

Macraes Phase 4 Fast-track

# **Vegetation and TAR Flora Management Plan**

for: Oceana Gold (New Zealand) Limited





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Appendix A Ecology documents prepared for the proposed Macraes Phase 4 Project.

Appendix B Management actions and locations for TAR flora species

## List of Abbreviations

| Abbreviation | Full term                                             |
|--------------|-------------------------------------------------------|
| AEE          | Assessment of Environmental Effects                   |
| AL1          | Narrow-leaved snow tussock grassland                  |
| BOAM         | Biodiversity Offset Accounting Model                  |
| BRWRS        | Back Road Waste Rock Stack                            |
| DoC          | Department of Conservation                            |
| ED           | Ecological District                                   |
| EcIA         | Ecological Impact Assessment                          |
| EIANZ        | Environment Institute of Australia and New Zealand    |
| FTAA         | Fast-track Approvals Act 2024                         |
| FTSF         | Frasers Tailings Storage Facility                     |
| GPUG         | Golden Point Underground                              |
| HH           | Highlay Hill                                          |
| MEEA         | Murphys Ecological Enhancement Area                   |
| MHP          | Mt Highlay Plantation                                 |
| MP4          | Macraes Phase 4                                       |
| MWMS         | Mine Water Management System                          |
| NPBV         | Net Present Biodiversity Value                        |
| NPS-IB       | National Policy Statement for Indigenous Biodiversity |
| OGL          | Oceana Gold                                           |
| OGLNZ        | Oceana Gold (New Zealand) Limited                     |
| pORPS        | Proposed Otago Regional Policy Statement              |
| REA-TE       | Residual Effects Assessment: Terrestrial Ecology      |
| REMP         | Residual Effects Management Plan                      |
| RMA          | Resource Management Act 1991                          |
| SIPO         | South Island pied oystercatcher                       |



|     |                                                     |
|-----|-----------------------------------------------------|
| TAR | Threatened and At Risk                              |
| TSF | Tailings Storage Facility                           |
| VS6 | Matagouri, <i>Coprosma propinqua</i> , kōwhai scrub |
| WA  | Wildlife Act 1953                                   |
| WRS | Waste Rock Stack                                    |

## 1 EXECUTIVE SUMMARY

This Vegetation and TAR Flora Plan has been prepared to support the Macraes Phase Four Project (MP4, 'the Project') and outlines measures to manage potential effects on indigenous vegetation and plant species listed as 'Threatened' or 'At Risk' (TAR) during construction, operation, and rehabilitation of the proposed MP4 works. This plan forms part of the Project's ecological assessment under the Fast-track Approvals Act 2024.

The Project involves the continuation and expansion of mining activities in a landscape with a long history of human modification and gold mining. Despite this, the site supports a high diversity of indigenous plant species, including many with elevated conservation classifications (TAR species).

For the purposes of this management plan, indigenous vegetation communities and TAR species have been addressed separately. The Project will necessitate the direct clearance of approximately 90 ha of the narrow-leaved snow tussock vegetation community (snow tussock) and 3.06 ha of the dry shrubland floristic community. It will also require the removal of 0.26 ha of tor ecosystems which host a high number of non-threatened and TAR plants. A total of 4.17 ha of wetlands will be directly removed for the MP4 Project, including 1.14 ha of ephemeral wetlands, a nationally threatened ecosystem type that supports disproportionately high numbers of TAR flora. An estimated additional 0.55 ha of wetland will be lost from buffer areas due to de-watering as a result of the Project.

Clearance of vegetation for the Project will result in the loss of Threatened or At Risk plants. In total 50 TAR plant species have been recorded within the MP4 works extent (Table 1), including two Not Threatened but locally uncommon species. This includes species found within the works footprint and those located within the 100m disturbance buffer around the works extent. Within this report TAR flora have been addressed in relation to their respective conservation status' and have not been separated based on habitat. As such TAR species included in this plan include both terrestrial and wetland species.

While not part of the MP4 Project, Camp Creek and Coal Creek are also included in this plan. Both sites are within the wider OGL landholdings and are subject to existing consents that authorise activities that would result in the loss of TAR plants. Their inclusion provides a coordinated framework to avoid or minimise effects on these species where practicable, while also supporting improved ecological outcomes across the existing Project as a whole. A total of 23 TAR plant species have been recorded within the consented Camp Creek and Coal Creek project areas. 14 of these species have not otherwise been recorded within the MP4 area, including the Nationally Critical *Cardamine dilatata*, for which Coal Creek represents a significant national population.

**Table 1. Total number of TAR Plant species recorded within the MP4 Project and Camp and Coal Creek areas**

| Project component                       | Number of TAR plant species |
|-----------------------------------------|-----------------------------|
| MP4 direct impact areas                 | 29                          |
| MP4 buffer area                         | 21                          |
| <b>MP4 Total</b>                        | <b>50</b>                   |
| Camp and Coal Creek direct impact areas | 18                          |
| Camp and Coal Creek buffer areas        | 5                           |
| <b>Camp &amp; Coal Creek Total</b>      | <b>23</b>                   |

*Note: TAR flora found in both direct impact and buffer areas are only counted once, within the direct impact numbers of this table. Two not threatened, but locally uncommon species have been included in this MP4 list. Eight species are found both in the MP4 and Camp & Coal Creek areas. A complete list of species and recorded locations is included in Appendix A.*

Key management measures for indigenous vegetation and TAR flora include:

- Vegetation Direct Transfer of 7.16 ha of tussock grasslands from Coronation, Central and Golden Bar (5.54 ha from Coronation; 0.67 ha from Central; 0.95 ha from Golden Bar);
- Planting of 175 ha of tussock grassland, 50 ha of dry shrubland, 15 ha of tor edge and 13.118 ha of wetland areas within the Murphy's Ecological Enhancement, Cranky Jim's and Mt Highlay areas (described separately in Bioresearches 2026n);
- Salvage of TAR flora as well as those listed as host species for TAR invertebrates found within the landholdings;
- Salvage of taoka species;
- Propagation and planting of TAR species from within impact and buffer areas into protected land;
- Ongoing monitoring of TAR flora within buffer areas;
- In-situ management of populations outside the Project area for five very high value TAR species with very high residual effects;
- Monitoring of translocated and planted TAR flora, including measuring the impact of grazing at different intensities where appropriate;
- The establishment of a TAR flora conservation grant to support research and conservation work on TAR flora found in the Macraes Ecological District.

These measures are designed to avoid overall population losses for each species and aim to increase both individual plant numbers as well as populations across protected areas within the landholdings.

## 2 INTRODUCTION

### 2.1 Macraes Phase 4 Project Description

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

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

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

#### 2.1.1 Site Location and Description

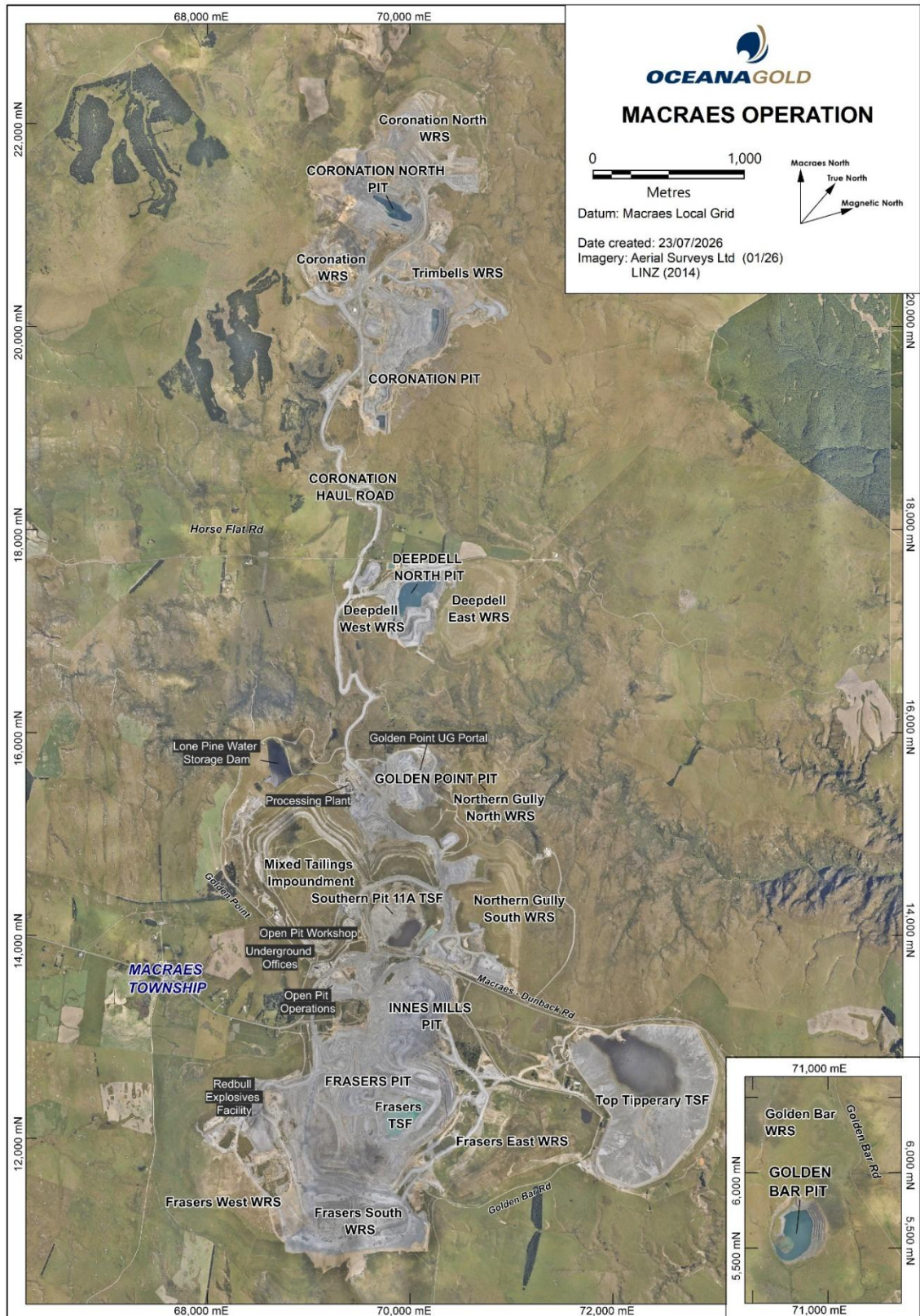
OGNZL owns and operates the Macraes Operation at Macraes, approximately 30 km northwest of Palmerston in the Otago Region. The Macraes Operation is the largest gold mine in New Zealand and, since commissioning in 1990, has produced more than 6 million ounces of gold.

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

The environment within and surrounding the Macraes Operation has been shaped by historic and current mining activities. **Error! Reference source not found.** shows the arrangement of the major mine features at the Macraes Operation. In summary, the current components of the Macraes Operation include:

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





**Figure 1: Existing site layout at the Macraes Operation (as of July 2026)**

### 2.1.2 Project Overview

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

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

An overview of the proposed activities which make up the Project is shown in Figure 2 below.



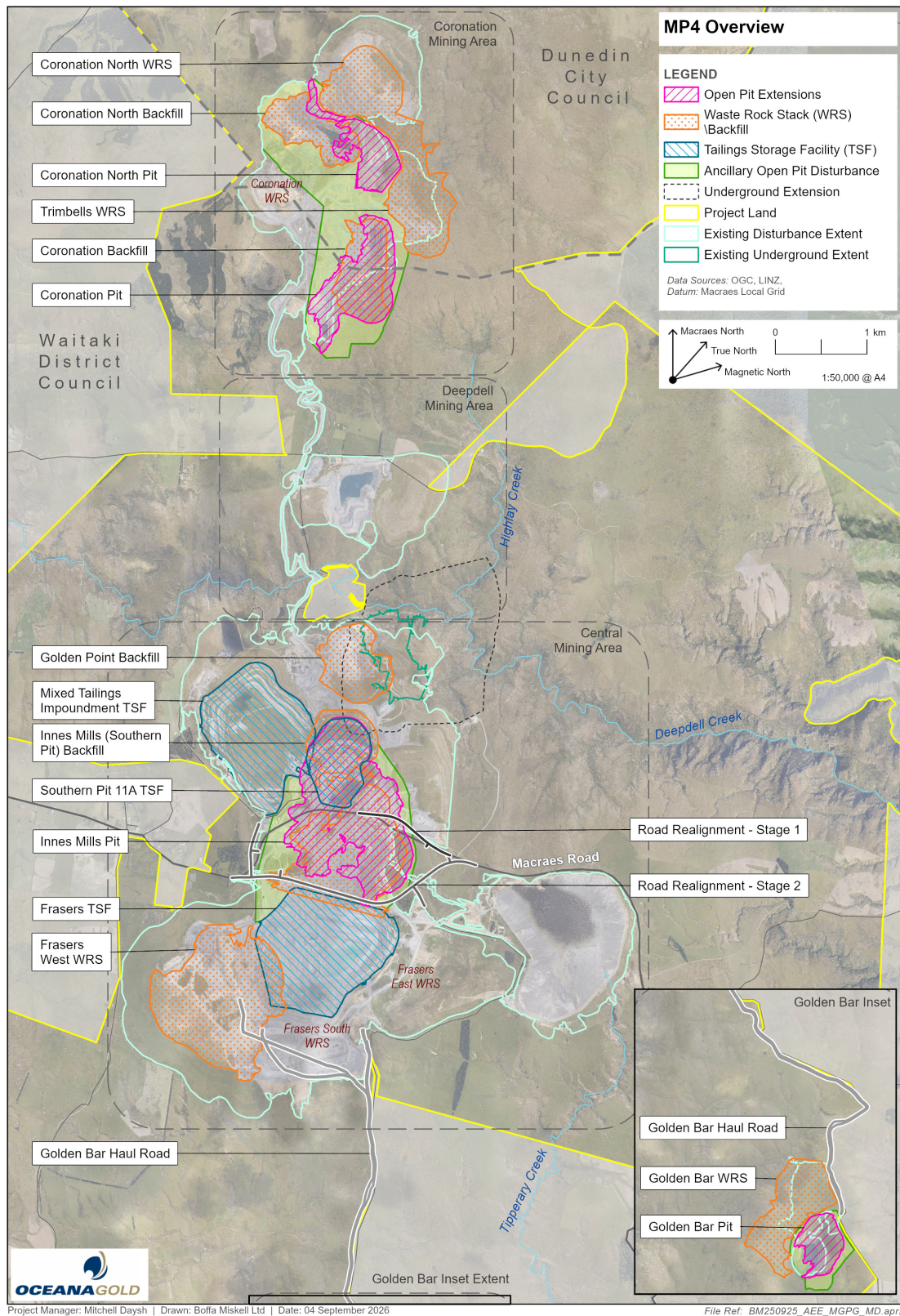


Figure 2: MP4 Overview Plan

### 2.1.3 Sequencing of Activities and Proposed Work Dates

The project is not being progressed in stages. Rather, all activities that comprise the MP4 project are included in this substantive application. Those activities are anticipated to occur across a period of 13 years, with OGNZL proposing to commence the MP4 project as soon as the necessary approvals are obtained.

The activities described herein are expected to be generally sequenced as follows:

- The continuation of Innes Mills Pit mining from Year 1 to Year 12;
- The continuation of Coronation Pit mining from Year 2 to Year 6;
- Relocation of tailings from Southern Pit TSF and MTI from Year 2 to Year 12 to facilitate mining of Innes Mills Stage 13 (IM13);
- The continuation of Golden Bar Pit mining mostly in Year 3 and in Year 7;
- The continuation of GPUG mining from Year 1 to Year 10;
- The continuation of Coronation North mining from Year 1 to Year 2 and then from Year 7 to Year 10;
- Associated replenishment of stockpiles throughout the MP4 mine life; and
- Full site rehabilitation to commence in Year 11 and be completed by approximately end of Year 13.

Mine planning is fluid at complex multi-pit operations such as the Macraes Operation. Precise timing of activities depends on a range of factors and operational requirements may facilitate changes to the sequencing of some activities.

Table 2 shows the anticipated sequencing of the proposed MP4 activities across the life of the project.

**Table 2: Anticipated sequencing of MP4 activities**

|                  |       | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Year 8 | Year 9 | Year 10 | Year 11 | Year 12 | Year 13 |
|------------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| Pit              | Stage |        |        |        |        |        |        |        |        |        |         |         |         |         |
| Innes Mills      | IM8   |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | IM9   |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | IM10  |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | IM11  |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | IM12  |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | IM13  |        |        |        |        |        |        |        |        |        |         |         |         |         |
| Coronation North | CN5   |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | CN6   |        |        |        |        |        |        |        |        |        |         |         |         |         |
| Coronation       | CO6   |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | CO7   |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | CO8   |        |        |        |        |        |        |        |        |        |         |         |         |         |
| Golden Bar       | GB2   |        |        |        |        |        |        |        |        |        |         |         |         |         |
|                  | GB3   |        |        |        |        |        |        |        |        |        |         |         |         |         |
| Underground      | GPUG  |        |        |        |        |        |        |        |        |        |         |         |         |         |
| Stockpiles       |       |        |        |        |        |        |        |        |        |        |         |         |         |         |

## 2.2 Purpose and scope

The purpose of this Vegetation and TAR Flora Management Plan is to present the methods required to manage actual and potential adverse ecological effects resulting from the proposed MP4 Project on the floristic communities and listed Threatened, At Risk, Data Deficient and locally uncommon plant species within the impact and buffer areas of the Project (Figure 3, Project footprint).

This Vegetation and TAR Flora Management Plan is a project-specific plan that is prepared to identify and guide actions required to manage the impacts caused to vegetation and Threatened and At-Risk (TAR) flora by the MP4 Project. The purpose of this Plan is to detail actions necessary to mitigate the potential and actual effects of the proposed Project on indigenous vegetation communities and specific flora species within the site. The Plan covers two broad aspects of flora management: vegetation management, which responds to the effects of the Project on narrow-leaved snow tussock (hereby referred to as snow tussock) and dry shrubland communities across the site, and TAR flora management, which addresses effects on individual plant species found within the Project footprint that are categorised as regionally or nationally 'At-Risk' or 'Threatened' (TAR).

Residual effects and management protocols for other Project components, ecosystems, and taxa are addressed in separate management documents, as listed in Appendix B.

This Vegetation and TAR Flora Management Plan gives effect to the resource consent conditions.

This document (E8) sits within a series of ecology-focused documents relating to the MP4 Project (Table 3).

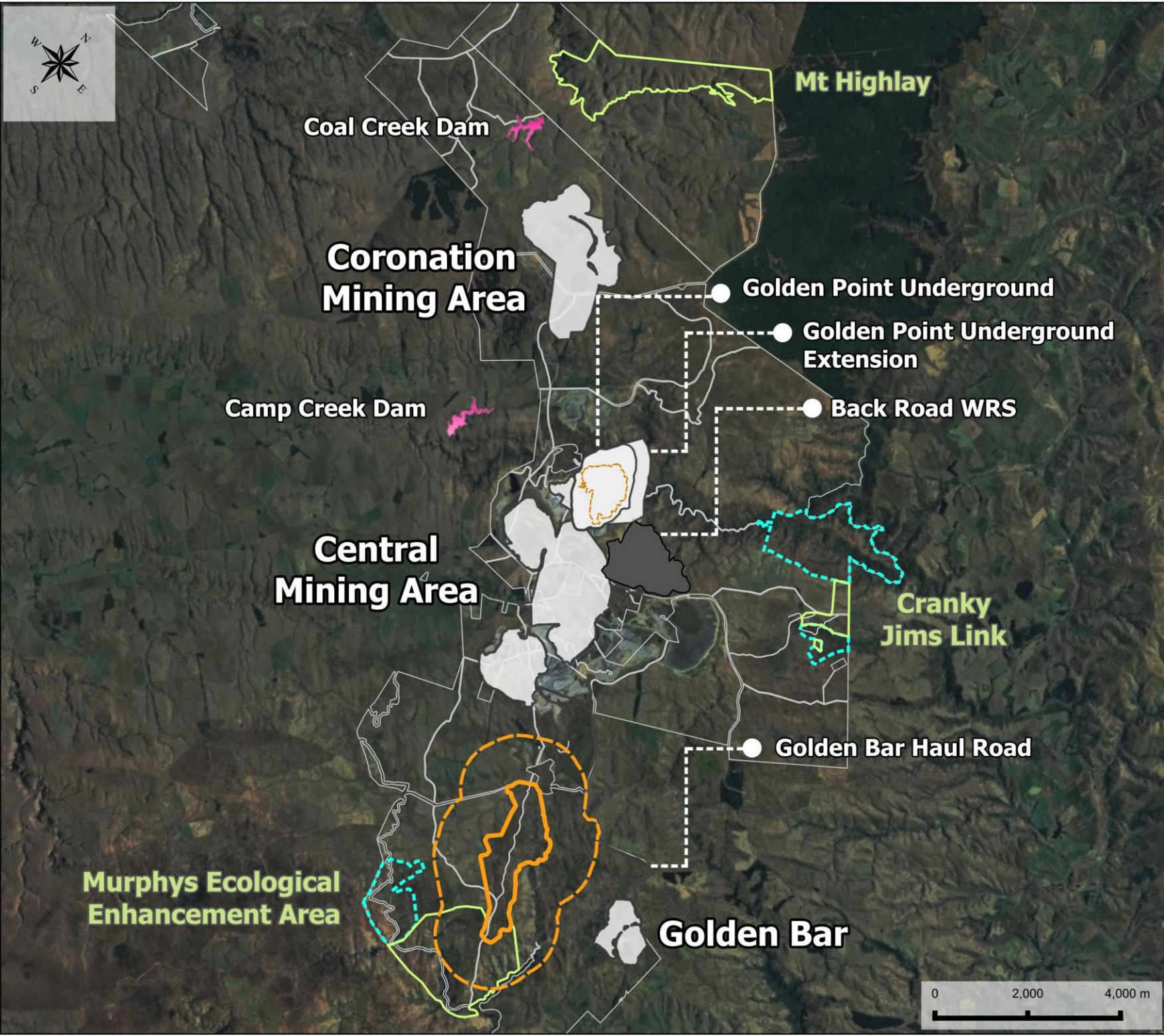
This Vegetation and TAR Flora Management Plan should be read alongside the Substantive Application, which contains further details on the context of the project, and in conjunction with the terrestrial, wetland and freshwater management and offset plans.



**Table 3. Ecology Documents prepared for the proposed Macraes Phase 4 Project. Current document highlighted**

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

**Figure 3. (Following page) A map of the MP4 Project Areas, including impact areas and offset/compensation sites**



# MP4 Project Areas

Date: 23/07/2026  
Drawn By: MS  
Client: OceanaGold New Zealand Ltd  
Scale: 1:110,000

## Legend

- OGI Landholdings
- Mining Areas**
  - MP4 Project Components
  - Camp and Coal Creek Dams
  - GPUG Consented Boundary
  - Back Road Waste Rock Stack
- Offset/Compensation Sites**
  - Sites of Protection/Restoration for Compensation Package
  - Existing Ecology Covenants
  - Predator Exclusion Fence
  - Predator Exclusion Fence Buffer

SOURCES  
LINZ Basemap aerial

MAP PROJECTION  
NZGD2000 / New Zealand Transverse  
Mercator 2000



### 2.2.1 Summary of ecological values

A summary of the ecological values for the vegetation types present within the Project footprint is provided below (Bioresearches 2026f). In total, 48 Threatened, At Risk, or Data Deficient indigenous flora species have been identified within the Project footprint and surrounding buffer zones. An additional two species that are Not Threatened, but are uncommon within the ecological district and so are considered to warrant elevated conservation concern, are found within the Project area and are included as part of TAR plant management.

**Table 4. Ecological value, areal extent of impact, magnitude of effect and residual level of effect for vegetation and habitat types affected by MP4.**

| Vegetation/habitat type              | Ecological value  | Areal extent of impact (ha) <sup>1</sup> | Magnitude of effect <sup>2</sup> | Residual level of effect <sup>3</sup> |
|--------------------------------------|-------------------|------------------------------------------|----------------------------------|---------------------------------------|
| <b>Terrestrial habitats</b>          |                   |                                          |                                  |                                       |
| Snow tussock grassland               | High              | 90.01                                    | High                             | Very High                             |
| Dry shrubland (grey scrub)           | Moderate          | 3.06                                     | Low                              | Low                                   |
| Schist rock outcrops                 | Very High         | 0.26                                     | Low                              | Moderate                              |
| <b>Wetland and riparian habitats</b> |                   |                                          |                                  |                                       |
| Ephemeral wetland                    | Very High         | 1.14                                     | High                             | Very High                             |
| Freshwater herbaceous wetland (FWH)  | High              | 2.1                                      | Moderate                         | High                                  |
| Wetland sedgeland                    | Moderate          | 1.43                                     | Moderate                         | Moderate                              |
| Wetland seepage                      | High              | 0.02                                     | High                             | Very high                             |
| Wetland shrubland                    | Moderate          | 0.03                                     | High                             | Moderate                              |
| Copper tussock wetland               | High to Very High | Not directly impacted                    | Not directly impacted            | Not directly impacted                 |
| Induced wetland                      | Negligible - low  | 3.58                                     | Low                              | Very Low                              |

<sup>1</sup> Areal extent of impact is the direct loss plus a 20 m precautionary buffer. <sup>2</sup> Magnitude of effect is prior to mitigation. <sup>3</sup> The residual level of effect is after avoidance, minimisation and remediation, and does not include biodiversity offsetting or compensation.

### 2.2.2 Summary of proposed compensation actions

The following actions are proposed as part of this Plan for the management of indigenous and TAR flora within the Project footprint.

#### **Snow tussock community management:**

- 5.5 ha of vegetation direct transfer (VDT) from Coronation;
- 0.67 ha of VTD from Central;
- 0.95 ha of VDT from Golden Bar; and
- Planting of 175 ha of tussock in Mount Highlay (discussed separately; Bioresearches 2026n), including the receipt of translocated TAR species.

**TAR plant management actions:**

- Surveys for specific cryptic or poorly understood species;
- In-situ management of populations of six very high value TAR species outside the Project area;
- Salvage of all TAR plants within works footprints;
- Propagation and planting of all TAR species;
- The establishment of an experimental grazing study area for particular plants requiring open habitat; and
- Monitoring of TAR plant populations post planting and translocation, as well as within buffer areas.

**Camp and Coal Creek TAR plant management actions:**

- Survey of TAR plant species at Camp Creek and Coal Creek;
- Salvage of all TAR plants within works footprint;
- Propagation and planting of all TAR species; and
- Monitoring of TAR populations.

## 2.3 Ecological values and effects summary

The MP4 Project will result in the permanent removal of land supporting indigenous vegetation communities and the clearance of habitats supporting a high diversity of Threatened, At Risk, or Data Deficient plant species. It will also alter the hydrology of streams and wetlands both within direct impact and buffer areas, which is expected to cause losses of these habitat types. Vegetation communities affected include: snow tussock, dry shrubland, wetlands (including nationally threatened ephemeral wetlands), riparian vegetation and rock outcrop habitats. These vegetation types support numerous indigenous species and provide habitat for a high diversity of regionally and nationally TAR flora and fauna.

The highest numbers and diversity of TAR plants within the MP4 impact sites are recorded within Coronation North, which is vegetated with dense snow tussock. This location will undergo the greatest area of indigenous vegetation clearance and wetland loss of all the Project components. Vegetation removal will result in direct mortality of individual plants, reduction in habitat extent, and fragmentation of remaining habitat. Hydrological changes caused by the Project will result in the loss of wetlands within the 100 m buffer at Coronation North.

The highest ecological values within the Project area are associated with ephemeral wetlands, seepage wetlands and rock tors, which have been assessed as having Very High ecological value, while tussock grassland has been assessed as High ecological value. Moderate to High values are associated with riparian and freshwater wetland communities and grey shrubland.

Predicted ecological effects of the MP4 Project include:

- Permanent loss of indigenous vegetation within the project footprint;
- Loss or disturbance of habitat supporting TAR flora;
- Direct mortality of TAR plants during vegetation clearance;
- Mortality of TAR wetland plants in buffer areas due to hydrological changes;



- Fragmentation of vegetation communities;
- Reduction in available habitat provision for indigenous fauna dependant on indigenous vegetation; and
- Indirect effects on vegetation adjacent to works through changes in hydrology, edge effects and construction activities.

These effects will be managed in accordance with the effects management hierarchy by avoiding adverse effects where practicable in the first instance, and where avoidance is not possible, by minimising and remediating adverse effects, with offsetting or compensation considered only where appropriate and required.

Effects management actions include salvaging and translocating individual plants, direct vegetation transfer (VDT), propagating and planting TAR flora, restoring indigenous vegetation communities within newly covenanted areas through remediation and offset planting, and implementing long-term monitoring, research and maintenance programmes. New covenants are to be established within the Murphys pest exclusion fence, the Murphys Link area connecting to the existing Redbank covenant, Cranky Jim's Link covenant and the Mt Highlay covenant.

Together, these measures are intended to maintain representative indigenous vegetation communities within the Macraes Ecological District and improve the long-term security of TAR flora populations.

Table 5 summarises the effects, including level of effects after the proposed management actions, for terrestrial vegetation communities and TAR flora species, as identified in the MP4 Ecological Impact Assessment (Bioresearches 2026f).

**Table 5. Summary of terrestrial ecological effects, avoidance, minimisation and remediation measures, and final level of effect for terrestrial ecological components affected by MP4. The table summarises direct and indirect adverse effects, the unmitigated magnitude and level of effect, proposed avoidance, minimisation and remediation measures, and the final level of effect after those measures. The final level of effect does not include biodiversity offsetting or compensation**

| Terrestrial ecological component                                            | Ecological value | Direct adverse effects                                                                                                                                                                                                                                                  | Indirect adverse effects                                                                                                                                                                          | Overall Magnitude of effect | Overall Level of effect (unmitigated) | Proposed avoidance, minimisation and remediation measures                                                                                                                                                                                                                                                                                       | Final level of effect                                          |
|-----------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| Snow tussock                                                                | High             | Permanent clearance and modification of snow tussock grassland associated with pit extensions, waste rock storage, road works, backfilling and associated earthworks. Loss includes tussock vegetation structure, indigenous plant cover and terrestrial fauna habitat. | Dust deposition, weed invasion, edge effects, accidental encroachment, altered runoff or soil moisture near retained vegetation, and local changes in exposure and microclimate.                  | High                        | Very High                             | Final works footprint demarcation to avoid spill-over; dust suppression; erosion and sediment controls; weed hygiene and weed control; Vegetation Direct Transfer; restoration planting; rehabilitation of temporary disturbance areas where practicable.                                                                                       | Very High                                                      |
| Dry Shrubland                                                               | Moderate         | Clearance and modification of dry shrubland vegetation within the works footprint, including loss of indigenous shrub structure and associated fauna habitat.                                                                                                           | Weed invasion, dust deposition, edge effects, reduced habitat connectivity, increased exposure, accidental encroachment and degradation of retained shrubland margins.                            | Low                         | Low                                   | Final works footprint demarcation; no-go areas where practicable; retention of shrubland outside the approved footprint; weed hygiene and weed control; dust suppression; erosion and sediment controls; restoration planting; rehabilitation of temporary disturbance areas where practicable.                                                 | Low                                                            |
| Rock habitat                                                                | Very High        | Direct disturbance, burial or removal of localised rock habitat and associated vegetation during earthworks, pit development, waste rock placement or road formation. Loss may include specialised plant habitat and refugia for lizards and invertebrates.             | Dust deposition, altered runoff, accidental encroachment, edge effects, increased exposure of retained rock features, disturbance to retained refugia and weed invasion around disturbed margins. | Low                         | Moderate                              | Avoidance of retained rock habitat where practicable; works boundary demarcation; no-go areas; pre-clearance ecological checks; careful removal of rock refugia where required; salvage or direct transfer of associated plants and substrate where feasible; dust and access controls; protection of retained rock features adjacent to works. | Moderate                                                       |
| Threatened, At Risk, Data Deficient and locally uncommon terrestrial plants | Very High        | Loss or disturbance of recorded plants and supporting habitat where individuals occur within the works footprint or 20 m buffer and cannot be avoided. Effects include removal of small or localised populations and loss of associated seedbank or habitat conditions. | Dust deposition, weed invasion, altered runoff or soil moisture, edge effects, accidental encroachment, and degradation of retained habitat or nearby plants.                                     | High                        | Very High                             | Pre-clearance surveys to identify salvage requirements; demarcation, fencing and no-go areas; vegetation direct transfer; seed collection & propagation; salvage and translocation; weed control; dust suppression; monitoring of transferred or salvaged material                                                                              | Ranging from Very High for some species to Very Low for others |

**Table 6. Ecological values, residual levels of effect and summary of proposed management actions for Threatened, At-Risk and Data Deficient plant species recorded within the MP4 direct loss footprint.**

| Species                                                        | Locations in footprint | Regional threat status             | National threat status             | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Residual Level of Effect |
|----------------------------------------------------------------|------------------------|------------------------------------|------------------------------------|------------------|--------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Dwarf broom<br>( <i>Carmichaelia corrugata</i> )               | Coronation North       | Threatened – Regionally Critical   | Threatened – Nationally Vulnerable | Very High        | Very High                | Very High       | <p>Management: Salvage from Coronation, propagation from seed, in-situ monitoring and active management of Coal Creek population, post-salvage monitoring and management.</p> <p><i>Carmichaelia corrugata</i> is expected to be moderately successful to cultivate and plant. However, the species can be difficult to establish and has specific habitat requirements, which may be challenging, including browsing to maintain open, bare ground and deep nurse soils. <i>C. corrugata</i> is susceptible to weed competition.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                                                                                                                                                                                                                                                    | Very High                |
| Indigenous St John's wort<br>( <i>Hypericum rubicundulum</i> ) | Coronation North       | Threatened – Regionally Critical   | Threatened – Nationally Endangered | Very High        | Very High                | Very High       | <p>Management: Salvage of plants from Coronation, propagation from seed and plant divisions, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance. In-situ management of population growing outside MP4 Project area.</p> <p>Cultivation of <i>Hypericum rubicundulum</i> is anticipated to be straight forward, however finding appropriate habitat and success in planting out are both expected to be challenging. Plants in Macraes show distinctive habitat requirements that can differ from those in other regions and imply that there may be a genetically unique population present, if not a new plant entity. Plants are vulnerable to competition from taller vegetation and may require grazing, however this is not confirmed and plants may need to be planted in both grazed and ungrazed areas, increasing uncertainty for management of the species.</p> <p>Confidence of management success for this species is low.</p> | Very High                |
| Wetland daisy<br>( <i>Lagenophora barkeri</i> )                | Coronation North       | Threatened – Regionally Endangered | At Risk – Declining                | Very High        | Low                      | Moderate        | <p>Management: Salvage from Coronation and Coal Creek, propagation from plant divisions and seed (if possible), in-situ monitoring, post-salvage monitoring and maintenance.</p> <p>This small daisy can be hard to identify, which poses challenges for accurate surveying and salvage. It requires open damp ground on stream and wetland margins to grow and this habitat can be difficult to find due to competition from taller plants. Grazing may be required, although this is uncertain. Seed production for this species is unreliable and seed collection may be difficult. <i>Lagenophora barkeri</i> is expected to grow well in propagation and when planted if suitable habitat is found.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                                                                             | Moderate                 |



| Species                                                                  | Locations in footprint       | Regional threat status             | National threat status             | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Residual Level of Effect |
|--------------------------------------------------------------------------|------------------------------|------------------------------------|------------------------------------|------------------|--------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <i>Lobelia ionantha</i>                                                  | Fraser's / Innes Mills       | Threatened – Regionally Endangered | At Risk - Declining                | Very High        | High                     | Very High       | <p>Management: Salvage from Central Mining area, propagation from plant division and seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>This ephemeral wetland plant may sulk in cultivation. It is sensitive to competition from taller plants and requires open habitat. Planting areas may be in ephemeral wetlands and planted pond edges. Grazing may be required.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                               | Very High                |
| <i>Leptinella pusilla</i>                                                | Coronation North             | Threatened – Regionally Endangered | At Risk – Declining                | Very High        | Moderate                 | High            | <p>Management: Salvage from Coronation, propagation from seed and plant division, post-salvage monitoring.</p> <p>This species is anticipated to be easy to grow and transfer and suitable habitat is available in shady areas (around rock bases and in shrublands). Competition from taller vegetation is expected to be the primary challenge for <i>Leptinella pusilla</i>, which may need to be resolved through grazing.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                         | High                     |
| <i>Rytidosperma thompsonii</i>                                           | Coronation North, Golden Bar | Threatened – Regionally Endangered | At Risk – Declining                | Very High        | Very High                | Very High       | <p>Management: Salvage from Golden Bar and Coronation, propagation from seed and plant division, post-salvage monitoring and maintenance.</p> <p><i>Rytidosperma thompsonii</i> can be challenging to identify, and requires flowers or seed to be present. The species requires open ground and limited competition, which may need to be achieved through grazing. Prefers similar habitat to <i>C. corrugata</i> with deep soils. Is expected to grow easily in cultivation and translocation.</p> <p>Confidence in management success is high.</p>                                                                                          | Very High                |
| <i>Sonchus</i> aff. <i>novae-zelandiae</i> (a) (CHR 517718; "grassland") | Coronation North             | Threatened – Regionally Endangered | Threatened – Nationally Endangered | Very High        | Very High                | Very High       | <p>Management: Salvage from Coronation, propagation from seed, post-salvage monitoring and maintenance. In-situ management of population growing outside MP4 Project area.</p> <p>A very difficult species to grow, with limited seed production and low seed viability, very rare in the local environment, intolerant of competition, potential for root damage during salvage. Hard to plant out successfully. The species is also facing challenges due to climate change, which adds additional levels of uncertainty and risk to management. Grazing may be useful to limit competition.</p> <p>Low confidence in management success.</p> | Very High                |

| Species                                                        | Locations in footprint | Regional threat status             | National threat status | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Residual Level of Effect |
|----------------------------------------------------------------|------------------------|------------------------------------|------------------------|------------------|--------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <i>Acaena buchananii</i>                                       | Coronation North       | Threatened – Regionally Vulnerable | At Risk – Declining    | Very High        | High                     | Very High       | <p>Management: Salvage of plants from Coronation, propagation from both seed and plant divisions and post-salvage monitoring and management.</p> <p>This species requires a grazed environment to manage competition from weeds and other plants and maintain open ground.</p> <p>Confidence in management success for <i>Acaena buchananii</i> is high as the species is expected to transfer well, propagate easily and appropriate habitat is available within the landholdings.</p>                                                                                                                                           | High                     |
| Narrow-leaved speargrass<br>( <i>Aciphylla subflabellata</i> ) | Coronation North       | Threatened – Regionally Vulnerable | At Risk – Declining    | Very High        | Low                      | Moderate        | <p>Management: Salvage from Coronation and survey of Central area to check no plants are present here and also require salvage, propagation from seed, monitoring of in-situ plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>This speargrass species grows well from seed and is expected to establish well if planted into suitable habitat. Plants need deep nurse soils that are seasonably damp, which may be challenging to locate. There is a risk of damage to plant tap roots during salvage. Herbivory is a challenge for this species.</p> <p>Confidence in management success is moderate.</p> | Moderate                 |
| Tufted hair grass<br>( <i>Deschampsia cespitosa</i> )          | Coronation North       | Threatened – Regionally Vulnerable | At Risk – Declining    | Very High        | Very High                | Very High       | <p>Management: Salvage from Coronation, propagation from seed and plant divisions, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance. In-situ management of population growing outside MP4 Project area.</p> <p>A large impact on a significant population of this species is anticipated from this project, amplifying any risks. There may be difficulties in finding suitable habitat to replicate the ecosystem dynamics to be lost. <i>Deschampsia cespitosa</i> is expected to be easy to cultivate and plant out.</p> <p>Confidence in management success is moderate.</p>             | Very High                |
| <i>Epilobium insulare</i>                                      | Coronation North       | Threatened – Regionally Vulnerable | At Risk – Declining    | Very High        | Low                      | Moderate        | <p>Management: Salvage from Coronation and Coal Creek, propagation from seed and plant division, in-situ monitoring in buffer areas, post-salvage monitoring and management.</p> <p>Expected to be easy to grow and plant out, although challenges from fungal infections during cultivation are possible. Suitable wetland habitat available. Is vulnerable to competition from taller vegetation, which will require management.</p> <p>Confidence in management success is high.</p>                                                                                                                                           | Low                      |

| Species                                                  | Locations in footprint | Regional threat status             | National threat status       | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Residual Level of Effect |
|----------------------------------------------------------|------------------------|------------------------------------|------------------------------|------------------|--------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                                          |                        |                                    |                              |                  |                          |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                          |
| <i>Euchiton polylepis</i>                                | Coronation North       | Threatened – Regionally Vulnerable | At Risk – Declining          | Very High        | High                     | Very High       | <p>Management: Salvage from Coronation, propagation from seed and plant divisions, post-salvage monitoring and maintenance. In-situ management of population growing outside MP4 Project area.</p> <p>A species that is rarely grown and little is known about success in propagation. Challenges are expected from competition from exotic weeds and very particular and narrow habitat requirements (damp rock faces).</p> <p>Confidence in management success is low.</p>                                                                                                                        | Very High                |
| <i>Juncus pusillus</i>                                   | Fraser's / Innes Mills | Threatened – Regionally Vulnerable | At Risk – Naturally Uncommon | Very High        | Moderate                 | High            | <p>Management: Salvage from Central Mining Area, propagation from division of plants and seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>A small rush of damp ground and ephemeral wetlands. This species is expected to cultivate and plant out well. It requires open habitat with little competition from other plants, but tolerates modified environments such as track edges.</p> <p>Confidence in management success is high.</p>                                                                                                        | Moderate                 |
| <i>Lobelia perpusilla</i>                                | Fraser's / Innes Mills | Threatened – Regionally Vulnerable | Not Threatened               | Very High        | High                     | Very High       | <p>Management actions: Salvage from Central Mining Area, propagation from division of plants and seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>A creeping herb of open damp ground, lake margins and ephemeral wetlands. This species suffers from competition from taller vegetation. It is expected to cultivate and plant out well. Suitable habitat is anticipated around constructed ephemeral wetlands and graded pond margins.</p> <p>Confidence in management success is high.</p>                                                    | High                     |
| Dwarf greenhood orchid<br>( <i>Pterostylis tristis</i> ) | Coronation North       | Threatened – Regionally Vulnerable | At Risk – Declining          | Very High        | Moderate                 | High            | <p>Management: Salvage from Coronation, vegetation direct transfer from Coronation, post-salvage monitoring and maintenance.</p> <p>This species is very difficult to manage due to the short window of time it is above ground, the cryptic nature of plants, the reliance of soil-based fungal symbionts for survival, challenges in cultivating orchids, specific habitat requirements and dislike of competition from taller vegetation. There is a risk that VDT and salvage may cause damage to bulbs. There is much uncertainty around the ability to grow and translocate this species.</p> | High                     |

| Species                                             | Locations in footprint                                                    | Regional threat status | National threat status | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Residual Level of Effect |
|-----------------------------------------------------|---------------------------------------------------------------------------|------------------------|------------------------|------------------|--------------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                                     |                                                                           |                        |                        |                  |                          |                 | Confidence in management success for <i>Pterostylis tristis</i> is low.                                                                                                                                                                                                                                                                                                                                                                                                              |                          |
| Delicate bluegrass<br>( <i>Anthosachne falcis</i> ) | Coronation North, Frasers / Innes Mills                                   | Regionally Declining   | At Risk – Declining    | High             | Low                      | Low             | <p>Management: Salvage from Coronation and Central areas, propagation from seed and plant divisions, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>This grass is expected to grow well in propagation and establish well from translocation and planting. It is hoped that management approaches will help develop a better understanding of what makes this species flourish.</p> <p>Expectation of management success is high.</p> | Very Low                 |
| Desert broom<br>( <i>Carmichaelia petriei</i> )     | Coronation North, Golden Bar, Golden Bar Haul Road, Frasers / Innes Mills | Regionally Declining   | At Risk – Declining    | High             | Low                      | Low             | <p>Management: Salvage of plants from Coronation and Golden Bar, propagation from seed, in-situ monitoring of plants in buffers, post-salvage monitoring and maintenance.</p> <p>This species is known to suffer from recruitment failure. Herbivory is also an issue. There is a risk of root damage during salvage of plants. There is ample appropriate habitat and the species is widespread within the landholdings.</p> <p>Confidence in management success is moderate.</p>   | Low                      |
| <i>Colobanthus strictus</i>                         | Coronation North                                                          | Regionally Declining   | Not Threatened         | High             | Moderate                 | High            | <p>Management: Salvage of plants from Coronation North, propagation from seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>An inconspicuous species that may be challenging to cultivate. Vulnerable to weed invasion.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                    | High                     |
| <i>Juncus distegus</i>                              | Coronation North, Frasers / Innes Mills                                   | Regionally Declining   | Not Threatened         | High             | Low                      | Low             | <p>Management: Salvage from Coronation and Central areas, propagation from seed and plant division, in-situ monitoring of plants in buffers, post-salvage monitoring and maintenance.</p> <p>A rush species that is expected to grow and translocate well. Appropriate habitat is available and will be increased through construction of wetlands.</p> <p>Confidence in management success is high.</p>                                                                             | Very Low                 |
| New Zealand mint / hīoi                             | Coronation North                                                          | Regionally Declining   | At Risk – Declining    | High             | Low                      | Low             | <p>Management: Salvage from Coronation, propagation from seed and plant division, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p>                                                                                                                                                                                                                                                                                                         | Very Low                 |



| Species                                              | Locations in footprint       | Regional threat status        | National threat status       | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Residual Level of Effect |
|------------------------------------------------------|------------------------------|-------------------------------|------------------------------|------------------|--------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| <i>(Mentha cunninghamii)</i>                         |                              |                               |                              |                  |                          |                 | <p>Some uncertainty about how this plant will take in cultivation, but reasonably high confidence. <i>Mentha cunninghamii</i> has particular habitat requirements, preferring damp, shaded areas with little competition. Grazing may be required to keep other vegetation low.</p> <p>Confidence in management success is high.</p>                                                                                                                                                                                                                                                                 |                          |
| <i>Rytidosperma buchananii</i>                       | Coronation North             | Regionally Declining          | At Risk – Declining          | High             | Moderate                 | High            | <p>Management: Salvage from Coronation, propagation from seed and plant division, post-salvage monitoring and maintenance.</p> <p>A species that is expected to be easy to grow and survive salvage well. However there are challenges in identifying plants and low vegetation is needed (grazing is a possible solution to this).</p> <p>Expectation of management success is high.</p>                                                                                                                                                                                                            | Moderate                 |
| Wetland grass<br><i>(Agrostis pallescens)</i>        | Coronation North             | Regionally Naturally Uncommon | At Risk – Naturally Uncommon | Moderate         | High                     | Moderate        | <p>Management: Salvage from Coronation, propagation from seed and plant division, post-salvage monitoring and maintenance.</p> <p><i>Agrostis pallescens</i> requires ephemeral wetland habitat with limited competition from taller vegetation. This may be difficult to find. It is expected to grow well in propagation and survive salvage if adequate habitat is found.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                                | Moderate                 |
| <i>Brachyscome longiscapa</i>                        | Coronation North             | Regionally Naturally Uncommon | At Risk – Naturally Uncommon | Moderate         | Negligible               | Low             | <p>Management: Salvage from Coronation, propagation from seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.</p> <p>This daisy is expected to be difficult to propagate, in part because of difficulties in sourcing seed. Plants require cool, shaded open ground. Grazing may be required to manage competition from taller plants.</p> <p>Confidence in management success is moderate.</p>                                                                                                                                                              | Low                      |
| Hooker's mountain daisy<br><i>(Celmisia hookeri)</i> | Coronation North, Golden Bar | Regionally Naturally Uncommon | At Risk – Naturally Uncommon | Moderate         | Negligible               | Very Low        | <p>Management: Salvage of seedlings from Coronation, Golden Bar, Coal and Camp Creeks, propagation from seed, direct scattering of seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance of salvaged plants.</p> <p>A difficult species to cultivate. Larger plants are unlikely to survive salvage due to root damage and challenges in finding suitable deep rock crevices to plant into. Weed competition an issue. Herbivory also a challenge in open habitat. Seed scattering expected to be successful. Translocations of seedlings also expected to</p> | Negligible               |

| Species                                                            | Locations in footprint                  | Regional threat status        | National threat status | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                                                                                                                                                                                                                                            | Residual Level of Effect |
|--------------------------------------------------------------------|-----------------------------------------|-------------------------------|------------------------|------------------|--------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|                                                                    |                                         |                               |                        |                  |                          |                 | be successful. There are large populations in wider landholdings and the species is expected to recolonise habitat if browsing and weed competition managed.<br><br>Expectation of management success high.                                                                                                                                                                                                                                                     |                          |
| <i>Lagenophora pinnatifida</i>                                     | Coronation North                        | Regionally Naturally Uncommon | Not Threatened         | Moderate         | Moderate                 | Moderate        | Management: Salvage from Coronation, propagation from seed and plant division, post-salvage monitoring.<br><br>This species may be difficult to cultivate from seed. Suitable damp and open habitat may be hard to find and weed incursion may be an issue.<br><br>Confidence in management success is moderate.                                                                                                                                                | Moderate                 |
| <i>Poa pusilla</i>                                                 | Coronation North                        | Regionally Naturally Uncommon | Not Threatened         | Moderate         | Moderate                 | Moderate        | Management: Salvage from Coronation, propagation from seed and plant divisions, post-salvage monitoring and maintenance.<br><br>This species is expected to propagate and translocate well. Finding suitable habitat is biggest challenge. Planting will need to be into rock environments, which poses challenges.<br><br>Confidence in management success is moderate.                                                                                        | Moderate                 |
| <i>Shawia bullata</i><br>(formerly <i>Olearia bullata</i> )        | Coronation North, Frasers / Innes Mills | Regionally Naturally Uncommon | Not Threatened         | Moderate         | Low                      | Low             | Management: Salvage from Coronation, Central, Coal and Camp Creeks, propagation from seed and cuttings, post-salvage monitoring and maintenance.<br><br>A shrubby daisy species that can be challenging to cultivate. Woody roots may also be sensitive to damage during salvage. Adequate suitable habitat is found at gully heads and in riparian margins. The species is common in the local landscape.<br><br>Confidence in management success is moderate. | Low                      |
| <i>Oxalis rubens</i>                                               | Coronation North                        | Regionally Data Deficient     | Not Threatened         | Moderate         | Low                      | Low             | Management: Salvage from Coronation, propagation from seed and plant divisions, post-salvage monitoring and maintenance.<br><br><i>Oxalis rubens</i> is expected to be easy to grow and plant, and to survive translocation. Appropriate habitat is available around the constructed tors, and in rocky, dry vegetation up to 1m tall. The species resents competition from weeds.<br><br>Confidence in management success is high.                             | Very Low                 |
| Porcupine shrub<br>( <i>Melicytus</i> aff. <i>alpinus</i> 'Otago') | Golden Bar                              | Regionally Data Deficient     | Data Deficient         | Moderate         | High                     | Moderate        | Management: Salvage from Golden Bar, propagation from seed, in-situ monitoring of plants in buffer areas, post-salvage monitoring and maintenance.<br><br>A very slow growing shrub, which requires further study to determine if this is distinct from <i>Melicytus alpinus</i> . Faces risks from herbivory of seedlings and                                                                                                                                  | Moderate                 |

| Species | Locations in footprint | Regional threat status | National threat status | Ecological Value | Magnitude of effect (ED) | Level of Effect | Management and confidence in success                                                                                                                                                                                                           | Residual Level of Effect |
|---------|------------------------|------------------------|------------------------|------------------|--------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
|         |                        |                        |                        |                  |                          |                 | <p>damage to roots during salvage. No obvious habitat is available for replanting this species/tag entity, which requires areas of rock break-down. Artificial tors may provide this.</p> <p>Confidence in management success is moderate.</p> |                          |

## 2.4 Impact and receiving sites

Impact sites within the Project footprint are all located adjacent to existing mine pits or infrastructure, with the exception of the Golden Bar Haul Road, which is roughly parallel to the existing public road. Existing indigenous vegetation within impact sites comprises snow tussock, dry shrubland and wetlands, including ephemeral wetlands. A total of 50 TAR and locally uncommon plant species have been recorded within the Project footprint and buffer areas.

