneration Zone B3	357	Taramea, tussock and shrubland expansion and enhancement, kowhai patches	Years 1-35	Browse control then exclusion, enrichment planting, plant pest and competition management

Appendix A sets out the actions required for each Landscape Management Unit in more detail. Cushionfield and spring annual herb rehabilitation is described in the Applied Research Plan (Simcock and Brownstein 2025).

11.3. Key Actions by Management Unit

Table 2: Key Rehabilitation Actions by Management Unit.

Unit	Infrastructure Actions	Vegetation Actions	Habitat Enhancement	Water Management
TSF	Install ≥1.2 m protective cap Build embankment access track and naturalise form Install outlet infrastructure and 'break' diversion drains	Temporary erosion control Hydroseed Plant wetlands at 7,500 plants/ha Plant swales and bunds 1,500 plants/ha Remove non-native trees	Build 137 rock stacks above inundation level Create swale/bund topography (additional depth on bunds) Establish tussock clusters	Create ≥2ha permanent wetland Build ≥4ha ephemeral wetland Maintain ≥0.5ha open water patches (a mosaic) Install engineered outlet Bring water from diversion drains onto TSF
ELF-S	Shape final landforms, scallop, apply 1-2 m brown rock, then 10 to 50 cm soil Remove linear terracing Create access roads, fire buffer Install drainage systems	Temporary erosion control-hydroseed Plant native nursery stock at 1500 plants/ha in clusters Transplant salvaged tussocks Establish shrubland mosaic	Create 25 to 50% deep root zones Build 212 rock stacks Create 60 rubble pits Deliver ≥5% rock cover Create fire buffer zones	Build permanent diversion Create riffle and pool sequences Install riparian planting and salvage from adjacent areas Design low flow and high flow habitat features

Unit	Infrastructure Actions	Vegetation Actions	Habitat Enhancement	Water Management
ELF-W	Complete landform by year 2 Install trial infrastructure Refine root zone construction methods	Hydroseed Trial plant establishment techniques Apply RAP Cushionfields Monitor establishment rates Monitor growth and spread	Build 33 trial rock stacks (refine technique) Create 10 trial rubble pits (refine technique) Monitor lizard colonization Monitor use of habitats	Refine erosion control methods Monitor drainage patterns Assess water retention Refine design approaches
ELF-X	Complete landform integration by year 12	Hydroseed Vegetation mosaic including taramea	Build 29 rock stacks Create 8 rubble pits	Manage surface water flows to minimise erosion
PB	Place root zone wedges Treat upper benches Install bench edge treatments Develop access systems	Hydroseed Enhance edge vegetation Reduce edge plant pests Enhance bench revegetation Monitor natural colonization	Enhance edge habitat with strategic rocks Enhance edge connectivity	Manage surface water flows Manage flows in in-pit diversions Enhance habitat in permanent in-pit diversions
CT (if mined)	Backfill pit	Spring annual herbs & cushionfield focus	Build 25 rock stacks Create 7 rubble pits	Manage surface water flows to minimise erosion

Unit	Infrastructure Actions	Vegetation Actions	Habitat Enhancement	Water Management
	Landform integration by year 12			
HR	Break linear features Scarify cut faces Place root zone wedges against cuts >2m, deconstruct bunds Create access roads, fire buffer Rip or spot mound >0.5 m depth except permanent tracks, spread root zone	Hydroseed Enhance edge vegetation and plant long-term bunds Reduce edge plant pests Move parts of bunds with plants and root zone, plant native nursery stock and establish seed germination zones	Deliver ≥5% rock cover	Manage surface water flows to locally concentrate and infiltrate water in ways that maintain surface stability and assist vegetation establishment. Remove culverts where practical and replace with fords
PL	Place boulders within lake edge along haul road and on haul road Place root zone on haul road using wedges Exclude vehicles	Hydroseed Plant above lake level along haul road Establish kowhai, grey scrub	Install boulders across lake edge in clusters ensuring part of the submerged boulders will emerge above the water	Manage surface water flows (pit walls and haul road) Minimise lake edge erosion

Unit	Infrastructure Actions	Vegetation Actions	Habitat Enhancement	Water Management
S	Restore original landform contours that are stable Re-establish drainage Rip or spot mound stockpile base Scallop surface and spread root zone	Temporary erosion control Hydroseed Plant native nursery stock at 1500 plants/ha in clusters Establish vegetation mosaic that complements adjacent areas	Build 44 rock stacks Create 13 rubble pits Deliver ≥5% rock cover	Manage surface water flows to minimise erosion Reinstate ephemeral watercourses and seepages Use armouring where necessary
C, QU	Remove hard infrastructure Maintain culverts or convert to fords Shape final landforms, ensure suitable drainage Spread root zone or gravel Fence riparian zone	Enhance soil stockpile quality Establish dense pasture or cereal cover Minimise agricultural plant pests Establish riparian zone planting	Establish riparian zone to wetland Establish kowhai in riparian zone	Manage runoff quality and quality from roads, hardstand Minimise risk of upstream erosion and manage hydrology within Ardgour Terrace wetland Enhance resilience of unfenced watercourse sections
MRZ-A	Install stock-proof boundary fencing Build maintenance access	Control targeted plant pests Enhance plant species diversity	Enhance habitat structure and leaf litter habitats Create habitat corridors	Enhance riparian zones Exclude stock

Unit	Infrastructure Actions	Vegetation Actions	Habitat Enhancement	Water Management
	Establish fire breaks	Control pest browsers Establish snow tussock Expand taramea	Increase plant species hosting threatened invertebrates Monitor fauna response	Enhance degraded seepage zones
MRZ-B1	Install stock fencing Build stock watering system (troughs) Install rabbit exclosures Establish access tracks	Control targeted plant pests Control competing plant pests Protect, enhance cushionfields Manage grazing timing Enhance spring annuals Control pest browsers	Establish new high-value plants (seedlings) Protect high-value plants Increase cover and health of high-value plants Monitor threatened species	Stop stock water extraction Protect seepage areas from stock Enhance degraded seepage zones Enhance natural stream flow

Unit	Infrastructure Actions	Vegetation Actions	Habitat Enhancement	Water Management
MRZ-B2	Install boundary fencing Create internal subdivisions if necessary Create kowhai enclosures Build stock watering system Maintain access routes Establish fire breaks	Control targeted plant pests Protect, enhance cushionfields Enhance plant species diversity (enrichment planting) Control competing plant pests Manage grazing intensity Protect remnant kowhai Control pest browsers	Enhance rock features Establish kowhai Enhance habitat connectivity Monitor lizard populations Increase plant species hosting threatened invertebrates	Protect riparian zones Enhance degraded seepage zones
MRZ-B3	Install boundary fencing Install temporary stock water supply (for sheep) Build maintenance access Establish fire breaks	Control targeted plant pests Control competing plant pests Protect, enhance remnant kowhai and taramea Enhance plant species diversity Control pest browsers	Create habitat corridors Enhance rock features Establish kowhai in exclosures Increase plant species hosting threatened invertebrates Monitor fauna response	Protect Jean Creek headwaters Enhance wetland areas Control, then exclude stock Improve aquatic habitat

11.4. Risk Management Matrix

Table 3: Risk Management Matrix for Key Rehabilitation Risks by LMU.

Unit	High Priority Risks	Medium Priority Risks	Mitigation Measures	Contingency Plans
TSF, W	Material supply shortfalls Wetland hydrology Vegetation salvage failures	Access track erosion Surface flooding Pest plant and invasive tree establishment	Volume tracking systems Water balance modelling Early salvage scheduling Regular monitoring	Alternative material sources Supplementary irrigation Nursery backup plants Outlet modifications
ELFS. HR, S, P, CT	Landform contouring inadequacy Root zone inadequacy Plant establishment failure	Erosion control failure Fire risks Climate change effects	Design approval processes Root zone standards and approvals before planting Multi-layer erosion control Regular inspections	Landform modifications Additional soil placement Enhanced surface treatments Sediment capture systems
MRZs	Grazing management failures Plant pest control challenges Mining-related damage	Exclosure fence breaches Damage by road users New plant pest establishment Fire	Adaptive grazing protocols Integrated plant pest management Dust and sediment controls	Alternative grazing regimes Enhanced plant pest control Enhanced protection measures Remedial planting/seeding

Unit	High Priority Risks	Medium Priority Risks	Mitigation Measures	Contingency Plans
			Regular monitoring with triggers for intervention	
PB	Inadequate root zone placement In adequate roughness of pit surfaces Coordination protocols Stream diversion failure	Degraded natural edges Surface re-treatment impractical Slumping of pit benches	Additional root zone placement Natural edge (re) treatment Develop a range of surface treatment and vegetation establishment methods Protective barrier installation Emergency stream management	Construction monitoring Surface assessments Quarterly vegetation surveys Continuous stream monitoring

Detail of management risks per Landscape Management Unit is included in **Appendix A.**

11.5. Success Criteria & Monitoring

Table 4: Success Criteria and Monitoring Framework by Landscape Management Unit.

Unit	Vegetation Success Criteria	Habitat Success Criteria	Infrastructure Success Criteria	Monitoring Schedule
TSF	≥75% planted seedling survival at 3 years and active growth ≥66% native wetland vegetation cover with target threatened species established Native species dominance Minimal invasive plant species; pest plant covers diminishing	≥137 functional rock stacks ≥2ha permanent wetland, 0.5 ha open water at spring maxima as a mosaic ≥4ha ephemeral wetland Lizard colonization evidence (tussock skink and gecko)	Capping integrity maintained Outlet functionality confirmed Access track, fords and diversion drains stable Embankment stability	Annual vegetation surveys Quarterly water monitoring Bi-annual lizard surveys Monthly infrastructure checks
ELF-S	>75% planted seedlings survival at age 3 years and active growth ≥20% native plant cover by year 10 Vegetation mosaic established and tussock nodes expanding by year 10 Minimal erosion occurrence	≥212 rock stacks functional ≥60 rubble pits occupied Wildlife corridor established Habitat mosaic established with variation in native vegetation structure and dominant species	Landform stability maintained Drainage system functional Visual integration achieved Fire buffer effective	Annual vegetation monitoring Seasonal erosion surveys Bi-annual fauna surveys Quarterly infrastructure inspections

Unit	Vegetation Success Criteria	Habitat Success Criteria	Infrastructure Success Criteria	Monitoring Schedule
	Species diversity targets met			
MRZ-B1	Expansion of cushionfield area Enhanced cushionfield condition Increase in spring annual populations and individuals Elimination of reproductive brier	Regeneration of *Pimelea aridula* and native brooms in exclosures Natural recruitment of kowhai seedlings in exclosures containing adult trees and active growth of planted kowhai within 5 years	Fence integrity maintained Stock water system functional	Plant monitoring determined by ARP Cushionfields Quarterly infrastructure checks
MRZ-B2	Cushionfield area maintained Spring annual population stable Forms an effective buffer for Cushionfields No expansion of brier Minimal invasive plant species; pest plant covers diminishing Reduction in pasture cover	Enhanced native plant species diversity Enhanced plant structure in scrub areas with vines Threatened lizard species populations enhanced	Fence integrity maintained Water system functionality Access track condition maintained Grazing infrastructure effective	Two-yearly plant surveys Bi-annual threatened species counts Monthly grazing assessments Quarterly infrastructure checks

Unit	Vegetation Success Criteria	Habitat Success Criteria	Infrastructure Success Criteria	Monitoring Schedule
	Target plant species naturally recruiting			
MRZ-B3	Increase in cover and structural diversity of native-dominated vegetation associations. Increase in native woody plant with active growth of planted nursery seedlings, including all threatened species (exceeding targets for each species in Appendix G) Reduction in pasture cover Minimal invasive plant species; pest plant covers diminishing and <5%	Connectivity established across areas that were dominated by pasture Planted kowhai thriving with minimal evidence of mammalian browse Taramea recruitment observed within 5 years, >5% increase in taramea area within 10 years	Fire buffers and access track condition maintained. Public access tracks and gates meet required standards	Two-yearly plant surveys Bi-annual planted threatened species counts Quarterly infrastructure checks
MRZ-A	As for MRZ B3 and Over 5000 snow tussock established in nodes over at least 5 ha with long-lived woody trees; natural recruitment of	Connectivity established across areas that were dominated by pasture	Fire buffers and access tracks condition maintained	Two-yearly plant surveys Bi-annual planted threatened species counts Quarterly infrastructure checks

Unit	Vegetation Success Criteria	Habitat Success Criteria	Infrastructure Success Criteria	Monitoring Schedule
	snow tussock observed within 10 years	Taramea recruitment observed within 5 years, >5% increase in taramea area within 10 years		
PB	Native vegetation established on areas with root zones (20m) Native dominated edges thriving Erosion control effective Pest plant species fail to establish (are not reproductive)	Edge connectivity established with batters Lizard access to batters confirmed Habitat diversity created	Safety standards maintained	Two-yearly vegetation surveys by drone Quarterly safety inspections
HR	Per ELF and S	Per ELF and S	Reduced to light vehicle access tracks Fire buffer established	Per ELF and S
TGT	N/a	N/a	Recreation route reinstated Wayfinding and lookout opportunities Safety standards maintained	Quarterly safety inspections Annual road surface assessments to maintain free-drain, gravel surface

Unit	Vegetation Success Criteria	Habitat Success Criteria	Infrastructure Success Criteria	Monitoring Schedule
			Fire buffer established	Six-monthly plant pest and fire buffer assessments

The above rehabilitation outcomes are summarised and illustrated using photographs in Appendix F. Specific revegetation methods for DDF and MRZ are described in Appendix E2, Tables 2.1 (DDF) and 2.2 (MRZ). These rehabilitation methods are designed to achieve the following overall vegetation success criteria, with expected changes within MRZ discussed in Appendix E1 Table 1.1.