Compensation sites, which are to receive planting, protection and/or translocation of salvaged plants, are located within the OGNZL landholdings and represent a variety of habitat types and landscape features typical of the Macraes Ecological District (ED).

**Table 7. Summary of MP4 Indigenous Terrestrial Vegetation Losses and Proposed Offset/Compensation Actions.**

| Ecosystem            | Direct quantity lost to MP4 (excluding 20 m buffer)                                                                                           | Offset/compensation actions                                                                                                                                                                                                                                                                                                           |
|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Snow tussock         | Coronation North: 55.41 ha<br>Central Mining: 1.60 ha<br>Golden Bar and Haul Road: 18.41<br><b>Total: 75.42 ha</b>                            | 175 ha revegetation planting at Mt Highlay and protection of 354.91 ha of existing snow tussockland within: <ul style="list-style-type: none"> <li>• 18.66 ha at Mt Highlay</li> <li>• 336.25 ha at MEAA</li> </ul>                                                                                                                   |
| Dry shrubland        | Coronation North: 2.09 ha<br>Central Mining: 0.05 ha<br>Golden Bar and Haul Road: 0.08 ha<br><b>Total: 2.22 ha</b>                            | 50 ha revegetation planting within the Cranky Jim's Link covenant, and protection of 66.1 ha of existing dry shrubland within: <ul style="list-style-type: none"> <li>• 6.58 ha at Cranky Jim's Link</li> <li>• 0.74 ha at Mt Highlay</li> <li>• 58.78 ha at MEAA</li> </ul>                                                          |
| Tors / Rock outcrops | Coronation North: 0.13 ha<br>Central Mining: 0.00 ha<br>Golden Bar and Haul Road: 0.03 ha<br><b>Total: 0.16 ha</b>                            | 15.05 ha revegetation planting at Mt Highlay, and protection of 31.59 ha of tors / rock outcrop within: <ul style="list-style-type: none"> <li>• 0.56 ha Cranky Jim's Link</li> <li>• 4.07 ha Mt Highlay</li> <li>• MEAA (26.96 ha)</li> </ul>                                                                                        |
| Wetlands             | Coronation North: 2.62 ha (plus 0.73 in buffer through dewatering)<br>Central Mining: 0.78 ha<br>Golden Bar: 1.49 ha<br><b>Total: 5.62 ha</b> | Compensation includes the protection of 10.37 ha of existing wetlands, the creation of 1.14 ha of ephemeral wetlands and restoration and enhancement of 13.73 ha of wetlands across: <ul style="list-style-type: none"> <li>• 5.81 ha Cranky Jim's Link</li> <li>• 1.94 ha Murphys MEEA</li> <li>• 5.98 ha Macraes Central</li> </ul> |

Note: \* Direct loss and areas within 100m buffer have been combined for wetlands due to the impact of dewatering on wetlands within buffer areas.



## 2.5 Ecological context

The Macraes ED is one of two ecological districts that comprise the Lammerlaw Ecological Region. The district was once characterised by extensive dryland forest and shrubland communities, interspersed with montane short tussockland transitioning into subalpine tall tussockland (Bibby 1997). Areas of mixed hardwood and podocarp forest, kānuka woodland, and Coprosma–flax scrub were also historically widespread across the district. However, much of this original vegetation cover has been profoundly altered over the past c. 750 years, primarily through repeated anthropogenic burning associated with human land use practices (McGlone et al. 1995; Whitaker 1996). Following European settlement in the 1850s, large areas were further modified through repeated burning, gold mining, cultivation, oversowing, and fertiliser application, resulting in the widespread establishment of exotic pasture systems (Thompson 1949, Whitaker 1996).

Today, the Macraes ED represents a highly modified landscape, with approximately 75% of the district dominated by exotic vegetation types, particularly improved pasture. The remaining indigenous vegetation is fragmented and largely confined to narrow-leaved snow tussock, copper tussock wetlands, and dry shrubland communities, with only very small and isolated remnants of original forest ecosystems persisting across the district (Bibby 1997; Thorsen pers. obs.).

Despite this extensive modification, the vegetation of the Macraes ED is considered botanically diverse and supports a high number of plants classified as ‘Threatened’ or ‘At-Risk’ (TAR). This is supported by surveying of the proposed works extent, which identified 48 TAR plant species within the footprint and buffer areas of the works extent. The Macraes area has been recommended to the New Zealand Plant Conservation Network as an ‘Important Plant Area’ due to the high diversity of threatened and uncommon plants and as a stronghold for a number of TAR species (Thorsen, 2008). Some of these species are only known to occur within this Ecological District.

Threatened environment classification mapping of the district (available on Manaaki Whenua Landcare Research) indicates that all land within the proposed project footprint falls within four classifications: environments with less than 10% indigenous cover left, those with 10-20% indigenous cover left, those with 20-30% indigenous cover left and those with up to 30% indigenous cover left, but no more than 10% of this is protected.

Wetland ecosystem types present in the ED include copper tussock wetlands (WL16), sedgeland wetlands (WL22), seeps, herbaceous wetlands and ephemeral wetlands. Across Aotearoa New Zealand 90% of wetlands have been lost since European arrival, and these losses continue (Godsen, Kelly & McIntosh, 2026). Ephemeral wetlands, in particular, are classified as threatened ecosystems and are known to support a fifth of our indigenous vascular flora. A large proportion of these plants are classified as TAR species. Snow tussock and dry shrubland vegetation communities are also known to support a diversity of TAR herbs, grasses and woody plants within the Macraes ED.

### 3 METHODS: NON-TAR VEGETATION AND FLORISTIC COMMUNITY MANAGEMENT

Snow tussock, dry shrubland and schist rock outcrop communities comprise 90.01 ha, 3.06 ha and 0.26 ha respectively, within the conservatively defined Project impact area. This includes potential edge effects extending up to 20 m from the direct disturbance footprint (Bioresearches, 2026f). Although these communities have developed following a long history of human modification and do not represent the original ecosystem types of the Macraes Ecological District, they are indigenous vegetation communities that support high plant diversity, including numerous Threatened and At-Risk species. In addition, these plant communities provide habitat for indigenous fauna, including TAR lizard and invertebrate species, several of which are endemic to Otago. Snow tussock and rock outcrop communities are therefore assessed as having very high ecological values. Dry shrubland (grey scrub) vegetation is assessed as having a moderate ecological value.

Three complementary methods are proposed to address the loss of snow tussock and dry shrubland communities: vegetation direct transfer (VDT), salvage of individual high-value non-TAR plants, and planting across a total of 225 ha to represent the floristic communities affected by the Project (Table 7). The loss of rock outcrop vegetation is addressed through salvage of individual high-value non-TAR plants (including bryophytes and lichens) and the planting of 15.05 ha of rock outcrops at Mt Highlay. Salvage of plants from rock outcrops is more challenging than other vegetation communities due to the risk of root damage to plants growing in rock cracks and the challenges of replicating exact micro climates of each individual rock outcrop. Salvage from rock outcrops is anticipated to have a high failure rate and is therefore additional to modelled compensation actions.

The proposed planting programme is described in detail in the Residual Effects Restoration Plan (Bioresearches, 2026n), with a summary of the relevant actions provided in the following sections. This report focuses on the methods and requirements for VDT and plant salvage.

The slow growth of many key plant species and extended development trajectories for these plant communities mean that compensation requires restoration across areas substantially larger than those affected. TAR species will be incorporated into restoration planting schedules as far as practicable. However, because propagation and establishment cannot be assured for all species, salvage and relocation of indigenous vegetation and Threatened and At Risk flora are key measures for retaining affected floristic values and managing the consequences of habitat loss.





**Figure 4: Example of snow tussock flora within the Coronation MP4 Project footprint**



**Figure 5: Example of grey shrubland and tussock vegetation within the Golden Bar Project footprint**





**Figure 6: Example of rock outcrop with associated vegetation in Coronation North**

### 3.1 Revegetation planting

Revegetation planting of dry shrubland and snow tussock, along with rock outcrop planting and targeted enrichment planting of existing indigenous vegetation, is proposed as part of compensation measures to address the loss of terrestrial vegetation resulting from the Project. This will require a total of 175 ha of snow tussock community planting within the Mount Highlay covenant, 15.05 ha of rock outcrop planting (as a 5 m buffer around existing rock outcrops) at Mt Highlay and 50 ha of dry shrubland revegetation and enhancement planting within the Cranky Jim's Link covenant.

Planting details, including species lists and methods are detailed in the MP4 Residual Effects Terrestrial Restoration Plan (Bioresearches, 2026n). Maps showing the location of the proposed planting can be found below.



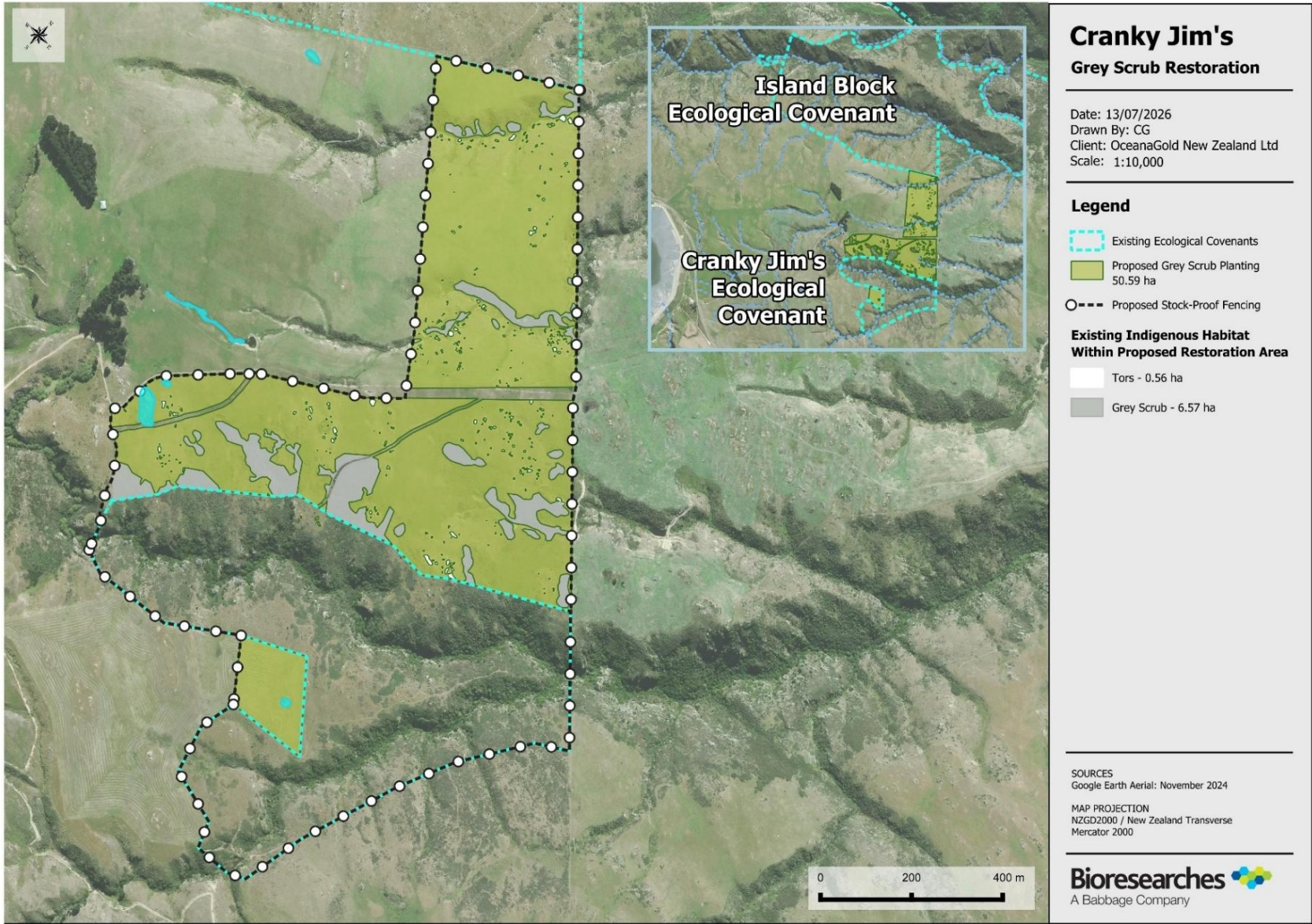


Figure 7: Map showing location of proposed restoration planting at Cranky Jim's Covenant



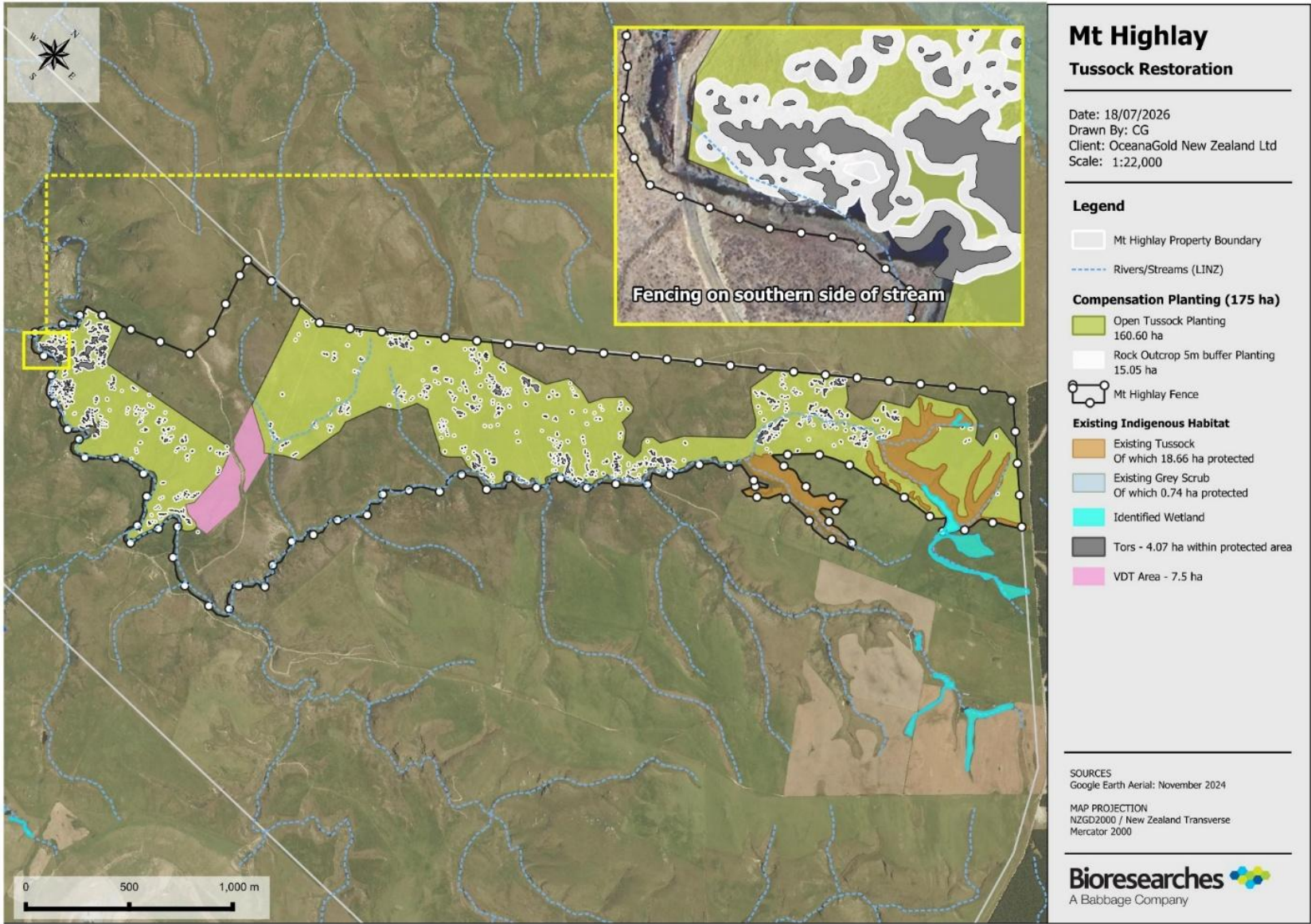


Figure 8: Map showing location of proposed restoration planting at Mt Highlay

## 3.2 Vegetation Direct Transfer (VDT)

Vegetation Direct Transfer (VDT) is a salvage technique where sections of vegetation and topsoil are cut from the ground and transferred as entire blocks directly to a receiving environment. This process is intended to transfer full plant communities, as well as any microbial soil communities and small fauna within the plants, from one location to another. Within New Zealand this process has largely been used for mine rehabilitation on the West Coast.

VDT is proposed as a salvage technique for snow tussock floristic communities growing within the MP4 Project areas. This shall be applied to no less than 10% of the direct impact area at Coronation North, while all of the remaining high-density snow tussock shall be translocated through VDT from the Central Mining, and Golden Bar Project areas (estimated to be 0.67 and 7.5 ha respectively). This is intended as a salvage of a vegetation community (rather than specific species) and to provide additional confidence that cryptic or seasonally ephemeral species growing within the tussock are retained.

It is recognised that there is inherent uncertainty in using this technique, as VDT practice within New Zealand has largely been on the West Coast, where different climate and soil conditions occur. Removing vegetation and soil from sloping areas may be difficult. Training of operators and following best practice guidelines for this technique is important to achieving the best outcome for VDT.

Planting and translocations, including VDT, are all be done under the supervision of a qualified botanist with strong experience of the flora of the Macraes' ED. VDT must also be done under supervision of a person(s) experienced in this technique, who can provide guidance on technical detail.

All machine operators involved in VDT must receive thorough training in this technique and the objectives of vegetation transfer before starting work. Operators must show a good understanding of methods to improve the success of VDT. Worker engagement with this process is vital to achieving successful plant establishment through VDT.

### 3.2.1 Coronation North VDT

It is proposed to VDT 5.5 ha of snow tussock from the Coronation North Project area, representing 10% of the tussock grassland within this site. This should target areas of high-quality tussock as identified and ground truthed by a suitably qualified botanist and indicatively mapped in Figure 9. Vegetation transferred from Coronation North is to be relocated to the Mt Highlay covenant. This must be in an area of low-gradient that is comparable to the topography the vegetation is to be removed from. A map showing the proposed salvage locations, as well as the designated transfer site, can be found in Figure 9.

### 3.2.2 Macraes Central and Golden Bar VDT

A further 0.67 ha of snow tussock from the Central Mining area, and 0.95 ha from Golden Bar shall also be translocated using VTD, representing all of the identified high-value tussock grassland within the impact sites. These sections of transferred vegetation shall also be relocated to the Mt Highlay covenant. Vegetation removed from these sites must be transferred to valley and hill slopes of moderate gradient, to match the topography of the donor sites. Maps demonstrating the location of VDT salvage and transfer locations, for the Central Mining area and Golden Bar, can be found in Figure 10 and Figure 11 respectively.



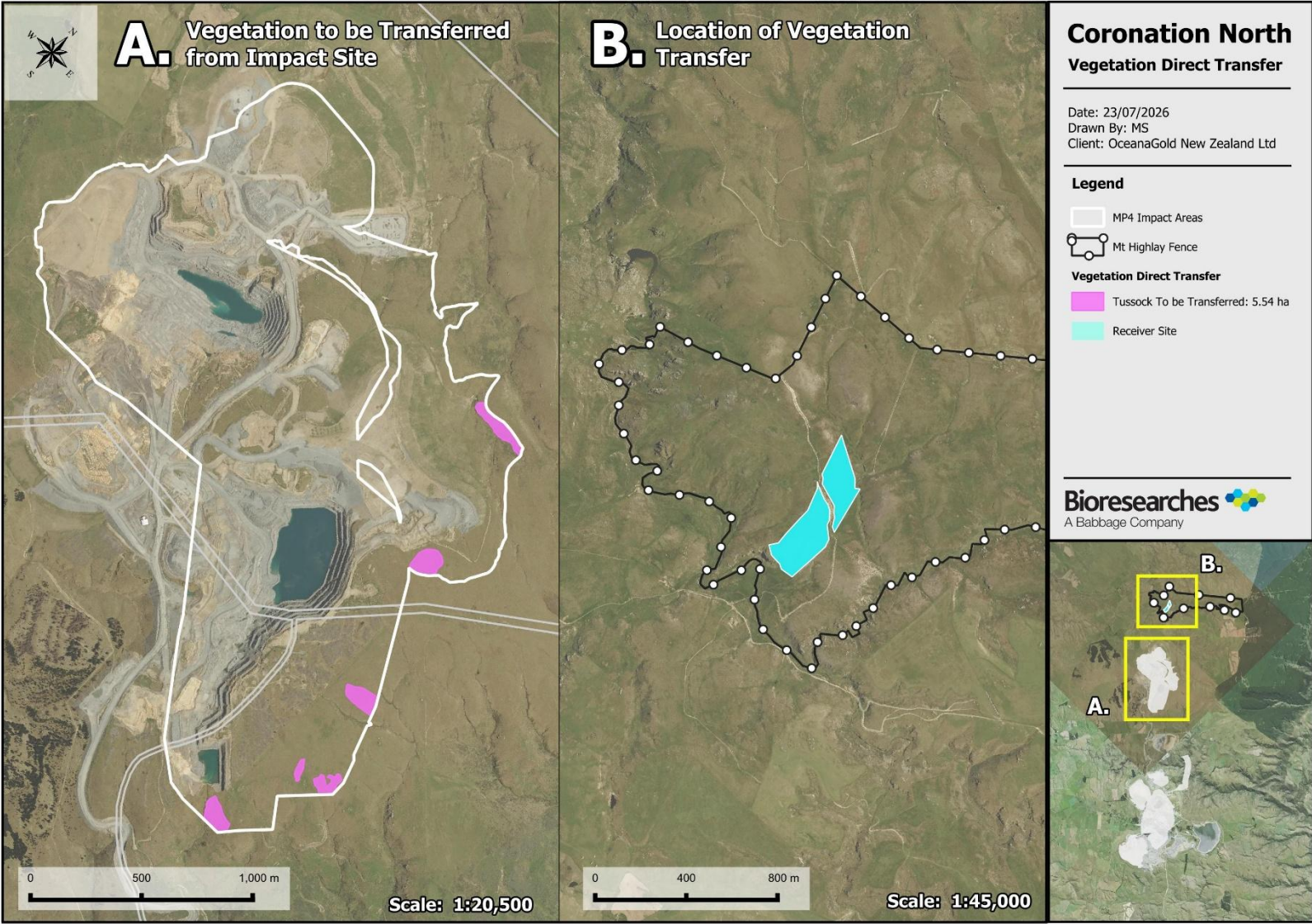


Figure 9: Map of indicative locations of VDT from Coronation North area to Mt Highlay



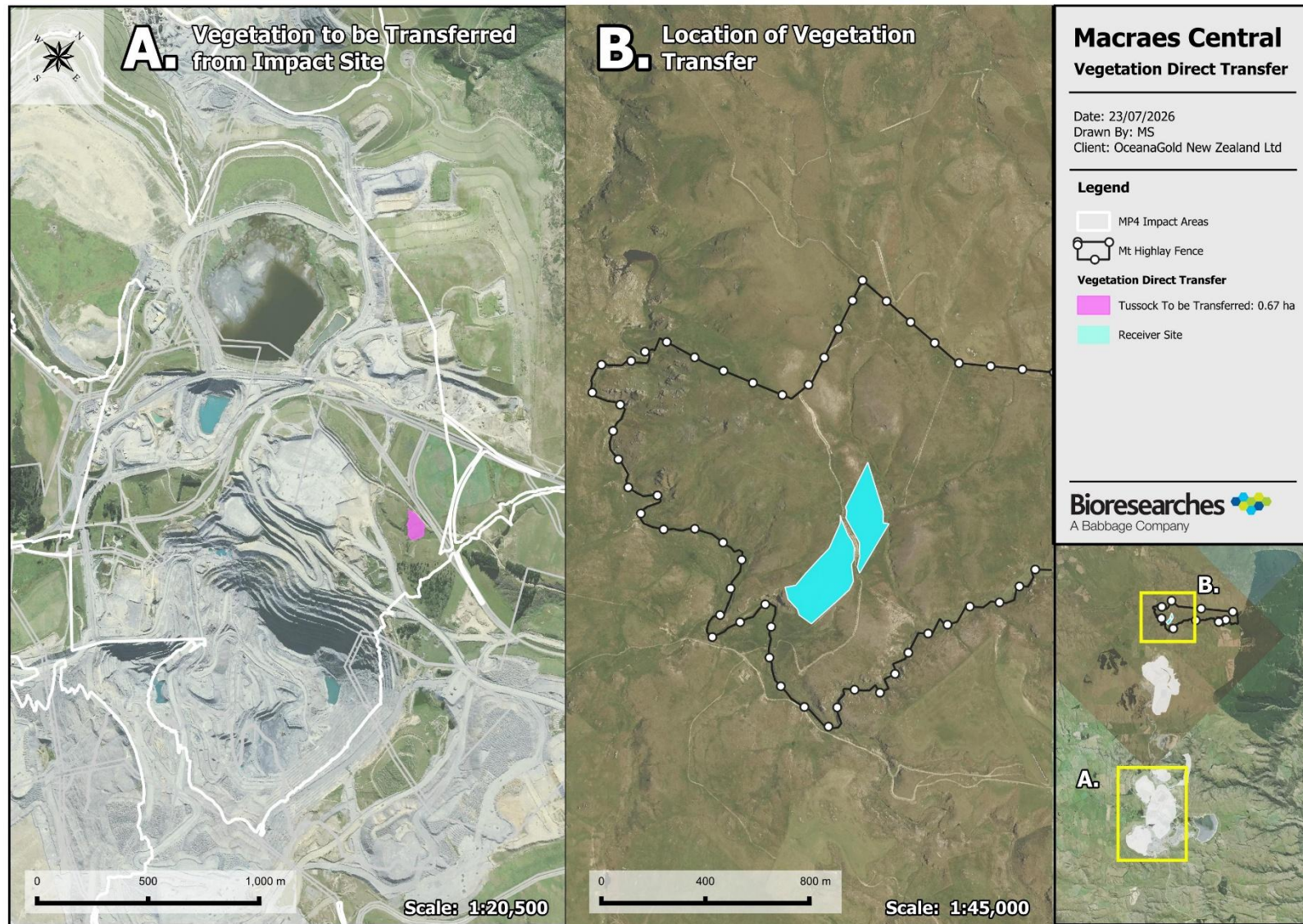


Figure 10: Map of VDT locations from the Central Mining area and indicative receiver location in Mt Highlay



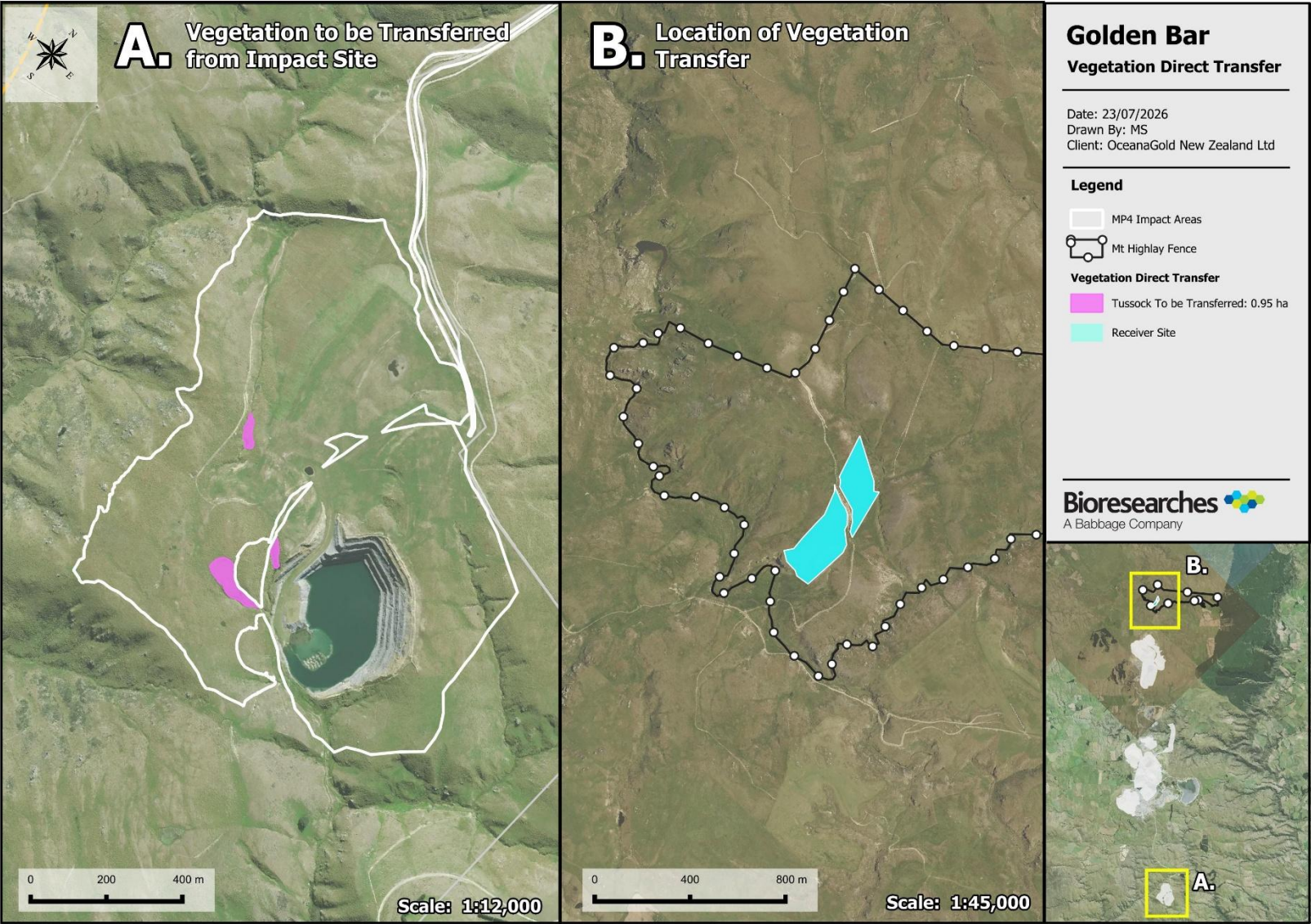


Figure 11: Map of VDT locations in Golden Bar and indicative receiver area within Mt Highlay

### 3.2.3 Site preparation for VDT

#### Donor Sites

Sites from which vegetation is to be removed and transferred must be marked out prior to VDT beginning. Areas of highest indigenous plant diversity and best-quality tussock should be preferentially selected. This must be done by the Project botanist using stakes, waratahs or other temporary demarcation to ensure that suitable vegetation is identified and clearly demarcated. Within the Coronation North area, this must include at least one area where the orchid *Pterostylus tristis* has been identified as present.

Once marked, machine operators and any other persons expected to be involved in the VDT process must meet with the botanist on site to discuss each area and agree on the best approach. This discussion must involve how to prevent machinery from damaging or tracking over vegetation to be transferred and where temporary roadways and turning bays shall be located. Ecological values of the vegetation to be transferred and the intended outcomes of VDT shall also be discussed.

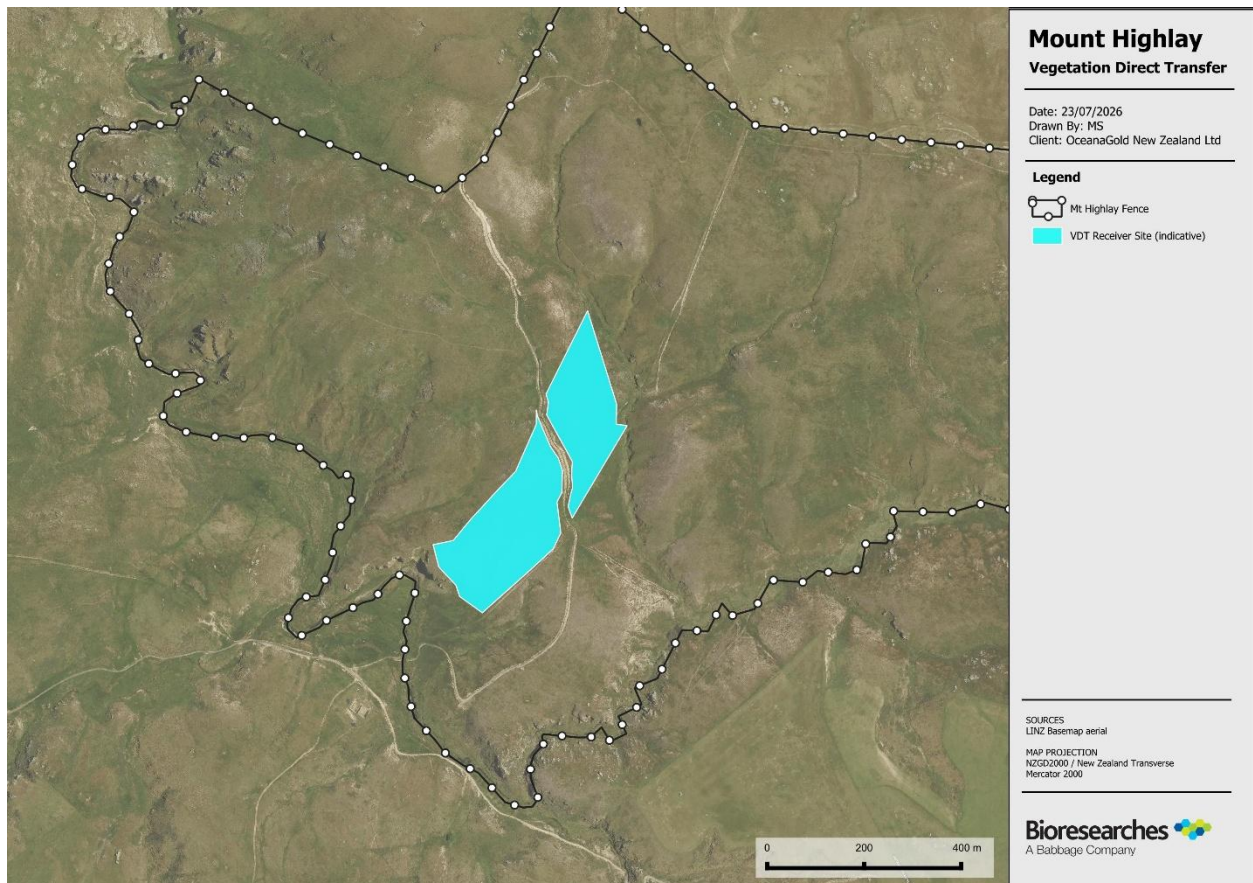
#### Receptor Sites

Prior to VDT commencing, receptor sites must:

- Have vehicle accessways and turning bays confirmed and marked out to prevent driving over valuable vegetation in the nearby landscape;
- Have a systematic method of VDT delivery agreed upon (between the Project botanist and machine operators) to create well-fitted blocks of turf without requiring vehicles to drive over newly laid areas; and
- Have soil scraped back to a depth equal to that of the turf blocks so that they can be laid flush with the surrounding ground surface.

The depth of soil scraping may need to be adjusted once VDT begins to ensure the best depth is achieved to create a flush continuous ground surface.





**Figure 12: Map of indicative VDT receptor site at Mt Highlay**

### 3.2.4 VDT methods

VDT methods have been based on those developed and used with success in Stockton and Denniston Plateaux (Rodgers *et al.*, 2011). These methods and their recommendations for achieving best establishment success should be followed closely. As Macraes Flat is an ecological system with different climate, soil and vegetation to the locations where this technique was refined, it will be important to regularly assess the process and adjust the technique where any issues arise. Key considerations before, during and after VDT include the following:

- Salvage of all TAR and non-TAR plants from the areas of VDT and any accessways must be complete before VDT begins;
- VDT timing should be late autumn (May – June) to ensure best conditions for root growth and plant establishment;
- Machine operators must be specially trained and dedicated to this restoration technique, with a good understanding of purpose and methods to improve success;
- Excavators must be fitted with specialised mechanical buckets 1m wide and 1m deep with flat base and cutting front edge to be used to cut and lift sods;
- VDT bucket dimensions must be matched at pick-up and lay-down sites to avoid damage to sods;
- Sods must be cut with an even thickness of soil (400 – 500mm) and sharp/smooth edges;
- Sods must be cut systematically from front edge of donor site to back, to avoid any vehicles driving over vegetation to be transferred;



- A pair of excavators must be used to load, unload and place sods for efficiency (so constant loading is possible);
- Sodds must not be compressed during loading, unloading and transportation; wet sodds tend to have less friction and better outcomes;
- Sodds should only be handled once during loading and once during unloading (to limit damage to sod integrity);
- Flat truck decks are to be used to transport sodds which must be arranged in a single layer on the tray;
- Low haulage speeds are to be used to limit shaking and minimise damage to VDT sodds;
- Sodds are to be laid in the receiving scrape in a tight, contiguous mat, with edges in close contact (avoiding gaps, overlapping, flaps or bunching);
- Sodds to be laid from back of receiver site to front, to avoid any vehicles driving over newly laid sodds;
- Edges must be well covered with rock to prevent root exposure and soil drying (this may also create additional habitat for lizards);
- Sodds must be cut, lifted and laid on the same day;
- Sodds must be watered (using a drip line, sprinkler, or spray fitting from water truck) immediately after being laid to help settle roots and soil into the receiving scrape. It is recommended to allow approximately 25L per m<sup>2</sup> to be watered;
- Unless rain of more than 100mm is experienced within a week of VDT being laid, sodds must be regularly watered. This shall be repeated once weekly for two months after laying;
- VDT must be fenced to permanently exclude stock once transfer of vegetation is complete;
- VDT receptor sites must receive regular pest plant control (Bioresearches, 2026n) and pest animal (Alliance Ecology, 2026) control and monitoring.

### 3.3 Salvage of not-Threatened or-At Risk plants

Salvage of high-value non-TAR plants is required to manage effects of the MP4 Project on:

- Taoka / culturally significant plant populations
- Plant species known to support TAR invertebrates within the Macraes ED
- Rock outcrop vegetation, including bryophytes (mosses) and lichens
- Indigenous plants occurring within the footprint of the Murphy's predator-proof fence. Including areas subject to temporary disturbance during fence construction, and wetland and gully-head plants that may be affected by construction activities or associated changes in local hydrology.

Salvage of non-TAR plants complements the more extensive TAR flora salvage programme described in Section 4.3.