11.6. Establishment of Habitat

The following specific outcomes will be achieved through implementation of this management plan:

- 222 ha of indigenous tussockland that contains at least 20% tussock cover in the DDF. Within MRZ B2, B3 and MRZ A tussock will be managed to expand its area and thicken existing areas (i.e. increase proportion of cover) within and between open scrubland canopy, replacing non-native pasture. Pasture currently covers 47% of areas mapped as tussock and 45% of mixed-tussock shrubland
- 230 ha of Indigenous woody scrubland in the DDF. Within MRZ A, parts of B2 and B3 mixed scrubland will be managed towards native dominant scrubland
- 19 ha of cushionfield with increased number of sub-populations of the three spring annual herb species being managed through the Applied Research Plan. These outcomes are uncertain and experimental, as they are dependent on the success of the Applied Research Plan and implementation of its recommendations. Appendix E6, Table 6.1 lists the cushionfield species with a threat status with preliminary conservation notes
- 2 ha of taramea herbfield and shrubland
- 3.5 ha Swamp wetland with 0.5 ha of open water elements (3.5 ha)
- 4 ha of Marsh wetland including >0.5 ha of direct transferred material in year 1 to form the new Ardgour Terrace wetland, a minimum 0.4 ha wetland established in lower Shepherd's Valley before the end of year 2, and small wetland in the vicinity of the plant established when mining ceases. Appendix E5 lists threatened wetland plants to be established in mined areas
- Establishment of at least 24 reproductively viable kōwhai clusters across the DDF and MRZ. These clusters will be established within the first 2 years around retained kowhai (probably no more than 8), and include seedlings grown from cuttings retrieved from those kowhais that are removed to enable mining, as well as kowhai from the wider upper Clutha area (Appendix E, Table 3.1)
- Deployment of at least 480 rock stacks to provide habitat for lizards, invertebrates and nursery-grown plants (at a nominal 1 per ha). Creation of at least 96 rubble pits (at a minimum density of 1 per 5 ha) totalling approximately 1.5 ha of rock piles and rubble pits. Establishing >5% rock cover in all rehabilitation units measured within 2 years of revegetation (except wetlands and pit lakes). Adoption of specific planting requirements for rocks stacks and rubble pits (Appendix E4 Table 4.1)
- Salvage of at least 25,000 larger tussocks as sods from the stripped footprint and their replacement in clusters to favourable sites in mined areas to inoculate

mined areas and accelerate establishment of habitat nodes to complement nursery-grown plants

- Establishment of specific minimum numbers of individuals of threatened plants in the DDF as identified in Appendix E7, with plant species and proportions to be used in MRZ listed in Appendix E3, Table 3.1.

11.7. Rehabilitation Implementation

This section outlines the specific actions required to achieve successful rehabilitation outcomes. All actions fall under one of three implementation phases and are further organised into five core management strategies that apply across all LMU's.

Three Implementation Phases include:

- Phase 1: Foundation (Years 0-2)
- Phase 2: Main Implementation (Years 2-10)
- Phase 3: Completion & Monitoring (Years 10-30).

Five Core Management Strategies are:

- **Plant Pest and Browser Management:** Target and remove invasive species before they spread, reduce browsers to very low numbers, remove cattle and manage sheep/rabbit grazing
- **Plant Establishment:** Plant nursery-raised plants and targeted plants salvaged from the mine footprint in clusters, including around rock stacks and rubble pits, with enrichment transplanting and planting along mine edges, and enrichment planting in MRZ
- **Habitat Creation:** Construct minimum of 480 rock stacks, 96 rubble pits and minimum 5% rock cover (in mined areas to provide specialized habitat features for native fauna. This excludes wetlands, pit lakes, and returned to agricultural use
- **Drought Resilience:** Create 'dimpled' topography to create localised areas with higher moisture, establish minimum areas of deep soils (1-3m depth) using ripping and soil replacement, using rocks and boulders to create microsites, and create swale/ bund topography on the TSF. In wetlands, enhance moisture storage by reusing stripped and separately stockpiled organic-rich soils.

  Fire Protection: Low biomass fire breaks based on linking cushionfields, pit walls, parts of haul roads, and grazed zones along roads.

11.8. Implementation Phases

Phase 1: Foundation (Years 0-2)

Goal: Establish comprehensive rehabilitation management systems and infrastructure and initiate rehabilitation activities across priority areas.

Key actions for the first phase are:

- Integrate pre-stripping and rehabilitation with mine plan
- Construct mine and ancillary infrastructure (including nursery plant hardening and processing areas)
- Install fencing and stock water provision in MRZ B1 and B2 areas to be grazed
- Begin plant pest and browser control
- Start material salvage (soils, rocks, plants, wood) including tussock to live storage and cuttings from kowhai that will be removed in years 0 to 3
- Refine techniques for salvage and enhancement of final edges along stream diversions, permanent access tracks, and other contingency zones
- Start excavation of RAS pit and create TSF embankment
- Initiate Applied Research Plan including surveys of cushionfields and spring annual herbs
- Initiate erosion stabilisation and rehabilitation trials
- Initiate seed and plant propagule collection and nursery plant production
- Build Western ELF, apply rock stacks and rubble pits (refine techniques)
- Construct Ardgour Terrace wetland using salvaged wetland sods and Lower Shepherd's wetland using salvaged wetland sods and individual plants.

Success Measure: Rehabilitation systems are operational with successful material salvage programs established, plants being propagated in local nurseries, Western ELF trial site constructed, Applied Research Plan actioned, and stream diversions completed to support ongoing restoration activities.

Phase 2: Main Implementation (Years 2-10)

Goal: Rehabilitate at least one third of mined areas including SRX ELF, pit, haul road, and associated stockpiles, CIT (if mined). and temporary site workers camp

Key Actions:

- Maintain Ardgour Terrace and Lower Shepherds Wetlands, soil stockpiles and contingency zones
- Tussock continued to be salvaged and used or transferred to live storage areas
- Rehabilitate and revegetate SRX complex, including establishment of taramea
- CIT pit backfilled to near-natural landforms including at least 4.5 ha of slopes suitable for cushionfields/spring annual herbs
- Complete edge and batter rehabilitation of permanent RAS and SRX pits as mining progresses
- Initiate Spring Annual and cushionfield rehabilitation trials
- Build Shepherds and SRX ELFs and rehabilitate areas that are complete
- Disestablish temporary Site Workers Camp and return to agricultural use
- Create rock stacks, rubble pits and habitat features, including delivering suitable ROM rock for rock features
- Plant native vegetation across all completed landforms
- Establish permanent watercourses. And SRX pit lake with terrestrial, riparian and aquatic habitats along pit haul road

Success Measure: All mined areas have rehabilitation started except TSF.

Phase 3: Completion and Monitoring (Years 10-30)

Goal: Finish rehabilitation and ensure long-term success

Key Actions:

- Rehabilitate and revegetate TSF, Shepherds ELF, haul roads, RAS pit, portal and stockpiles
- Establish and maintain fire buffers
- Dis-establish temporary diversions, allow water to flow onto the TSF
- Dis-establish and revegetate sediment ponds and other temporary infrastructure
- Establish long-term management systems
- Reinstate public walking access through Rise and Shine Creek
- Monitor and maintain all areas to agreed levels
- Review results at five-yearly intervals and adapt management based on results.

Success Measure: All areas meeting success criteria.

11.9. Core Management Strategy

Strategy 1: Plant Pest and Browser Management

This strategy addresses non-native plant species that compete with native vegetation and controls mammalian browsers that can damage newly established plantings. The integrated approach protects rehabilitation investments from both plant pest and mammalian pest threats, ensuring conditions for successful native vegetation establishment across all landscape management units.

What will be Controlled:

- **Plant Pests:** Non-native, wind and bird-dispersed pest plant species including wilding pine, thyme, stonecrop, broom, gorse, willow, hawthorn, cotoneaster, buddleia, elderberry, box thorn, flowering current, gooseberry cherry, stinking iris, malefern and all non-native climbers including *Clematis tangutica*

  (Australian bidibid, foxglove, Californian poppy and vipers bugloss will not generally be controlled). Specific methodology for plant pest management is described in the BPPMP.

  Mammalian Browsers: Most mammalian browsers will be reduced to very low densities including possums, deer, goats, hares, pigs. Specific methodology for mammalian pest management is described in the MPMP. All cattle will be removed. Sheep and rabbit browsing will be managed through the measures set out in the MPMP in non-cushionfield areas, and the Applied Research Plan in cushionfield areas to promote cushionfields and spring annual herbs.

How It will be Done:

Table 5 outlines the plant pest and browser management strategy supporting rehabilitation success. The approach targets invasive species and controls browsers (rabbits, hares, deer, possums), while removing cattle and implementing controlled sheep grazing.

This strategy begins with comprehensive plant pest mapping and soil quarantine during stripping to identify pest plants and prevent contamination and spread. Browser control uses fencing, pest management, and managed grazing throughout the project, with ongoing targeted removal ensuring long-term control. Special consideration includes reduced rabbit control in sensitive cushionfield environments.

Table 5: Plant pest and Browser Management Implementation Schedule.

Action	When	Where	Method
Plant pest Mapping	Before any work starts. Maintain register of plant pest species	All areas	GPS mapping, species identification
Soil Quarantine	During stripping	Contaminated areas	Separate storage of plant pest-infested soils, and separate non-organic from organic soils
Ongoing Control	Throughout project	All rehabilitation areas	Targeted removal, follow-up treatments as described in Biosecurity and Plant Pest Management Plan (BPPMP)
Browser Control	Throughout project	All areas (reduced rabbit control probable in cushionfields)	Fencing, pest control, managed grazing

Success Criteria: The effectiveness of plant pest and browser management will be measured through six key indicators that demonstrate successful control and protection of rehabilitation efforts:

- Elimination of reproductive individuals of target pest plant species maintained throughout project duration; including brier rose in cushionfield areas from year 5
- Control of competition from non-native plants allows planted seedlings to demonstrate growth over three successive years, and existing native shrubs and tussocks in MRZ to expand
- <10% of highly palatable plants with mammalian browse damage in ungrazed or exclosure areas in any one year
- Natural expansion of taramea in MRZ by at least 10% area over 10 years (currently limited by hare browsing of seedlings and pig rooting)
- Effective exclusion fencing operational with additional monitoring after snow events

- Ongoing surveillance detecting and managing new pest plant incursions.

Strategy 2: Plant Establishment

What will be planted:

- **Salvaged Plants:** Tussocks, wetland plants from stripped areas
- **Nursery Plants:** Native shrubs, trees, herbs (taramea) and vines grown from local seed, with kowhai seedlings grown from cuttings taken from the oldest kowhai tree in each cluster within the DDF that is removed.
- **Erosion Control:** Non-native grasses (temporary) to minimise soil loss.

Plant establishment approach:

Table 6 presents the planting strategy for rehabilitation: plant types, sources, planting densities, and location priorities. Plant species used for different areas are listed in Appendix E. E3 lists plant species for MRZs, E4 lists species for lizard rock stacks and rubble pits, E5 lists threatened species for wetland planting, E6 identified Cushionfield plants, and E7 lists plants with a threat status that are present in the DDF and the rehabilitation response (e.g. if they are planted as seedlings other approaches).

The revegetation approach combines three key components: salvaged plants recovered from areas prior to disturbance, nursery-grown native species propagated from local seed sources, and temporary erosion control measures using non-native grasses to prevent soil loss during establishment and provide an initial cover.

The plant establishment program for most areas (i.e. excluding agricultural areas of Ardgour Terrace) prioritizes native species using relatively small areas of wetland and at least 25,000 salvaged tussocks, and large numbers of nursery-grown plants.

Strategic placement focuses initial planting in nodes within the most favourable locations such as rock stacks, stream edges, swales, and protected slopes, with specific density targets ranging from 7500 plants/ha for wetland areas to 1,000-1,500 plants per hectare for shrub and tussock communities. Erosion control seeding of sweet vernal and/or browntop at ~3kg/ha is designed to quickly stabilise bare soils while minimising competition for planted native seedlings.

Table 6: Revegetation Strategy – Plant Types, Sources, Densities, and Location Priorities.