#### 3.3.1 Salvage methods for non-TAR plants

##### Pre- salvage

- Appropriate iwi engagement must begin a minimum of two months before salvage, including discussions about how matauraka Māori is to be incorporated into taoka species salvage and opportunities provided for iwi to be involved and collect plant material where appropriate;
- Plant species to be salvaged must be surveyed and marked out by the Project botanist (or

ecologist / entomologist for TAR invertebrate host salvage) using stakes or waratahs no more than two months before salvage;

- Plants for salvage must represent as wide a range of habitats and distribution as possible within the Project footprint for each species (rather than selecting from one area);
- Minimum numbers of each species to be salvaged must be determined (all plants for species with populations of 100 plants or less in the works footprint; a minimum of 200 plants, or 10% of the population within the project footprint for species with larger populations, whichever is greater);
- The Project botanist must identify suitable habitat and mark exact translocation locations for each salvage species immediately prior to salvage. Where possible this should include a minimum of five locations per species;
- Weed and pest animal control of receiver sites must be done no less than one month prior to salvage (as per Bioresearches 2026n and Alliance Ecology 2026);

### Salvage

- Each plant (or clump/mat of plants) must be dug out (by hand, or with small machinery), including the entire root mass, leaving a minimum of 30 cm buffer of soil around the entire root mass;
- Any significant weeds must be carefully hand-weeded from root balls, taking care to minimise soil disturbance;
- Soil clump/roots of plants must be wrapped in wetted hessian;
- Handling of each plant should be minimised throughout the salvage process to limit disintegration of soil around roots;
- Plants must be transported to translocation sites on their sides (unless otherwise directed by consultant botanist), supported to prevent movement during transfer and in a single layer (not stacked, or compressed);
- Vehicles transporting salvaged plants must drive at reduced speed to limit soil disturbance around root balls;
- Plants must be planted into translocation sites the same day they are salvaged, under botanist supervision;
- Rock outcrops must be salvaged immediately before and during deconstruction, under botanist supervision;
- Planting sites for TAR insect host species must allow for close physical contact between salvaged plants and local populations of the same species to provide opportunities for invertebrate movement, also discussed in Section 3.3.2;
- Plants must be planted into receiver sites so that the soil around their roots is slightly below the surrounding soil level and each is gently firmed in to the ground;
- Translocation sites must be fenced to permanently exclude stock at the time of salvage;
- Adaptive management approaches must be applied to all plant salvages, following best practice botanical and ecological advice.

**Post-salvage:** All plants must be monitored to assess survival and respond to any establishment issues, discussed in further detail within Section 7.

### 3.3.2 TAR insect host plant salvage

Plants and insects often have very specific relationships and each may be dependent on a single other species for their survival. A number of TAR insect species have been identified as potentially present within the Project area. As part of management measures to reduce impacts on these invertebrates it is proposed to salvage their host plant species, where this is known. This follows the requirements to manage impacts on TAR invertebrates as set out in the Invertebrate Management & Monitoring Plan (Bioresearches, 2026i).

Eight indigenous species and genera required to be salvaged for the purposes of managing impacts on TAR invertebrates, which include:

- *Chionochloa* spp.
- *Festuca novae-zelandiae*
- *Poa* spp.
- *Ranunculus* spp.
- *Senecio* spp.
- *Aciphylla subflabellata*
- *Carmichaelia* spp.
- *Muehlenbeckia* spp.

Several of these genera are extremely widespread across the landscape at Macraes, including within the project footprint. For *Chionochloa*, *Festuca*, *Poa* and *Muehlenbeckia* species a proportional salvage approach should be taken to ensure that a minimum of 10% of the population of each is salvaged across the whole site. This may be achieved in part using VDT, if supported and guided by the project entomologist. It will be important to distribute salvage efforts widely for these species to ensure the greatest chance of capturing plants hosting TAR invertebrates. Ground truthing and marking of appropriate plants for the purpose of TAR insect management must be done by the project ecologist or entomologist as the first step in salvage of these plants. This must be done at least six months before the first vegetation clearance begins.

As the footprint will be disturbed in stages, locations of TAR insect host plants to be salvaged should be marked up by the project botanist / entomologist before each stage is cleared. This must be shared with OGNZL and a plan for TAR host plant salvage developed for each stage of clearance. Proportions of species salvage should be equal across each stage.

For those TAR invertebrates that are generalists, or for which no host species is known, salvage of dense snow tussock through VDT at Golden Bar, Central Mining area and Coronation North is hoped to provide for the survival of various host plants, in complement to the broad planting of a wide range of shrub, grassland and herbaceous plant species.

A list of management actions for different TAR invertebrate host plants is given below. Adaptive management approaches must be applied during all salvages to achieve best ecological outcomes for TAR invertebrates.



**Table 8: Table listing identified indigenous host flora species for TAR invertebrates within the project footprint**

| Plant Species                                                                                                                                        | TAR Invertebrate Species                              | Compensation Actions                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tussock: <i>Chionochloa rigida</i>, <i>C. rubra</i> subsp. <i>cuprea</i>, <i>Festuca novae-zelandiae</i>, <i>Poa cita</i>, <i>P. colensoi</i></b> | <i>Orocrambus sophistes</i>                           | <ul style="list-style-type: none"> <li>VDT of snow tussock (including <i>C. rigida</i>, likely including <i>F. novae-zelandiae</i>, <i>P. cita</i> and <i>P. colensoi</i>)</li> <li>Planting of <i>C. rigida</i>, <i>C. rubra</i> subsp. <i>cuprea</i>, <i>F. novae-zelandiae</i>, <i>P. cita</i> and <i>P. colensoi</i></li> </ul>         |
| <b>Herbs in open areas</b>                                                                                                                           | <i>Agrotis admirationis</i>                           | <ul style="list-style-type: none"> <li>VDT of snow tussock (with associated herbs)</li> <li>Planting of ephemeral wetlands</li> </ul>                                                                                                                                                                                                       |
| <b><i>Ranunculus</i>, <i>Senecio</i></b>                                                                                                             | <i>Asaphodes recta</i>                                | <ul style="list-style-type: none"> <li>VDT of snow tussock (likely including plants of <i>R. foliosus</i> from Coronation and <i>S. glomeratus</i> from Central)</li> <li>Planting of <i>S. dunedinensis</i>, <i>R. amphitrichus</i>, <i>R. ternatifolius</i></li> <li>Salvage of <i>Ranunculus</i> from wetlands and grasslands</li> </ul> |
| <b><i>Aciphylla subflabellata</i></b>                                                                                                                | <i>Dasyuris partheniata</i>                           | <ul style="list-style-type: none"> <li>Salvage of individual plants from proposed works footprint</li> <li>Propagation and planting of plants within covenanted areas</li> </ul>                                                                                                                                                            |
| <b><i>Senecio</i> spp.</b>                                                                                                                           | <i>Nyctemera annulata</i>                             | <ul style="list-style-type: none"> <li>VDT of snow tussock (likely including plants of <i>S. glomeratus</i> from Central)</li> <li>Planting of <i>S. dunedinensis</i></li> </ul>                                                                                                                                                            |
| <b><i>Carmichaelia</i> spp.</b>                                                                                                                      | <i>Pasiphila</i> sp. A (NZAC 04285480 "Carmichaelia") | <ul style="list-style-type: none"> <li>Salvage of individual <i>Carmichaelia</i> plants</li> <li>Planting of <i>C. crassicaulus</i> subsp. <i>crassicaulis</i>, <i>C. petriei</i> and <i>C. corrugata</i></li> </ul>                                                                                                                        |
| <b><i>Senecio</i> species</b>                                                                                                                        | <i>Patagoniodes farinaria</i>                         | <ul style="list-style-type: none"> <li>VDT of snow tussock (likely including plants of <i>S. glomeratus</i> from Central)</li> <li>Planting of <i>S. dunedinensis</i></li> </ul>                                                                                                                                                            |
| <b><i>Carmichaelia</i> spp.</b>                                                                                                                      | <i>Samana acutata</i>                                 | <ul style="list-style-type: none"> <li>Salvage of individual <i>Carmichaelia</i> plants</li> <li>Planting of <i>C. crassicaulus</i> subsp. <i>crassicaulis</i>, <i>C. petriei</i> and <i>C. corrugata</i></li> </ul>                                                                                                                        |
| <b><i>Carmichaelia</i> spp.</b>                                                                                                                      | <i>Theoxena scissaria</i>                             | <ul style="list-style-type: none"> <li>Salvage of individual <i>Carmichaelia</i> plants</li> <li>Planting of <i>C. crassicaulus</i> subsp. <i>crassicaulis</i>, <i>C. petriei</i> and <i>C. corrugata</i></li> </ul>                                                                                                                        |
| <b><i>Muehlenbeckia</i> spp.</b>                                                                                                                     | <i>Bityla sericea</i>                                 | <ul style="list-style-type: none"> <li>VDT of narrow-leaved snow tussock (expected to contain <i>Muehlenbeckia complexa</i>)</li> <li>Planting of <i>M. complexa</i></li> </ul>                                                                                                                                                             |
| <b>Grasslands and shrublands</b>                                                                                                                     | <i>Wiseana fuliginea</i>                              | <ul style="list-style-type: none"> <li>Planting of snow tussock community</li> <li>Planting of dry shrubland ecosystems</li> <li>VDT of snow tussock</li> </ul>                                                                                                                                                                             |

Salvage of invertebrate host plants will require that translocated plants are relocated to planting sites immediately abutting existing plants of the same species to ensure that any larvae or flightless invertebrates are able to shift onto healthy neighbouring plants should the salvaged host not survive

replanting. Salvage planting locations for each plant species must be confirmed by the project botanist prior to the start of salvage and must allow for close contact of salvaged plants with local populations of the same species to provide opportunities for invertebrate movement.

### 3.3.3 Taoka / Taonga species

A number of taoka plant species (as listed in Schedule 98 of the Ngāi Tahu Claims Settlement Act 1998) are known to grow within the Project area. In order to manage impacts from the Project on the populations of these species, it is recommended that all taoka species growing in the Project footprint are salvaged and replanted. This must be within appropriate habitat in covenanted areas. Where a species is extremely widespread, complete salvage may not be practicable (for example *Wī*; *Poa cita* and *Pātōtara*; *Styphelia nesophila*). In this instance a minimum of 200 individual plants should be salvaged, or 10% of the estimated population within the clearance area, whichever is greater.

Schedule 98 of the Ngāi Tahu Claims Settlement Act (1998) has been used in this document to reference taoka species, but we note that additional species may also be considered taoka and this can only be defined by Ngāi Tahu. Consultation with local iwi about taoka plants is essential before vegetation clearance begins. This should confirm all species of significance to ensure that any species that may not be included in this document or Schedule 98 (for example *Celmisia hookerii* which was collected for cultural harvest during a 2025 salvage) are noted as taoka. This document applies to any additional species that may be added following discussion with iwi.

Vegetation clearance is expected to result in mortality of some taoka species. Where loss of taoka species is anticipated, the opportunity to be present before or during clearance shall be given and plant material shall be made available to local iwi for use.

Consultation with local iwi representatives must be undertaken prior to vegetation clearance and salvage to ensure that any specific matauranga Māori management measures are able to be implemented. It is essential that adequate notice is given for this to enable full and respectful engagement and a practical ability to respond. Adaptive management of taoka species must be applied to all salvages and local iwi must be involved in and agree to any decisions that trigger changes to management of taoka plants.

As well as taoka species to be salvaged, additional taoka plant species have been included in compensation planting plans where they are suitable to the habitat type. This is anticipated to return many species to an environment from which they have been extirpated. The table below sets out taoka species to be salvaged as well as those that are included in compensation planting schemes as part of this proposal. Note that species identified for salvage have been listed based on a conservative likelihood of their presence within the Project footprint, but this must be confirmed as part of the pre-salvage survey of any area. Taoka species should not be removed from buffer areas as this introduces unnecessary risk to plants that are expected to persist in their natural habitat.

**Table 9: List of taoka species (as listed in Schedule 98 of the Ngāi Tahu Claims Settlement Act 1998), either identified within the works footprint and proposed to be salvaged, or included within restoration plantings as part of the MP4 project.**

| Te Reo Name | Scientific Name                 | Present within Footprint; to be Salvaged | Planting |
|-------------|---------------------------------|------------------------------------------|----------|
| Horoeka     | <i>Pseudopanax crassifolius</i> |                                          | ✓        |
| Kahikatea   | <i>Dacrycarpus dacrydioides</i> |                                          | ✓        |
| Kānuka      | <i>Kunzea ericoides</i>         |                                          | ✓        |
| Kāpuka      | <i>Griselinia littoralis</i>    | ✓                                        | ✓        |
| Kōhūhū      | <i>Pittosporum tenuifolium</i>  |                                          | ✓        |
| Korokio     | <i>Corokia cotoneaster</i>      | ✓                                        | ✓        |
| Koromiko    | <i>Veronica salicifolia</i>     |                                          | ✓        |
| Kōtukutuku  | <i>Fuchsia excorticata</i>      | ✓                                        |          |
| Kōwhai      | <i>Sophora microphylla</i>      | ✓                                        | ✓        |
| Mānia       | <i>Carex flagellifera</i>       | ✓                                        | ✓        |
| Mānuka      | <i>Leptospermum scoparium</i>   | ✓                                        | ✓        |
| Mataī       | <i>Prumnopitys taxifolia</i>    |                                          | ✓        |
| Pātōtara    | <i>Styphelia nesophila</i>      | ✓                                        |          |
| Raupō       | <i>Typha orientalis</i>         |                                          | ✓        |
| Rimu        | <i>Dacrydium cupressinum</i>    |                                          | ✓        |
| Taramea     | <i>Aciphylla aurea</i>          | ✓                                        | ✓        |
| Taramea     | <i>Aciphylla subflabellata</i>  | ✓                                        | ✓        |
| Tī kōuka    | <i>Cordyline australis</i>      |                                          | ✓        |
| Toatoa      | <i>Phyllocladus alpinus</i>     |                                          | ✓        |
| Toetoe      | <i>Austroderia richardii</i>    | ✓                                        | ✓        |
| Tōtara      | <i>Podocarpus laetus</i>        |                                          | ✓        |
| Tutu        | <i>Coriaria</i> spp.            | ✓                                        |          |
| Wī          | <i>Poa cita</i>                 | ✓                                        | ✓        |
| Wīwī        | <i>Juncus distegus</i>          | ✓                                        | ✓        |
| Wīwī        | <i>Juncus edgariae</i>          | ✓                                        | ✓        |
| Wīwī        | <i>Juncus pusillus</i>          | ✓                                        | ✓        |
| Wharariki   | <i>Phoridium cookianum</i>      | ✓                                        | ✓        |



### 3.3.4 Salvage of rock outcrop vegetation communities

Ecological communities associated with rock outcrops have been assessed as having very high ecological values. Rocks can be refugia for plant species requiring particular shade, shelter, or moisture conditions which have otherwise been lost as the wider environment has become modified from a shrub and forest ecosystem to one that is now predominantly open grassland. Rock outcrops are also expected to support a range of bryophyte and lichen species, which in turn may provide food and habitat for indigenous invertebrates.

Because rock outcrops make up a proportionally small component of the different ecosystem types in the MP4 Project area, and because these are required to be deconstructed as part of lizard salvage efforts, all indigenous plants associated with rock outcrops are also required to be salvaged. This salvage must be done in two stages. The first should be completed during Autumn (or Winter if temperatures are above freezing), prior to deconstruction. This should involve the removal and translocation of soil and moss mats and any plants that can be extricated from the rocks without requiring rocks to be moved or broken apart. This must be done with care to ensure that plant removal does not cause harm to any lizards that may be present. The second stage of salvage is during lizard salvages, when rock outcrops are to be deconstructed. This salvage should remove any remaining plants, taking as much care as possible not to damage roots. Rocks with lichen or moss growing on them should also be salvaged during this time and relocated to translocation sites, ensuring that they are replaced with a similar orientation to that they were originally found in and are not stacked.

The salvage of plants from rock outcrops is expected to have a high rate of failure due to the potential for root damage and the difficulty of matching conditions between salvage and translocation systems. However, as salvage is additional to modelled compensation outcomes, and as it is expected that a proportion of plants will survive (particularly smaller plants, seedlings, mosses and lichens, which will otherwise be missed from compensation actions in the wider Project), ecological benefits to this very high value ecosystem are still expected to be gained from salvages. Adaptive management approaches must be applied to the salvage of rock outcrop vegetation, following advice from the Project botanist.

## 4 THREATENED AND AT RISK FLORA: MP4 PROJECT FOOTPRINT

The Macraes ecological district supports some of the highest diversity of Threatened and At Risk (TAR) plant species in Aotearoa / New Zealand (Thorsen, 2008). A total of 48 TAR plant species have been recorded within the proposed MP4 Project area; 29 of these in the Project footprint and 19 within the 100m buffer, with a further two locally uncommon species also found within this buffer area (Table 1).

Because of the high ecological values of TAR plants and the specialised habitat needs of many of these species, individual management of each is required, under botanist guidance. Management approaches are more intensive for species growing within direct impact areas, from which individuals will be salvaged and translocated. Six high value TAR flora that also have high residual effects from the MP4 Project will require ex-situ management of an equivalent population outside the Project area to address the high level of effect on these species and the low confidence in management through salvage and propagation.

Species growing in buffer areas shall be monitored in-situ and will not be removed unless impacts from the Project are causing the plants to decline, or are expected to cause mortality. All TAR species will be propagated and planted out into appropriate habitat to increase populations growing in the Macraes ED and as a safeguard against project impacts. Ephemeral wetland creation and the establishment of an experimental grazing area will provide research opportunities to better understand how certain TAR species respond to environmental conditions and can best be rehabilitated or restored.

It is important to recognise that the success of management approaches for TAR plants is uncertain for many species because of a lack of information about many TAR plants (including cultivation requirements, planting needs, habitat specifications and threats). How individual plants will respond to the management actions proposed is uncertain, with many species known to be difficult to propagate, transplant, or demonstrating poor recruitment. Cumulative threats, such as climate change, must also be considered, as this adds complexity to how some species are responding to other causes of decline. Because of this, adaptive management approaches must be followed for each species, following consultation with the Project botanist, to achieve the best survival outcomes for each TAR species. This may require new approaches not listed in this plan to be followed, where this is expected to provide improvements to plant propagation, translocation, or survival.

Ongoing monitoring of translocated, planted and in-situ TAR plants is important to record plant responses and measure any population changes that may be caused by external factors. Cultivation of all TAR species from material on site is required to provide contingency in case salvaged plants do not survive, if plantings fail and must be reattempted, as well as to increase opportunities for new populations of each species to be established within protected areas. Sourcing material from plants within the MP4 Project area is important so that the genetic diversity being impacted is protected by management actions.

A full description of each TAR species, with anticipated risks, location maps and management requirements is provided in Table 10.

**Table 10: TAR plant species predicted to be impacted by the MP4 Project**

| Scientific name                | National Conservation Status | Regional Conservation Status | Locations in project direct footprint | Locations in project buffer                                            | Management requirements                                                                      |
|--------------------------------|------------------------------|------------------------------|---------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <i>Acaena buchananii</i>       | At Risk - Declining          | Threatened - Vulnerable      | Coronation North                      |                                                                        | Propagation, salvage, grazing study, monitoring.                                             |
| <i>Aciphylla subflabellata</i> | At Risk - Declining          | Threatened - Vulnerable      | Coronation North                      | Golden Bar (20m), Central Mining (20, 80m), Golden Bar Haul Road (80m) | Propagation, salvage, monitoring. <i>Included in snow tussock restoration planting list.</i> |
| <i>Agrostis pallescens</i>     | At Risk – Naturally Uncommon | At Risk – Naturally Uncommon | Coronation North                      |                                                                        | Propagation, salvage, monitoring.<br><i>Included in wetland restoration planting list.</i>   |
| <i>Anthosachne falcis</i>      | At Risk - Declining          | At Risk - Declining          | Coronation North, Central Mining      | Coronation North (20, 80m)                                             | Propagation, salvage, monitoring.                                                            |
| <i>Argyrotegium mackayi</i>    | No Threatened                | At Risk – Naturally Uncommon |                                       | Central Mining (80m)                                                   | Propagation, monitoring.                                                                     |
| <i>Brachyscome longiscapa</i>  | At Risk – Naturally Uncommon | At Risk – Naturally Uncommon | Coronation North                      | Coronation North (80m)                                                 | Propagation, salvage, grazing study, monitoring.                                             |
| <i>Cardamine grandiscapa</i>   | At Risk – Naturally Uncommon | Data Deficient               |                                       | Golden Bar (20m)                                                       | Propagation, possible salvage if disturbance into buffer expected, monitoring.               |
| <i>Carex dipsacea</i>          | Not Threatened               | At Risk - Declining          |                                       | Central Mining (80m)                                                   | Propagation, monitoring.<br><i>Included in wetland restoration planting list.</i>            |

| Scientific name               | National Conservation Status       | Regional Conservation Status       | Locations in project direct footprint              | Locations in project buffer                                                                    | Management requirements                                                                                                 |
|-------------------------------|------------------------------------|------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <i>Carex kaloides</i>         | At Risk - Declining                | Threatened – Regionally Endangered |                                                    | Coronation North (20, 80m)                                                                     | Propagation, monitoring.<br><i>Will require salvage from Coal Creek. Included in wetland restoration planting list.</i> |
| <i>Carex purpurata</i>        | At Risk – Naturally Uncommon       | At Risk – Naturally Uncommon       |                                                    | Golden Bar Haul Road (80m)                                                                     | Propagation, monitoring.                                                                                                |
| <i>Carex tenuiculmis</i>      | At Risk - Declining                | Threatened – Regionally Endangered |                                                    | Coronation North (20, 80m), Central Mining (80m), Golden Bar Haul Road (20, 80m)               | Propagation, monitoring.<br><i>Included in wetland restoration planting list.</i>                                       |
| <i>Carmichaelia corrugata</i> | Threatened – Nationally Vulnerable | Threatened – Regionally Critical   | Coronation North                                   |                                                                                                | Propagation, salvage, grazing study, monitoring, management of outside population (due to very high residual effects).  |
| <i>Carmichaelia petriei</i>   | At Risk - Declining                | At Risk - Declining                | Coronation North, Golden Bar, Golden Bar Haul Road | Coronation North (20, 80m), Golden Bar (20, 80m), Golden Bar Haul Road (20, 80m)               | Propagation, salvage, monitoring.<br><i>Included in snow tussock and dry shrub restoration planting lists.</i>          |
| <i>Celmisia hookeri</i>       | At Risk – Naturally Uncommon       | At Risk – Naturally Uncommon       | Coronation North, Golden Bar                       | Coronation North (80m), Central Mining (80m), Golden Bar (20, 80m), Golden Bar Haul Road (80m) | Direct seed scattering, salvage, monitoring.                                                                            |



| Scientific name               | National Conservation Status | Regional Conservation Status       | Locations in project direct footprint | Locations in project buffer            | Management requirements                                                                                                                                              |
|-------------------------------|------------------------------|------------------------------------|---------------------------------------|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Colobanthus strictus</i>   | Not Threatened               | At Risk - Declining                | Coronation North                      | Coronation North (80m)                 | Propagation, salvage, monitoring.                                                                                                                                    |
| <i>Deschampsia cespitosa</i>  | At Risk - Declining          | Threatened – Regionally Vulnerable | Coronation North                      | Central Mining (80m)                   | Propagation, salvage, monitoring, management of outside population (due to very high residual effects).<br><br><i>Included in wetland restoration planting list.</i> |
| <i>Epilobium chionanthum</i>  | At Risk - Declining          | Threatened – Regionally Vulnerable |                                       | Golden Bar Haul Road (20, 80m)         | Propagation, monitoring.                                                                                                                                             |
| <i>Epilobium insulare</i>     | At Risk - Declining          | Threatened – Regionally Vulnerable | Coronation North                      | Central Mining (80m), Golden Bar (20m) | Propagation, salvage, monitoring.                                                                                                                                    |
| <i>Epilobium komarovianum</i> | Not Threatened               | At Risk – Naturally Uncommon       |                                       | Central Mining (80m)                   | Propagation, monitoring.                                                                                                                                             |
| <i>Euchiton ensifer</i>       | At Risk - Declining          | Threatened – Regionally Endangered |                                       | Central Mining (80m)                   | Propagation, monitoring.                                                                                                                                             |
| <i>Euchiton polylepis</i>     | At Risk - Declining          | Threatened – Regionally Vulnerable | Coronation North                      |                                        | Propagation, salvage, monitoring, management of outside population (due to very high residual effects).                                                              |
| <i>Euchiton traversii</i>     | Not Threatened               | At Risk – Naturally Uncommon       |                                       | Central Mining (80m)                   | Propagation, monitoring.                                                                                                                                             |
| <i>Fuchsia procumbens</i>     | Not Threatened               | Not Threatened                     |                                       | Golden Bar (20m)                       | Propagation, salvage, monitoring.                                                                                                                                    |

| Scientific name                                         | National Conservation Status       | Regional Conservation Status       | Locations in project direct footprint | Locations in project buffer                | Management requirements                                                                                  |
|---------------------------------------------------------|------------------------------------|------------------------------------|---------------------------------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------|
|                                                         |                                    |                                    |                                       |                                            | <i>Included in shrubland wetland restoration planting list.</i>                                          |
| <i>Gentianella amabilis</i>                             | Not Threatened                     | At Risk – Naturally Uncommon       |                                       | Central Mining (80m)                       | Propagation, monitoring.                                                                                 |
| <i>Geranium homeanum</i>                                | Not Threatened                     | Data Deficient                     |                                       | Central Mining (80m)                       | Propagation, monitoring.                                                                                 |
| <i>Gingidia grisea</i>                                  | At Risk – Naturally Uncommon       | At Risk - Declining                |                                       | Golden Bar (20m)                           | Propagation, monitoring.                                                                                 |
| <i>Gratiola aff. concinna</i> (AK 251855; South Island) | Threatened – Nationally Vulnerable | Threatened – Regionally Endangered |                                       | Central Mining (80m)                       | Propagation, monitoring.<br><i>Included in wetland restoration planting list.</i>                        |
| <i>Hypericum rubicundulum</i>                           | Threatened – Nationally Endangeres | Threatened – Regionally Critical   | Coronation North                      | Golden Bar Haul Road (80m)                 | Propagation, salvage, monitoring, management of outside population (due to very high residual effects).. |
| <i>Juncus distegus</i>                                  | Not Threatened                     | At Risk - Declining                | Coronation North, Central Mining      | Central Mining (20, 80m), Golden Bar (80m) | Propagation, salvage, monitoring.<br><i>Included in wetland restoration planting list.</i>               |
| <i>Juncus pusillus</i>                                  | At Risk – Naturally Uncommon       | Threatened – Regionally Vulnerable | Central Mining                        | Central Mining (20m)                       | Propagation, salvage, monitoring.<br><i>Included in wetland restoration planting list.</i>               |

| Scientific name                | National Conservation Status | Regional Conservation Status       | Locations in project direct footprint | Locations in project buffer                                        | Management requirements                                                                                                                                          |
|--------------------------------|------------------------------|------------------------------------|---------------------------------------|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Lachnagrostis striata</i>   | Not Threatened               | Threatened – Regionally Vulnerable |                                       | Central Mining (20, 80m)                                           | Propagation, monitoring.<br><i>Included in wetland restoration planting list.</i>                                                                                |
| <i>Lagenophora barkeri</i>     | At Risk - Declining          | Threatened – Regionally Endangered | Coronation North                      | Coronation North (20, 80m), Central Mining (80m), Golden Bar (80m) | Propagation, salvage, grazing study, monitoring.                                                                                                                 |
| <i>Lagenophora pinnatifida</i> | Not Threatened               | At Risk – Naturally Uncommon       | Coronation North                      |                                                                    | Propagation, salvage, monitoring.                                                                                                                                |
| <i>Leptinella pusilla</i>      | At Risk Declining            | Threatened – Regionally Endangered | Coronation North                      |                                                                    | Propagation, salvage, grazing study, monitoring.                                                                                                                 |
| <i>Lilaeopsis ruthiana</i>     | Not Threatened               | At Risk – Naturally Uncommon       |                                       | Central Mining (80m)                                               | Propagation, monitoring.<br><i>Included in wetland restoration planting list.</i>                                                                                |
| <i>Lobelia ionantha</i>        | At Risk - Declining          | Threatened – Regionally Endangered | Central Mining                        | Central Mining (20, 80m)                                           | Propagation, salvage, monitoring, management of outside population (due to very high residual effects).<br><i>Included in wetland restoration planting list.</i> |
| <i>Lobelia perpusilla</i>      | Not Threatened               | Threatened - Vulnerable            | Central Mining                        | Central (80m)                                                      | Propagation, salvage, monitoring.<br><i>Included in wetland restoration planting list.</i>                                                                       |

| Scientific name                                       | National Conservation Status | Regional Conservation Status       | Locations in project direct footprint | Locations in project buffer              | Management requirements                                                                      |
|-------------------------------------------------------|------------------------------|------------------------------------|---------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------|
| <i>Melicytus aff. alpinus (c) (CHR 541568; Otago)</i> | Not Threatened               | Data Deficient                     | Golden Bar                            | Coronation North (80m), Golden Bar (80m) | Propagation, salvage, monitoring.                                                            |
| <i>Mentha cunninghamii</i>                            | At Risk - Declining          | At Risk - Declining                | Coronation North                      | Central Mining (80m)                     | Propagation, salvage, grazing study, monitoring.                                             |
| <i>Oxalis rubens</i>                                  | Not Threatened               | Data Deficient                     | Coronation North                      |                                          | Propagation, salvage, monitoring.                                                            |
| <i>Poa pusilla</i>                                    | Not Threatened               | At Risk – Naturally Uncommon       | Coronation North                      |                                          | Propagation, salvage, monitoring.                                                            |
| <i>Pterostylis tristis</i>                            | At Risk - Declining          | Threatened – Regionally Vulnerable | Coronation North                      |                                          | Salvage, VDT, grazing study, monitoring.                                                     |
| <i>Ranunculus aff. reflexus (CHR 394270; Mt Peel)</i> | At Risk - Declining          | At Risk – Naturally Uncommon       |                                       | Golden Bar (80m)                         | Propagation, monitoring.                                                                     |
| <i>Rytidosperma buchananii</i>                        | At Risk - Declining          | At Risk - Declining                | Coronation North                      |                                          | Propagation, salvage, grazing study, monitoring.                                             |
| <i>Rytidosperma thomsonii</i>                         | At Risk - Declining          | Threatened – Regionally Endangered | Coronation North, Golden Bar          |                                          | Propagation, salvage, grazing study, monitoring.                                             |
| <i>Shawia bullata</i>                                 | Not Threatened               | At Risk – Naturally Uncommon       | Coronation, Central                   |                                          | Propagation, salvage, monitoring.<br><i>Included in dry shrub restoration planting list.</i> |
| <i>Shawia lineata</i>                                 | At Risk - Declining          | At Risk - Declining                |                                       | Coronation North (80m)                   | Propagation, monitoring.<br><i>Included in dry shrub restoration planting list.</i>          |



| Scientific name                                                   | National Conservation Status       | Regional Conservation Status       | Locations in project direct footprint | Locations in project buffer | Management requirements                                                                                                            |
|-------------------------------------------------------------------|------------------------------------|------------------------------------|---------------------------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <i>Sonchus aff. novae-zelandiae</i> (a) (CHR 517718; "grassland") | Threatened – Nationally Vulnerable | Threatened – Regionally Endangered | Coronation North                      |                             | Salvage, propagation, monitoring, management of outside population (due to very high residual effects).                            |
| <i>Sophora microphylla</i>                                        | Not Threatened                     | Not Threatened                     |                                       | Golden Bar (20m)            | Salvage (if small enough), propagation, monitoring.<br><i>Included in dry shrub and wetland buffer restoration planting lists.</i> |
| <i>Wurmbea novae-zelandiae</i>                                    | Threatened – Nationally Endangered | Threatened – Regionally Endangered |                                       | Central Mining (80m)        | Propagation, monitoring.<br><i>Included in wetland restoration planting list.</i>                                                  |

## 4.1 TAR Plant Surveying

Further targeted surveying of TAR plants is required before management action begins, to ensure that cryptic and seasonal TAR plants, as well as those with old or uncertain surveying records, are able to be confirmed and checked for inclusion in this management plan. Surveying must be done by an experienced botanist with excellent ability to identify the Macraes rare flora. Plants found during this survey must be recorded with a GPS location and notes on population size, plant health and habitat.

## 4.2 Ex-situ management of high-value TAR plants

Seven species of threatened plants (*Carmichaelia corrugata*, *Deschampsia cespitosa*, *Euchiton polylepis*, *Hypericum rubicundulum*, *Lobelia ionantha*, *Sonchus* aff. *novae-zelandiae* (a) (CHR 517718; “grassland”), and *Rytidosperma thomsonii*) have been assessed as having both ‘Very High’ ecological value and a ‘Very High’ level of residual effect. These species should receive ex-situ management of populations in the ecological district that are outside the Project area. This should be of an equivalent size to that being impacted (or as many plants as possible if this is not possible due to the extent of impact). Management of these populations must follow botanist advice and may include: fencing from stock or rabbits, pest animal and weed control, planting of additional plants into the population, habitat planting to improve growing conditions. This management must be adaptive and monitored at least annually. Ex-situ management of these populations must continue on a twice-annual basis for the life of the mine.

## 4.3 TAR Salvage

Salvage of individual plants is required for all TAR species growing within the Project impact area. This may include plants growing in wetlands in buffers outside the impact area that are expected to be destroyed or significantly negatively impacted by de-watering as a result of the Project. Salvage techniques should be guided by the Project botanist and be adaptive in order to incorporate new information and approaches for long-term plant survival. Plants growing in the 20 m buffer around the Project area should not be salvaged in the first instance, but should be clearly demarcated. If there is a risk that these plants may be significantly damaged or killed due to their proximity to the Project boundary, or monitoring indicates that they are being impacted, then this must trigger their inclusion in salvage.

The majority of plant species to be salvaged are low-growing (<1m) with shallow or hair-like root systems. Care must be taken not to damage those remaining species on the list that are of a larger size, or have woody or tap roots. These should be dug out to a minimum of 1m deep in order to include secondary roots and reduce root damage which may cause plant fatality. This applies to *Aciphylla subflabellata*, *Carmichaelia petriei*, *Melicytus* aff. *alpinus* (CHR 541568; Otago) and *Shawia bullata*.

A table listing the TAR species identified within the Project footprint, and requiring salvage, has been provided in Table 11.

**Table 11: TAR species identified within the project footprint to be salvaged**

| Scientific name                                                   | Salvage sites                        |
|-------------------------------------------------------------------|--------------------------------------|
| <i>Acaena buechananii</i>                                         | Coronation                           |
| <i>Aciphylla subflabellata</i>                                    | Coronation                           |
| <i>Agrostis pallescens</i>                                        | Coronation                           |
| <i>Anthosachne falcis</i>                                         | Coronation, Central                  |
| <i>Brachyscome longiscapa</i>                                     | Coronation                           |
| <i>Carmichaelia corrugata</i>                                     | Coronation                           |
| <i>Carmichaelia petriei</i>                                       | Coronation, Golden Bar, GB Haul Road |
| <i>Celmisia hookeri</i>                                           | Coronation, Golden Bar, GB Haul Road |
| <i>Colobanthus strictus</i>                                       | Coronation                           |
| <i>Deschampsia cespitosa</i>                                      | Coronation                           |
| <i>Epilobium insulare</i>                                         | Coronation                           |
| <i>Euchiton polylepis</i>                                         | Coronation                           |
| <i>Hypericum rubicundulum</i>                                     | Coronation                           |
| <i>Juncus distegus</i>                                            | Coronation, Central                  |
| <i>Juncus pusillus</i>                                            | Central                              |
| <i>Lagenophora barkeri</i>                                        | Coronation                           |
| <i>Lagenophora pinnatifida</i>                                    | Coronation                           |
| <i>Leptinella pusilla</i>                                         | Coronation                           |
| <i>Lobelia ionantha</i>                                           | Central                              |
| <i>Lobelia perpusilla</i>                                         | Central                              |
| <i>Melicytus aff. alpinus</i> (c) (CHR 541568; Otago)             | Golden Bar                           |
| <i>Mentha cunninghamii</i>                                        | Coronation                           |
| <i>Oxalis rubens</i>                                              | Coronation                           |
| <i>Poa pusilla</i>                                                | Coronation                           |
| <i>Pterostylis tristis</i>                                        | Coronation                           |
| <i>Rytidosperma buechananii</i>                                   | Coronation                           |
| <i>Rytidosperma thomsonii</i>                                     | Coronation, Golden Bar               |
| <i>Shawia bullata</i>                                             | Coronation, Central                  |
| <i>Sonchus aff. novae-zelandiae</i> (a) (CHR 517718; "grassland") | Coronation                           |

Note: where wetlands in buffer areas are expected to be lost due to de-watering, additional plants may require salvage

#### 4.3.1 Salvage targets

All recorded TAR plants within the Project's direct impact areas must be salvaged, with the exceptions of:

- *Anthosachne falcis* to a salvage target of 500 plants (due to the widespread numbers of this species in the footprint and local landscape); and
- Where individual plants are not recommended for salvage by the project botanist due to certain mortality (for example plants growing in tight rock crevices that cannot be extracted).

#### 4.3.2 Salvage methods

Where appropriate to species, salvage should follow instructions provided in the existing Oceana Gold Plant Rescue Species Management spreadsheet (Whirika). For all other species, salvage should be directed and supervised by the project botanist. The following methods are general and may be varied by the Project botanist if this is believed to result in better plant survival:

#### 4.3.3 Pre-salvage

- All TAR plants within the Project footprint must be surveyed and marked out by the project botanist using GPS points, combined with stakes or waratahs, no more than two months before salvage (or during the appropriate season for cryptic or ephemeral species, as advised by the Project botanist);
- The Project botanist must identify suitable habitat and mark exact translocation locations for each TAR species immediately prior to salvage. Where possible this should include a minimum of five locations per species;
- Sites for translocation of salvaged plants must be covered by the weed and pest animal controls set out in the relevant plans (Bioresearches 2026n, Alliance Ecology, 2026);
- Salvage translocation sites must be fenced to permanently exclude stock prior to salvage (excluding species that require grazing for habitat retention).

#### 4.3.4 Salvage

- The first round of salvage should be completed the autumn before works are due to start and the second in the late spring prior to works beginning. Having two rounds of salvage is essential in order to detect and remove all the TAR species present, several of which may be seasonally cryptic;
- Salvage for annual, ephemeral and seasonally cryptic species may be required during other seasons (as determined by the project botanist), but must also be completed prior to clearance works beginning;
- Salvage timing must be responsive to weather conditions to determine seasonality (rather than calendar dates) in order to achieve best salvage and survival outcomes;
- Each TAR plant (or clump/mat of plants) must be carefully dug out (by hand, or with small machinery), under project botanist supervision, taking care not to damage the root mass and leaving a minimum 30 cm buffer of soil around the entire roots system;
- Any significant weeds must be carefully hand-weeded from root balls, taking care not to disturb the soil;



- The soil clump/roots of each plant must be wrapped in wetted hessian;
- Handling of each plant should be minimised throughout the salvage process to limit disintegration of soil around roots;
- Plants must be transported to translocation sites on their side to minimise root damage (or following the direction of the Project botanist), supported to prevent movement during transfer and in a single layer (not stacked, or compressed);
- Vehicles transporting salvaged plants must drive at reduced speed to limit soil disturbance around root balls;
- Plants must be planted into translocation sites, or taken into cultivation, the same day they are salvaged, under botanist supervision. No plants are to be removed from the ground if there is a risk that they cannot be replanted (or be in a nursery care) on the same day;
- Plants must be planted into receiver sites under botanist supervision to guide particular plant requirements;
- Once translocated, all salvaged plants must be GPS marked and a metal waratah installed at each planting site so that they can be relocated for monitoring purposes. Individual plants must be tagged so that survival can be measured;
- Post-salvage all plants must be monitored to assess long-term health, survival and respond to any establishment issues (as discussed in Section 7.2).

## 4.4 Propagation and planting

### 4.4.1 Propagation

Propagation of all TAR plant species (both those occurring within the Project direct impact area and within buffer areas) is required in order to prevent net loss of TAR plant populations, and to provide contingency should salvage attempts fail for any TAR species. This must be begun a minimum of two years prior to vegetation clearance to ensure that two season's worth of seed can be collected. Where TAR plants are growing within areas that are scheduled to be cleared within the first three years of MP4 (i.e. two years' worth of seed collection may not be possible), then as much seed and propagation material as possible must be collected from these plants, with a minimum of one year's worth of seed collected. Further seed from these species must continue to be collected from other individuals outside the clearance area to ensure a minimum of two years' worth of seed is collected. For TAR plants growing in areas scheduled to be cleared after year three, seed and plant propagation material should be collected for as many years as possible before clearance.

For many species seed production can vary significantly from year to year and this may be exacerbated by climate-change induced weather extremes. Propagation material can be sourced from seed, cuttings and plant division (where appropriate), however seed is most preferred. It is essential that maximum genetic diversity is collected for every TAR species to ensure that propagated plants represent the full genetic diversity present for each species. This should be done by collecting material from all possible plants.

Cultivation of TAR plants is difficult and there are few people in New Zealand with the requisite skills and knowledge to grow the full extent of TAR species impacted by this Project. The failure to engage, or establish, a suitable nursery (with the appropriate capacity, set-up and species propagation experience)

is a recognised risk to the success of the achievement of compensation required for TAR flora under MP4. Propagation must be done by a nursery with good experience of growing rare Otago species and able to provide the specific cultivation conditions for each species (e.g. able to grow both wetland and dryland species). Should this expertise not be available, this must be sought from an appropriately skilled consultant.

It may be necessary for different nurseries to grow upland and wetland species as expertise dictates. Plants should be cultivated within the Macraes' ED in order to provide similar climatic conditions and appropriate hardening off to prevent plant shock after planting. All plants must be hardened to local conditions (as particular to each species) within the Macraes ED for a minimum of three months prior to planting.

It is essential that an appropriate nursery(s) is/are engaged or established immediately following consent. This will allow for the collection of plant material required for propagation, which may take more than two years to collect and grow on. Multiple nurseries may be engaged to propagate TAR plants. This would provide an opportunity to increase cultivation knowledge of these TAR species and act as a fail-safe should unforeseen circumstances impact plants being cultivated at one site.

Regular communication with nurseries is required to check on plant growth progress and to prepare for planting as soon as TAR plants are ready. This should be provided via reports every six months. Planting of propagated plants should be done in the first planting season (April – September) that they are mature enough to plant (or during the climate conditions specified for the species by the project botanist). Planting must be done under the supervision of an experienced botanist with good knowledge of the habitat requirements of each species.

Each TAR species within impact areas **must be in propagation with a minimum of twenty plants before salvage occurs** so that a contingency population with representative genetics exists should salvage fail. Propagation of TAR plants within buffer areas should also begin as soon as possible, however collection of seed/cuttings/divisions may continue for several years as required. Plants must be propagated over multiple years, to enable several years of planting from propagated plants, provide contingency populations should a planting year fail and increase the likelihood of planting success.

In addition to the Threatened and At Risk plant species that are impacted by the proposed MP4 works, TAR plant species found within the Ecological District, but not impacted by the project have also been included within restoration planting lists. These additional TAR species are included to increase diversity in tussock enhancement, dry shrublands, tor buffers and wetland planting lists (Bioresearches 2026n). These have been selected based on their appropriateness to each habitat being planted. It is intended that the propagation and planting of these species as part of compensation requirements for revegetation will support the establishment of new populations of these species and increase cultivation knowledge for them. It is recommended that additional plant numbers of these species be grown, if possible, and offered to iwi, the Department of Conservation and Otago Regional Council for further conservation planting.

#### 4.4.2 Propagation and planting targets

- 50 plants for species with populations of 9 or fewer plants in the Project area
- 100 plants for species with populations of 10-20 plants in the Project area
- 200 plants for species with populations of 21-50 plants in the Project area
- 500 plants for species with populations of 51-100 plants in the Project area
- 1000 plants for species with populations of greater than 100 plants in the Project area

These targets include plants growing in buffer areas. They may be revised for species that prove difficult to cultivate, following consultation with the nursery and project botanist.

#### 4.4.3 Planting preparation

Planting of propagated TAR plants must be guided and supervised by the project botanist. Unless specified by the botanist no plant guards, weed mat or stakes are required for the planting of TAR plants.

- Planting sites with appropriate habitat for each TAR species must be identified by the Project botanist and recorded via GPS points prior to planting;
- Planting sites must be included in the weed control requirements as set out in the Residual Effects Terrestrial Restoration Plan (Bioresearches, 2026n)
- Pest animal control must apply to the planting sites as set out in the MP4 Pest Animal Management Plan (Alliance Ecology, 2026);
- Planting sites must be permanently fenced to exclude stock (except for those species that require grazing as described in Section 4.5) prior to planting;
- Constructed ephemeral wetlands and pond edge grading must be completed prior to planting species requiring these habitats (as specified in Bioresearches 2026o);
- The planting season for each species must be determined and the particular climate conditions that trigger the beginning and end of the planting season for each noted;
- Boots, spades and other equipment must be cleaned prior to planting to prevent introducing unwanted seeds or soil organisms to planting sites.

#### 4.4.4 Planting methods:

- Planting for each species may have particular requirements and these should be guided by the Project botanist, this may include using those methods set out for particular species in the Coronation North plant rescue document;
- During the appropriate planting season for each TAR species, plants must be set out according to their relative spacing in a randomised order to create a natural appearance. Spacing must be determined by the project botanist;
- Holes should be dug approximately 1.5 times the size of the plant pots/bags
- Plants should be carefully removed from pots/bags and placed in holes;
- Loose soil should be crumbled into the hole to surround plant root balls and fill all gaps before gently firming in;
- Plants must sit slightly below the soil surface to support survival; and
- For some species, specific planting techniques will be required and this shall be guided by the project botanist.