Plant Type	Source	Planting Density	Location Priority

Tussocks	Salvaged from site and nursery grown	12,500 minimum salvaged tussocks planted in clusters of 50 plants at 0.5 to 1 m spacing	Rock stacks and rubble pits, sheltered areas (swales, hollows), pit edges, stream edges
Shrubs	Local nurseries, hardened onsite	1,000-1,500/ha in DDF, 250 to 1500 plants/ha in MRZ	Rock stacks and rubble pits, deeper soils, protected slopes and moister micro-sites
Kowhai	Local nurseries using plant sourced from Clutha Basin genetics primarily by seed with on-site cuttings	24 nodes with at least 30 seedlings per node ensuring diverse genetics	Contingency zone & MRZ B1 to B3, Ardgour Terrace riparian area, Shepherds riparian, lower pit haul road
Wetland Plants	Salvaged sods (including *Carex kaloides*).	7500 nursery plants/ha or by direct transfer (at least 0.5 ha)	Wetlands
Taramea	Nursery grown	Variable	Near existing taramea, rock stacks & rubble pits above 800m ASL
Erosion Control	Seed mix	3kg/ha sweet vernal and/or browntop	Most disturbed surfaces (not pit walls)

Success Criteria:

- 75% survival of planted vegetation at three years post-establishment; 66% survival for kowhai; exceed the minimum required numbers of each threatened plant species three years post-establishment with active growth
- Natural regeneration occurring between planted areas showing ecosystem expansion
- Pre-mining cover of native tussock and shrubs in 'mixed-tussock shrubland' and 'native dominant tussockland' achieved in DDF after 15 years, i.e. a minimum cover of 34% comprised of 7 to 28% tussock cover and 6 to 19 % native shrubs (Appendix E1, Table 1.2).

- Effective erosion control on all slopes; minimal soil losses.

Strategy 3: Habitat Creation

This strategy focuses on constructing specialised habitat structures that provide refuges, breeding sites, and movement corridors for native fauna, from small invertebrates to birds and lizards.

What will be built: This strategy targets five key habitat types needed to support diverse wildlife communities across the rehabilitation landscape, with specific emphasis on threatened species including Kawerau gecko and Tussock skink. The Applied Research Plan for cushionfields and spring annuals sits alongside these habitats.

- **Rock Stacks and rubble pits:** Both are large, engineered rock structures designed primarily for lizard habitat. Rock stacks are made from rocks >0.5 m diameter creating horizontal cracks providing communal refuges for gecko families and territorial areas for skinks. Rubble Pits are shallow excavated features (nominally 0.5m deep x 10m x 4-6m wide) filled with ~20-40mm diameter rock to provide habitat for small terrestrial invertebrates while excluding larger mammalian predators. Both rock stacks and rubble pits are planted with species that provide nectar, fruit, cover and food for lizards and invertebrates (Appendix C).
- **At least 5% rock cover in all rehabilitated areas:** Isolated rocks provide habitat for lizards and some invertebrates. No rock is required in wetlands or pit lakes although emergent rocks will be placed in small section of pit lake where haul road enters the water
- **Wetlands:** Three small, engineered features on Ardgour Terrace and Lower Shepherds Creek (~0.5 ha each) and large wetland complex TSF (6 ha) with 0.5ha open water supporting aquatic invertebrates, wetland birds, and threatened sedge species like *Carex kaloides, C. diandra, C. buchananii* and *Juncus distegus*
- **Tussock Nodes:** Dense clusters of salvaged and nursery-grown native tussocks providing ground-dwelling habitat for lizards and invertebrates, with each node containing 50+ plants at 0.5-1m spacing. Salvaged tussocks have particular values as they have a larger volume of dead leaves and are anticipated to also provide an inocula of invertebrates and soil organisms
- **Dead wood and fine organic resources:** Dead wood salvaged from footprint (particularly kowhai, willow, and cone-free pine/fir and willow sections >20cm diameter) placed into rehabilitation areas to provide invertebrate habitat. Organic mulches and/or compost will be strategically placed into parts of rock stacks.

How it will be done: The habitat construction follows detailed specifications outlined in the source document's Appendix C.

Construction utilizes excavator placement and engineered design techniques, with rock stacks requiring pre-excavated trenches at least 1m deep (20% of stacks) for winter refuges. Dead wood is placed immediately upon salvage rather than stockpiled, positioned near existing rock tors or within shrubland gaps in MRZs. The programme establishes minimum 500 rock stacks (average 1 per hectare), 100+ rubble pits (1 per 5 hectares), and 20+ tussock nodes per hectare. Habitat connectivity across the rehabilitated landscape is delivered by clustering rock stacks and rubble pits (Table 7).

Table 7: Habitat Construction Specifications - Types, Quantities, Methods, and Key Features.

Habitat Type	Number Required	Construction Method	Key Features
Rock Stacks	500+ (1 per ha)	Excavator placement	10+ rocks >0.5m diameter, 5-20mm cracks, >1 m depth
Rubble Pits	100+ (1 per 5ha)	Shallow excavation	20-40mm crushed rock, cross-contour placement to intercept water
Wetlands	7ha total	Engineered design	Variable water depths and methods of native plant establishment
Tussock Nodes	20+ per ha	Clustered planting	50+ plants per node, 0.5-1m spacing including at least 10 salvaged tussocks >100 mm basal diameter
Wood salvage	All available	Excavator placement	Place salvaged large wood (kowhai, willow, cone-free pine/fir) immediately in MRZs near rocks or shrubland gaps, ideally partially buried.

Success Criteria: The effectiveness of habitat construction will be measured through three key indicators that demonstrate successful wildlife habitat establishment and functionality:

- **Construction compliance:** All habitat features built to specification with verified crevice dimensions, depths, and spacing requirements
- **Wildlife occupation:** Evidence of target species (particularly Kawerau gecko and Tussock skink) using constructed habitats within 5 years, with 20% of rehabilitated area supporting suitable habitat
- **Landscape connectivity:** Habitat networks established with maximum 300m spacing between rock stack clusters and successful movement corridors demonstrated through monitoring (for more details refer to Appendix C).

Strategy 4: Drought Resilience

What will be done:

Enhancing resilience to drought by slowing, concentrating and infiltrating rainfall into sheltered microsites, some of which have deep soils and/or organic placement and/or boulders/rocks. These help plants survive dry periods by increasing water stored and water accessed and decreasing evapotranspiration. These techniques are combined with: clustering initial planting to help plants shelter each other; planting diverse plant species to better extract soil water as plants have different root architectures; thorough hardening off on-site of nursery-plants and minimising initial fertiliser helps develop drought resistant leaf and stem architecture; and, managing competition between native plants and non-native grasses (initial erosion covers or existing grasses).

How it will be done:

The methods, shown in

Table 8, are specifically designed for the semi-arid Central Otago environment where average annual rainfall is only 445mm, summer evapo-transpiration is high and severe moisture deficits limit the growing season to 2 to 3 months on average. The techniques work synergistically to maximise water retention and create optimal growing conditions for native vegetation establishment.

The techniques will be applied across all major rehabilitation areas including ELFs, TSF, haul roads, and soil stockpile areas, with priority given to the most drought-stressed north-facing slopes and where trees and taller shrubs are established as this is where water conservation is most critical for successful plant establishment.

Table 8: Water Conservation Techniques Implementation Table.

Technique	Purpose	Application	Result
Scalloped Surfaces	Provide shelter, catch and hold water	All rehabilitated slopes	Water concentrates in sheltered depressions and shelter from wind reduces water loss
Rock Placement	Provide shade and shelter, concentrate runoff	At initial nodes (rock stacks and rubble pits)	Reduced evaporation, wind protection, reduced plant competition
Deep Root Zones	Allow deep rooting (1 to 3 m)	Priority areas (varies with aspect and LMU)	Plants access deep soil moisture, especially for shrubs and trees
Organic rich soils and mulches	Reduce water loss	Wetlands and around rock stacks, under larger shrubs in MRZ	Organic matter retains soil moisture
Managing non-native grass biomass	Reduce below-ground competition; provide green-mulch	All sites	Provide shelter for native plants

Success Criteria:

- Visible water collection in scalloped areas after rain
- Plants showing healthy growth during dry periods
- Minimal plant mortality during drought years.

Strategy 5: Fire Protection

What will be protected:

High-value, fire-vulnerable vegetation that would take decades to replace if burned, including:

- Kowhai areas: "highly fire-vulnerable and slow-growing"
- 0.5 hectares of valley podocarp forest: "the most important features to buffer"
- Native shrubland: Slow to recover after fire damage.

How it will be done:

Table 9 shows the fire protection methods used to safeguard high-value vegetation from fire damage. These methods use features of natural and rehabilitated sites with existing management practices to create an integrated fire protection system.

Table 9: Fire Protection Methods and Implementation.

Protection Method	Location	Maintenance	Purpose
Low-Biomass Buffers	Along roads, tracks Across cushion-field areas	Maintain low-biomass rocky surfaces that may be compacted and/or have thin soils Grazing and/or cutting to lower biomass and limit shrub growth	Slow/prevent fire spread
Rocky Barriers	Pit highwalls	Probably none	Create firebreaks
Grazed Areas	Strategic locations	Controlled sheep grazing to remove pasture grass biomass before December and reduce shrub establishment	Maintain low fuel loads
Access	Key protection points	Maintain vehicle access	Enable fire suppression

Success Criteria:

- Fire break establishment: Low-biomass areas (cushionfields, grazed zones, some roads, pits) maintained as natural fire barriers
- Priority area protection: Kowhai areas and planned podocarp forest adequately buffered from fire risk
- Road corridor management: Grazing maintained along public roads and tracks to reduce biomass and ignition risk timed before Christmas tourism peak and after main pasture growth period
- Rock barrier effectiveness: Higher rock cover areas functioning as intended fire breaks
- Climate adaptation: Fire management considers predicted increased risk under climate change.

11.10. Quality Control and Hold Points

The following hold points and quality checks help guarantee that all rehabilitation activities meet consent conditions and technical specifications:

Before Work Starts:

- All areas surveyed and mapped (including edges)
- Permissions gained (i.e. landform, ecology signoff)
- Materials and equipment ready
- Weather conditions suitable now (and forecast for direct transfer)
- Environmental controls in place.

During Construction:

- Daily progress inspections
- Material quality checks
- Environmental compliance monitoring
- Safety protocols followed.

After Completion:

- Final inspection and sign-off
- Monitoring systems established
- Maintenance schedules activated
- Success criteria baseline established.

12. MONITORING AND REVIEW

12.1. Monitoring background

On-going annual monitoring is essential to:

- Recognise trends early to allow optimisation (e.g., identifying favourable micro-sites or successful rates of seed for short-term erosion control that allows native establishment)
- Address pest problems when first observed (e.g., removing plant pest seedlings while young or controlling browsing mammals)
- Manage changeable climatic conditions (e.g., delaying planting in drought years or applying more intensive erosion control practices in very dry years).

Monitoring and management responses form part of rehabilitation documentation and consent conditions. While some management measures are required from the outset, ongoing monitoring informs the type and timing of other actions, including refining rehabilitation methods.

Results of monitoring are used to create annual reports that:

- Describe climatic conditions in the previous year, highlighting features that influence rehabilitation outcomes
- Identify stripping, stockpiling volumes by resource (e.g., soils, tussocks, weathered rock, brown rock)
- Identify areas in different stages of rehabilitation (i.e. landforms contoured, covered with root zone, in temporary erosion cover, established with initial native plantings)
- Outline habitat construction completed (e.g., rock stacks, rubble pits, kowhai exclosures)
- Present results of revegetation with respect to conditions (e.g. survival rates by species and management zone, pest plants recorded)
- Describe areas stripped that are yet to be rehabilitated (i.e. liability) and resources required for rehabilitation
- Outline results of trials
- Identify deficiencies or inadequacies and recommendations for changes in procedures or approaches to deliver planned results
- Identify opportunities for improvements in the coming year
- Outline the programme for the coming year.

Progress photographs, including aerial photography and photographs from key vantage points looking towards the site, provide valuable monitoring tools. Collecting, collating and reporting is fundamental for Bendigo-Ophir because there is limited precedent for rehabilitation in this dryland environment.

12.2. Monitoring Programme

Monitoring and associated site management includes:

Rehabilitation Progress

- Length of final edge (i.e. within contingency zone) and length of edge enhanced with transplants, rock and treated to remove plant pests.
- Locations of final edges amended to reduce impacts on high-value ecosystems.
- Area of finished landform confirmed consistent with landscape objectives
- Observations of finished landform stability against wind and water erosion including success of specific surface treatments at providing desired short-term vegetative covers
- Areas of root zones established and deviations from design root zones and surface microtopography by root zone type, i.e. pit benches, ELFs, TSF, wetlands, pasture
- Areas (by vegetation type) established against proposed annual targets
- Number and proportion of target plant species planted and established (a minimum of 3 years after planting). Number and species with browse noted.
- Number of plants in propagation at nurseries and on-site in hardening-off area, by species
- Seed and propagules collected and supplied to nurseries from site or used directly, by species
- Habitat construction completed (e.g., rock stacks, rubble pits, kowhai exclosures).