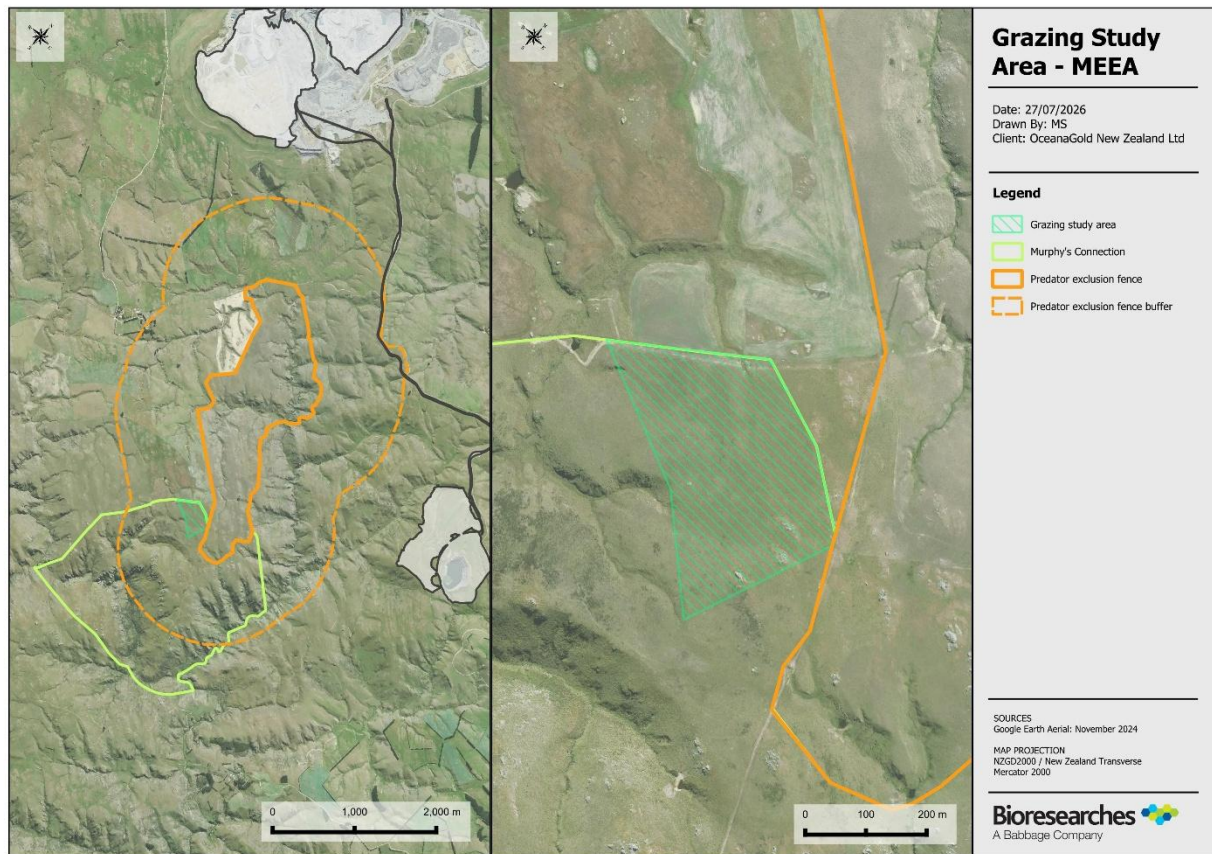
#### 4.5 Grazing study area

Nine TAR plants require open habitat with either bare ground or low vegetation and limited competition from weeds (*Carmichaelia corrugata*, *Acaena buchananii*, *Brachyscome longiscapa*, *Lagenophora barkeri*, *Leptinella pusilla*, *Mentha cunninghamii*, *Pterostylis tristis*, *Rytidosperma buchananii*, *Rytidosperma thompsonii*). To maintain open habitat and provide an opportunity to research the responses of these species to difference levels of grazing for restoration purposes, a grazing study area shall be established for these species to be planted into. Further TAR species within this report may be added to this grazing study at the direction of the Project botanist, if it is thought that this is appropriate to their habitat requirements.

This grazing study area shall be 10 ha in size and be created within the Murphys Ecological Enhancement Area covenant, adjacent to farmland to provide sheep access (Figure 13). The covenant for this land must specify that grazing by sheep is allowed for research and indigenous plant preservation purposes. Cattle must be permanently excluded from this area. Wetlands and waterways must be fenced to exclude stock (with the exception of ephemeral wetlands which may be left open to grazing on the advice of the Project botanist).

Half of all plants propagated for each of the nine TAR species must be planted into suitable habitat within the grazing study area. This will allow study of different levels of grazing intensity to explore how different conditions can be controlled to best support restoration of each species. The remaining plants of each species must be planted into suitable habitat in ungrazed areas, under botanist direction. The study methods and management must be detailed and overseen by the Project botanist and may be supported by students. This study must continue for a minimum of ten years.





**Figure 13: Map showing indicative location of the grazing study area for TAR plants within the MEEA**

## 4.6 Buffer area monitoring

All TAR plants within the 100 m buffer of the Project footprint (including those which may be identified at any future time) must receive targeted in-situ monitoring.

Monitoring must be completed in late spring for each species (unless otherwise recommended by the project botanist). Records of monitoring, and any actions taken in response to monitoring results shall be shared with stakeholders annually.

Monitoring for each TAR species must include:

1. A survey of known population sites and recordings of any new sites (each must be GPS marked)
2. Numbers of plants in each population, including sizes and reproductive stage
3. Plant health, including signs of disease, herbivory, stress and reproduction
4. Notes on any changes to habitat since the last survey
5. Changes to plant numbers and health since last survey

If a loss of 15% of the adult population (or greater) from the previous year is observed, the Project botanist must be consulted no less than one month from monitoring and a management response triggered to address this decline. If a loss of 10% or more is observed for two or more consecutive years this response must also be triggered. Management responses must follow best botanical advice and may include (but

are not limited to): pest animal or weed control, introducing controlled levels of grazing, or increased propagation efforts.

As discussed in Section 4.3, TAR plants within the 20 m buffer must be checked for any decline or risk of damage due to their proximity to the Project extent. This may trigger plant salvage requirements, which should be guided by the Project botanist.

## 4.7 Timings

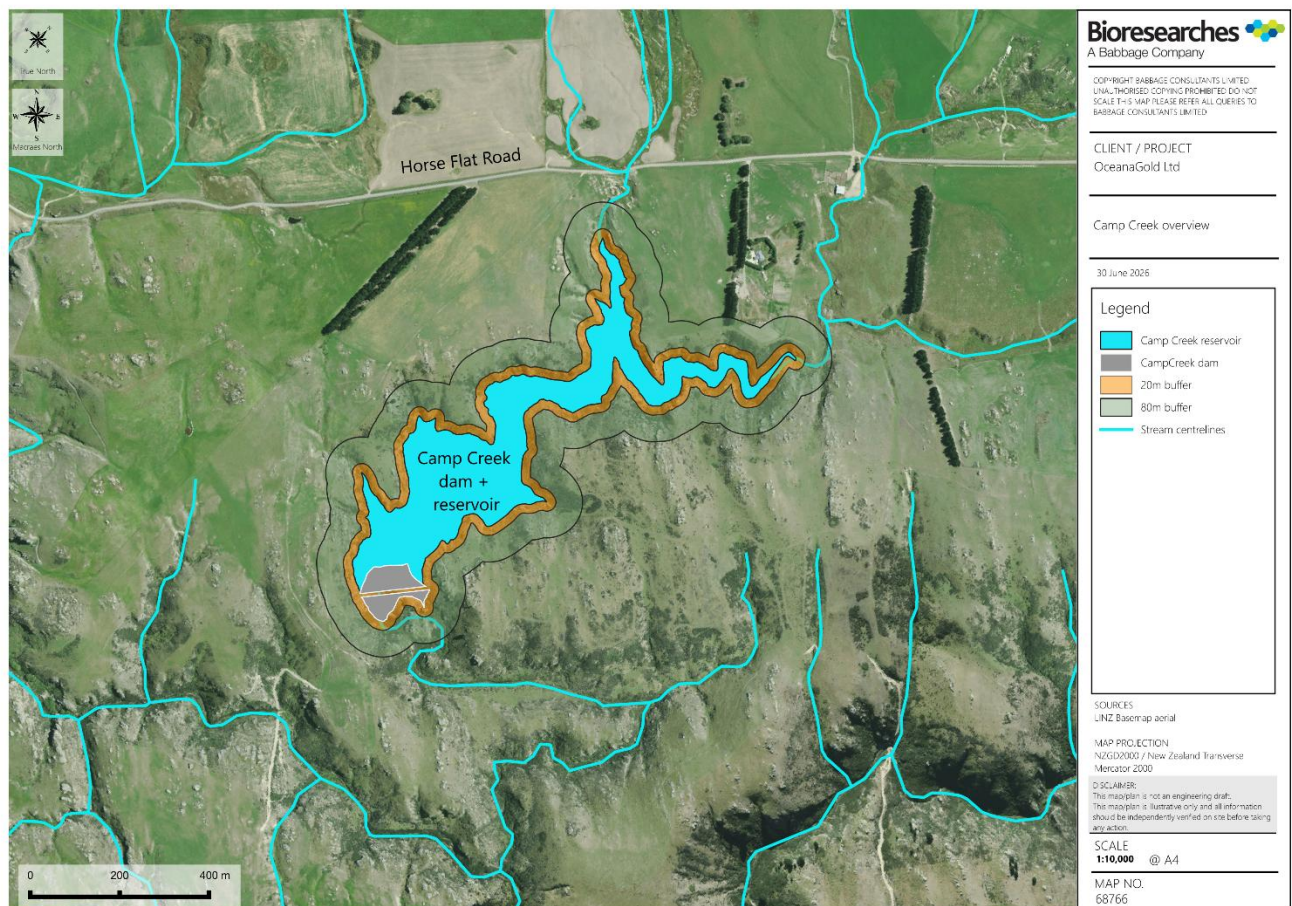
**Table 12. Schedule of timings for vegetation and TAR flora management actions**

| Activity                                             | Timing                                                                                                                  |
|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Seed collection and beginning of plant propagation   | Immediate, with priority for species in areas scheduled to be cleared in years 1-3. Ongoing throughout Project.         |
| Initial weed control at planting and receiving sites | As per directed in the weed control section of the Residual Effects Terrestrial Restoration Plan (Bioresearches, 2026n) |
| Salvage                                              | Autumn (April – June) prior to the staged clearance of any area.                                                        |
| VDT                                                  | Autumn (April – June) prior to the clearance of any area.                                                               |
| Planting                                             | Autumn (April – June) or early Spring (late August – September), or as directed by the Project botanist.                |
| Maintenance                                          | Early summer                                                                                                            |
| Monitoring                                           | Early summer, or as specified by the Project botanist (species specific)                                                |
| Infill and ongoing planting                          | Autumn (April – June) following the first year of planting, or as directed by the Project botanist                      |

## 5 CAMP AND COAL CREEK TAR MANAGEMENT

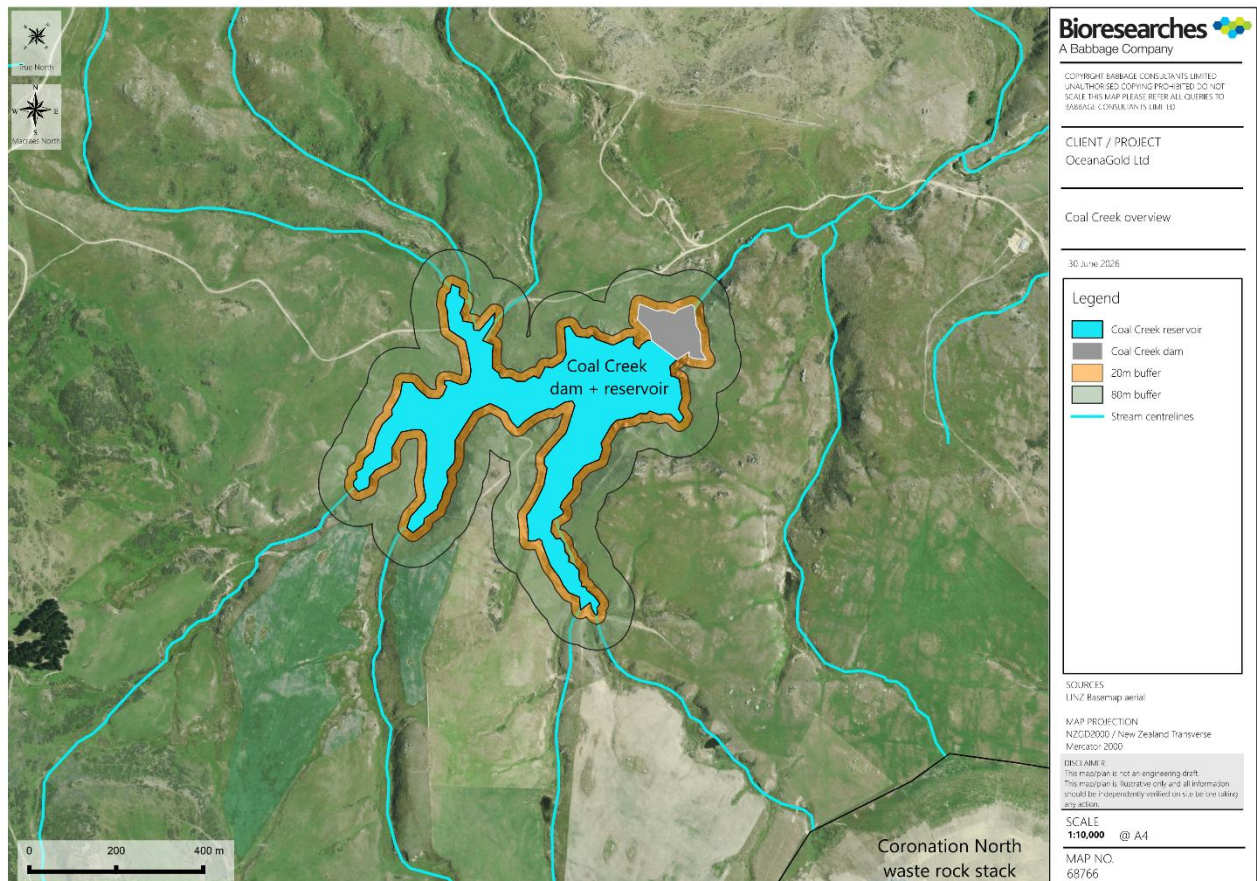
Camp and Coal Creek are the locations of consented, but as yet unbuilt, dams. The purpose of these dams is to provide clean water to flush waterways and dilute mine discharges. Camp Creek is a valley system located approximately 1.5 km south of Golden Point, while Coal Creek is a valley system located approximately 1.2 km west of the existing Coronation North pit and rock stack. An earth-mound dam is to be constructed in each of these valley systems to flood them for water storage.

While each of these dam projects have received consent, there are a number of TAR plant species known in these sites that require management to avoid significant adverse impacts. This includes the Nationally Critical cress *Cardamine dilatata* for which the Coal Creek valley represents a nationally significant population of the species, as well as the At-Risk grass *Carex kaloides* for which Coal Creek is a regional stronghold. As such, management protocols for these species have been included in this plan as complementary to the wider TAR management proposed as part of MP4 (for which these sites are not included).



**Figure 14: Camp Creek project and buffer area**





**Figure 15: Coal Creek project and buffer area**

### 5.1.1 TAR species in Camp and Coal Creeks

Thirteen TAR plant species have been recorded within the Coal Creek footprint and an additional five are recorded within the 100m buffer. This includes a significant number of the Nationally Critical *Cardamine dilatata*, which has been recorded at four locations within the dam footprint, a regionally significant population of the At Risk – Declining *Carex kaloides*. Individuals of the respectively Nationally Endangered and Nationally Vulnerable *Senecio dunedinensis* and *Carmichaelia crassicaulis* subsp. *crassicaulis* have also been recorded here. A full list of TAR flora recorded at Coal Creek is provided below in Table 13:

The ecological impact assessment for Camp Creek was completed in 2011 (Ryder Consulting). This report does not include precise information about which species are present, their numbers or locations. Therefore, there is uncertainty about the floristic community present in this location and the ecological impact of this Project on TAR flora. Due to the high numbers of TAR plant species found in the Macraes ecological district and the suitability of habitat known to be within Camp Creek, it is anticipated that this site supports some TAR plants. A full survey is required to assess TAR plant values in Camp Creek.



**Table 13: TAR plant species recorded within the Coal Creek works footprint and 100m buffer**

| Scientific name                                             | Common name            | Conservation status                     | Footprint or buffer |
|-------------------------------------------------------------|------------------------|-----------------------------------------|---------------------|
| <i>Acaena buchananii</i>                                    | Bidibid / piripi       | At Risk - Declining                     | Buffer              |
| <i>Anthosachne falcis</i>                                   | Grass                  | At Risk - Declining                     | Buffer              |
| <i>Cardamine dilatata</i>                                   | Cress                  | Threatened – nationally critical        | Footprint           |
| <i>Carex kaloides</i>                                       | Sedge                  | At Risk - Declining                     | Footprint           |
| <i>Carex subtilis</i>                                       | Handsome bastard grass | Data Deficient                          | Footprint           |
| <i>Carmichaelia corrugata</i>                               | Dwarf broom            | Threatened – Nationally Vulnerable      | Buffer              |
| <i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i> | Coral broom            | Threatened - Vulnerable                 | Footprint, buffer   |
| <i>Celmisia hookeri</i>                                     | Hooker's daisy         | At Risk – Naturally Uncommon            | Footprint           |
| <i>Coprosma intertexta</i>                                  |                        | At Risk - Declining                     | Footprint, buffer   |
| <i>Dracopyllum frondosum</i>                                | Sprawling inaka        | At Risk – Naturally Uncommon            | Footprint           |
| <i>Epilobium insulare</i>                                   | Willowherb             | At Risk - Declining                     | Footprint, buffer   |
| <i>Lagenophora barkeri</i>                                  |                        | At Risk - Declining                     | Footprint           |
| <i>Leptinella serrulata</i>                                 | Dryland button daisy   | At Risk - Declining                     | Buffer              |
| <i>Olearia bullata</i>                                      |                        | Regionally At Risk - Naturally Uncommon | Footprint           |
| <i>Rytidosperma corinum</i>                                 | Bristle grass          | Data Deficient                          | Footprint           |
| <i>Senecio dunedinensis</i>                                 |                        | Threatened - Endangered                 | Footprint           |
| <i>Taraxacum zealandicum</i>                                | New Zealand dandelion  | At Risk - Declining                     | Buffer              |
| <i>Veronika rakaiensis</i>                                  | Hebe                   | Regionally At Risk – Naturally Uncommon | Footprint           |

### 5.1.2 Propagation

All TAR plants within the Coal Creek and Camp Creek Project footprint and buffer are to be propagated prior to works starting and salvage. This is to create contingency populations of each species to prevent complete loss and significant ecological impacts should salvage fail. Seed collection for propagation must be done from the plants within Camp and Coal Creek, and the immediately surrounding environment (1 km buffer) to ensure that local genetics are preserved. Seed collection should occur for a minimum of two years prior to salvage in order to make sure enough material is collected. Plants may not produce seed every year and so repeated seed collections are required. Cuttings and plant divisions may be taken for appropriate species, however these should only be done where this is not likely to cause significant damage to the parent plant. Cuttings should be in addition to seed collection for each species and cuttings should be taken from all possible plants to prevent limited genetic representation.

Targets for TAR plant propagation are:

- 50 plants for species with populations of 9 or fewer plants in the Camp and/or Coal Creek area
- 100 plants for species with populations of 10-20 plants in the Camp and/or Coal Creek area
- 200 plants for species with populations of 21-50 plants in the Camp and/or Coal Creek area
- 500 plants for species with populations of 51-100 plants in the Camp and/or Coal Creek area
- 1000 plants for species with populations of greater than 100 plants in the Camp and/or Coal Creek area

These targets include plants growing in buffer areas. They may be revised for species that prove difficult to cultivate, following consultation with the nursery and project botanist.

It is recommended that multiple nurseries are engaged to propagate TAR plants from these sites. This is to increase cultivation knowledge of these TAR species and as a fail-safe should unforeseen circumstances impact plants being cultivated at one site.

Regular communication with nurseries is required to check on plant growth progress and to prepare for planting as soon as plants are ready. Planting of propagated plants should be done in the first planting season (April – September) that they are mature enough to plant. Planting must be done under the supervision of an experienced botanist with good knowledge of the habitat requirements of each species.

Planting locations are to be within the protected compensation wetlands adjacent to Coal Creek, Mount Highlay, Murphys Ecological Enhancement Area, Murphys Link and Cranky Jim's Link covenant areas. Where sufficient suitable habitat is not present in these areas an alternative planting site shall be confirmed by the project botanist and OGNZL and this area must be covenanted for the protection of the species. Specific planting requirements must be decided and directed by the Project botanist.

### 5.1.3 Salvage

It is recommended that all TAR plants located within the Coal and Camp Creek works footprints (including areas required for heavy vehicle access and construction of the dams) are salvaged before works commence. The first round of salvage should be done in the autumn before works are due to start and the second in the late spring prior to works. Having two rounds of salvage is essential in order to detect and remove all the TAR species present, several of which may be seasonally cryptic. Salvaged plants should be re-planted into sites within the Mt Highlay, Cranky Jim's, Murphys Link, or MEEA covenants, and sites should be selected by the Project Botanist. Salvage must follow adaptive best practice and be guided by the Project botanist.

#### 5.1.3.1 Salvage methods

- All salvage must be supervised by a qualified botanist with good familiarity with the species to be salvaged.
- Salvage must be done by hand-digging plants and their entire root-balls from the ground.
- Once dug from the ground, the roots of each plant (or clump of plants) must then be wrapped in damp hessian before transport to a relocation site.
- Plants must be transported upright, or on their side (as advised by the Project botanist) and be supported/buffered to prevent movement during travel.
- Plants must not be stacked or piled on top of one another, nor have equipment placed on them during the salvage or transport process.
- All salvaged plants must be replanted into an approved relocation site, or put into cultivation, on the same day that they are removed from their original location. No plants are to be removed from the ground if there is a risk that they cannot be replanted on the same day.
- Once translocated, all salvaged plants must be GPS marked and a metal waratah installed so that they can be relocated for monitoring purposes.
- For salvage of *Cardamine dilatata* all soil within 1m of plants must also be carefully lifted and transferred with the plants to collect any seed bank that may be present. Careful hand-weeding should be done to remove any significant weeds, but all soil should be shaken off roots onto the material being salvaged.

## 6 MAINTENANCE AND MONITORING

Maintenance actions are important to improve survival rates of salvaged plants. For salvaged plants (including TAR and non-TAR species) maintenance must be conducted monthly for the first six months, as plants establish, then four times per year after this for the first five years after salvage. High frequency monitoring during early stages of translocation is important to make sure that declines in plant health can be identified and addressed promptly. All maintenance should follow adaptive management approaches, with any changes guided by the Project botanist.

### 6.1 Maintenance

#### 6.1.1 Watering

All translocated vegetation (VDT and salvaged plants) are likely to have experienced some degree of root disturbance, making them more vulnerable to mortality caused by dry weather. This risk can be mitigated somewhat by planting during the appropriate season and by good planting technique being followed. However, should prolonged windy, dry weather be experienced for more than seven days without rainfall, this must be addressed through watering.

Watering is required during the first two months after translocation for any period longer than seven days with less than 50mm rain and should be done once per week, or until 50mm or more of rain falls. Salvaged plants (except those particular TAR species that require very dry conditions) and VDT sods should be watered with a sprinkler-type hose fitting (e.g. using a watering can, drip line, sprinkler, or spray fitting from water truck, no jets or unbroken streams of water shall be used) once immediately after planting/laying and then weekly if no substantial rain falls. It is recommended to allow approximately 20L per m<sup>2</sup> to be watered.

#### 6.1.2 Pest animal control

Pest animals may damage or kill plants and their control is essential for both initial establishment and ongoing plant survival. Pest animal control requirements are set out in the Pest Animal Management Plan (Alliance Ecology, 2026). These apply to all planting and translocation areas, unless specified by the Project botanist.

Regular pest animal monitoring should be conducted of all sites where plants have been planted or transferred, following the methods described in (section 7) below. If mammalian herbivory is observed on more than 10% of a planting area, more than 20% of an individual species, or 20% of the reproductive parts of any species, this will trigger adaptive management of pest animal control. This should be responsive to the species of animal pest and the damage being done and may include (but is not limited to): additional trapping, baiting or shooting, repairing or reinforcing fencing, or installing plant guards or cages around species proving to be particularly palatable. Should this responsive action fail to reduce herbivory more intensive pest animal control must be undertaken within no more than one month.

#### 6.1.3 Pest plant control

Pest plants are environmental weeds which have the potential to outcompete, smother, kill or otherwise harm native vegetation. The MP4 Residual Effects Terrestrial Restoration Plant (Bioresearches, 2026n) sets out weed control processes to be followed in all planting and translocation sites and provides a list



of target species for control. Any future additions to this list, or species noted to be problematic in the Macraes ED by the Project botanist should also be included in site management.

Note that the exotic wetland buttercup *Ranunculus flammula* (spearwort) should be removed in planting and translocation areas as a pest plant, but other native buttercups are also present across the site and must not be damaged or removed. This is particularly important as this genus is host to an At-Risk moth species (*Asaphodes recta*) subject to management actions including buttercup salvage, which requires protection on site (MP4 Invertebrate Management and Monitoring Plan, Bioresearches 2026i). To avoid damage to native buttercups or caterpillars it is important that anyone conducting weed control is briefed on this and is confident in distinguishing buttercup species.

#### 6.1.4 Fencing

All planting sites, as well as those receiving salvaged or VDT vegetation, must be fenced to exclude stock once planting or plant transfers are complete, with the exception of the grazing study area. Fencing should be of robust stock-proof post and wire design and enclose both planting areas and any relevant buffer areas (for example wetland riparian buffers). Should any damage or breach of fencing be noticed during monitoring (or any other incidental observation) this must be repaired immediately. If sheep or other farm animals are found to regularly (more than twice per year in any one fenced area) breach this fencing, it must be replaced with mesh, chain link, or wire grid fencing.

Where any areas receiving plants are already within a fence (for example within an existing fenced covenant), no additional fencing is required, but existing fencing should be thoroughly checked and repaired if needed prior to planting.

An exception to this is those TAR plants that require open ground and short turf to be maintained through grazing. These plants must be located in areas with regular sheep grazing, but have permanent exclusion of cattle. A portion of these plants are to be planted into the grazing study area to be established in the Murphys Ecological Enhancement Area, as described in section 4.5. Other grazed planting areas may be located within the 1km buffer surrounding the predator exclusion fence at Murphys, or as identified by the Project botanist. Any grazed planting area must have suitable covenant protections that enable sheep grazing while specifying protection of the land for habitat preservation of TAR species.

## 7 MONITORING

### 7.1 VDT monitoring

Areas of vegetation translocated using VDT must be monitored twice per year (spring and late summer) for five years post translocation. This shall be done using 10x10m vegetation plots to record native plant survival, native species coverage and species diversity. Paired plots shall be recorded inside and outside receiving areas in order to compare survival and VDT success.

A minimum of ten plots inside the VDT area, must be established and permanently marked (using GPS points and waratahs at each corner), no less than one month after the vegetation transfer. Ten plots in tussock growing outside receiving areas must also be established and marked in the same way, to pair these VDT plots.

Results of VDT monitoring must be available to be shared with stakeholders annually.

## 7.2 Salvage monitoring

Each TAR plant that has been salvaged from the impact site must be marked during planting with a GPS point and a permanently marked for post-salvage monitoring. Monitoring of each species must occur following the guidance below for a minimum of five years following transplanting.

Post-salvage monitoring must:

- Be completed at the same time each year as appropriate to each species (as determined by the project botanist);
- Record if each salvaged plant is alive;
- Record the health of each plant and any signs of ill health, damage or reproduction;
- Record the size of each salvaged plant; and
- Record any signs of recruitment.

Should monitoring identify a pattern of decline in number of surviving planted plants of more than 15% for any species over the five-year period this must immediately trigger management responses to address this loss. This must require:

- That the project botanist is advised within one week of monitoring identifying the decline;
- Reasons for decline are identified and a response discussed with the project botanist;
- Response is implemented within one month or less;
- Fortnightly monitoring shall be triggered to measure response for four months (or longer, if advised by the Project botanist);
- If decline continues during this time a revised response should be considered and applied.

All responses and the results of these are included in the annual monitoring report that is shared with stakeholders

## 7.3 Planted propagated plant monitoring

Following planting of propagated plants, all TAR species must be marked (using GPS and permanent physical marker) for ongoing monitoring.

Monitoring of planted TAR species must:

- Be completed weekly for the first two months after planting;
- After this monitoring shall be completed at the same time each year as appropriate to each species (as determined by the project botanist) for the life of the mine;
- Record plant survival and size;
- Record any damage, including known causes;
- Record signs of reproduction and recruitment; and
- Record any changes in habitat in the surrounding area, including any potential threats to plants.

Reports must be completed annually and shared on request.

If threats are identified within the area surrounding the plants, or if a decline of more than 15% of plants be identified, this must trigger an immediate management response. Known threats must be removed (e.g. broken fencing causing stock incursion, pest animal or weed control) and the Project botanist notified. Where the reason for decline is not known approaches to identify and resolve this must be established with the project botanist. This may require multiple adaptive responses.

## 7.4 TAR in MP4 buffer area monitoring

All individual TAR plants growing with the designated 100m buffer of the proposed works footprint must be monitored for the life of the mine. This is to measure any population patterns for each species and to record any indirect effects. Monitoring should be annual and completed at the same time each year, as determined by the Project botanist. This may vary depending on the species. Monitoring results must be shared on request.

Monitoring must record:

- Plant size(s)
- Number of plants in population (if appropriate)
- Evidence of flowering/fruitletting
- Evidence of pest damage (photos)
- Evidence of recruitment or die-off
- GPS location of each population

Where monitoring identifies a decline of more than 15% of recorded plants, or the presence of recognised threats within the environment are noted (e.g. the establishment of pest plants or animals), this must require an immediate response. Known risks must be removed and where plant decline is identified the project botanist must be consulted to establish the most appropriate adaptive response to follow.

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## Appendix A Ecology documents prepared for the proposed Macraes Phase 4 Project.

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

## Appendix B Management actions and locations for TAR flora species

### 8.1.1 *Acaena buchananii*

|                        |                                                                                                                                                                                                                                                                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Acaena buchananii</i>                                                                                                                                                                                                                                                                                                                                   |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                                        |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                                                         |
| Description            | A small herbaceous groundcover, which grows in mats amongst other vegetation within tussock grassland.                                                                                                                                                                                                                                                     |
| Recorded locations     | Within Coronation works footprint, and buffer area of Coal Creek.                                                                                                                                                                                                                                                                                          |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions from both sites</li> <li>• Salvage from Coronation</li> <li>• Post-salvage monitoring and management</li> </ul> Transfer and planting in Murphy's and Highlay Hill (exact locations to be confirmed through ground truthing by botanist prior to salvage and planting). |
| Notes                  | Needs to go into a grazed environment to maintain open vegetation.                                                                                                                                                                                                                                                                                         |
| Anticipated risks      | Weed competition.                                                                                                                                                                                                                                                                                                                                          |
| Confidence of success  | Good expectation of management success.                                                                                                                                                                                                                                                                                                                    |

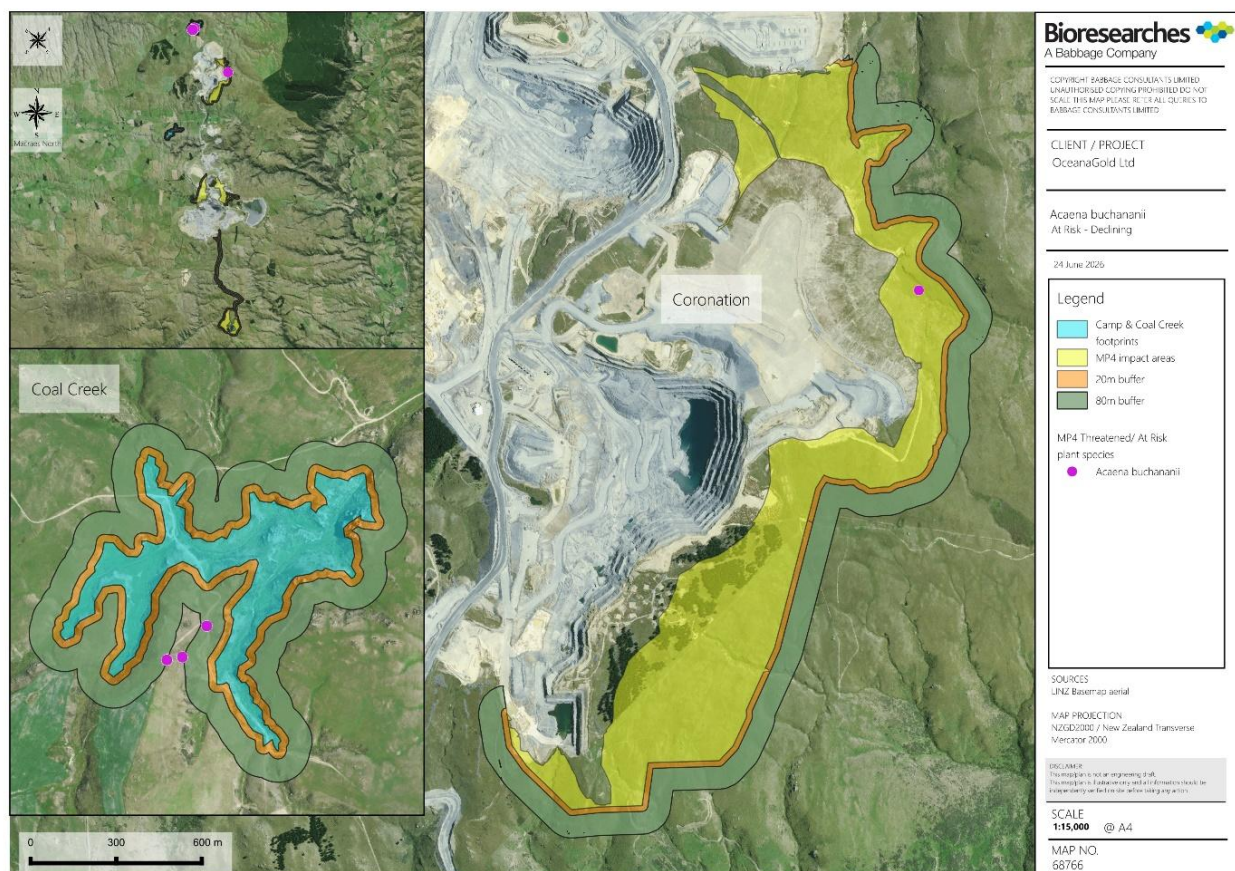
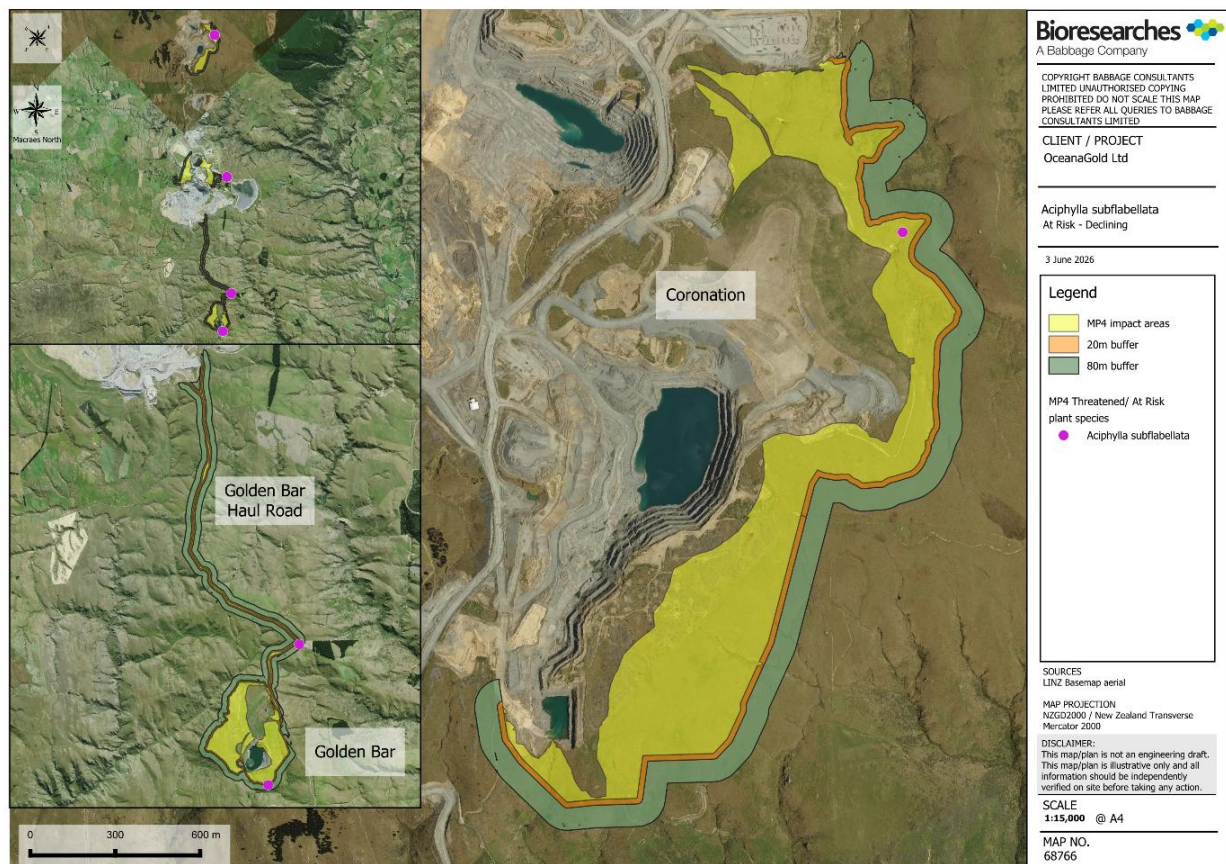


Figure 16: Map of recorded locations of *Acaena buchananii* within the MP4 and Coal Creek areas



### 8.1.2 *Aciphylla subflabellata*

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Aciphylla subflabellata</i>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>NZTCS status</b>           | At Risk - Declining                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Regional threat status</b> | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Description</b>            | A small, fine-leaved speargrass which grows in tussock grasslands and near rock outcrops.                                                                                                                                                                                                                                                                                                                                                       |
| <b>Recorded locations</b>     | Within the Coronation works footprint; within the buffers of the Central, Golden Bar and Golden Bar Haul Road.                                                                                                                                                                                                                                                                                                                                  |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Propagation from seed (all locations)</li> <li>• Salvage from Coronation (may also need to check Central area plants)</li> <li>• Monitoring in-situ of plants in buffer areas</li> <li>• Post-salvage monitoring of salvaged plants</li> </ul> <p>Transfer to Murphy's, planting in Murphy's. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting).</p> |
| <b>Notes</b>                  | Grows well from seed. Needs deep nurse soils that are seasonally damp.                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Anticipated risks</b>      | Herbivory, damage to roots during salvage or planting.                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Confidence of success</b>  | Average expectation of management success (low for salvage due to risk of damage to tap roots, moderate for propagation).                                                                                                                                                                                                                                                                                                                       |



**Figure 17: Locations of *Aciphylla subflabellata* records within the MP4 project area**

### 8.1.3 *Agrostis pallescens*

|                               |                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Agrostis pallescens</i>                                                                                                                                                                                                                                                                                                                                 |
| <b>NZTCS status</b>           | At Risk - Naturally Uncommon                                                                                                                                                                                                                                                                                                                               |
| <b>Regional threat status</b> | Regionally At Risk - Naturally Uncommon                                                                                                                                                                                                                                                                                                                    |
| <b>Description</b>            | A low-growing and fine wetland grass.                                                                                                                                                                                                                                                                                                                      |
| <b>Recorded locations</b>     | Within the Coronation works footprint.                                                                                                                                                                                                                                                                                                                     |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• Salvage from Coronation</li> <li>• Post-salvage monitoring of plants</li> </ul> <p>Planting and translocation to Murphy's wetlands and gully heads. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting).</p> |
| <b>Notes</b>                  | Needs low-growing wetland vegetation - ephemeral wetland plant.                                                                                                                                                                                                                                                                                            |
| <b>Anticipated risks</b>      | Finding appropriate receiving habitat.                                                                                                                                                                                                                                                                                                                     |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                                                                                                                                  |

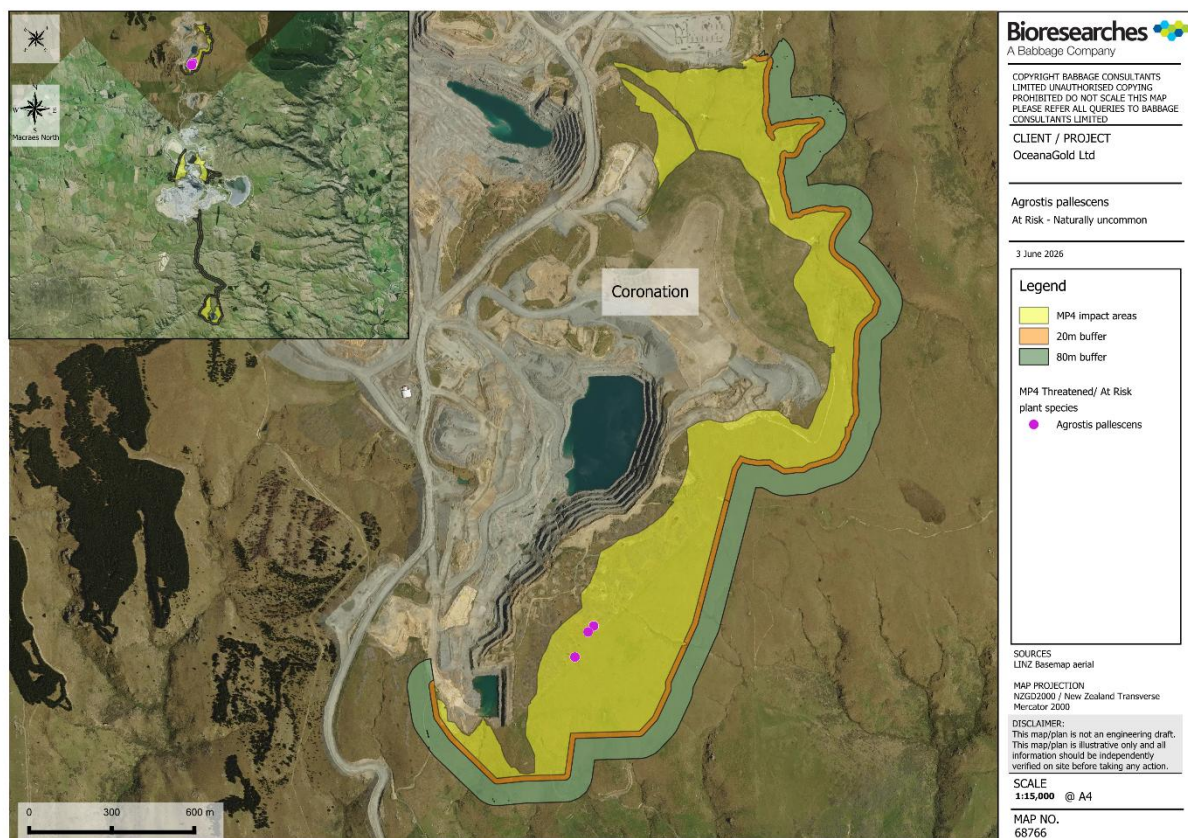


Figure 18: Locations of *Agrostis pallescens* records within the MP4 project area



#### 8.1.4 *Anthosachne falcis*

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Anthosachne falcis</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Description            | A grass of dry tussock grassland habitats.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Recorded locations     | Recorded in Central and Coronation works footprints; Coronation and Coal Creek buffer areas.                                                                                                                                                                                                                                                                                                                                                                                           |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage from Coronation and Central footprint sites</li> <li>Propagation from seed and plant divisions from footprint and buffer locations</li> <li>In-situ monitoring of populations in buffer areas</li> <li>Post-salvage monitoring of salvaged plants</li> </ul> <p>Planting and translocations to go to Murphy's and Highlay Hill. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting)</p> |
| Notes                  | Grows from division. Likely to be more plants present in the wider environment. Would benefit from more understanding of what makes the species flourish.                                                                                                                                                                                                                                                                                                                              |
| Anticipated risks      | None.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Confidence of success  | High.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



Figure 19: Locations of *Anthosachne falcis* records within the MP4 project area

### 8.1.5 *Argyrotegium mackayi*

|                        |                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Argyrotegium mackayi</i>                                                                                                                                                                                                                                                                                                                     |
| NZTCS status           | Not Threatened                                                                                                                                                                                                                                                                                                                                  |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                                                                                                                                                         |
| Description            | A diminutive silvery mat-forming herb occupying bogs and damp areas within tussock.                                                                                                                                                                                                                                                             |
| Recorded locations     | Recorded in Central buffer area.                                                                                                                                                                                                                                                                                                                |
| Management techniques  | <ul style="list-style-type: none"> <li>Management techniques:</li> <li>Propagation from seed and plant divisions</li> <li>In-situ monitoring of plants in buffer area</li> </ul> <p>Planting sites to be in Highlay Hill and Murphy's. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting).</p> |
| Notes                  | Needs low-vegetation damp ephemeral wetland or damp puddle environments. Unknown how this species will respond to cultivation.                                                                                                                                                                                                                  |
| Anticipated risks      | Suitability of planting sites and difficulty in propagation.                                                                                                                                                                                                                                                                                    |
| Confidence of success  | High due to no direct impact.                                                                                                                                                                                                                                                                                                                   |



Figure 20: Locations of *Argyrotegium mackayi* records within the MP4 project area



### 8.1.6 *Brachyscome longiscapa*

|                        |                                                                                                                                                                                                                                                                                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Brachyscome longiscapa</i>                                                                                                                                                                                                                                                      |
| NZTCS status           | At Risk - Naturally Uncommon                                                                                                                                                                                                                                                       |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                                                                                            |
| Description            | A diminutive rosette-forming daisy that occupies dry rocky ground within tussock grassland.                                                                                                                                                                                        |
| Recorded locations     | Within the Coronation works footprint and the Coronation buffer area.                                                                                                                                                                                                              |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• Salvage</li> <li>• In-situ monitoring of plants within buffer area</li> <li>• Post-salvage monitoring of translocated plants</li> </ul> <p>Planting and translocation sites: Murphy's, Highlay Hill.</p> |
| Notes                  | Would benefit from browsing/grazing. Salvage best option for this species, seed very hard to come by. Widespread species that can be common in areas. Likes cooler, darker, but open and grazed environments.                                                                      |
| Anticipated risks      | Challenges in propagation.                                                                                                                                                                                                                                                         |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                                          |

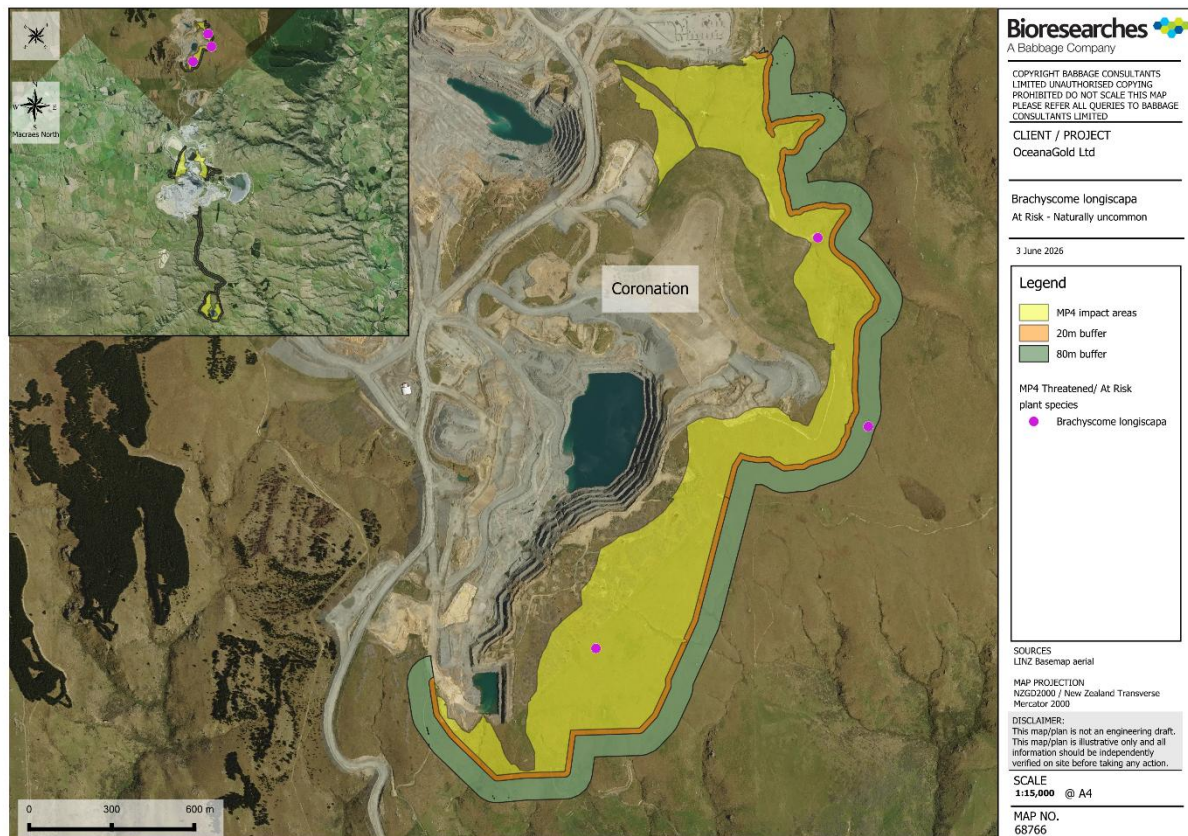
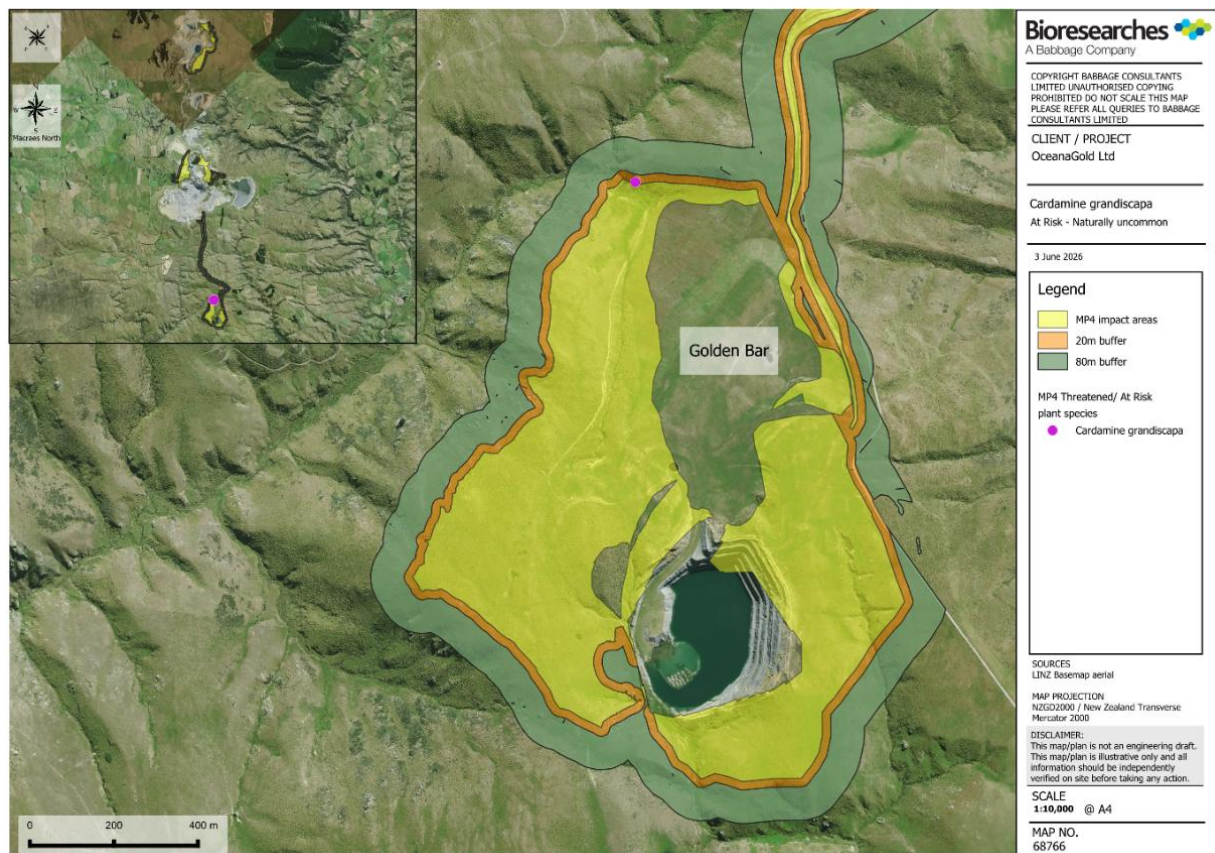


Figure 21: Locations of *Brachyscome longiscapa* records within the MP4 project area

### 8.1.7 *Cardamine grandiscapa*

|                               |                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Cardamine grandiscapa</i>                                                                                                                                                                                                                                                                                                                                                      |
| <b>NZTCS status</b>           | At Risk - Naturally Uncommon                                                                                                                                                                                                                                                                                                                                                      |
| <b>Regional threat status</b> | Regionally Data Deficient                                                                                                                                                                                                                                                                                                                                                         |
| <b>Description</b>            | A small, soft, rosette-forming herb that grows within tussock, rocky areas and shrublands.                                                                                                                                                                                                                                                                                        |
| <b>Recorded locations</b>     | Within the Golden Bar buffer area, within 20m of the works extent.                                                                                                                                                                                                                                                                                                                |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Seed collection</li> <li>Salvage if a risk to existing plants, or modification of their habitat assessed as likely</li> <li>In-situ monitoring of plants</li> </ul> <p>Planting locations: Constructed rock tors in Murphy's and Highlay Hill. (Exact locations to be confirmed through ground truthing by botanist prior to salvage).</p> |
| <b>Notes</b>                  | Recently described so not much known about this species. Rocky site specialist, including debris slopes. Needs degree of shading to reduce competition from weeds. Cultivation easy, reintroduction hard/uncertain.                                                                                                                                                               |
| <b>Anticipated risks</b>      | Competition from weeds and herbivory. Changes to hydrology may cause impact on plants within buffer if this modifies their habitat. Salvage success may be low as plants are annual and may resent root disturbance.                                                                                                                                                              |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                                                                                                                                                         |

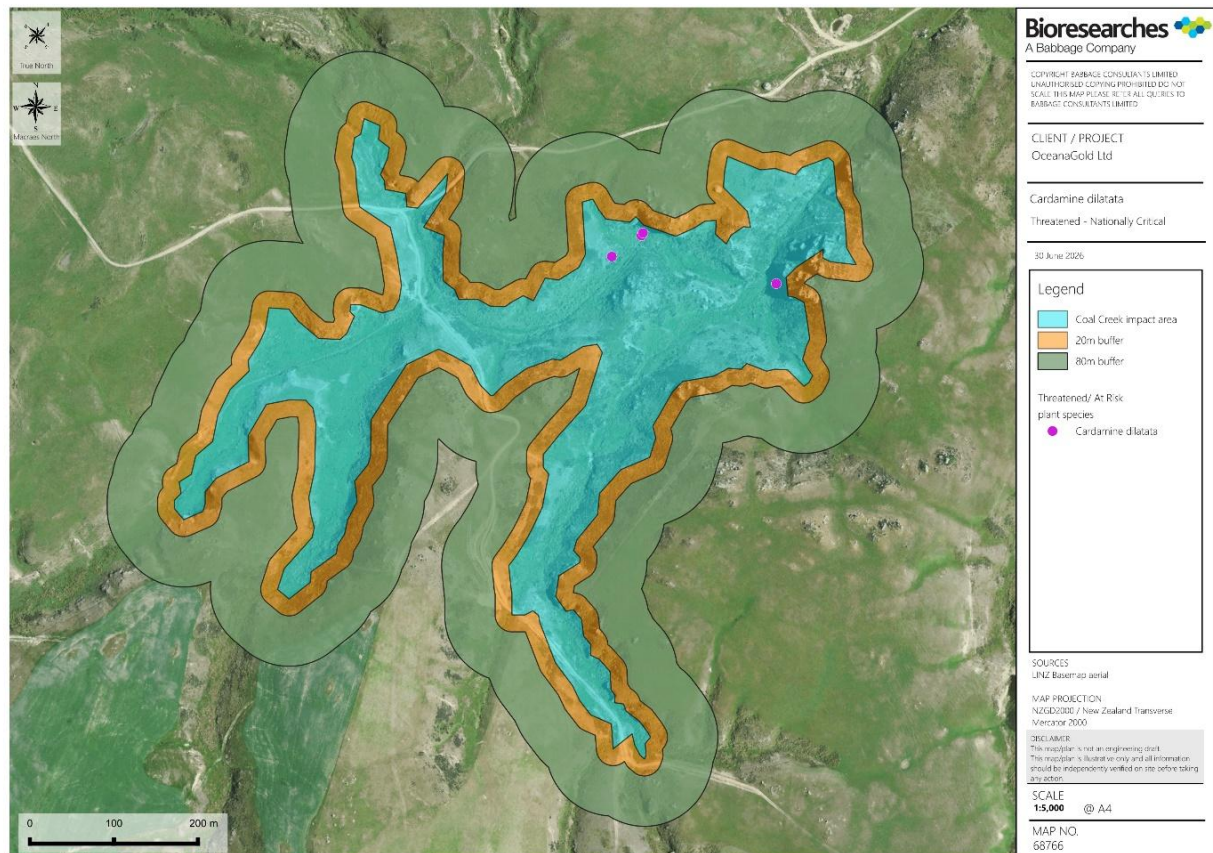


**Figure 22: Locations of *Cardamine grandiscapa* records within the MP4 project area**



### 8.1.8 *Cardamine dilatata*

|                               |                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Cardamine dilatata</i>                                                                                                                                                                                                                                                                                                                  |
| <b>NZTCS status</b>           | Threatened - Nationally Critical                                                                                                                                                                                                                                                                                                           |
| <b>Regional threat status</b> | Regionally Threatened - Critical                                                                                                                                                                                                                                                                                                           |
| <b>Description</b>            | A small, soft, rosette-forming herb that grows on shaded ledges on rocky bluffs.                                                                                                                                                                                                                                                           |
| <b>Recorded locations</b>     | This species has been recorded within the Coal Creek footprint.                                                                                                                                                                                                                                                                            |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Salvage</li> <li>• Propagation and planting</li> <li>• Post-salvage monitoring</li> </ul> <p>Planting locations: Rocky ledges within Murphy's fenced area, Cranky Jim's and Highly Hill. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting).</p> |
| <b>Notes</b>                  | The only known extant population of this species remaining.                                                                                                                                                                                                                                                                                |
| <b>Anticipated risks</b>      | Herbivory. Salvage failure due to annual plants resenting root disturbance. Extreme rarity of species.                                                                                                                                                                                                                                     |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                                                                                                                  |



**Figure 23: Locations of *Cardamine dilatata* records within the Coal Creek area**

### 8.1.9 *Carex dipsacea*

|                        |                                                                                                                                                                                                                                                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Carex dipsacea</i>                                                                                                                                                                                                                                                                               |
| NZTCS status           | Not Threatened                                                                                                                                                                                                                                                                                      |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                                                                                      |
| Description            | A tufted sedge of wetland and riparian habitat.                                                                                                                                                                                                                                                     |
| Recorded locations     | Within the Central area buffers.                                                                                                                                                                                                                                                                    |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed collection and plant divisions</li> <li>• In-situ monitoring</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's wetlands. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting).</p> |
| Notes                  | Likes drier part of wetlands, edges of ephemeral wetlands, open areas (some cross-over with <i>A. subflabelata</i> ), could be planted at gully tops.                                                                                                                                               |
| Anticipated risks      | None.                                                                                                                                                                                                                                                                                               |
| Confidence of success  | High.                                                                                                                                                                                                                                                                                               |

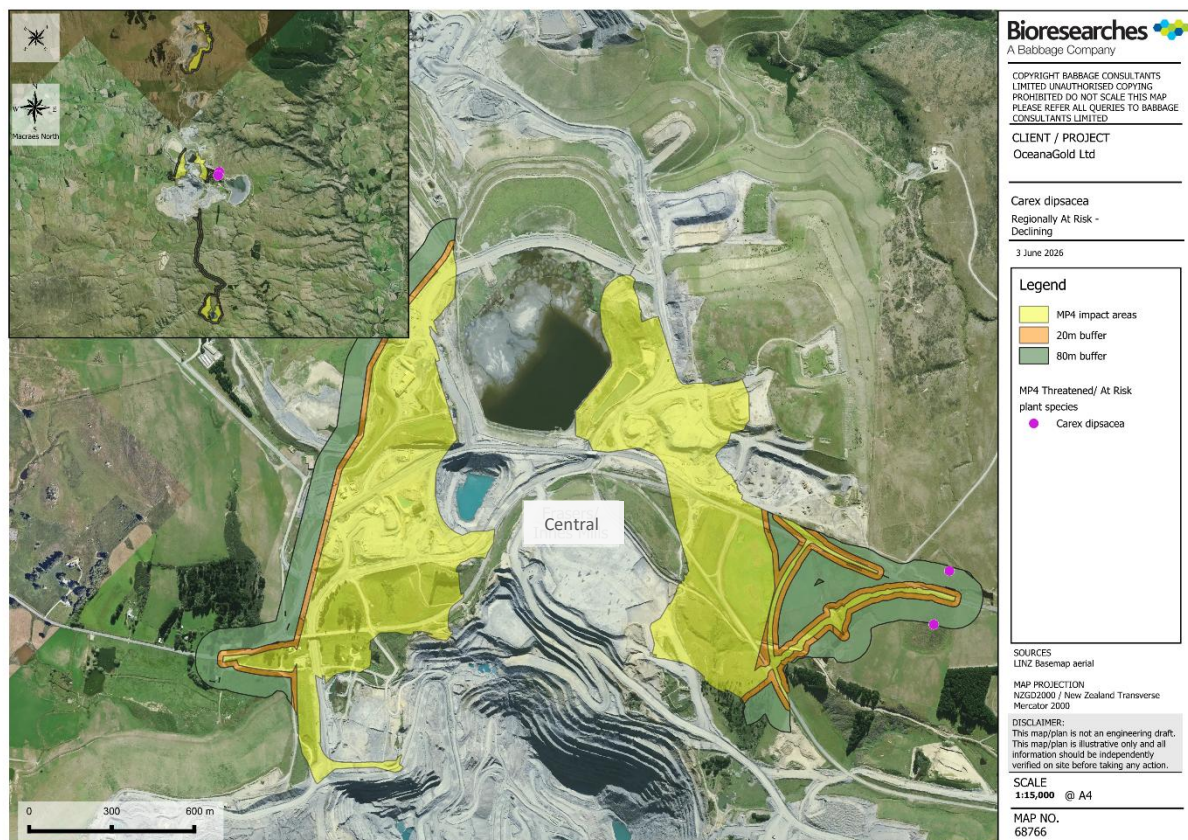


Figure 24: Locations of *Carex dipsacea* records within the MP4 project area



### 8.1.10 *Carex kaloides*

|                        |                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Carex kaloides</i>                                                                                                                                                                                                                                                                                                                                                                                                     |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                                                                                                       |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                                                                                                                                                                                                                                                        |
| Description            | A clumping sedge of wetlands and riparian margins.                                                                                                                                                                                                                                                                                                                                                                        |
| Recorded locations     | Within the Coal Creek footprint and the Coronation buffer area.                                                                                                                                                                                                                                                                                                                                                           |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant division</li> <li>• Salvage of Coal Creek plants</li> <li>• In-situ monitoring of Coronation buffer plants</li> <li>• Monitoring of salvaged plants</li> </ul> <p>Planting areas: Murphy's, Highlay Hill in open damp alluvial terraces. (Exact locations to be confirmed through ground truthing by botanist prior to salvage and planting)</p> |
| Notes                  | Easy to salvage and propagate, hard to replant as needs alluvial terrace damp habitat, without too much competition. May need some grazing. Plant in damp gully bottoms, not wetland. Hard to find habitat. Doesn't do well with taller grasses.                                                                                                                                                                          |
| Anticipated risks      | Competition from taller weeds. Limited habitat.                                                                                                                                                                                                                                                                                                                                                                           |
| Confidence of success  | High.                                                                                                                                                                                                                                                                                                                                                                                                                     |

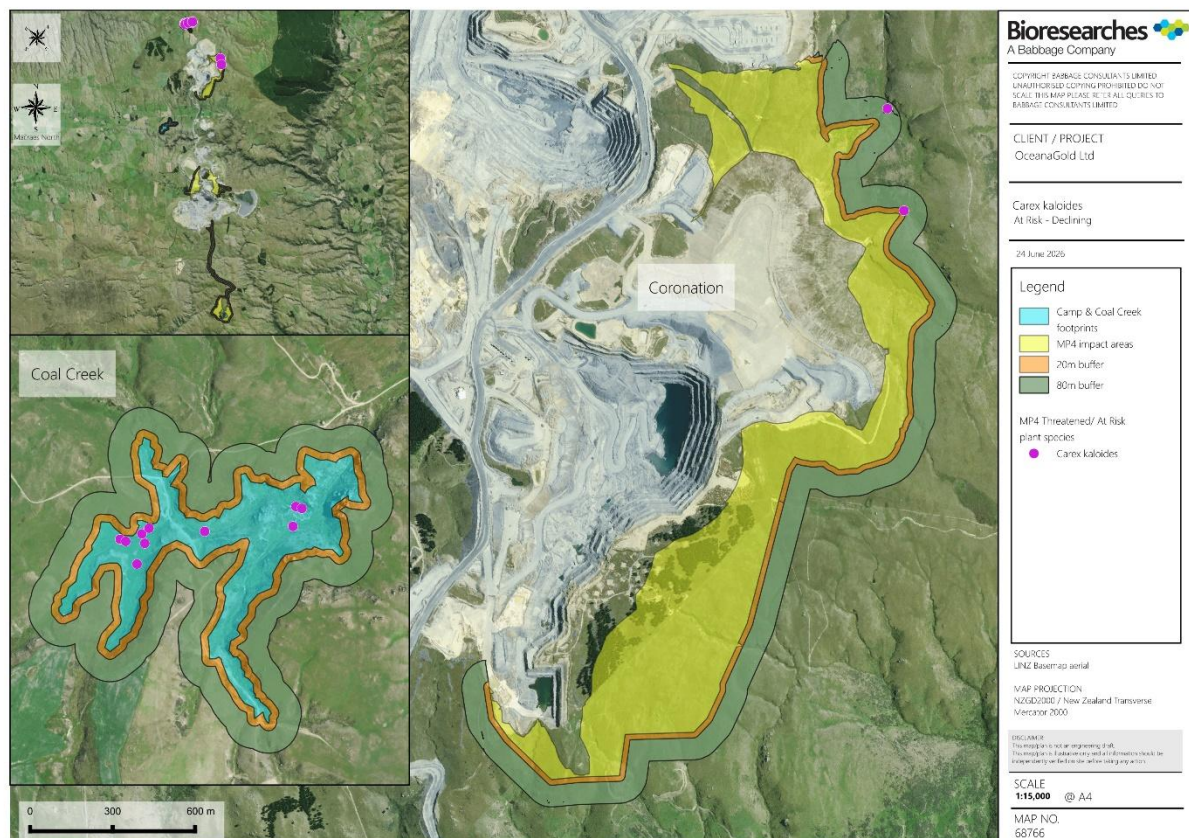


Figure 25: Locations of *Carex kaloides* records within the MP4 and Coal Creek project areas

### 8.1.11 *Carex purpurata*

|                        |                                                                                                                                                                                                                                                                           |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Carex purpurata</i>                                                                                                                                                                                                                                                    |
| NZTCS status           | At Risk - Naturally Uncommon                                                                                                                                                                                                                                              |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                                                                                   |
| Description            | A small tufting sedge of damp open ground.                                                                                                                                                                                                                                |
| Recorded locations     | Within the Golden Bar Haul Road buffer area.                                                                                                                                                                                                                              |
| Management techniques  | <ul style="list-style-type: none"> <li>• Mitigation techniques:</li> <li>• Propagation from seed and plant division</li> <li>• In-situ monitoring</li> </ul> <p>Planting areas: Murphy's and possibly HH: shady areas at the base of bluffs and under rock overhangs.</p> |
| Notes                  | Likes shady rock bottom areas, base of shady bluffs. Easy to grow.                                                                                                                                                                                                        |
| Anticipated risks      | Weed competition.                                                                                                                                                                                                                                                         |
| Confidence of success  | High.                                                                                                                                                                                                                                                                     |

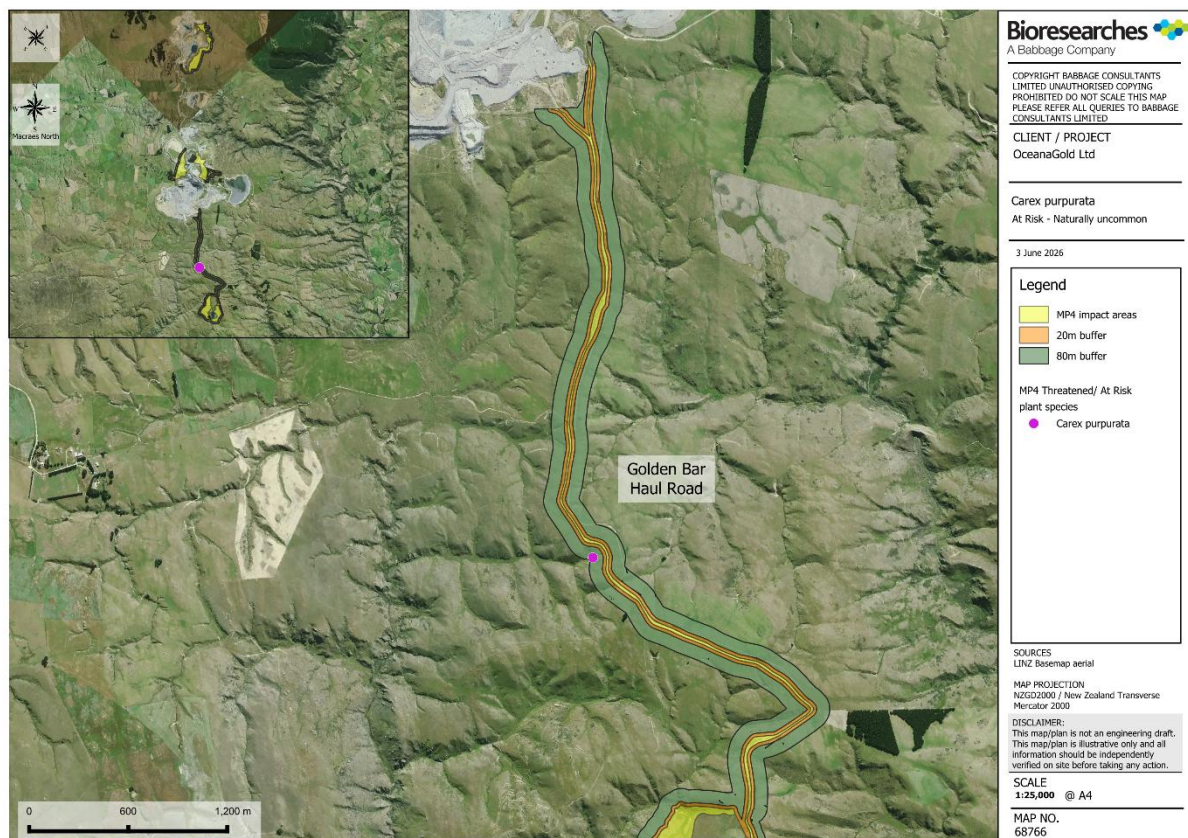
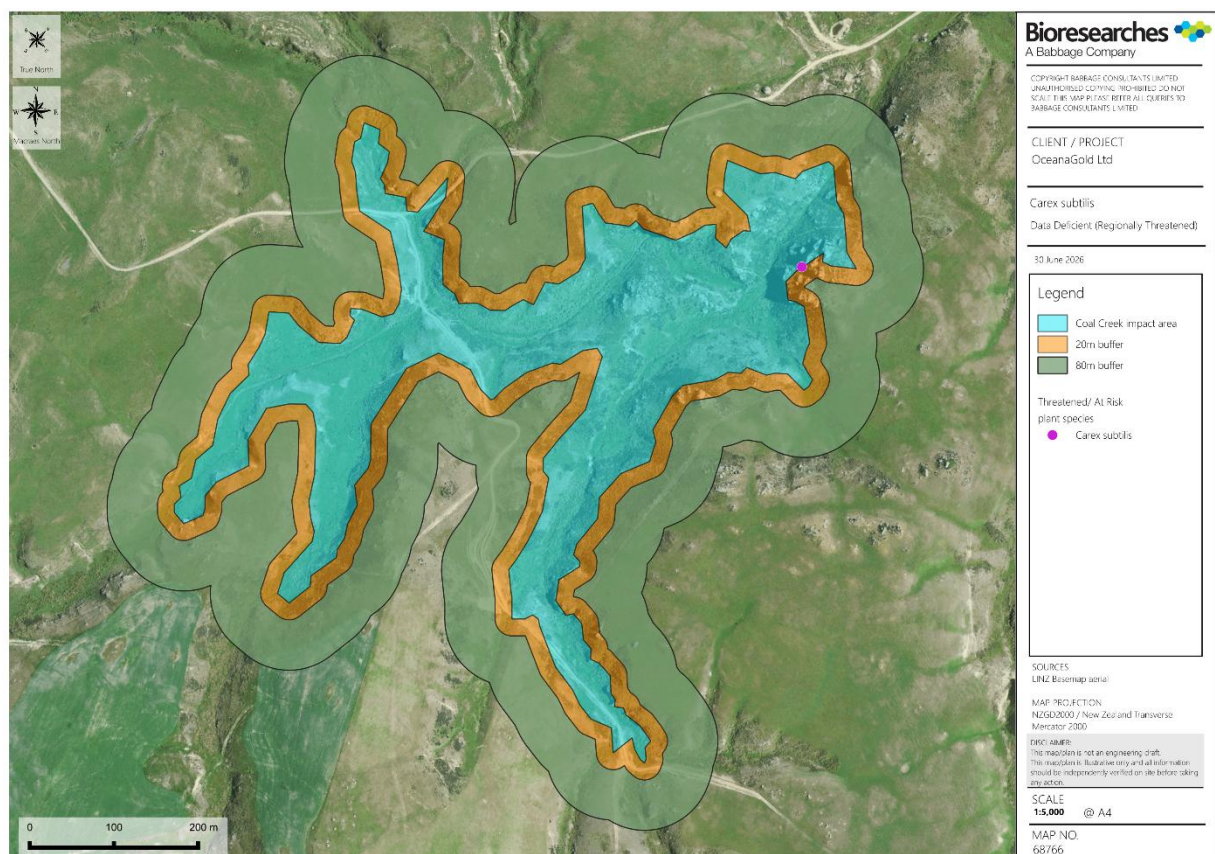


Figure 26: Locations of *Carex purpurata* records within the MP4 project area



### 8.1.12 *Carex subtilis*

|                               |                                                                                                                                                                                                                                                             |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Carex subtilis</i>                                                                                                                                                                                                                                       |
| <b>NZTCS status</b>           | Data Deficient                                                                                                                                                                                                                                              |
| <b>Regional threat status</b> | Regionally Threatened - Endangered                                                                                                                                                                                                                          |
| <b>Description</b>            | A small turf-forming sedge that grows in shady open areas.                                                                                                                                                                                                  |
| <b>Recorded locations</b>     | Identified within the Coal Creek footprint.                                                                                                                                                                                                                 |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Propagation from seed collection and plant division</li> <li>• Salvage of plants</li> <li>• Monitoring of translocated plants</li> </ul> <p>Planting areas: Island Block and Murphy's, into shaded open areas.</p> |
| <b>Notes</b>                  | Similar to <i>C. purpurata</i> , but needs short vegetation shady areas, like rock overhangs or under shrubland. Possibly could be planted into Island Block, or other existing covenants such as Murphy's.                                                 |
| <b>Anticipated risks</b>      | Competition from taller grasses, limited habitat.                                                                                                                                                                                                           |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                                   |



**Figure 27: Locations of *Carex subtilis* records within the Coal Creek area**

### 8.1.13 *Carex tenuiculmis*

|                        |                                                                                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Carex tenuiculmis</i>                                                                                                                                                                                                        |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                             |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                                                              |
| Description            | A fine red-leaved clumping sedge of wetlands and riparian margins.                                                                                                                                                              |
| Recorded locations     | Within buffer areas in Coronation, Central, and the Golden Bar Haul Road.                                                                                                                                                       |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• In-situ monitoring</li> </ul> <p>Planting areas: Riparian margins and wetlands within Murphy's Cranky Jim's and Highlay Hill.</p> |
| Notes                  | Easy to grow and plant: fine in most gully wetlands and gully heads, long-inundation ephemeral wetlands.                                                                                                                        |
| Anticipated risks      | None.                                                                                                                                                                                                                           |
| Confidence of success  | High.                                                                                                                                                                                                                           |

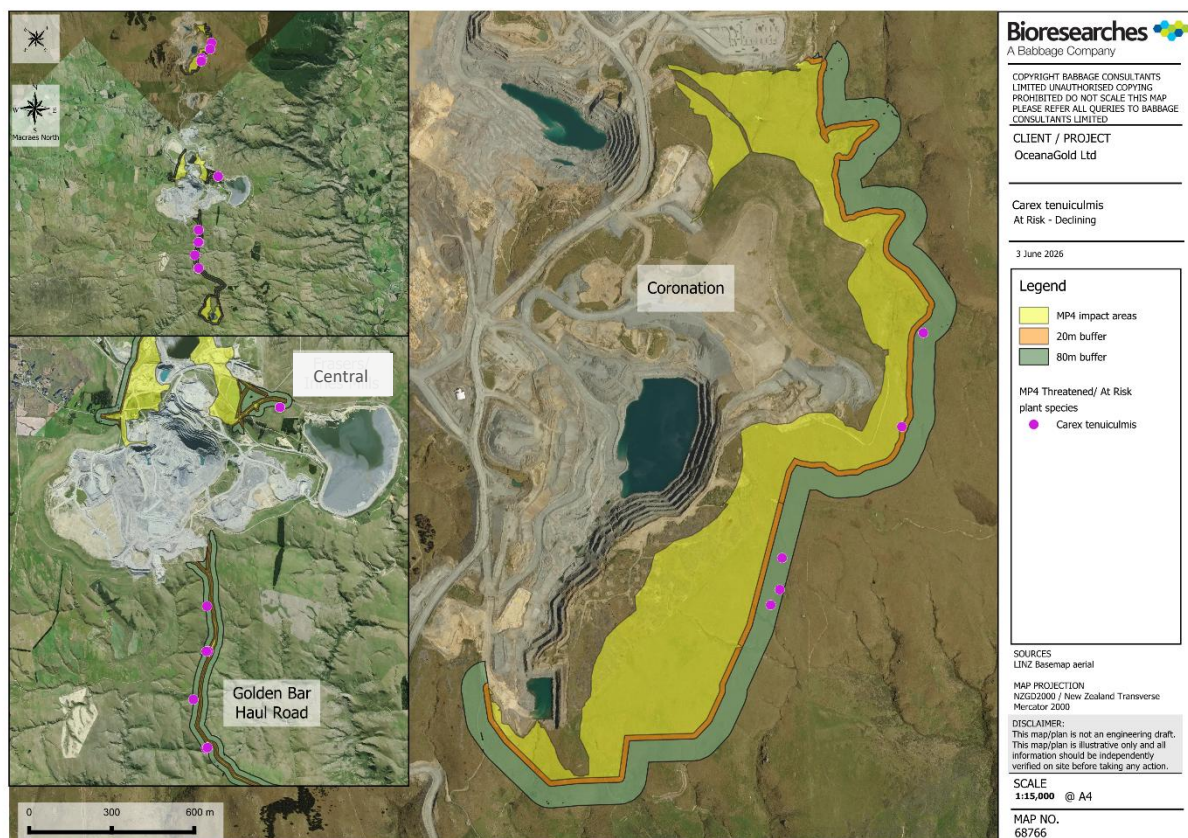
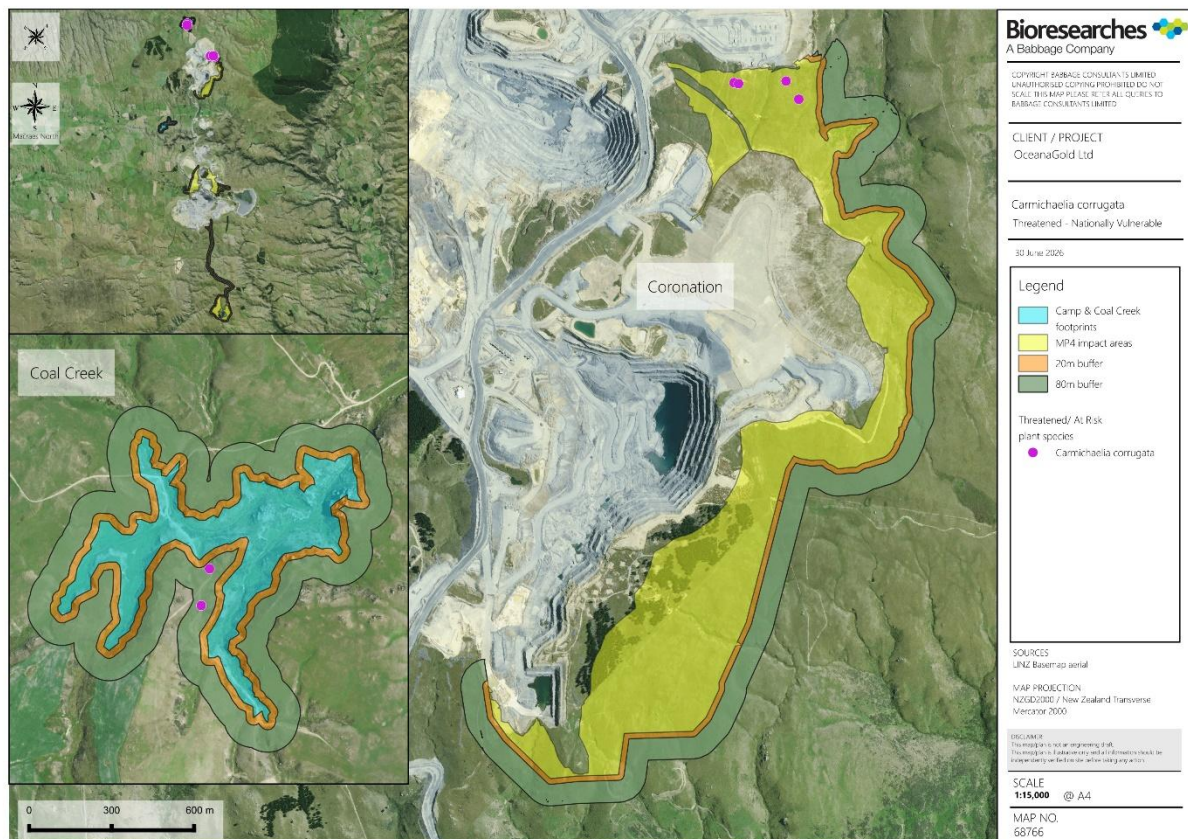


Figure 28: Locations of *Carex tenuiculmis* records within the MP4 project area



### 8.1.14 *Carmichaelia corrugata*

|                        |                                                                                                                                                                                                                                                                                                                               |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Carmichaelia corrugata</i>                                                                                                                                                                                                                                                                                                 |
| NZTCS status           | Threatened - Nationally Vulnerable                                                                                                                                                                                                                                                                                            |
| Regional threat status | Regionally Threatened - Critical                                                                                                                                                                                                                                                                                              |
| Description            | A low-growing broom that forms small patches in open, sunny areas.                                                                                                                                                                                                                                                            |
| Recorded locations     | Within the Coronation footprint and the Coal Creek buffer area.                                                                                                                                                                                                                                                               |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• Salvage from Coronation footprint</li> <li>• In-situ monitoring of Coal Creek population</li> <li>• Post-salvage monitoring of salvaged plants</li> </ul> <p>Planting sites: Murphy's, Highlay Hill. Potentially within open, grazed covenants.</p> |
| Notes                  | Requires some browsing to keep open ground habitat. Susceptible to weed competition. Needs deeper soils. Reasonably ok to cultivate and plant.                                                                                                                                                                                |
| Anticipated risks      | Competition from taller weeds, challenges with establishment and propagation.                                                                                                                                                                                                                                                 |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                                                                                     |



**Figure 29: Locations of *Carmichaelia corrugata* records within the MP4 and Coal Creek project areas**

### 8.1.15 *Carmichaelia petriei*

|                        |                                                                                                                                                                                                                                                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Carmichaelia petriei</i>                                                                                                                                                                                                                                                                                                                    |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                            |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                                                                                                                                 |
| Description            | A leafless, branching shrub of open grassland and shrubland.                                                                                                                                                                                                                                                                                   |
| Recorded locations     | Through Coronation and Golden Bar Footprints; buffer areas of Coronation, Golden Bar Haul Road, and Golden Bar.                                                                                                                                                                                                                                |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• Salvage of plants in works footprints</li> <li>• In-situ monitoring of plants in buffer areas</li> <li>• Post-salvage monitoring of translocated plants</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill in open grassland and grey shrubland.</p> |
| Notes                  | Lack of recruitment an issue for this species. Browsers an issue. Needs reasonably high light levels.                                                                                                                                                                                                                                          |
| Anticipated risks      | Recruitment failure, failure to establish from planting or salvage, root damage from salvage.                                                                                                                                                                                                                                                  |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                                                                                                      |

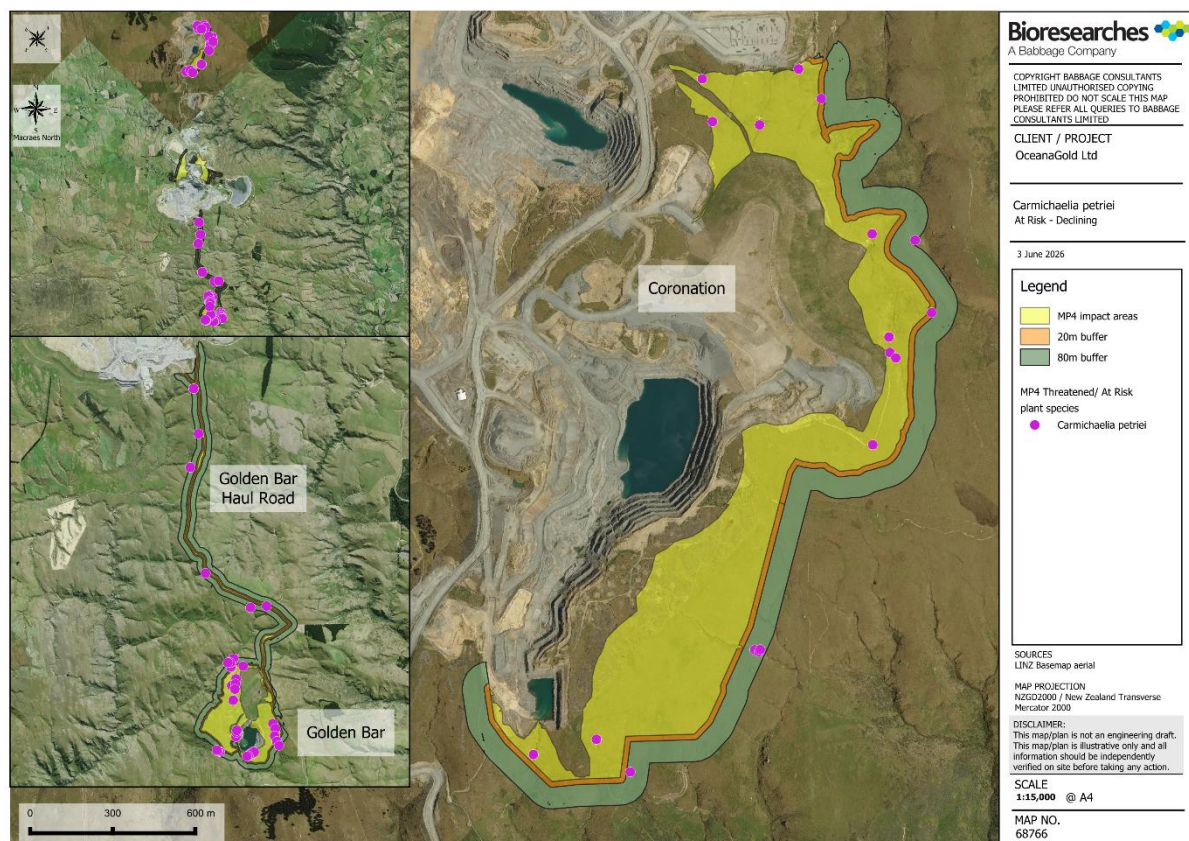


Figure 30: Locations of *Carmichaelia petriei* records within the MP4 project area



### 8.1.16 *Carmichaelia crassicaulis* subsp. *crassicaulis*

|                               |                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i>                                                                                                                                                                                                                                                           |
| <b>NZTCS status</b>           | Threatened - Nationally Vulnerable                                                                                                                                                                                                                                                                                    |
| <b>Regional threat status</b> | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                    |
| <b>Description</b>            | A coral-like, leafless woody shrub which grows in open grassland, grey shrubland, and rocky sites.                                                                                                                                                                                                                    |
| <b>Recorded locations</b>     | Within Coal and Camp Creek works footprint and buffer areas.                                                                                                                                                                                                                                                          |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Salvage from Camp and Coal Creek footprints</li> <li>Propagation from seed</li> <li>In-situ monitoring of plants in buffer areas</li> <li>Post-salvage monitoring of translocated plants</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill in open areas.</p> |
| <b>Notes</b>                  | Difficult to grow - herbivory an issue. High light demanding species. Could try range of browser exclusion to see what animals might be impacting plants. Needs deep nurse soils and rocky areas.                                                                                                                     |
| <b>Anticipated risks</b>      | Herbivory, possible need for some degree of browsing to limit competition from weeds, difficult to grow, limited recruitment.                                                                                                                                                                                         |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                                                                                             |