Resource Management

- Estimates and locations of rehabilitation resources available (specifically including brown 'weathered' rock, weathered boulders, soils)
- Number and area of tussocks and wetland salvaged and in storage onsite
- Number of plants salvaged to inoculate invertebrates and their location (taramea, broom, Olearia odorata and O. bullata)
- Condition score of established edges

- Condition of surfaces of soil stockpiles: plant and rock cover, regrowth of native species.

Pest Management

- Signs of mammalian pest damage to revegetation areas serve as a trigger for undertaking additional pest control.
- Results of pest plant and pest mammalian pest control verification and monitoring, including new species found on site (and their management), species intercepted in biosecurity assessments (e.g. nursery plants, hardening off area, roadsides on site and near the entrance) species required to be controlled under statutory documents (e.g. Regional Pest Management Strategy) and species presenting risks to the success of revegetation and rehabilitation, particularly brier across the different MRZ.

Plant Performance

- Survival (years 1, 2, 3) and growth rates of salvaged, planted and transplanted species will be used to direct future propagation, hardening off, infill and planting programmes.
- Spread (through growth and generation of new seedlings) and condition of target species (e.g. taramea) and communities (e.g., tussocks, cushionfields) in MRZs will be used to direct future management
- Experimental treatments and monitoring approaches to provide direction on overall rehabilitation approaches.

Risk Management

- Fire risk and condition of fire buffers
- Pit walls, pit edges and pit lake access
- Condition of grazed areas, including seepages and wetlands in these areas
- Browser incursion: condition of plants in fenced exclosures.

12.3. Methods

A monitoring programme and methods will be developed in more detail for each stage of mining and rehabilitation activity. Methods will be consistent with the overall Ecological Biodiversity Outcome Monitoring Plan and the Ardgour Restoration Area Management Plan.

13. MANAGEMENT ACTION SUMMARY

This section provides a summary of the LERMP proposed for the BOGP. Further details on methods and specific measures are provided in Appendices A-G.

13.1. Overview

The rehabilitation strategy is structured around three core approaches designed to protect, enhance, and re-establish ecological and landscape values across the site.

Avoid Negative Impacts

This approach avoids impacts on ecosystems and species with threatened components and those that have little rehabilitation precedent by prioritising avoidance of:

- **Cushionfields and spring annual herbs** (no established rehabilitation methods)
- **Kowhai trees and coral broom** (slow-growing, culturally important)
- **Taramea patches** (culturally important and ecologically valuable)
- **Rock outcrops** (rich habitats for plants, lizards, and invertebrates).

Key Actions to avoid negative impacts are:

- **Smart Planning**
  - Map and identify the above ecological features/values at operational scale, and in detail within Contingency Zones
  - Refine infrastructure locations to avoid high-value areas
  - Schedule works to minimise impacts (e.g. allow time for salvage)
  - Use cut vs fill construction where possible (minimise fill, maximise cut).

- **Minimise Disturbance / Damage**
  - Stack materials higher/deeper rather than spread wider
  - Control sediment, dust, noise, vibration, artificial light
  - Source plants locally (within Basin if possible) with appropriate genetics
  - Ensure rigorous plant hardening and inspection to remove plant pests and pests (including molluscs) before transporting to planting sites
  - Maintain dense vegetation along public roads and paths (minimise bare soil) and/or maintain free-draining, gravelled surfaces to minimise soil movement and contact of feet or tyres with soil).

- **Prevent Contamination**
  - Screen all imported materials (gravels, mulches, plants, erosion control products including any hydromulching or hydroseeding materials)
  - Thoroughly harden off plants in onsite facility before planting out (includes a quarantine period of at least 3 months)
  - Use depotting protocols at the hardening off site for tolerant plants to minimise pest introduction
  - Clean and treat earthmoving equipment moving onto site and between areas
  - Segregate plant pest-contaminated soils.

Enhance Ecological Values

Unstripped and adjacent regeneration zones (MRZ) will be managed to accelerate and support natural spread of native species into rehabilitated areas.

Target Zones:

- Contingency zones (undisturbed project areas)
- MRZs adjacent to mining footprint.

Management Actions by Zone:

- **All Enhancement Zones**
  - Cease oversowing and fertiliser topdressing
  - Implement targeted plant pest control
  - Install fencing to manage long-term grazing
  - Control or remove browsing pressure (e.g. rabbits, hares, livestock).

- **Shrubland and Tussock Areas**
  - Encourage natural expansion and thickening of native vegetation
  - Establish diverse native species
  - Enhance stream shading and aquatic habitat
  - Improve connectivity (reduce areas in pasture).

- **Special Features**
  - Kowhai Groves: Install rabbit-proof fencing; enhance genetic variation

  - Taramea Patches: Stop pig damage and browsing pressure (hares, rabbits)
  - Snow Tussock: Re-establish in MRZ-A
  - Wetlands: Salvage and re-establish intact communities.

- **Fire Management**
  - Create low-biomass buffer zones
  - Maintain firebreaks
  - Protect vulnerable and slow-growing species.

Establish Ecological Values in Mined Areas

Creating functioning native ecosystems post-mining.

Target Vegetation Types:

- Cushionfields with spring annual herbs (requiring ongoing research)
- Taramea herbfields (cultural and ecological value)
- Tussocklands (foundational grassland type)
- Shrublands (providing structural diversity).

Foundation Activities:

- **Resource Management**
  - Maximise salvage of vegetation, soils, and surface rock
  - Segregate wetland soils
  - Create soil stockpiles with surface of mixed soil and plants
  - Audit volumes and condition of salvageable materials
  - Manage stockpiles strategically, salving plants from stockpiles.

- **Landform Design**
  - Ensure natural ridgelines and shapes (landscape)
  - Construct varied slopes and aspects
  - Incorporate heterogeneous microtopography
  - Replicate natural drainage patterns.

- **Habitat Features**
  - Install >500 rock stacks for lizard habitat
  - Create >100 rubble pits for small fauna refugia
  - Rock cover at least 5% at planting
  - Establish tussock clusters and nodes, including use of salvaged tussock
  - Construct ~7 ha of rehabilitated wetlands with 0.5 ha open water
  - Establish 24 kowhai nodes
  - Create at least 2 ha of Taramea.

- **Connectivity**
  - Create stepping-stone habitats (kowhai)
  - Link fragmented woody vegetation
  - Establish corridors for wildlife movement around both sides of DDF.