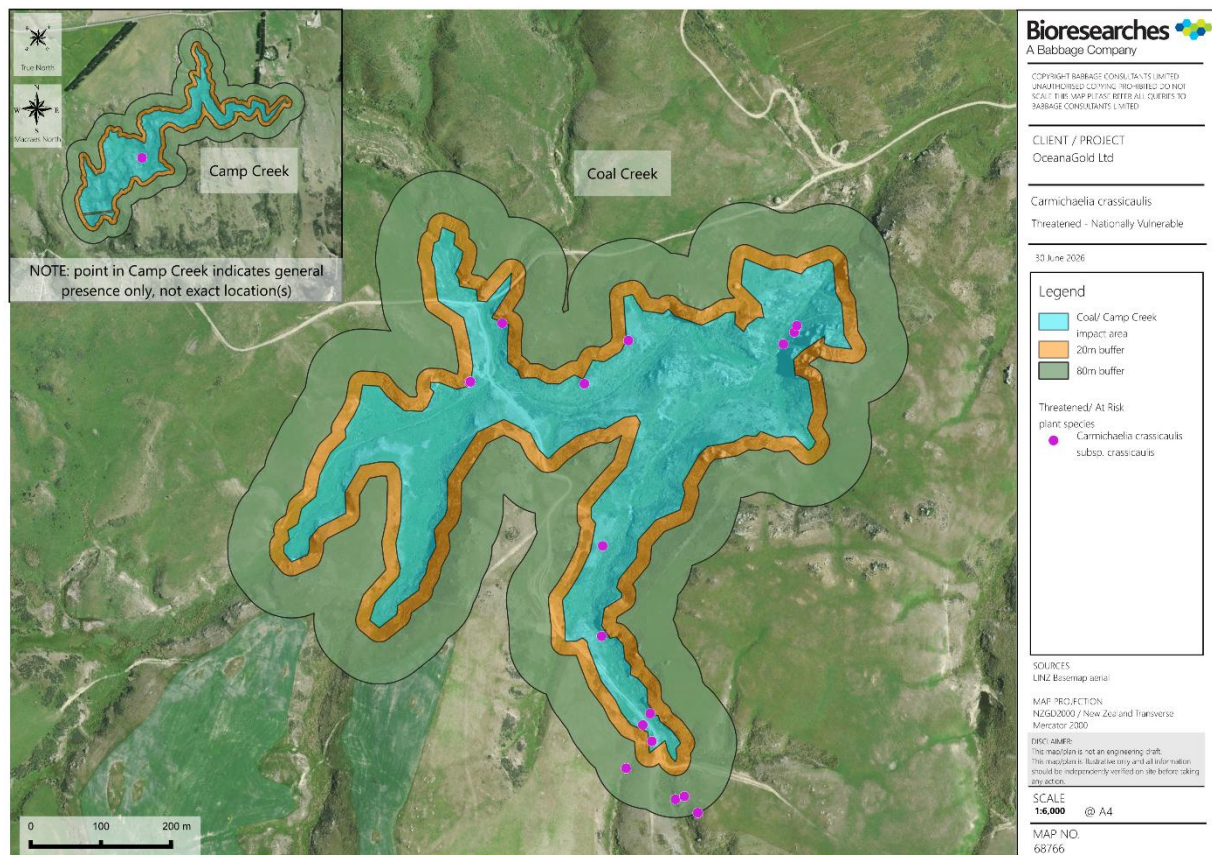
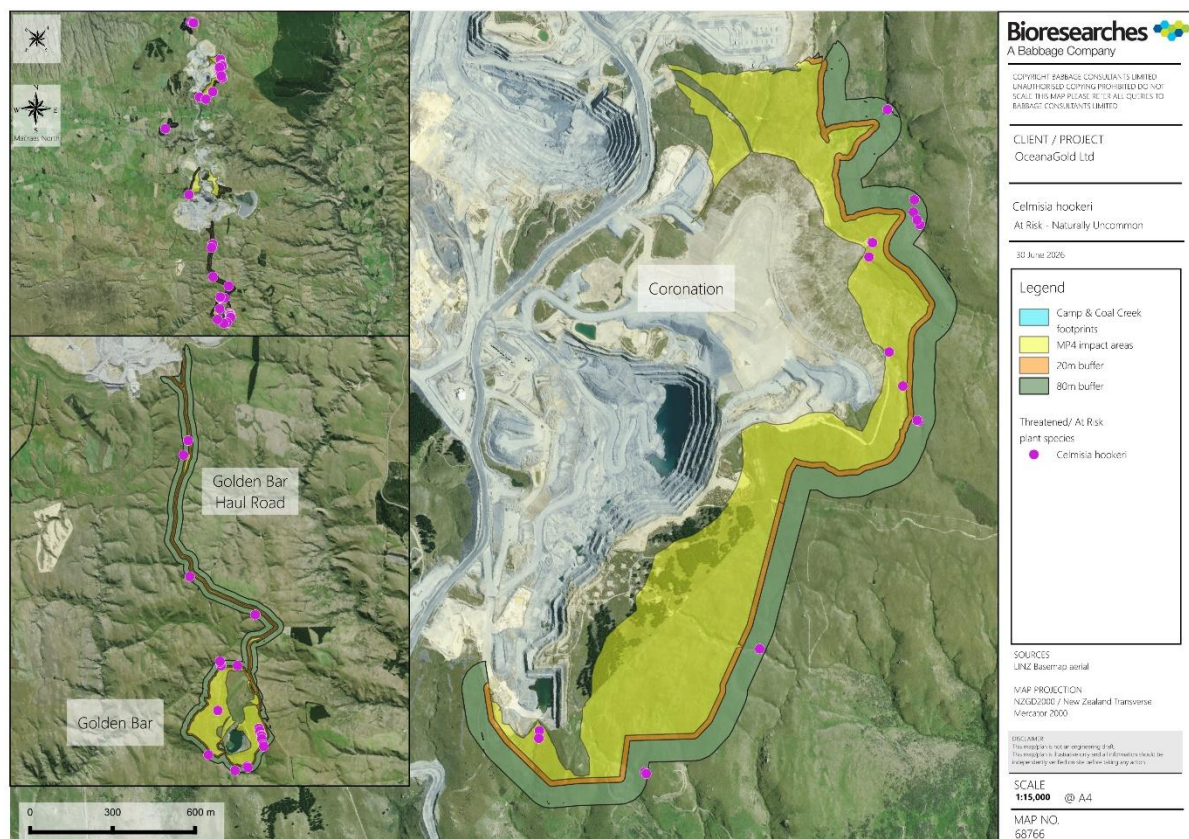


Figure 31: Locations of *Carmichaelia crassicaulis* subsp. *crassicaulis* records within the Coal Creek area

### 8.1.17 *Celmisia hookeri*

|                        |                                                                                                                                                                                                           |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Celmisia hookeri</i>                                                                                                                                                                                   |
| NZTCS status           | At Risk - Naturally Uncommon                                                                                                                                                                              |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                   |
| Description            | A silvery clump-forming daisy that grows on rock faces and sloping open ground.                                                                                                                           |
| Recorded locations     | Within the Coronation, Golden Bar, Coal, and Camp Creek works footprints; buffer areas in Coronation, Central, Golden Bar, and Golden Bar Haul Road.                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage of seedlings</li> <li>Seed scattering in appropriate habitat</li> </ul> <p>Planting sites: South-facing rocky bluffs in Murphy's and Highlay Hill.</p>     |
| Notes                  | Herbivory an issue, also competition from weeds. Expected to naturally recolonise habitat if browsing removed. Seed scattering expected to be a more successful method of establishment than propagation. |
| Anticipated risks      | Hard to cultivate, larger plants unlikely to salvage well due to root damage. Herbivory.                                                                                                                  |
| Confidence of success  | High.                                                                                                                                                                                                     |

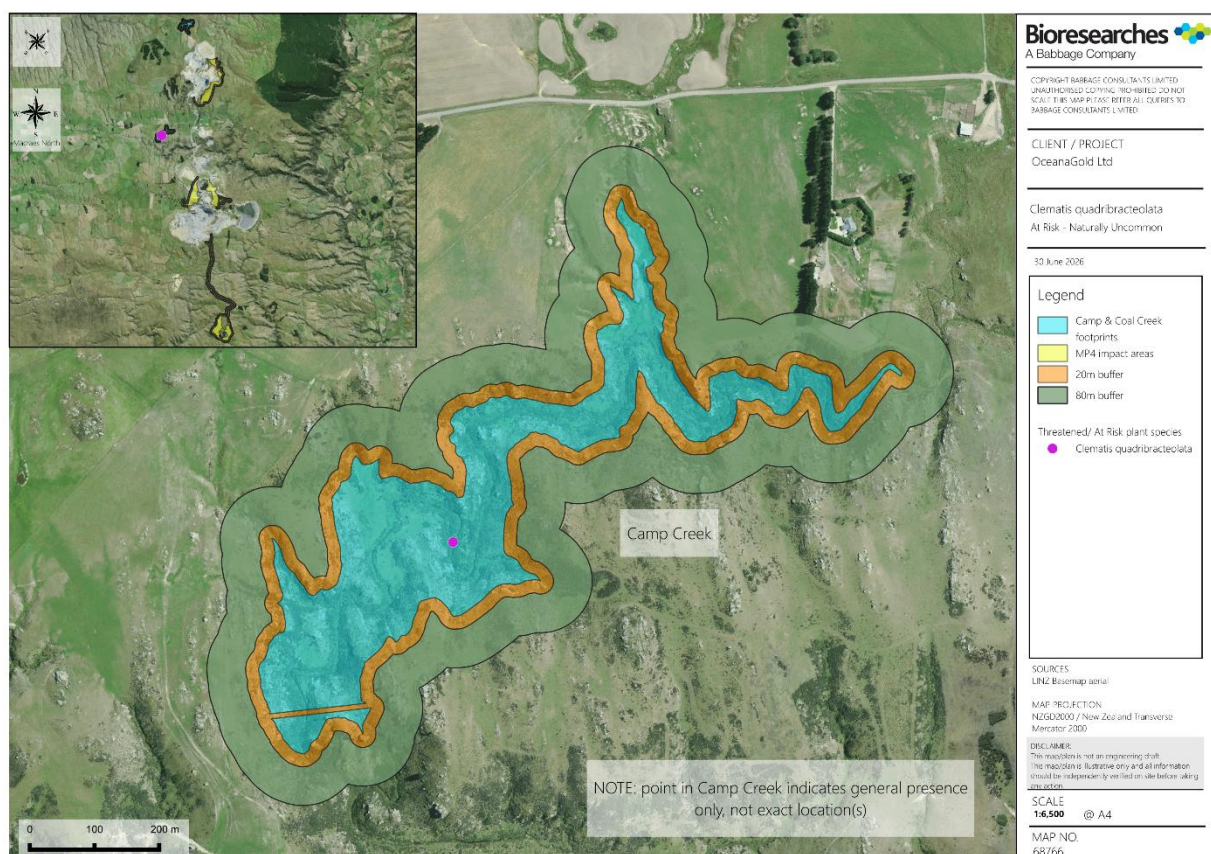


**Figure 32: Locations of *Celmisia hookerii* records within the MP4 project area. This species is also expected to be present in Camp and Coal Creeks.**



### 8.1.18 *Clematis quadribracteolata*

|                        |                                                                                                                                                                       |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Clematis quadribracteolata</i>                                                                                                                                     |
| NZTCS status           | At Risk - Naturally Uncommon                                                                                                                                          |
| Regional threat status | Regionally Threatened - Critical                                                                                                                                      |
| Description            | A twining vine that grows through grey shrublands.                                                                                                                    |
| Recorded locations     | Recorded from Camp Creek.                                                                                                                                             |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• Salvage from Camp Creek</li> </ul> <p>Planting in Cranky Jim's, Murphy's, Island Block.</p> |
| Notes                  | May not have seed often, but will grow from seed, grows from cuttings. Can be hard to identify.                                                                       |
| Anticipated risks      | Possibly not tolerant of salvage.                                                                                                                                     |
| Confidence of success  | High.                                                                                                                                                                 |



**Figure 33: Indicative location *Clematis quadribracteolata* record within the Camp Creek area**

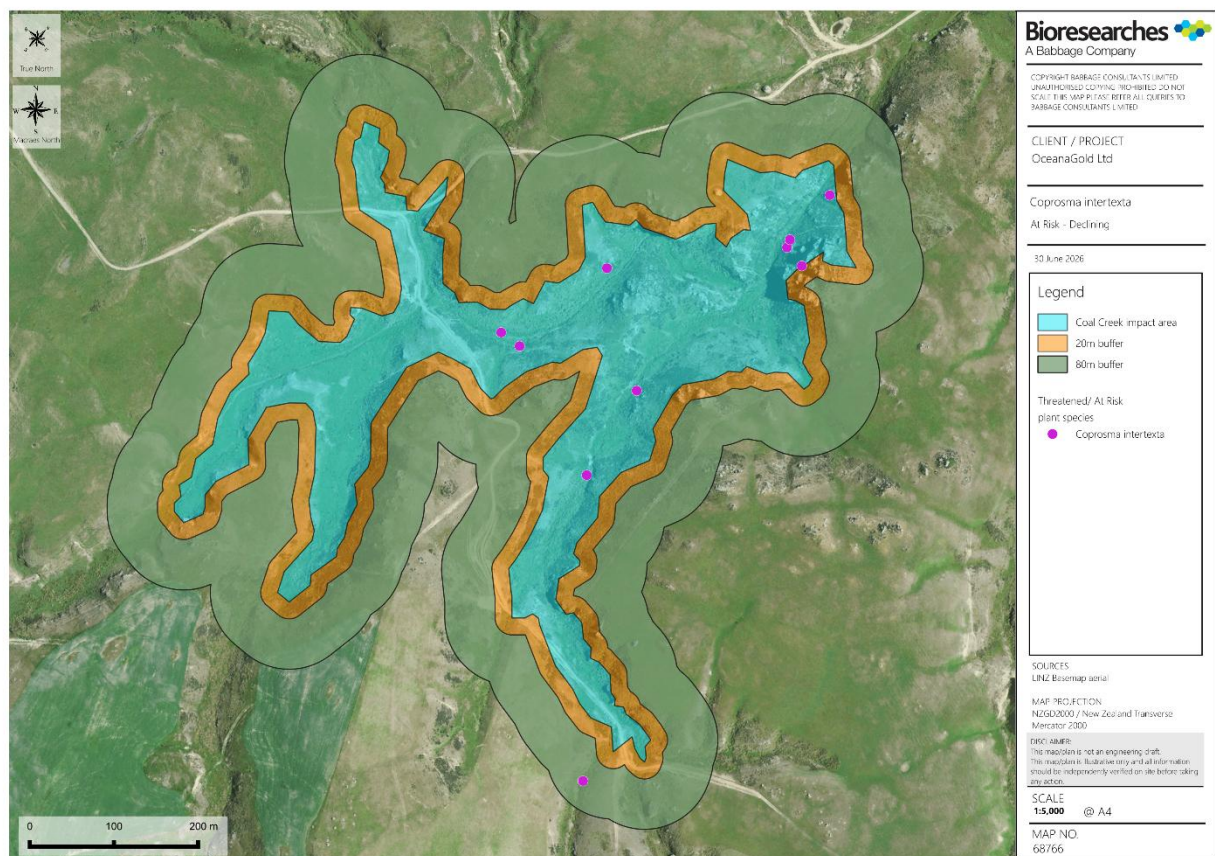
### 8.1.19 *Colobanthus strictus*

|                               |                                                                                                                                                                                                                                                                           |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Colobanthus strictus</i>                                                                                                                                                                                                                                               |
| <b>NZTCS status</b>           | Not Threatened                                                                                                                                                                                                                                                            |
| <b>Regional threat status</b> | Regionally At Risk - Declining                                                                                                                                                                                                                                            |
| <b>Description</b>            | A small dryland herb, which grows in small, pointed rosettes.                                                                                                                                                                                                             |
| <b>Recorded locations</b>     | Within the Coronation North impact and wider buffer area                                                                                                                                                                                                                  |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• Salvage of plants within the Coronation North impact area</li> <li>• Monitoring of plants in Coronation North buffer area</li> </ul> Planting areas: Open tussocklands in Highlay Hill, Murphys |
| <b>Notes</b>                  | Uncertain how this plant will respond to cultivation and planting                                                                                                                                                                                                         |
| <b>Anticipated risks</b>      | Specific habitat needs being met                                                                                                                                                                                                                                          |
| <b>Confidence of success</b>  | Low                                                                                                                                                                                                                                                                       |



### 8.1.20 *Coprosma intertexta*

|                               |                                                                                                                                                                                                              |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Coprosma intertexta</i>                                                                                                                                                                                   |
| <b>NZTCS status</b>           | At Risk - Declining                                                                                                                                                                                          |
| <b>Regional threat status</b> | Regionally Threatened - Vulnerable                                                                                                                                                                           |
| <b>Description</b>            | A reddish divaricating shrub that grows in open dry areas.                                                                                                                                                   |
| <b>Recorded locations</b>     | Within the Coal Creek footprint and buffer.                                                                                                                                                                  |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Propagation from seed and cuttings</li> <li>Salvage of plants within the Coal Creek footprint</li> </ul> <p>Planting areas: Cranky Jim's, Murphy's in shrublands.</p> |
| <b>Notes</b>                  | Expected to grow well from seed and cuttings, can be clonal so need to be careful all plants are collected from. Needs reasonable dryness but not arid conditions. Prefers sloping areas.                    |
| <b>Anticipated risks</b>      | Rabbit herbivory, low genetic diversity from clonal populations.                                                                                                                                             |
| <b>Confidence of success</b>  | High.                                                                                                                                                                                                        |



**Figure 34: Locations of *Coprosma intertexta* records within the Coal Creek area**

### 8.1.21 *Deschampsia cespitosa*

|                        |                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Deschampsia cespitosa</i>                                                                                                                                                                                                                                                                                                                                                        |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                                                                 |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                                                                                  |
| Description            | An upright tufted grass of wetlands and riparian margins.                                                                                                                                                                                                                                                                                                                           |
| Recorded locations     | Coronation footprint; buffer area of Central.                                                                                                                                                                                                                                                                                                                                       |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• Salvage of plants within works footprint</li> <li>• In-situ monitoring of plants in buffer area</li> </ul> <p>Planting areas: Long-inundation ephemeral wetlands, possibly in Cranky Jim's wetlands. Requires habitat to be identified by botanist prior to planting and salvage.</p> |
| Notes                  | Big impact on this species from MP4. Easy to cultivate and easy to plant in low-moderate stature wetland. Prefers moderately wet conditions, e.g. on hummock in wetland or around margins. Need a good population in ephemeral wetland to replicate what is being lost. Not good in gully bottoms. Likes some water variation.                                                      |
| Anticipated risks      | Large impact on a significant population, lack of appropriate habitat to replicate lost ecosystem dynamics.                                                                                                                                                                                                                                                                         |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                                                                                                                                           |

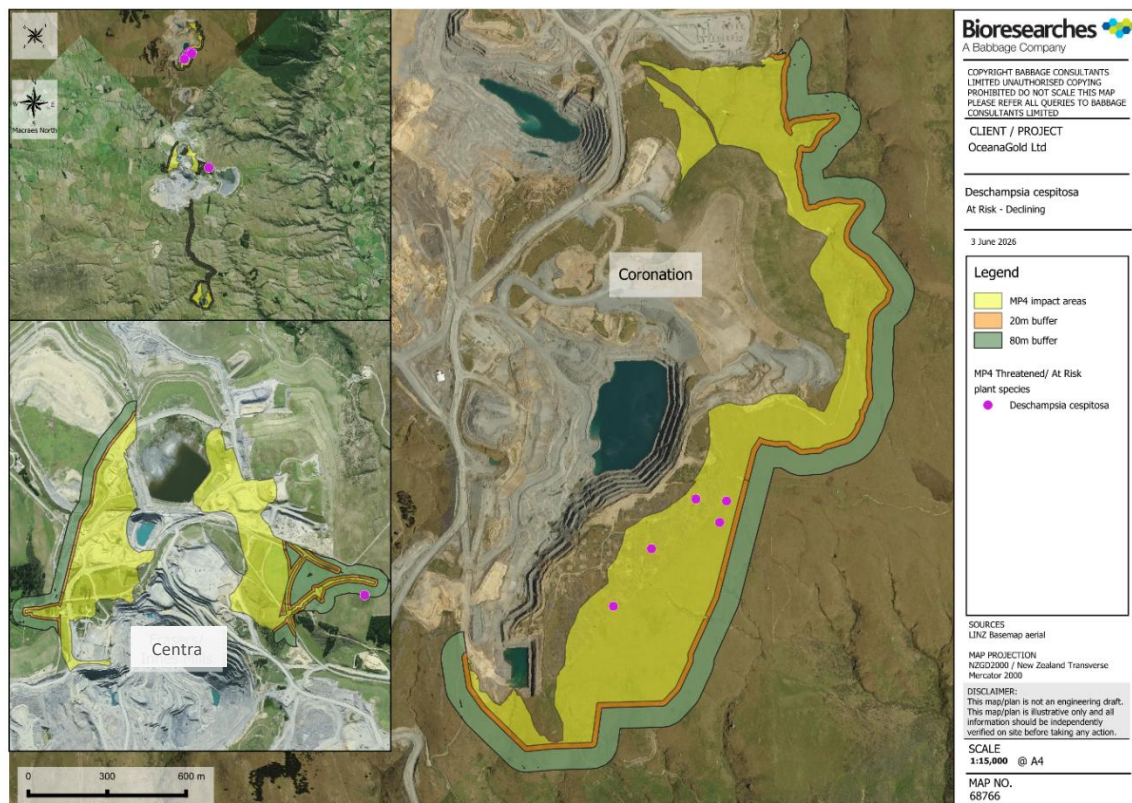
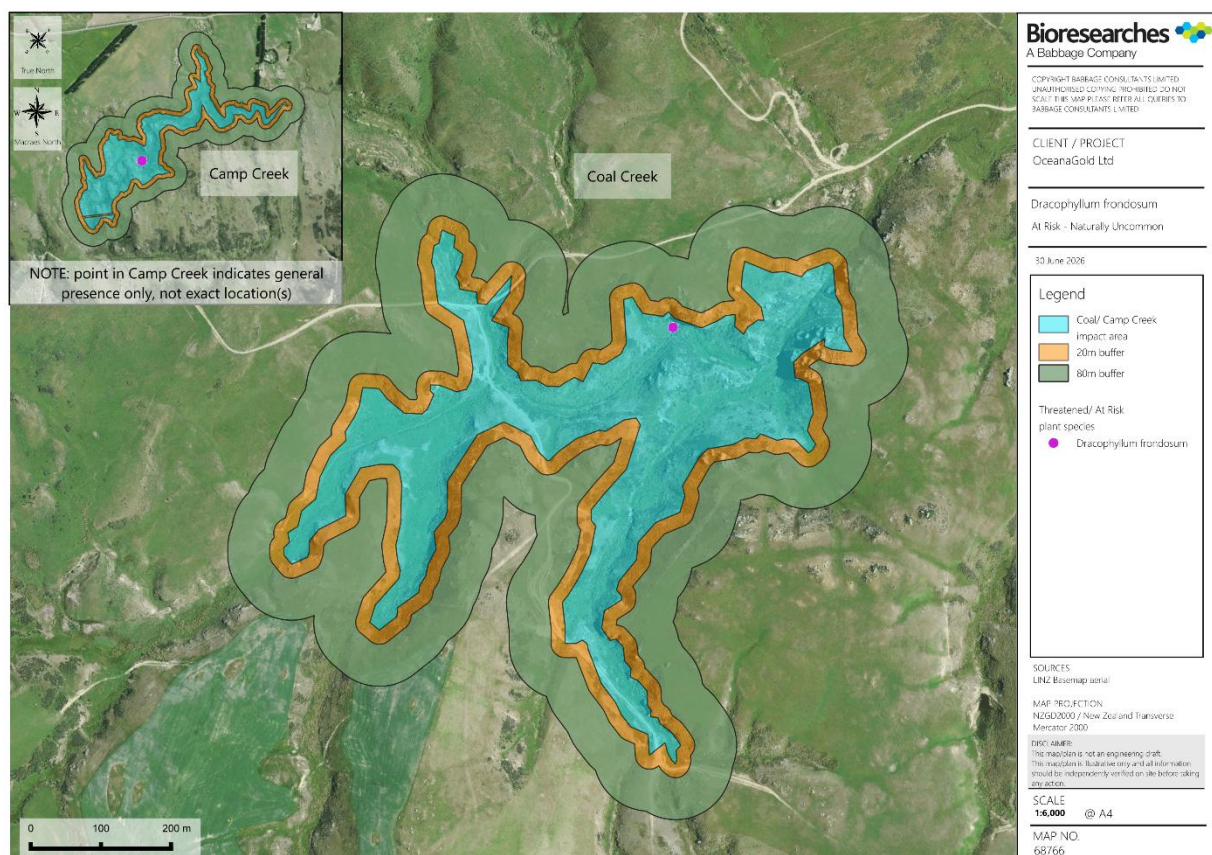


Figure 35: Locations of *Deschampsia cepitosa* records within the MP4 project area



### 8.1.22 *Dracophyllum frondosum*

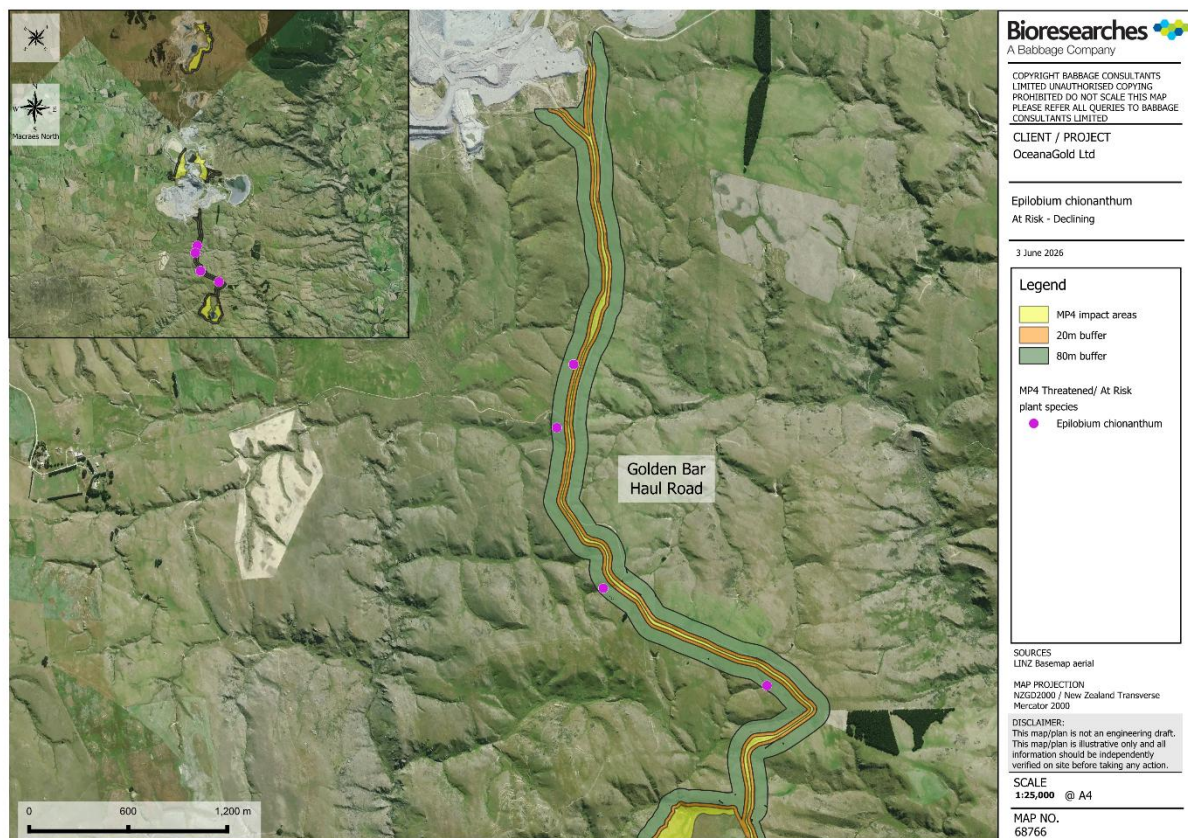
|                               |                                                                                                                                                                                                                                             |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Dracophyllum frondosum</i>                                                                                                                                                                                                               |
| <b>NZTCS status</b>           | At Risk - Naturally Uncommon                                                                                                                                                                                                                |
| <b>Regional threat status</b> | Regionally Threatened - Vulnerable                                                                                                                                                                                                          |
| <b>Description</b>            | A prostrate woody shrub that grows in rocky areas.                                                                                                                                                                                          |
| <b>Recorded locations</b>     | Within Coal and Camp Creek footprints.                                                                                                                                                                                                      |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Propagation from seed and cuttings</li> <li>• Salvage from Coal and Camp Creek</li> <li>• Monitoring of post-salvage translocated plants</li> </ul> <p>Planting areas: Murphy's, Highlay Hill.</p> |
| <b>Notes</b>                  | Difficult to cultivate and plant. Managing a wild population would be best. Likes larger bluffs near top. Hard to collect material due to location on steep rock faces. Seed and cuttings worth trying. Needs particular growing medium.    |
| <b>Anticipated risks</b>      | Difficult to propagate and resents root disturbance for salvage.                                                                                                                                                                            |
| <b>Confidence of success</b>  | Low.                                                                                                                                                                                                                                        |



**Figure 36: Locations of *Dracophyllum frondosum* records within the Coal Creek area. The species is also expected to be present in Camp Creek.**

### 8.1.23 *Epilobium chionanthum*

|                        |                                                                                                                                                               |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Epilobium chionanthum</i>                                                                                                                                  |
| NZTCS status           | At Risk - Declining                                                                                                                                           |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                            |
| Description            | A soft herb that grows amongst wetland vegetation.                                                                                                            |
| Recorded locations     | Within the buffer of the Golden Bar Haul Road.                                                                                                                |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• In-situ monitoring</li> </ul> Planting areas: Murphy's, Highlay Hill, Cranky Jim's. |
| Notes                  | Susceptible to mould fungus. Expected to be good to grow and salvage.                                                                                         |
| Anticipated risks      | Competition from exotic weeds. Disease during cultivation.                                                                                                    |
| Confidence of success  | High.                                                                                                                                                         |



**Figure 37: Locations of *Epilobium chionanthum* records within the MP4 project area**



### 8.1.24 *Epilobium insulare*

|                        |                                                                                                                                                                                                                                       |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Epilobium insulare</i>                                                                                                                                                                                                             |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                   |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                                                                    |
| Description            | A soft-leaved sprawling herb that grows amongst wetland vegetation.                                                                                                                                                                   |
| Recorded locations     | Within the Coal Creek and Coronation footprints; buffer areas of Coal Creek, Central, and Golden Bar.                                                                                                                                 |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage from footprint areas</li> <li>Propagation from seed and plant divisions</li> <li>In-situ monitoring</li> </ul> <p>Planting areas: Murphy's, Crank Jim's and Highlay Hill wetlands.</p> |
| Notes                  | Susceptible to mould fungus. Expected to be good to grow and salvage.                                                                                                                                                                 |
| Anticipated risks      | Competition from exotic weeds. Disease during propagation.                                                                                                                                                                            |
| Confidence of success  | High.                                                                                                                                                                                                                                 |



**Figure 38: Locations of *Epilobium insulare* records within the MP4 project area**

### 8.1.25 *Epilobium komarovianum*

|                        |                                                                                                                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Epilobium komarovianum</i>                                                                                                                                                                              |
| NZTCS status           | Not Threatened                                                                                                                                                                                             |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                    |
| Description            | Small, mat-forming herb of ephemeral wetlands and seeps.                                                                                                                                                   |
| Recorded locations     | Within the Central buffer area.                                                                                                                                                                            |
| Management techniques  | <ul style="list-style-type: none"> <li>Propagation from seed and plant divisions</li> <li>In-situ monitoring</li> </ul> <p>Planting areas: Murphy's and Cranky Jim's ephemeral wetlands.</p>               |
| Notes                  | Can be grown from division and seed. Might do well on margins of reservoirs. Rare in the Macraes environment, so may be more finicky with habitat than expected. Seems to like mineral soils that dry out. |
| Anticipated risks      | Competition from exotic weeds.                                                                                                                                                                             |
| Confidence of success  | High.                                                                                                                                                                                                      |



Figure 39: Locations of *Epilobium komarovianum* records within the MP4 project area



### 8.1.26 *Euchiton ensifer*

|                        |                                                                                                                                                                                                                                                   |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Euchiton ensifer</i>                                                                                                                                                                                                                           |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                               |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                                                                                |
| Description            | Small silvery creeping herb of damp sites and ephemeral wetlands.                                                                                                                                                                                 |
| Recorded locations     | Within the Central buffer area.                                                                                                                                                                                                                   |
| Management techniques  | <ul style="list-style-type: none"> <li>Propagation from seed and plant divisions</li> <li>In-situ monitoring</li> </ul> <p>Planting areas: Murphy's.</p>                                                                                          |
| Notes                  | Can be grown from division and seed. Might do well on margins of reservoirs. Grows well in cultivation. Likes seeps. Seems to like mineral soils that dry out. Moist but low growing or bare ground. Euchitons can be grown from plant divisions. |
| Anticipated risks      | Competition from exotic weeds.                                                                                                                                                                                                                    |
| Confidence of success  | High.                                                                                                                                                                                                                                             |



**Figure 40: Locations of *Euchiton ensifer* records within the MP4 project area**

### 8.1.27 *Euchiton polylepis*

|                        |                                                                                                                                                                                                                                      |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Euchiton polylepis</i>                                                                                                                                                                                                            |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                  |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                                                                   |
| Description            | Small mat-forming herb of ephemeral wetlands and rocky areas.                                                                                                                                                                        |
| Recorded locations     | Within the Coronation footprint.                                                                                                                                                                                                     |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• Salvage of plants</li> <li>• Monitoring of translocated plants</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill.</p> |
| Notes                  | Habitat is damp rock faces, fussy about habitat. Few areas of habitat available. Murphy's near stream with rock bluff edge possible. Expected to propagate well and can be grown from plant divisions.                               |
| Anticipated risks      | Competition from exotic weeds. Habitat challenges.                                                                                                                                                                                   |
| Confidence of success  | High.                                                                                                                                                                                                                                |

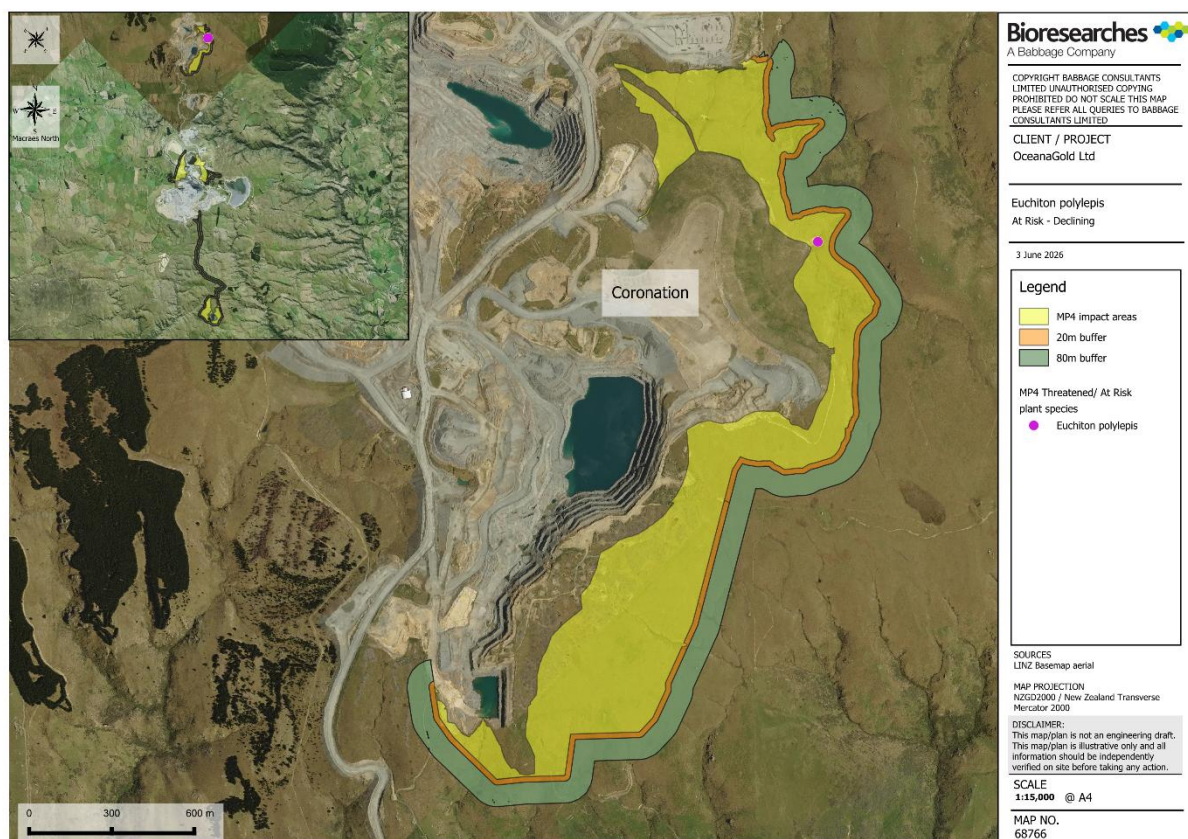
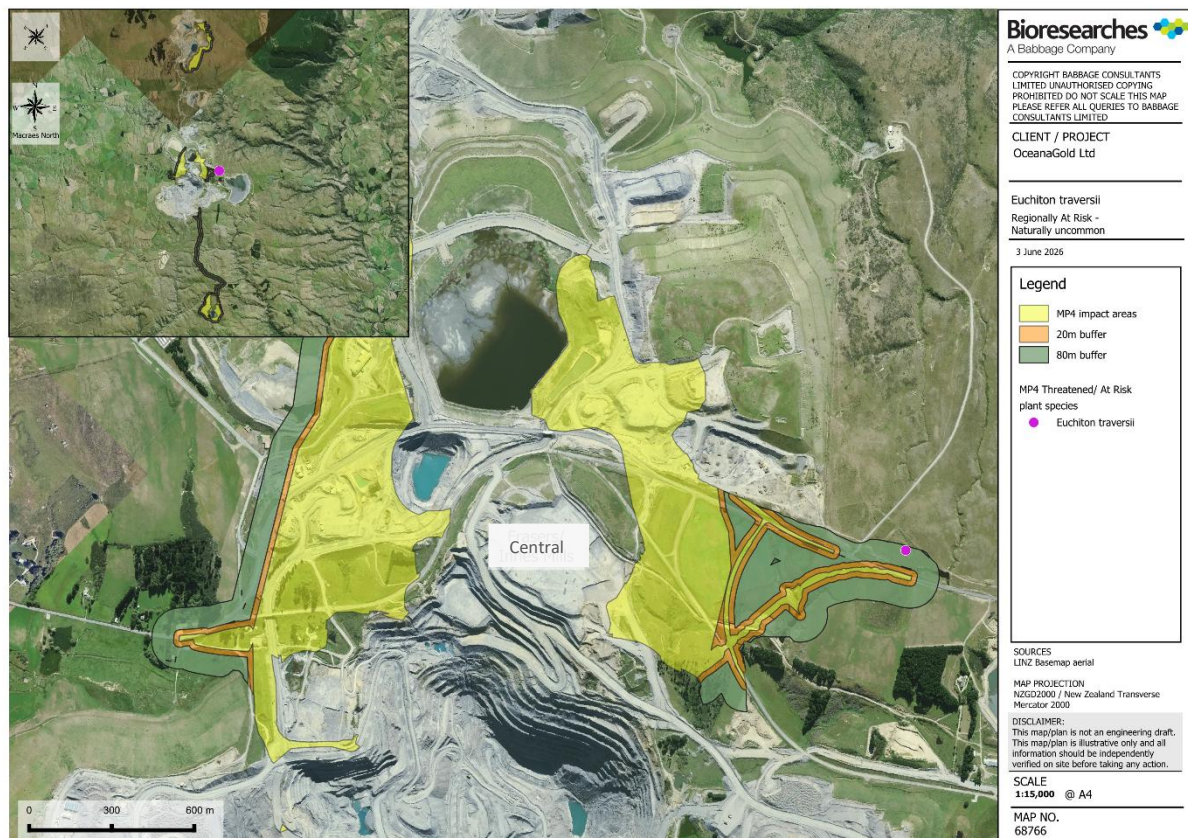


Figure 41: Locations of *Euchiton polylepis* records within the MP4 project area



### 8.1.28 *Euchiton traversii*

|                        |                                                                                                                                                       |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Euchiton traversii</i>                                                                                                                             |
| NZTCS status           | Not Threatened                                                                                                                                        |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                               |
| Description            | Small, silvery mat-forming herb of damp open sites.                                                                                                   |
| Recorded locations     | Within the Central buffer area.                                                                                                                       |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagate from seed and plant division</li> <li>• In-situ monitoring</li> </ul> Planting areas: Murphy's.    |
| Notes                  | Ephemeral wetland species. Can easily be confused with <i>E. makayi</i> and <i>E. japonicum</i> . Hard to ID. Propagate and plant after ID confirmed. |
| Anticipated risks      | Competition from exotic weeds. Identification issues.                                                                                                 |
| Confidence of success  | High.                                                                                                                                                 |



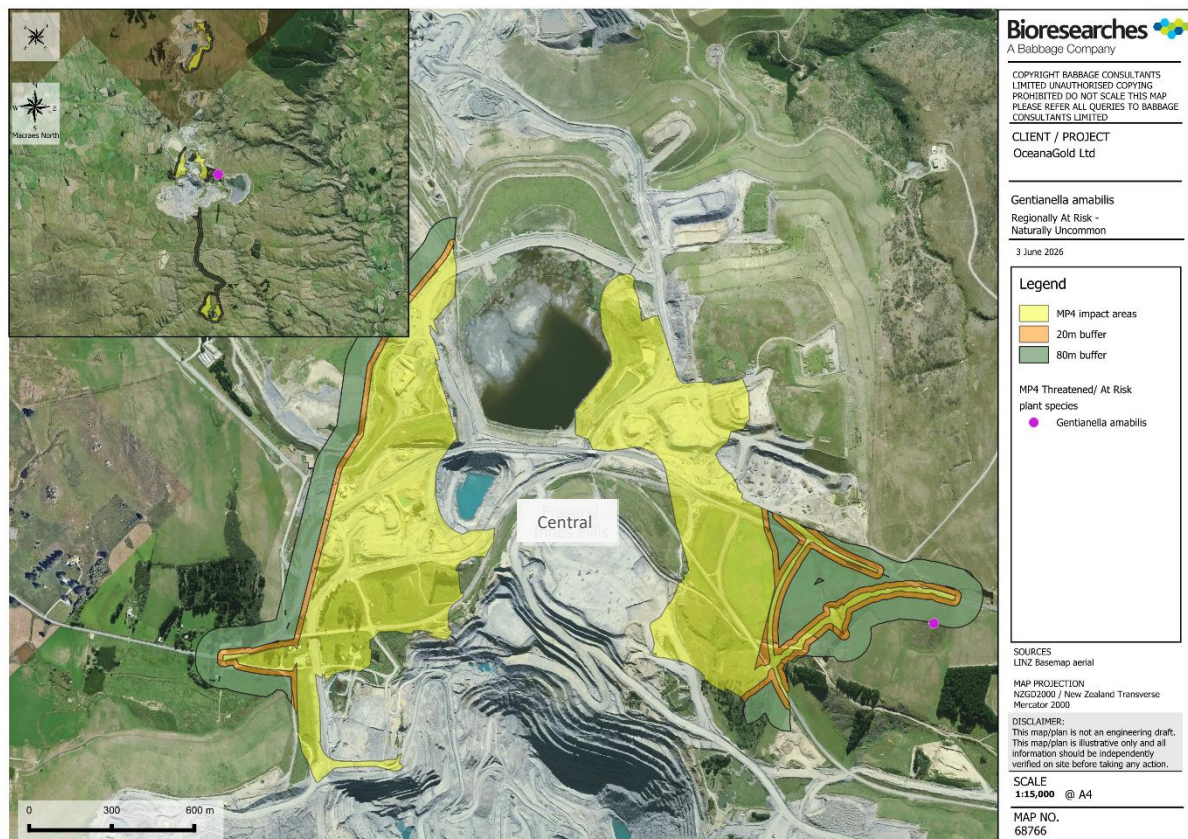
**Figure 42: Locations of *Euchiton traversii* records within the MP4 project area**

### 8.1.29 *Fuchsia procumbens*

|                        |                                                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------|
| Species name           | <i>Fuchsia procumbens</i>                                                                            |
| NZTCS status           | Not Threatened                                                                                       |
| Regional threat status | Not Threatened (uncommon in the Ecological District)                                                 |
| Description            | A scrambling vining shrub                                                                            |
| Recorded locations     | Within the Golden Bar waste rock stack area (20 m buffer)                                            |
| Management techniques  | <ul style="list-style-type: none"><li>• Salvage</li><li>• Propagation</li><li>• Monitoring</li></ul> |
| Notes                  | Reasonably easy to propagate. Likes sheltered, damp environments.                                    |
| Anticipated risks      | Exposure, insufficient habitat.                                                                      |
| Confidence of success  | High.                                                                                                |

### 8.1.30 *Gentianella amabilis*

|                        |                                                                                                                                                                                                                                                                      |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Gentianella amabilis</i>                                                                                                                                                                                                                                          |
| NZTCS status           | Not Threatened                                                                                                                                                                                                                                                       |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                                                                              |
| Description            | A small flower bulb of open wetlands and seeps.                                                                                                                                                                                                                      |
| Recorded locations     | Within the Central buffer area.                                                                                                                                                                                                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>In-situ monitoring</li> </ul>                                                                                                                                                                                                 |
| Notes                  | Hard to cultivate, not uncommon in local environment. Likes damp, dark, short-vegetation growing habitats. Often grows surrounding ephemeral wetlands. Try to cultivate from seed. Fussy in cultivation. Short-lived. Direct scatter seed in new ephemeral wetlands. |
| Anticipated risks      | Competition from exotic weeds. Propagation issues.                                                                                                                                                                                                                   |
| Confidence of success  | High.                                                                                                                                                                                                                                                                |



**Figure 43: Locations of *Gentianella amabilis* records within the MP4 project area**



### 8.1.31 *Geranium homeanum*

|                        |                                                                                                                                                                        |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Geranium homeanum</i>                                                                                                                                               |
| NZTCS status           | Not Threatened                                                                                                                                                         |
| Regional threat status | Regionally Data Deficient                                                                                                                                              |
| Description            | Small soft herb of grassland environments.                                                                                                                             |
| Recorded locations     | Within the Central buffer area.                                                                                                                                        |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• In-situ monitoring</li> </ul> Planting areas: Tussock grassland in Murphys and Highlay Hill. |
| Notes                  | Easy to grow, need to confirm is still present at site.                                                                                                                |
| Anticipated risks      | None                                                                                                                                                                   |
| Confidence of success  | High                                                                                                                                                                   |