Specialised Programmes:

- **Species-Specific Actions**
  - Invertebrates: Plant host species (e.g. Olearia for moths; taramea for beetles, broom for moths including salvage and translocation of galls and whole plants)
  - Lizards: Construct and place rock habitat structures and loose rock
  - Kowhai: Implement propagation, genetic conservation and establishment programme (at least 24 nodes with at least 480 established saplings at closure)
  - Wetland Plants: Undertake direct translocation (0.5 ha as sods, 0.5 ha as sods or individuals) and nursery supplementation (at least 6 ha).

- **Pest Management**
  - Control competing non-native vegetation
  - Control invasive plant species
  - Manage mammalian browsers (e.g. possums, deer, pigs)
  - Use adaptive management based on monitoring data
  - Maintain site-wide surveillance systems to prevent the establishment of plant and mammalian pests.

13.2. Indicators of Success

Timeframe	Key Indicators of Progress
Years 1–3	Surveys complete, Infrastructure in place; initial wetland salvage operations completed; rehabilitation trials initiated on W-ELF, Habitat Features installed, MRZ fencing, MRZ plant pest and grazing management, and MRZ plantings established. Kowhai cuttings propagated from trees that require removal. Soil stockpiles vegetated and stable with separation of soils containing pest plants and wetland soils.
Years 3–10	Salvage targets met and soil stockpiles regenerating native plant cover, edge enhancement achieved, pit benches treated, vegetation establishment targets met, effective pest control. General rehabilitation methods refined (including grazing, plant pest control) on SRX. Cushionfield and spring annual herb propagation and establishment methods successful, allowing mining and rehabilitation methods to be successfully applied on CIT ELF. Temporary workers camp rehabilitated to productive pasture.
Years 10–20	Ecosystem development evident; natural regeneration ongoing with increases in area of tussock, taramea and shrubland (and decreased pasture cover), increased resilience through structural thickening and establishment of fire buffers; major rehabilitation areas completed (TSF, S-ELF and Plant area) with wetlands developing on TSF and natural colonisation of rock stacks, rubble pits and tussocks by the three lizard species. Area of cushionfields and populations of spring annual herbs are thriving in W-ELF and present in other areas.
Years 20+	Self-sustaining tussock and shrubland ecosystems requiring minimal intervention (pest plant and mammalian pest control); shrubland connected across the landscape from mountains to river terraces; fire buffers and fences remain effective. Expansion of taramea; snow tussock and kowhai patches obvious in the landscape. Area of cushionfields and populations of spring annual herbs are at least 10% greater than in year 1; Methods for managing cushionfields and spring annuals successfully adopted at Ardgour Station.

13.3. Implementation and Monitoring

Adaptive Management:

- Annual monitoring and reporting; five-yearly deeper reviews
- Method refinement based on outcomes of early trials and long-term monitoring that includes records of root zone placement and revegetation treatments.
- Flexible scheduling responsive to climatic variability and resource availability
- Emphasis on continuous improvement and adapting to variable climate (drought).

Resource Requirements:

- Local nursery partnerships for seed collection and processing, raising and hardening off seedlings
- Skilled, dedicated personnel for sensitive operations, including monitoring
- Specialised equipment for ecological restoration, e.g. matching loading and unloading buckets for excavators undertaking wetland salvage
- Long-term maintenance planning and consultation with stock manager and community

Risk Management:

- Weather-related contingency planning
- Maintaining methods with changing staff, contractors, suppliers and grazing managers
- Backup sources of restoration materials
- Range of soil stabilisation, revegetation and rehabilitation strategies
- Early warning systems and intervention protocols in place.

14. SUMMARY

This LERMP has been prepared for the proposed BOGP within the Dunstan Mountains, Central Otago. This plan is intended to manage impacts on the landscape and ecology associated with the proposed mine and its ancillary infrastructure. The purpose of the plan is to effectively rehabilitate mining activity within the Dunstan Mountains ONL by creating rehabilitated landforms with slopes and skylines that visually integrate with the existing landscape character and transition between the south and north Dunstan Mountains.

A mosaic of native tussock, shrubland and cushionfield ecosystems will be established onto the rehabilitated landforms and reinforce the natural landscape features. The mosaic is supported by a varied but typically deep (1-2 m) root zones and establishing water-harvesting micro-topographies that include rock stacks, rubble pits and surface rock. Tussock and shrubland ecosystems will be initiated using a low density of planting into the least-stressed sites of nursery-raised seedlings and salvaged tussocks. MRZs are proposed around the mined areas which are currently in a range of a currently degraded states with a high proportion of non-native pastures, reflecting over 150 years of farming and mining, with associated fire, grazing, oversowing and topdressing. Mining is being used as an opportunity to enhance these unmined areas by: gradually replacing non-native pasture grasses and herbs with native vegetation; enriching native plant species diversity and structural diversity; removing invasive species in targeted areas; enhancing resilience to fire; and strengthening connectivity between areas managed for native biodiversity that lie above and below the mined areas. These enhanced MRZs will provide a flow of native plants and animals to accelerate recovery of the adjacent mined areas. Growth rates in this climate are relatively slow and variable from year to year – the provision of a regular inflow of seeds combined with keeping pest plants and mammalian pests at very low levels provides resilience to variable climatic conditions. Ecological conservation will be established as the primary and dominant post-mining land use. Sheep grazing will be limited to that required to support ecological values, and primarily in areas managed for cushionfield and spring annual herb conservation

Both the mined area and MRZs contain cushionfields and threatened spring annual herbs that are adapted to the current degraded conditions, and which are high-value ecosystems rich in native fauna. Techniques for management and rehabilitation of cushionfields and spring annul herbs are untested and speculative. Techniques will attempt to be developed through an Applied Research Plan. Mined areas will include novel pit lakes and extensive rock highwalls that have very low ecological values; however, these features provide value by contributing to fire-breaks and fire refugia which are a critical part of site resilience.

The success of this LERMP is heavily influenced by actions during mining and stripping, in particular: the quality and quantity of salvaged materials (soils, tussock, wetlands), the precision of disturbance boundaries; the quality of the enhanced MRZs; and learning from early rehabilitation. These actions in the first two years of project development are critical influences on overall rehabilitation success. In these first two years plant pest and pest control enhances the MRZ, two wetlands are created using direct transfer, soil stockpiles are constructed, up to 25,000 tussocks are salvaged for later reuse in mined areas, the Applied Research Plan begins, and an ELF is created on which revegetation methods and rock habitat construction methods are refined. Monitoring of these areas over at least 5 years allows adaption, as most of mine rehabilitation does not occur until mining finishes (scheduled for year 10). A minimum 20-year post-revegetation maintenance period, within a total consent duration of 35 years allows for 'waves' of planting and adaptive management. Some rehabilitation areas should reach closure standard during mining operation or early in the post-mining period.