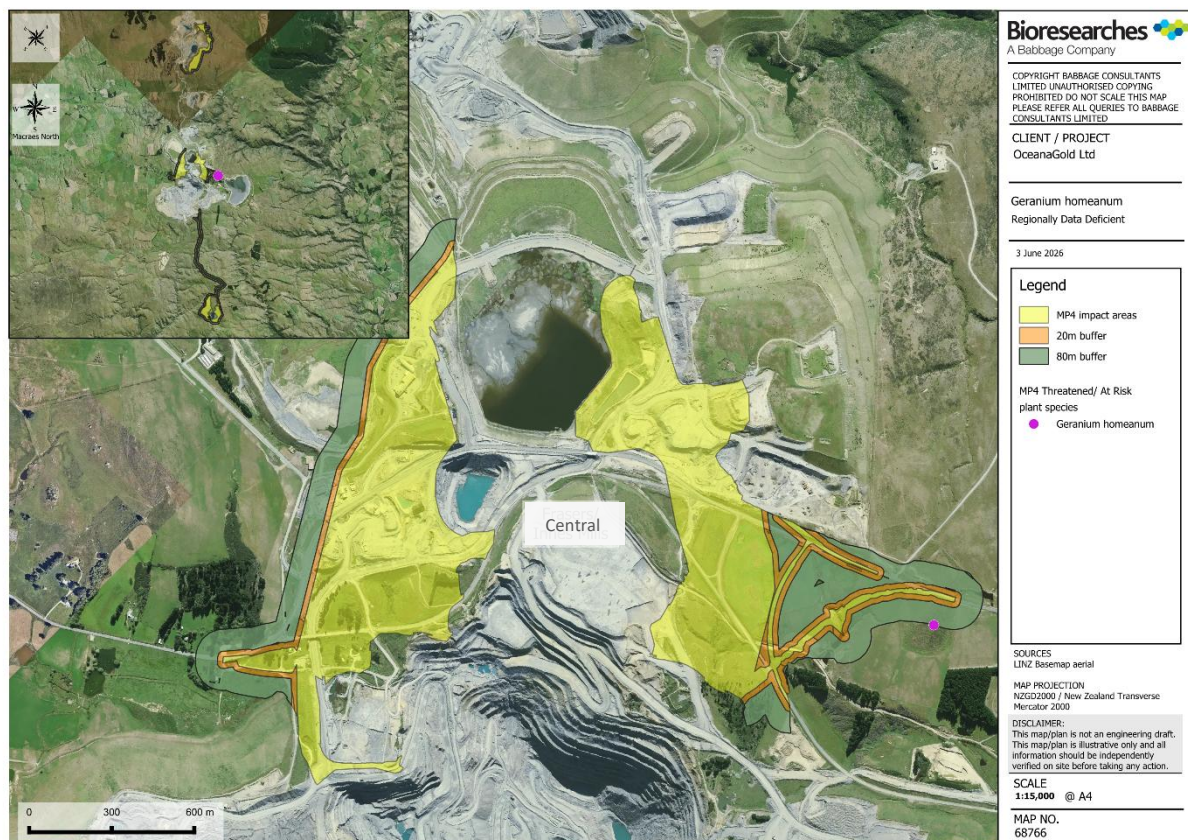
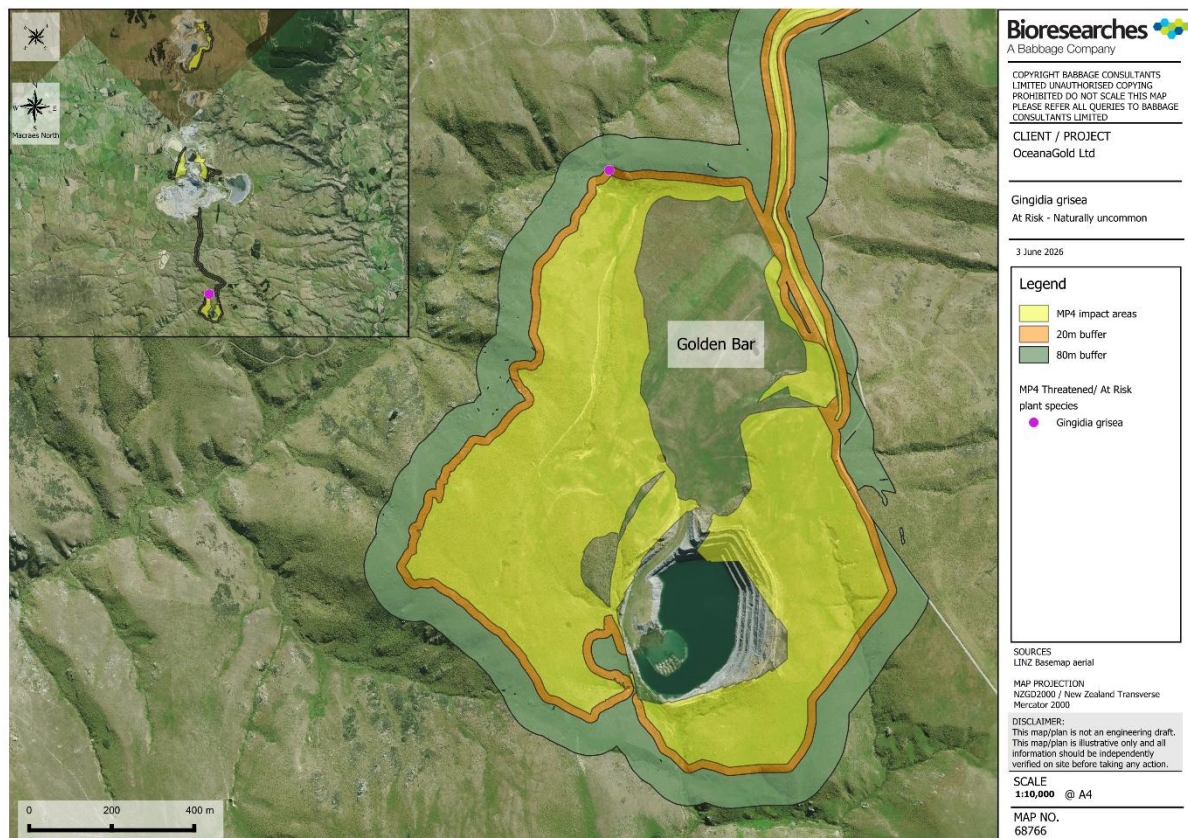


Figure 44: Locations of *Geranium homeanum* records within the MP4 project area

### 8.1.32 *Gingidia grisea*

|                        |                                                                                                                                                                                           |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Gingidia grisea</i>                                                                                                                                                                    |
| NZTCS status           | At Risk - Naturally Uncommon                                                                                                                                                              |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                            |
| Description            | A glaucous aromatic herb that grows in open rock sites.                                                                                                                                   |
| Recorded locations     | Within the Golden Bar buffer area, within 20 m of the works footprint.                                                                                                                    |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• Direct scattering of seed</li> </ul> <p>Planting areas: Murphy's fenced area in rocky bluffs, Highlay Hill.</p> |
| Notes                  | Grows well from seed, likes steep rocky faces. Recommend seed scattering to adapt to habitat - Even hydroseeding.                                                                         |
| Anticipated risks      | Very prone to herbivory, competition from exotic weeds.                                                                                                                                   |
| Confidence of success  | High.                                                                                                                                                                                     |



**Figure 45: Locations of *Gingidia grisea* record within the MP4 project area**



### 8.1.33 *Gingidia montana*

|                        |                                                                                                                                                                                                                                                   |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Gingidia montana</i>                                                                                                                                                                                                                           |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                               |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                                    |
| Description            | Green clumping aromatic herb of rocky habitats.                                                                                                                                                                                                   |
| Recorded locations     | Recorded from within the Camp Creek footprint.                                                                                                                                                                                                    |
| Management techniques  | <ul style="list-style-type: none"> <li>• Salvage from Camp Creek</li> <li>• Propagation from seed</li> <li>• Direct scattering of seed</li> </ul> <p>Planting areas: Murphy's (in fence), Highlay Hill, on ledges and cracks in rocky bluffs.</p> |
| Notes                  | Further survey needed to confirm identity of this record. Very likely that this has been misidentified and is instead <i>G. grisea</i> .                                                                                                          |
| Anticipated risks      | Herbivory, damage to roots during salvage.                                                                                                                                                                                                        |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                         |

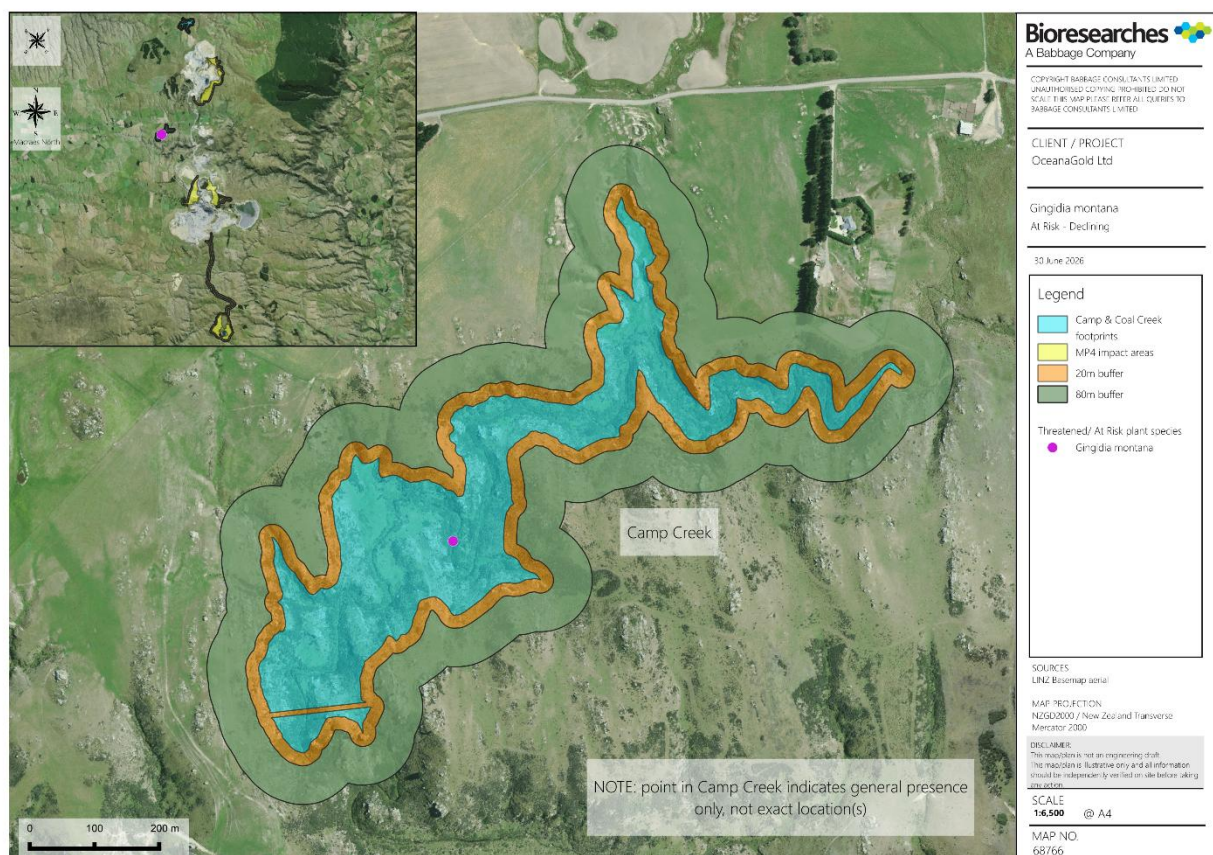


Figure 46: Locations of *Gingidia montana* record within the Camp Creek area



### 8.1.34 *Gratiola aff. concinna* (AK 251855; South Island)

|                        |                                                                                                                                                                                                                                  |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Gratiola aff. concinna</i> (AK 251855; South Island)                                                                                                                                                                          |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                              |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                   |
| Description            | Small groundcover of ephemeral wetlands and open riparian margins.                                                                                                                                                               |
| Recorded locations     | Within the Central buffer area.                                                                                                                                                                                                  |
| Management techniques  | <ul style="list-style-type: none"> <li>Propagation from seed and plant division</li> <li>In-situ monitoring</li> </ul> Planting sites: Murphy's, Cranky Jim's ephemeral wetlands.                                                |
| Notes                  | South Island plants seem larger and more robust than North Is plants so may be new species. Grows well from division and seed. Habitat is short wet turf environments, ephemeral wetlands. Could include in pond edge plantings. |
| Anticipated risks      | Competition from exotic weeds.                                                                                                                                                                                                   |
| Confidence of success  | High.                                                                                                                                                                                                                            |

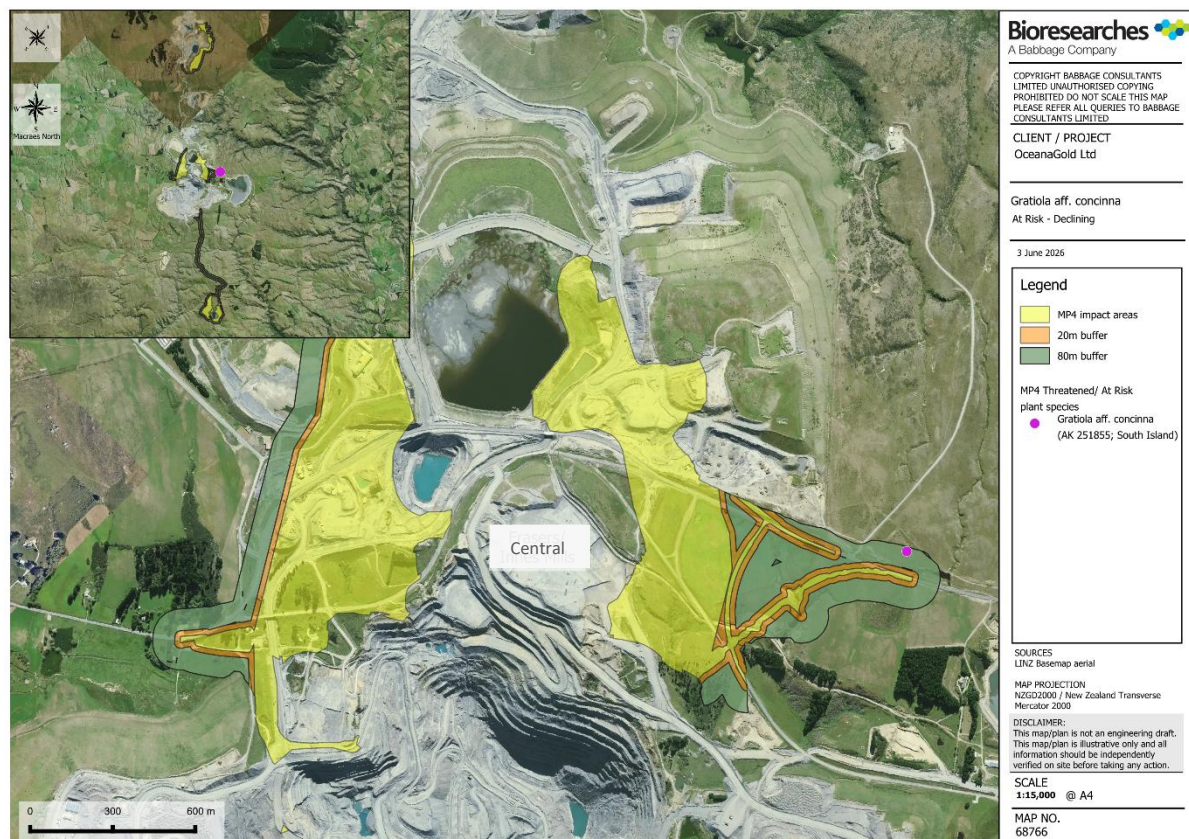
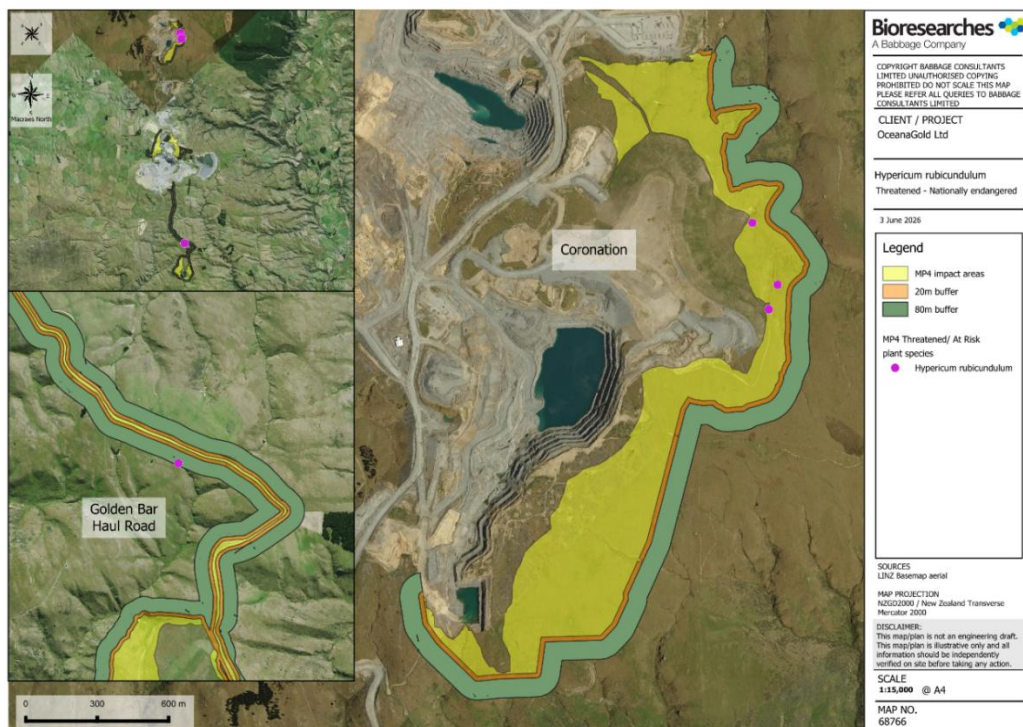


Figure 47: Locations of *Gratiola aff. concinna* (AK 251855; South Island) records within the MP4 project area

### 8.1.35 *Hypericum rubicundulum*

|                               |                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Hypericum rubicundulum</i>                                                                                                                                                                                                                                                                                                                     |
| <b>NZTCS status</b>           | Threatened - Nationally Endangered                                                                                                                                                                                                                                                                                                                |
| <b>Regional threat status</b> | Regionally Threatened - Critical                                                                                                                                                                                                                                                                                                                  |
| <b>Description</b>            | A reddish, soft-leaved herb of ephemeral wetlands.                                                                                                                                                                                                                                                                                                |
| <b>Recorded locations</b>     | Within the Coronation works footprint, and buffer area of Golden Bar Haul Road.                                                                                                                                                                                                                                                                   |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• Salvage of plants within works footprint</li> <li>• In-situ monitoring of plants in buffer areas</li> <li>• Post-salvage monitoring of translocated plants</li> </ul> Planting areas: Murphy's, Cranky Jim's ephemeral wetlands.                    |
| <b>Notes</b>                  | Grows in wetlands, on clay banks, and under rock overhangs. Need to match planting site with original plant. May want to create rock shelter and plant there. Could be two species (one undescribed) each with different habitat needs. Easy to grow, may be hard to plant. Impacted plants are all on clay banks and overhangs. Difficult plant. |
| <b>Anticipated risks</b>      | Competition from exotic weeds, may require grazing (unknown). Planting and habitat challenges.                                                                                                                                                                                                                                                    |
| <b>Confidence of success</b>  | Low.                                                                                                                                                                                                                                                                                                                                              |

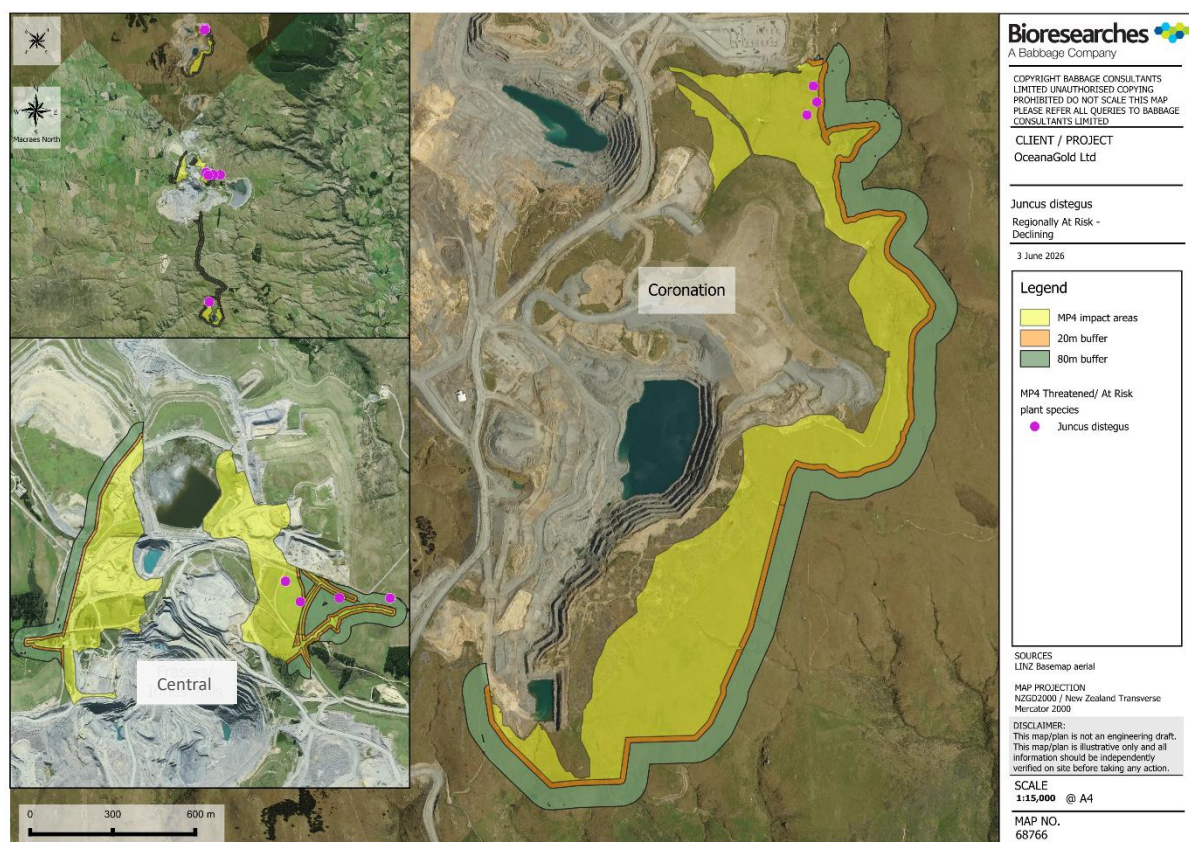


**Figure 48: Locations of *Hypericum rubicundulum* records within the MP4 project area**



### 8.1.36 *Juncus distegus*

|                               |                                                                                                                                                                                                                                                                                         |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Juncus distegus</i>                                                                                                                                                                                                                                                                  |
| <b>NZTCS status</b>           | Not Threatened                                                                                                                                                                                                                                                                          |
| <b>Regional threat status</b> | Regionally At Risk - Declining                                                                                                                                                                                                                                                          |
| <b>Description</b>            | Loosely clumping reddish rush of wetland and riparian margins.                                                                                                                                                                                                                          |
| <b>Recorded locations</b>     | Within the Coronation and Central footprints, and the buffer areas of Central and Golden Bar.                                                                                                                                                                                           |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Salvage from works footprint areas</li> <li>Propagation from plant division and seed</li> <li>In-situ monitoring of plants in buffer areas</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill wetlands and riparian margins.</p> |
| <b>Notes</b>                  | Straightforward to grow, likes wetland margins and areas that dry out a bit. Likes some changing water levels, e.g. as found on edges of reservoirs.                                                                                                                                    |
| <b>Anticipated risks</b>      | None.                                                                                                                                                                                                                                                                                   |
| <b>Confidence of success</b>  | High.                                                                                                                                                                                                                                                                                   |



**Figure 49: Locations of *Juncus distegus* records within the MP4 project area**



### 8.1.37 *Juncus pusillus*

|                               |                                                                                                                                                                                                                                                                                                                    |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Juncus pusillus</i>                                                                                                                                                                                                                                                                                             |
| <b>NZTCS status</b>           | At Risk - Naturally Uncommon                                                                                                                                                                                                                                                                                       |
| <b>Regional threat status</b> | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                 |
| <b>Description</b>            | Minute rush of ephemeral wetlands.                                                                                                                                                                                                                                                                                 |
| <b>Recorded locations</b>     | Within the Central footprint and buffer areas.                                                                                                                                                                                                                                                                     |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Salvage from footprint area</li> <li>Propagation from division of plants and seed</li> <li>In-situ monitoring of plants in buffer area</li> <li>Post-salvage monitoring of translocated plants</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's ephemeral wetlands.</p> |
| <b>Notes</b>                  | Likes damp puddles. Easy to grow. Needs short vegetation. Can plant into puddles on tracks and roads. Ephemeral wetlands also appropriate.                                                                                                                                                                         |
| <b>Anticipated risks</b>      | Competition from exotic weeds, suitability of habitat.                                                                                                                                                                                                                                                             |
| <b>Confidence of success</b>  | High.                                                                                                                                                                                                                                                                                                              |

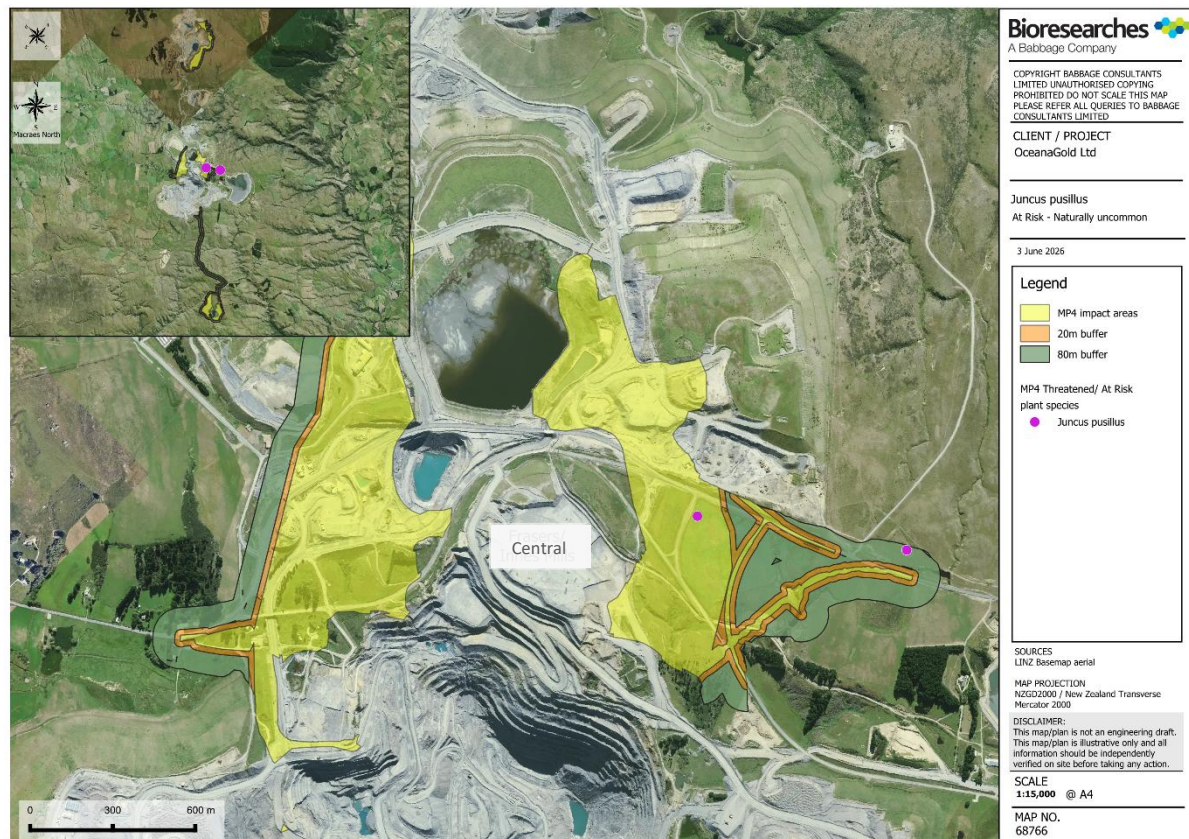


Figure 50: Locations of *Juncus pusillus* records within the MP4 project area

### 8.1.38 *Lachnagrostis striata*

|                        |                                                                                                                                                                                               |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Lachnagrostis striata</i>                                                                                                                                                                  |
| NZTCS status           | Not Threatened                                                                                                                                                                                |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                            |
| Description            | Very small, fine grass growing in ephemeral wetlands.                                                                                                                                         |
| Recorded locations     | Within the Central buffer areas, including within 20 m of the works footprint.                                                                                                                |
| Management techniques  | <ul style="list-style-type: none"> <li>Propagate from seed and plant divisions</li> <li>In-situ monitoring</li> </ul> <p>Planting areas: ephemeral wetlands in Murphy's and Cranky Jim's.</p> |
| Notes                  | Easy to grow, needs short damp vegetation. Ephemeral wetlands, margins of ponds good habitat. This species struggles with weed invasion.                                                      |
| Anticipated risks      | Competition from exotic weeds, difficulty in identification.                                                                                                                                  |
| Confidence of success  | High.                                                                                                                                                                                         |

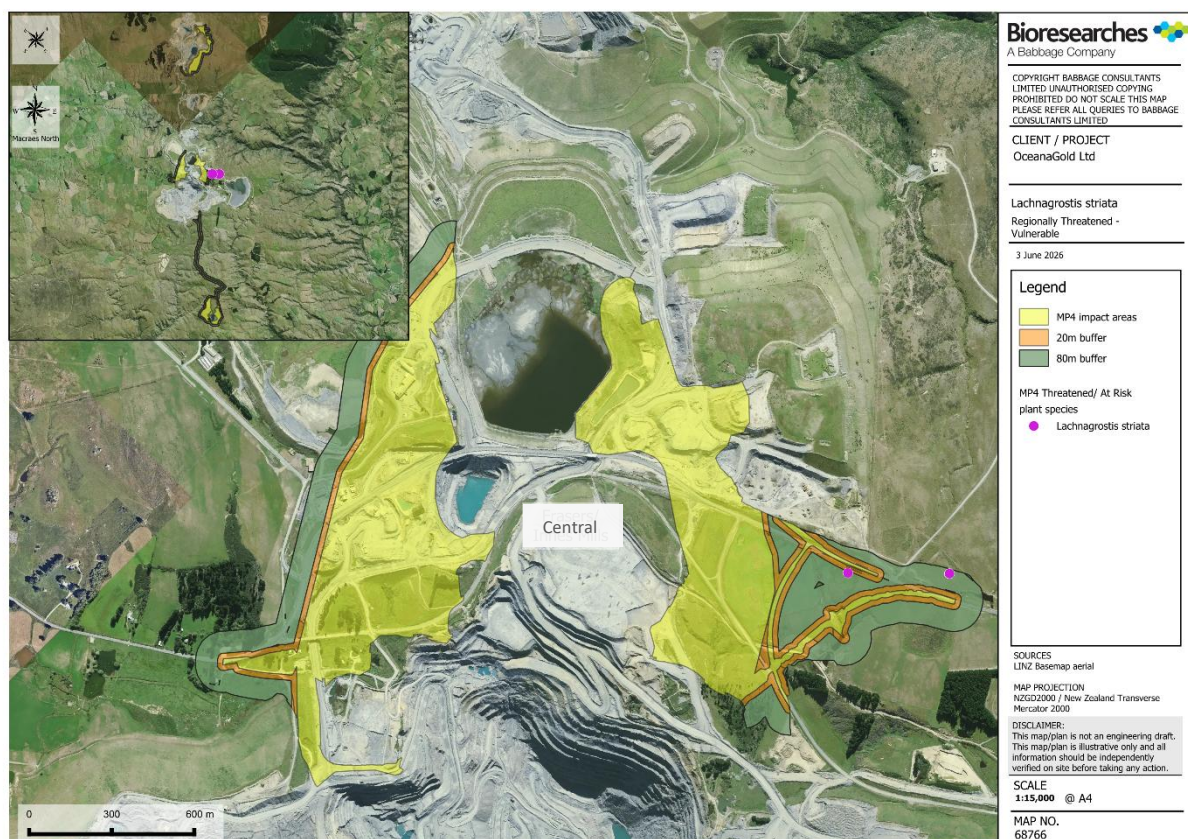
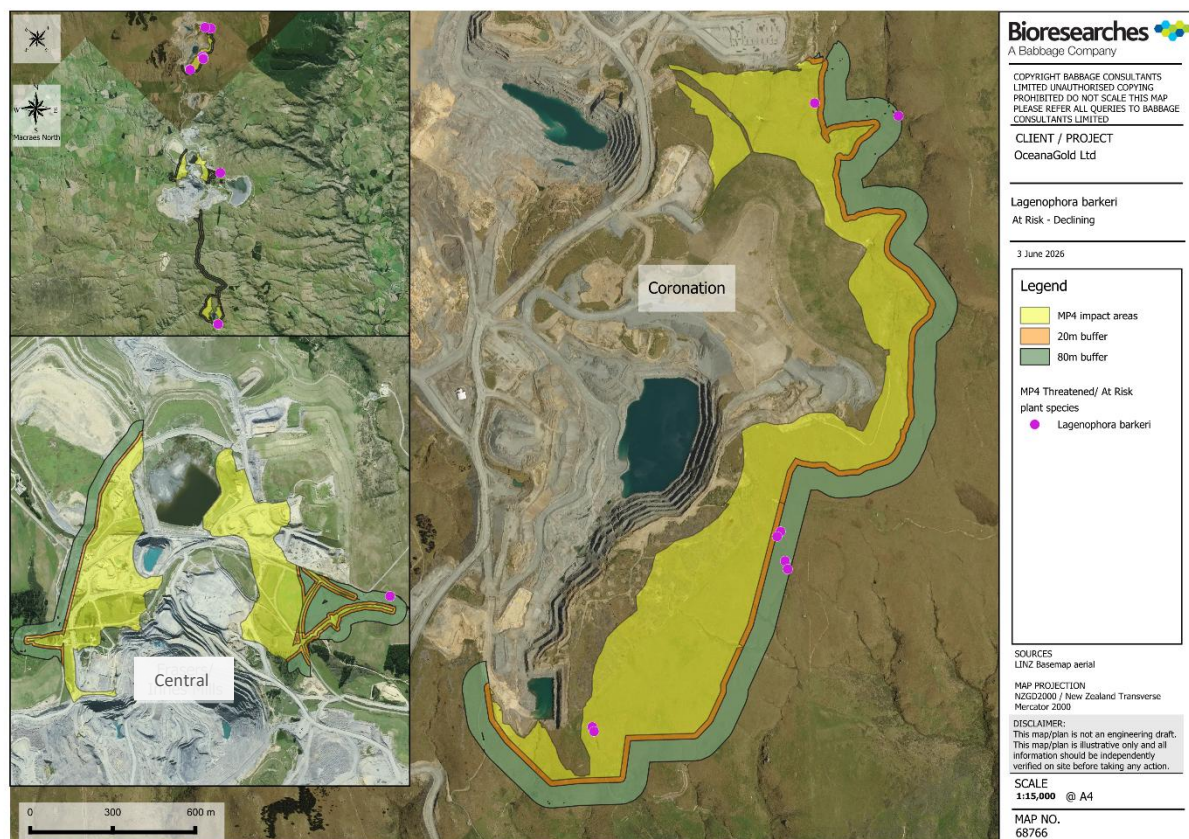


Figure 51: Locations of *Lachnagrostis striata* records within the MP4 project area



### 8.1.39 *Lagenophora barkeri*

|                        |                                                                                                                                                                                                                        |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Lagenophora barkeri</i>                                                                                                                                                                                             |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                    |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                                                     |
| Description            | Small mat-forming daisy that grows in open damp sites.                                                                                                                                                                 |
| Recorded locations     | Within the Coronation and Coal Creek footprint, and in the buffer areas of Coronation and Central.                                                                                                                     |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage from footprint areas</li> <li>Propagation from plant divisions</li> <li>In-situ monitoring</li> <li>Post-salvage monitoring</li> </ul> <p>Planting sites: Murphy's.</p> |
| Notes                  | Needs to be confirmed that this is <i>L. barkeri</i> , rather than another daisy species. Hard to ID. Requires a wet stream margin environment, wetland margins. Reasonably easy to grow.                              |
| Anticipated risks      | Competition from taller vegetation, challenge to find appropriate habitat, may require browsing (unknown). May not be possible to find seed for propagation.                                                           |
| Confidence of success  | Moderate.                                                                                                                                                                                                              |



**Figure 52: Locations of *Lagenophora barkeri* records within the MP4 project area**

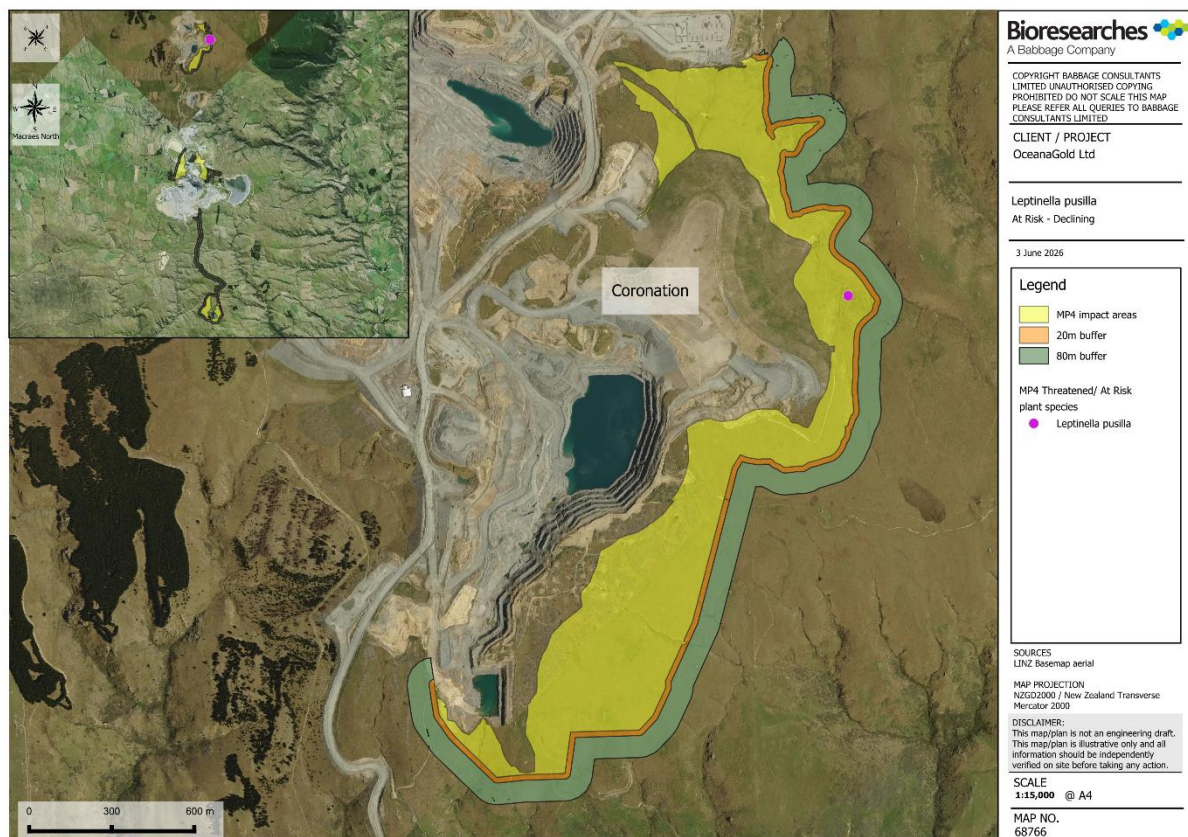


#### 8.1.40 *Lagenophora pinnatifida*

|                               |                                                                                                                                                                                                                                                        |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Lagenophora pinnatifida</i>                                                                                                                                                                                                                         |
| <b>NZTCS status</b>           | Not Threatened                                                                                                                                                                                                                                         |
| <b>Regional threat status</b> | Regionally At Risk – Naturally Uncommon                                                                                                                                                                                                                |
| <b>Description</b>            | Small creeping daisy that can spread via stolons.                                                                                                                                                                                                      |
| <b>Recorded locations</b>     | Within the Coronation North impact area                                                                                                                                                                                                                |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Salvage from works footprint</li> <li>• Propagation from seed and plant division</li> <li>• Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill, grazed covenants.</p> |
| <b>Notes</b>                  | Moderately easy to grow and transfer. Likes slightly damper open areas. Plant at base of rocks and in open tussock grassland.                                                                                                                          |
| <b>Anticipated risks</b>      | Competition from exotic weeds, may require grazing to keep ground open.                                                                                                                                                                                |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                              |

### 8.1.41 *Leptinella pusilla*

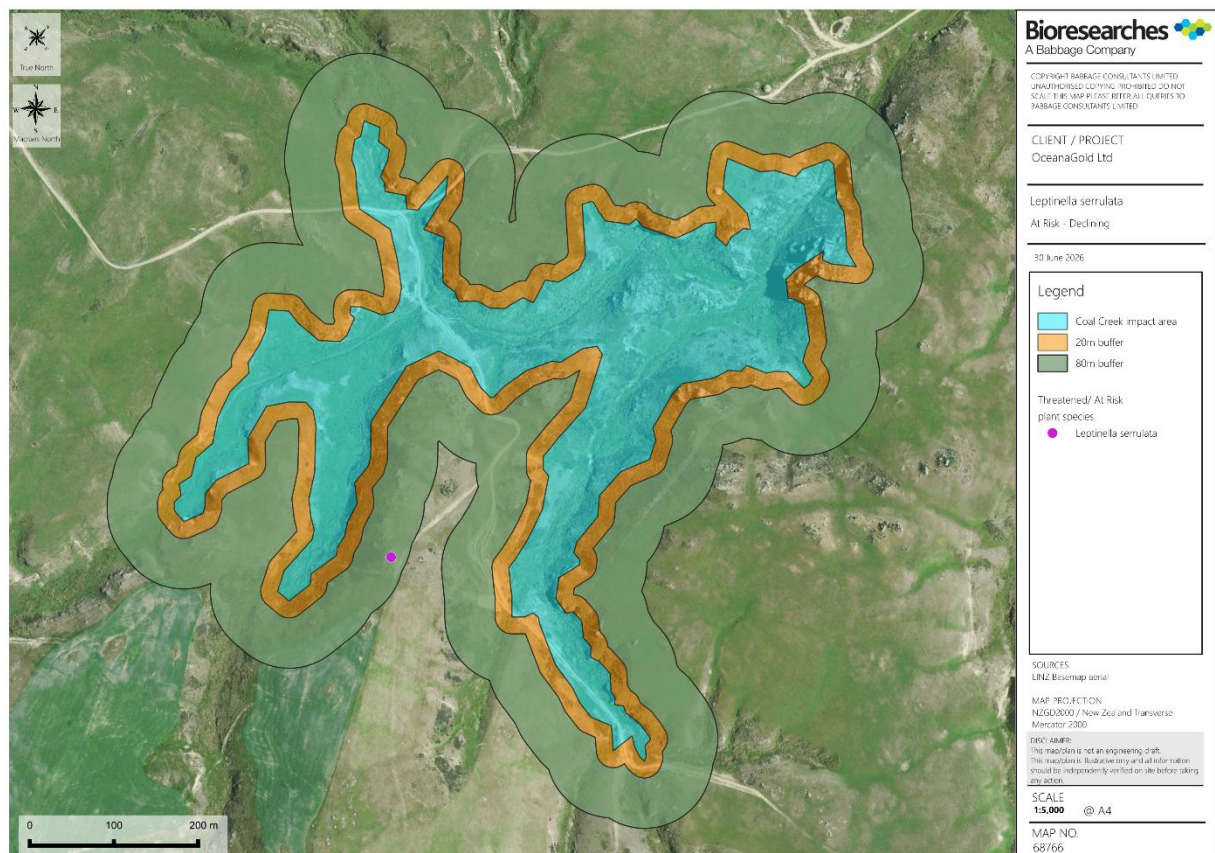
|                               |                                                                                                                                                                                                                                                       |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Leptinella pusilla</i>                                                                                                                                                                                                                             |
| <b>NZTCS status</b>           | At Risk - Declining                                                                                                                                                                                                                                   |
| <b>Regional threat status</b> | Regionally Threatened - Endangered                                                                                                                                                                                                                    |
| <b>Description</b>            | Small, brown, ferny groundcover that grows on open rocky ground.                                                                                                                                                                                      |
| <b>Recorded locations</b>     | Within the Coronation works footprint.                                                                                                                                                                                                                |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Salvage from works footprint</li> <li>Propagation from seed and plant division</li> <li>Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's (outside covenant), grazed covenants.</p> |
| <b>Notes</b>                  | Easy to grow and transfer. Likes slightly damper areas, shady. Plant at base of rocks and under shrublands.                                                                                                                                           |
| <b>Anticipated risks</b>      | Competition from exotic weeds, may require grazing to keep ground open.                                                                                                                                                                               |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                             |



**Figure 53: Locations of *Leptinella pusilla* records within the MP4 project area**

### 8.1.42 *Leptinella serrulata*

|                        |                                                                                                                                                                                                                                    |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Leptinella serrulata</i>                                                                                                                                                                                                        |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                     |
| Description            | Grey-brown fern groundcover that grows in open ground.                                                                                                                                                                             |
| Recorded locations     | Within the Coal Creek buffer.                                                                                                                                                                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• In-situ monitoring</li> </ul> <p>Planting areas: open grazed areas in Murphy's and Cranky Jim's, other grazed covenants.</p>         |
| Notes                  | Habitat is open, very dry, sparse vegetation. Need to confirm plant with survey for ID. Intolerant of too much root moisture so moderately hard to cultivate and plant. Plant in similar places to <i>Carmichaelia corrugata</i> . |
| Anticipated risks      | Competition from taller plants.                                                                                                                                                                                                    |
| Confidence of success  | High.                                                                                                                                                                                                                              |



**Figure 54: Locations of *Leptinella serrulata* records within the MP4 project area**



### 8.1.43 *Lilaeopsis ruthiana*

|                        |                                                                                                                                                                                                     |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Lilaeopsis ruthiana</i>                                                                                                                                                                          |
| NZTCS status           | Not Threatened                                                                                                                                                                                      |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                             |
| Description            | Minute creeping herb of ephemeral wetlands.                                                                                                                                                         |
| Recorded locations     | Within the Central buffer area.                                                                                                                                                                     |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed and plant divisions</li> <li>• In-situ monitoring</li> </ul> <p>Planting sites: ephemeral wetlands in Murphy's and Cranky Jim's.</p> |
| Notes                  | Hard to re-establish. Might like pond margins. Almost aquatic. OK to cultivate.                                                                                                                     |
| Anticipated risks      | Competition from taller plants.                                                                                                                                                                     |
| Confidence of success  | Low                                                                                                                                                                                                 |

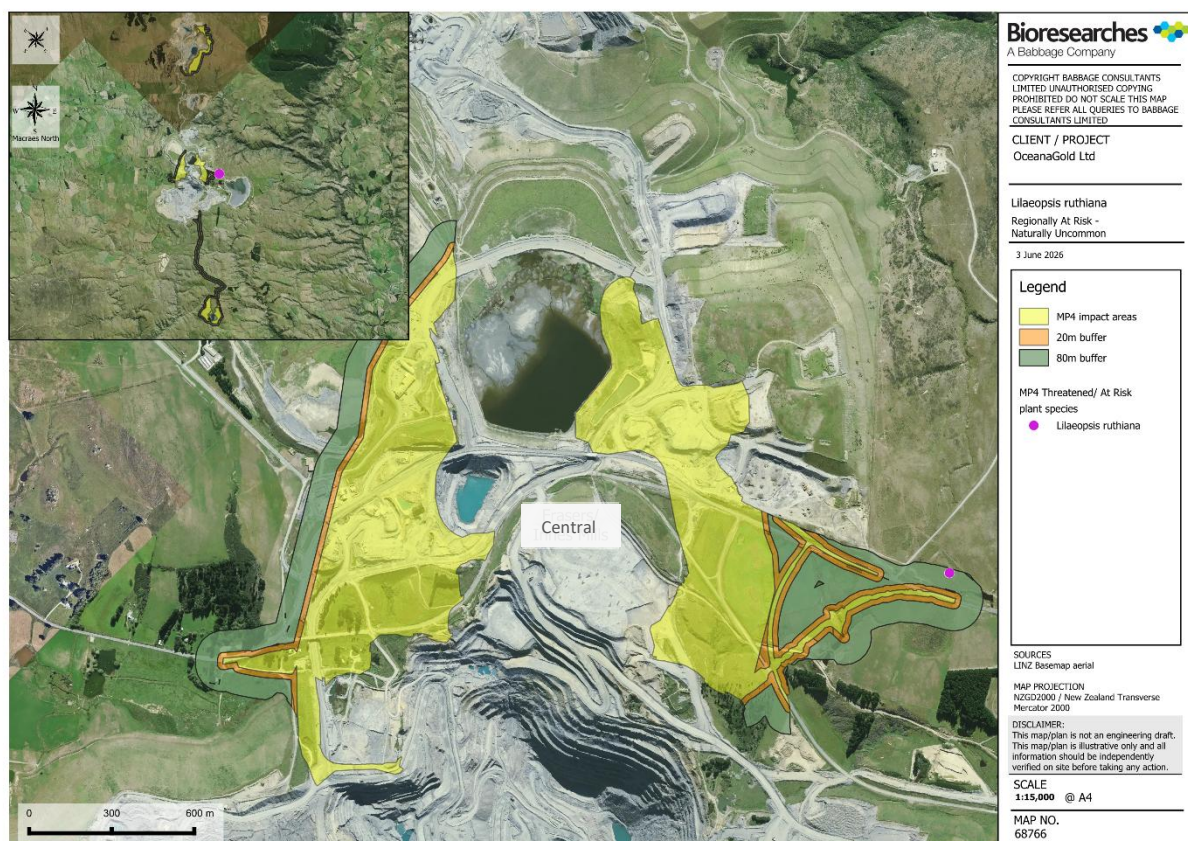


Figure 55: Locations of *Lilaeopsis ruthiana* records within the MP4 project area

#### 8.1.44 *Lobelia ionantha*

|                               |                                                                                                                                                                                                                                                                                                               |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Lobelia ionantha</i>                                                                                                                                                                                                                                                                                       |
| <b>NZTCS status</b>           | At Risk - Declining                                                                                                                                                                                                                                                                                           |
| <b>Regional threat status</b> | Regionally Threatened - Endangered                                                                                                                                                                                                                                                                            |
| <b>Description</b>            | Low-growing mat-forming groundcover of ephemeral wetlands and open damp ground.                                                                                                                                                                                                                               |
| <b>Recorded locations</b>     | Within the Central works footprint and buffer area.                                                                                                                                                                                                                                                           |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Salvage from works footprint</li> <li>Propagation from seed and division of plants</li> <li>In-situ monitoring of plants in buffer areas</li> <li>Post-salvage monitoring of plants</li> </ul> <p>Planting areas: ephemeral wetlands in Murphy's and Cranky Jim's.</p> |
| <b>Notes</b>                  | Cultivates moderately well. Ephemeral wetland plant, and pond margins.                                                                                                                                                                                                                                        |
| <b>Anticipated risks</b>      | Competition from weeds and taller vegetation. Can sulk in cultivation.                                                                                                                                                                                                                                        |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                                                                                                                     |

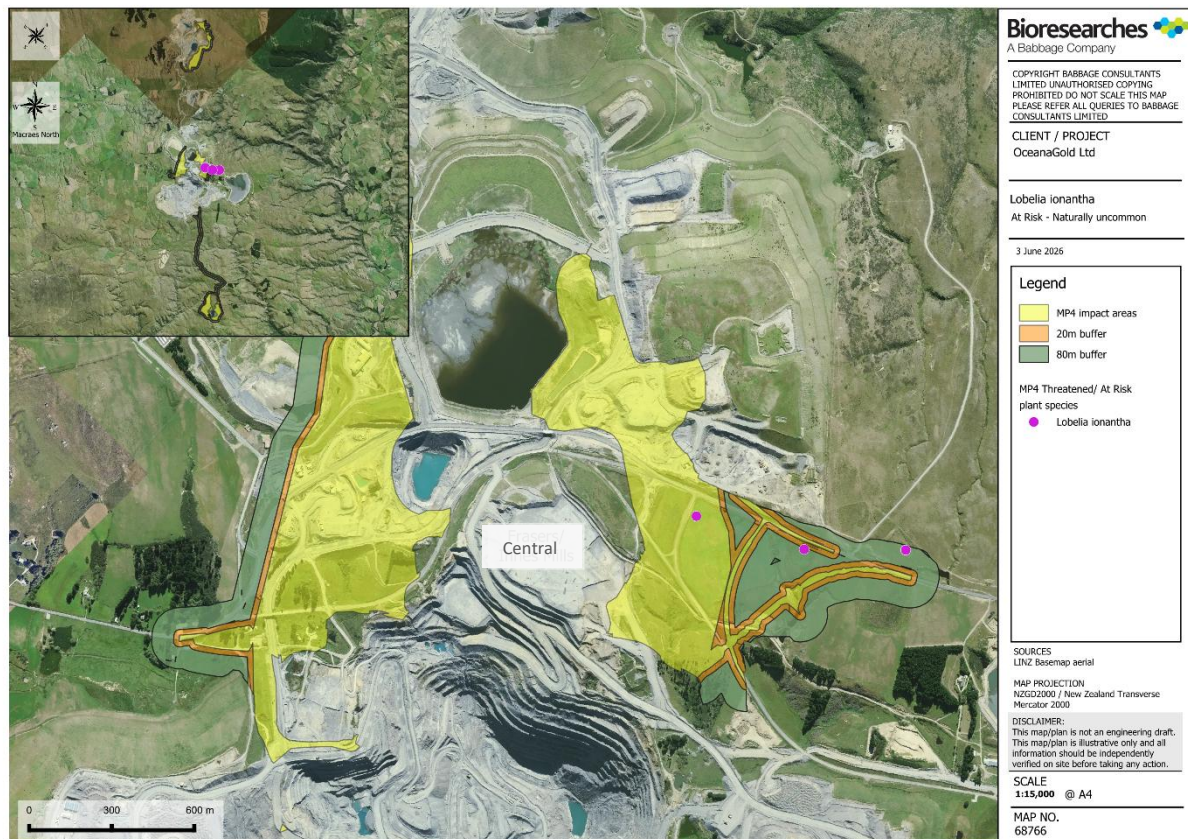


Figure 56: Locations of *Lobelia ionantha* records within the MP4 project area



### 8.1.45 *Lobelia perpusilla*

|                        |                                                                                                                                                                                                                                                                                                                       |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Lobelia perpusilla</i>                                                                                                                                                                                                                                                                                             |
| NZTCS status           | Not Threatened                                                                                                                                                                                                                                                                                                        |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                    |
| Description            | Low-growing mat-forming groundcover of ephemeral wetlands.                                                                                                                                                                                                                                                            |
| Recorded locations     | Within the Central works footprint and buffer area.                                                                                                                                                                                                                                                                   |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage from footprint area</li> <li>Propagation from seed and plant division</li> <li>In-situ monitoring of plants in buffer area</li> <li>Post-salvage monitoring of translocated plants.</li> </ul> <p>Planting areas: Ephemeral wetlands in Murphy's and Cranky Jim's.</p> |
| Notes                  | Easy to grow, similar habitat to <i>L. ionantha</i> , loves lake margins.                                                                                                                                                                                                                                             |
| Anticipated risks      | Competition from weeds and taller vegetation.                                                                                                                                                                                                                                                                         |
| Confidence of success  | High.                                                                                                                                                                                                                                                                                                                 |

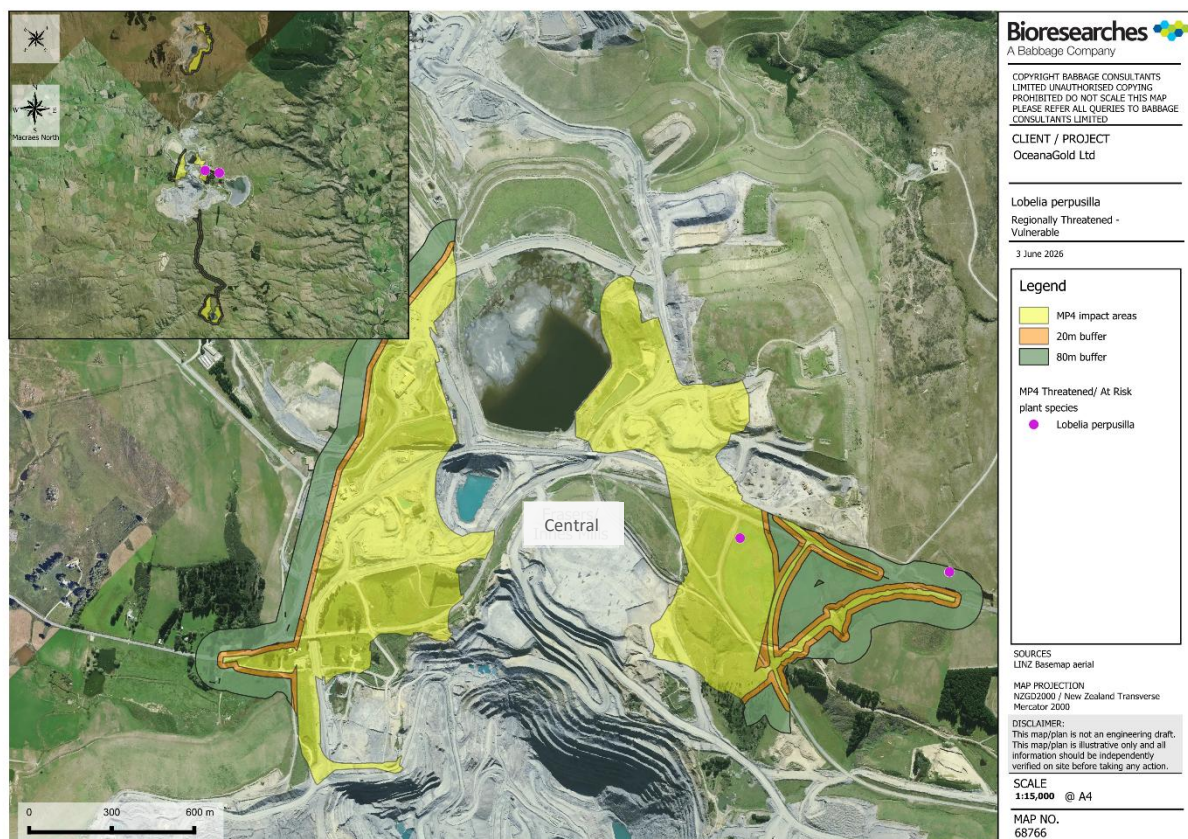
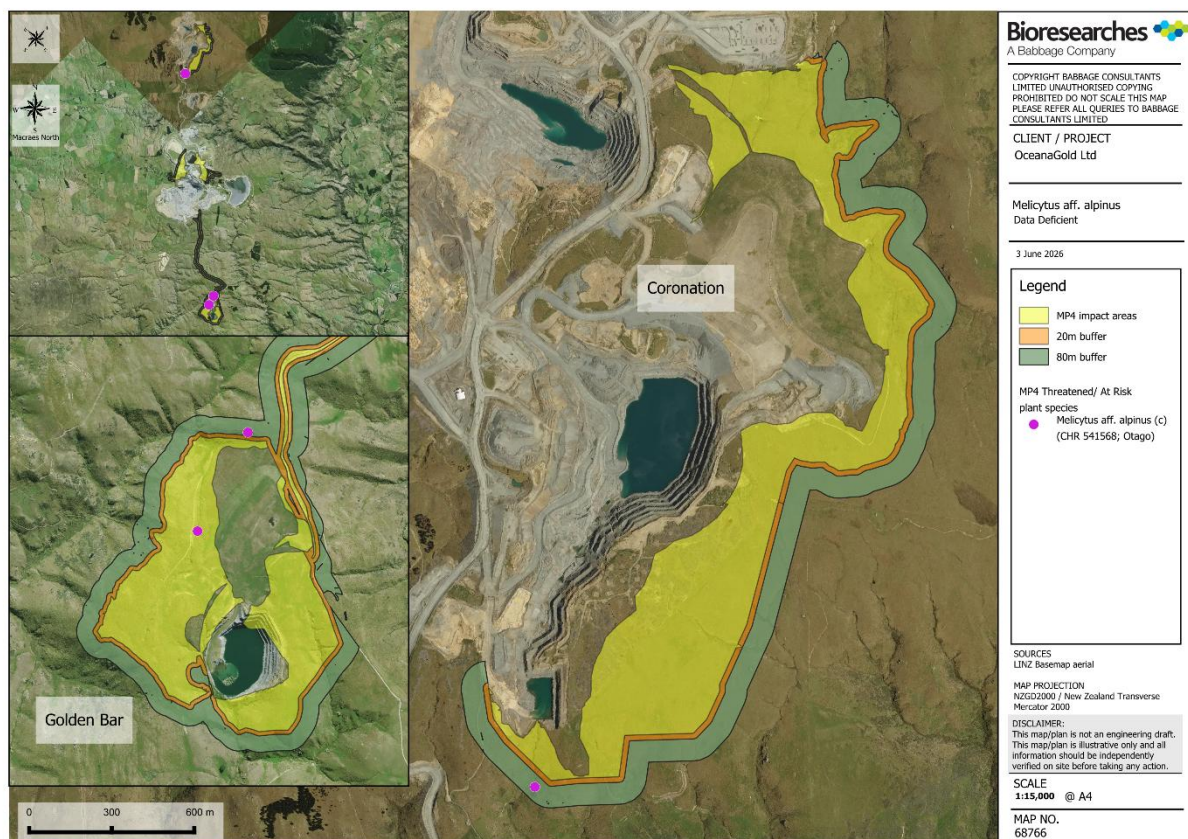


Figure 57: Locations of *Lobelia perpusilla* records within the MP4 project area



#### 8.1.46 *Melicytus* aff. *alpinus* (c) (CHR 541568; Otago)

|                        |                                                                                                                                                                                                                                                                                                                   |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Melicytus</i> aff. <i>alpinus</i> (c) (CHR 541568; Otago)                                                                                                                                                                                                                                                      |
| NZTCS status           | Not Threatened                                                                                                                                                                                                                                                                                                    |
| Regional threat status | Regionally Data Deficient                                                                                                                                                                                                                                                                                         |
| Description            | Low-growing mounded divaricating shrub that grows in open grassland and grey shrubland.                                                                                                                                                                                                                           |
| Recorded locations     | Within the Golden Bar footprint and buffer area.                                                                                                                                                                                                                                                                  |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage of plants in works footprint</li> <li>Propagation of plants from seed and cuttings</li> <li>In-situ monitoring of plants in buffer</li> <li>Post-salvage monitoring of translocated plants</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill.</p> |
| Notes                  | Possibly 3 <i>M. alpinus</i> species, need to confirm what tag name entity this is first. 'Otago' seems to like a rocky environment (rock break down). No obvious habitat present, may be best with rock tor creation. Slow growing.                                                                              |
| Anticipated risks      | Lack of appropriate habitat. Damage to roots from salvage causing plant death, herbivory of seedlings. Slow growth rate.                                                                                                                                                                                          |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                                                                         |



**Figure 58: Locations of *Melicytus* aff. *alpinus* (c) (CHR 541568; Otago) records within the MP4 project area**

### 8.1.47 *Mentha cunninghamii*

|                        |                                                                                                                                                                                                                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Mentha cunninghamii</i>                                                                                                                                                                                                                                                                                                               |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                      |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                                                                                                                                                           |
| Description            | Small aromatic groundcover of sheltered sites under rock overhangs.                                                                                                                                                                                                                                                                      |
| Recorded locations     | Within the Coronation works footprint, and the buffer area of Central.                                                                                                                                                                                                                                                                   |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage of plants in works footprint</li> <li>Propagation of plants from seed and plant division</li> <li>In-situ monitoring of plants in buffer areas</li> <li>Post-salvage monitoring of translocated plants</li> </ul> <p>Planting areas: shaded open ground in Murphy's and Highlay Hill.</p> |
| Notes                  | Requires rock underhangs, shady environments, no tall vegetation. Damp. Might be hard to cultivate - unknown. Salvage expected to be ok.                                                                                                                                                                                                 |
| Anticipated risks      | Competition from taller plants and weeds, may require grazing. Uncertainty about cultivation.                                                                                                                                                                                                                                            |
| Confidence of success  | High.                                                                                                                                                                                                                                                                                                                                    |

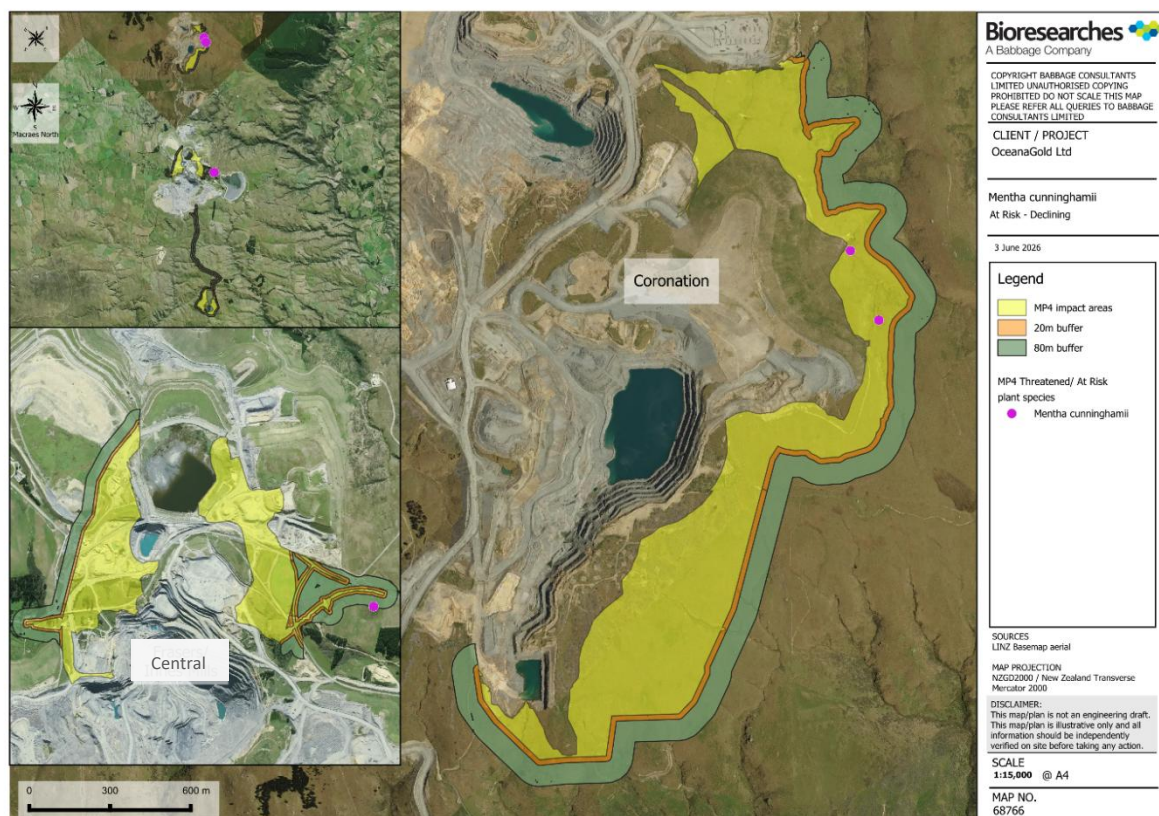


Figure 59: Locations of *Mentha cunninghamii* records within the MP4 project area



#### 8.1.48 *Shawia bullata*

|                        |                                                                                                                                                                                                                                                                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Shawia bullata</i>                                                                                                                                                                                                                                            |
| NZTCS status           | Not Threatened                                                                                                                                                                                                                                                   |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                                                                                          |
| Description            | A divaricating twiggy tree daisy that grows in open damp ground in tussock and grey shrubland.                                                                                                                                                                   |
| Recorded locations     | Within the Coronation, Coal Creek, Camp Creek and Central works footprints.                                                                                                                                                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage of plants</li> <li>Propagation from seed and cuttings</li> <li>Post-salvage monitoring</li> </ul> <p>Planting sites: Tops of gullies and riparian margins throughout Murphy's, Cranky Jim's and Highlay Hill.</p> |
| Notes                  | Salvage may damage roots, grows well from cuttings.                                                                                                                                                                                                              |
| Anticipated risks      | Root damage from salvage, difficulty in cultivation.                                                                                                                                                                                                             |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                        |



**Figure 60: Locations of *Shawia bullata* records within the MP4 project area**



### 8.1.49 *Shawia lineata*

|                        |                                                                                                                                                                                                             |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Shawia lineata</i>                                                                                                                                                                                       |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                         |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                                              |
| Description            | A twiggly tree daisy that grows in riparian margin and wetland habitat.                                                                                                                                     |
| Recorded locations     | Within the Coronation buffer area.                                                                                                                                                                          |
| Management techniques  | <ul style="list-style-type: none"> <li>Propagation from seed and cuttings</li> <li>In-situ monitoring</li> </ul> <p>Planting sites: Murphy's, Cranky Jim's, Highlay Hill in riparian and wetland areas.</p> |
| Notes                  | Limited material (5-6 plants). Prefers slightly damper gullies. Grows well from cutting and seed.                                                                                                           |
| Anticipated risks      | Limited genetic diversity for propagation. Potential difficulty cultivating.                                                                                                                                |
| Confidence of success  | Moderate.                                                                                                                                                                                                   |

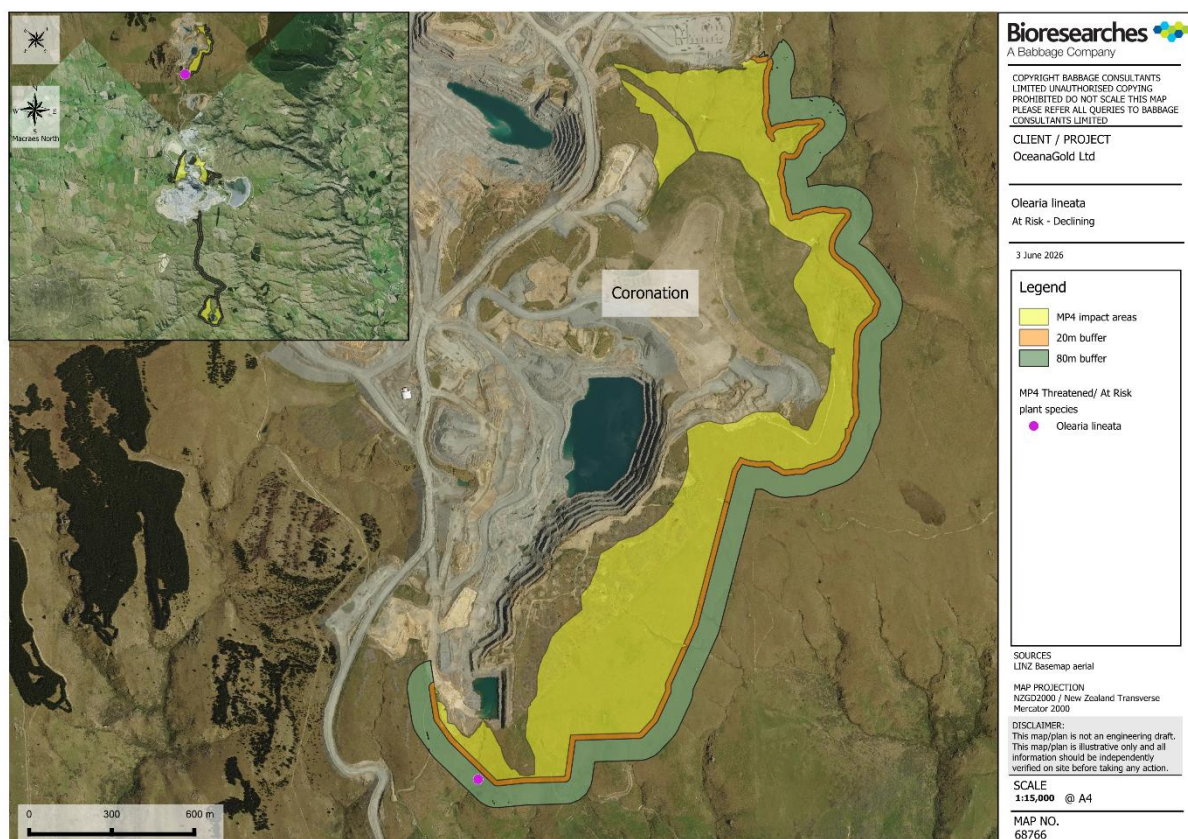


Figure 61: Locations of *Shawia lineata* records within the MP4 project area

### 8.1.50 *Oxalis rubens*

|                        |                                                                                                                                                                                                             |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Oxalis rubens</i>                                                                                                                                                                                        |
| NZTCS status           | Not Threatened                                                                                                                                                                                              |
| Regional threat status | Regionally Data Deficient                                                                                                                                                                                   |
| Description            | A small, sprawling groundcover that grows in open ground.                                                                                                                                                   |
| Recorded locations     | Within the Coronation works footprint.                                                                                                                                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>• Salvage of plants</li> <li>• Propagation from seed and plant divisions</li> <li>• Post-salvage monitoring</li> </ul> <p>Planting sites: Murphy's, Highlay Hill</p> |
| Notes                  | Easy to grow. Could plant on margins of constructed tors, or within tussock vegetation about 1m tall. Likes sun and rocky places. OK in dry conditions.                                                     |
| Anticipated risks      | Competition from weeds, may need grazing (unknown).                                                                                                                                                         |
| Confidence of success  | High.                                                                                                                                                                                                       |

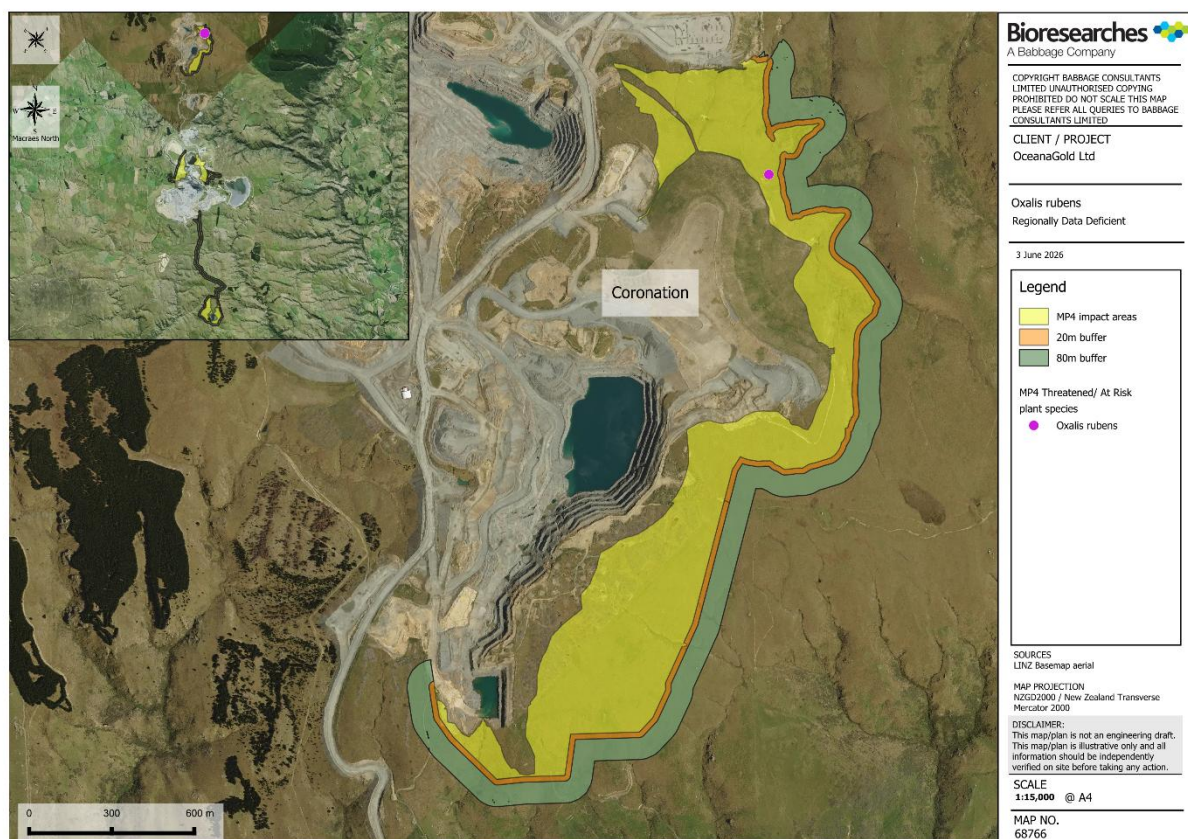
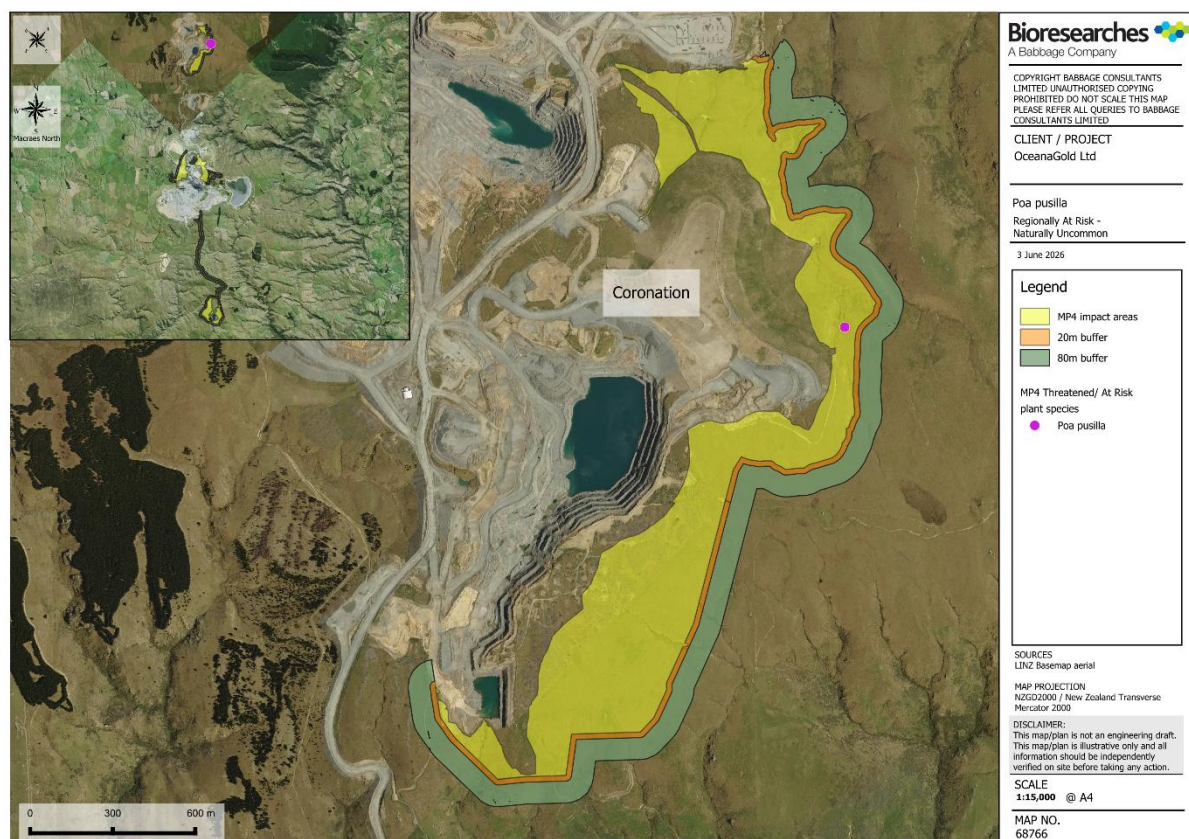


Figure 62: Locations of *Oxalis rubens* records within the MP4 project area



### 8.1.51 *Poa pusilla*

|                               |                                                                                                                                                                                                                  |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Poa pusilla</i>                                                                                                                                                                                               |
| <b>NZTCS status</b>           | Not Threatened                                                                                                                                                                                                   |
| <b>Regional threat status</b> | Regionally At Risk - Naturally Uncommon                                                                                                                                                                          |
| <b>Description</b>            | Slender, prostrate turf-forming grass of open grass and grey scrub areas.                                                                                                                                        |
| <b>Recorded locations</b>     | Within the Coronation works footprint.                                                                                                                                                                           |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Salvage</li> <li>• Propagation from seed and plant divisions</li> <li>• Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Cranky Jim's, Highlay Hill.</p> |
| <b>Notes</b>                  | Easy to grow. Hard to find good habitat. Likes semi-shaded rock faces. Under shrubland also ok. South and east-facing slopes might be best.                                                                      |
| <b>Anticipated risks</b>      | None.                                                                                                                                                                                                            |
| <b>Confidence of success</b>  | Moderate.                                                                                                                                                                                                        |



**Figure 63: Locations of *Poa pusilla* records within the MP4 project area**



### 8.1.52 *Pterostylis tristis*

|                        |                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Pterostylis tristis</i>                                                                                                                                                                                                                                                                                                                                                     |
| NZTCS status           | At Risk - Declining                                                                                                                                                                                                                                                                                                                                                            |
| Regional threat status | Regionally Threatened - Vulnerable                                                                                                                                                                                                                                                                                                                                             |
| Description            | Small greenhood orchid of open ground within tussock grassland.                                                                                                                                                                                                                                                                                                                |
| Recorded locations     | Within the Coronation works footprint.                                                                                                                                                                                                                                                                                                                                         |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage</li> <li>VDT</li> <li>Post-salvage monitoring</li> </ul> <p>Planting area: Murphy's.</p>                                                                                                                                                                                                                                        |
| Notes                  | Above ground for very short time. Hard to know how many are in footprint. Very hard to cultivate. VDT possible but tricky. Can try and take cores with plants then plant directly into a drill hole. Requires low growing vegetation and nurse-soils. Doesn't like tall veg, needs very open competition. Dry conditions better. Still reasonably common in local environment. |
| Anticipated risks      | Cryptic plant only seasonally above ground. Not likely to be able to propagate. Difficult to translocate. Competition from taller vegetation.                                                                                                                                                                                                                                  |
| Confidence of success  | Low.                                                                                                                                                                                                                                                                                                                                                                           |



Figure 64: Locations of *Pterostylis tristis* records within the MP4 project area

### 8.1.53 *Ranunculus aff. reflexus* (CHR 394270; Mt Peel)

|                        |                                                                                                                                                                                            |
|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Ranunculus aff. reflexus</i> (CHR 394270; Mt Peel)                                                                                                                                      |
| NZTCS status           | At Risk - Declining                                                                                                                                                                        |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                    |
| Description            | Small hairy buttercup of open ground in tussock grassland or grey shrubland.                                                                                                               |
| Recorded locations     | Within the Golden Bar buffer area.                                                                                                                                                         |
| Management techniques  | <ul style="list-style-type: none"> <li>Cultivation from seed, possibly plant divisions</li> <li>In-situ monitoring</li> </ul> <p>Planting areas: Murphy's, Highlay Hill, Cranky Jim's.</p> |
| Notes                  | Moderately easy to grow, suffers from fungal attack. Plant at base of rocks, in shady, slightly damp, low vegetation.                                                                      |
| Anticipated risks      | Identification challenges.                                                                                                                                                                 |
| Confidence of success  | High.                                                                                                                                                                                      |

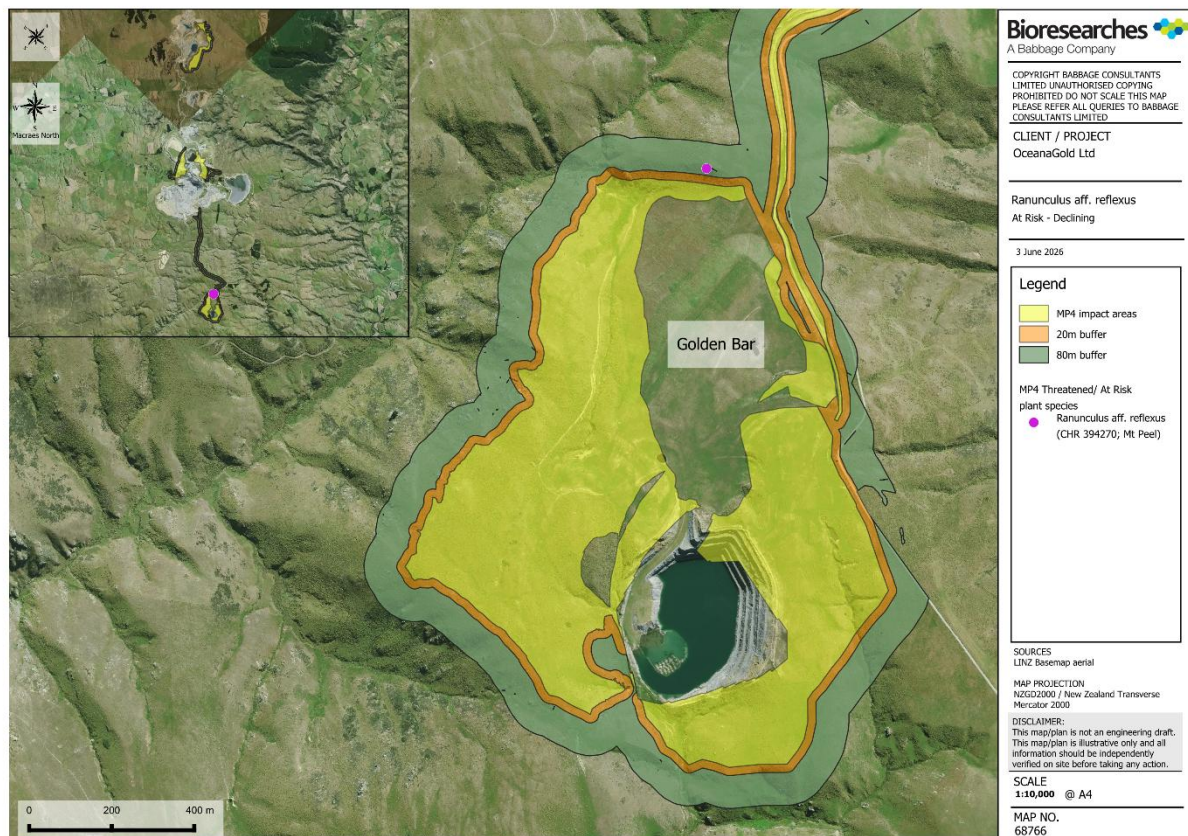


Figure 65: Locations of *Ranunculus aff. reflexus* (CHR 394270; Mt Peel) records within the MP4 project area



### 8.1.54 *Ranunculus brevis*

|                        |                                                                                                                                                                                                                |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Ranunculus brevis</i>                                                                                                                                                                                       |
| NZTCS status           | Threatened - Nationally Endangered                                                                                                                                                                             |
| Regional threat status | Regionally Threatened - Critical                                                                                                                                                                               |
| Description            | Small tufted buttercup of wetland habitats.                                                                                                                                                                    |
| Recorded locations     | Possible record from Camp Creek footprint.                                                                                                                                                                     |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage</li> <li>Propagation from seed and plant divisions</li> <li>Post-salvage monitoring</li> </ul> <p>Planting areas: Cranky Jim's wetlands, Murphy's wetlands.</p> |
| Notes                  | Very unlikely this record was correctly identified - will need confirmation. Aquatic pond inhabitant – gravel bottom ponds.                                                                                    |
| Anticipated risks      | Identification challenges, competition from taller plants.                                                                                                                                                     |
| Confidence of success  | High.                                                                                                                                                                                                          |

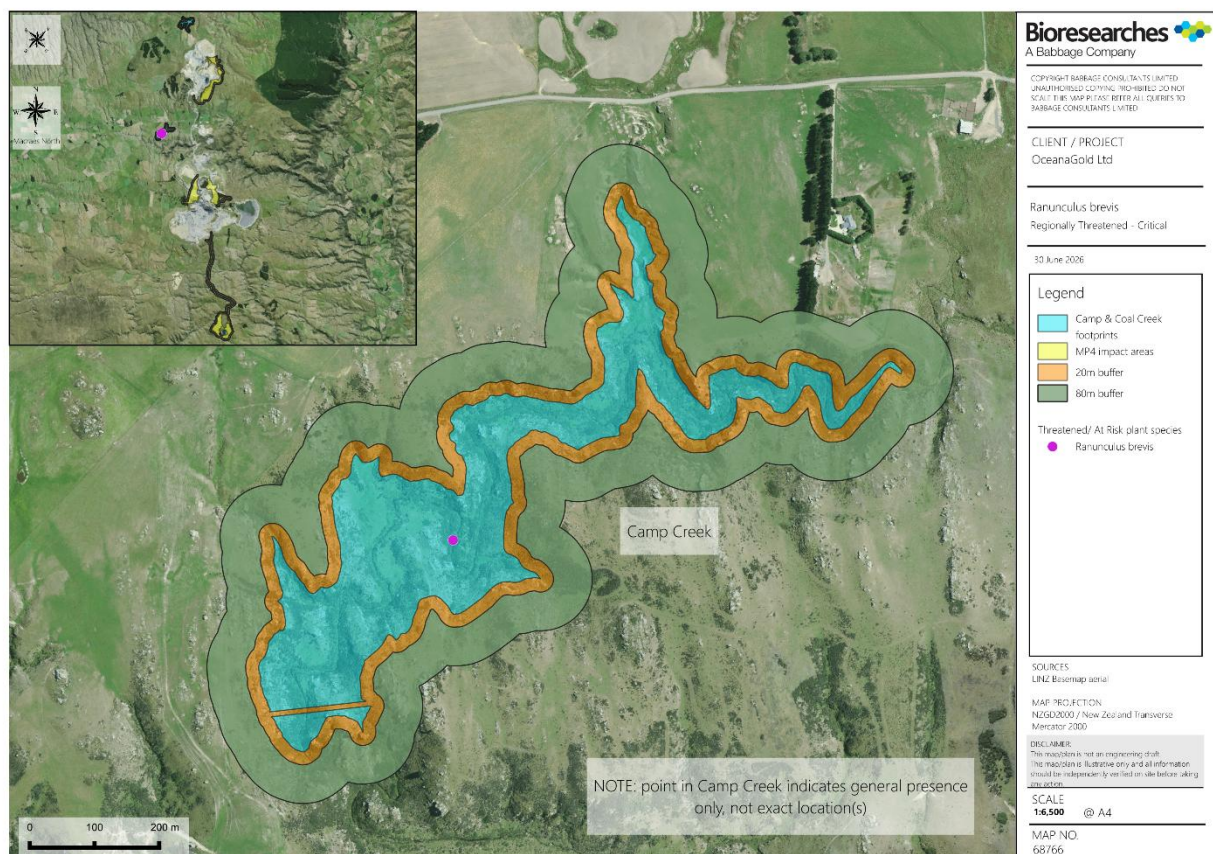


Figure 66: Locations of *Ranunculus brevis* record within the Camp Creek area



### 8.1.55 *Rytidosperma buchananii*

|                        |                                                                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Rytidosperma buchananii</i>                                                                                                                                                              |
| NZTCS status           | At Risk - Declining                                                                                                                                                                         |
| Regional threat status | Regionally At Risk - Declining                                                                                                                                                              |
| Description            | A tufty grass of open rocky places.                                                                                                                                                         |
| Recorded locations     | Within the Coronation works footprint area.                                                                                                                                                 |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage</li> <li>Propagation from seed and plant division</li> <li>Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Highlay Hill.</p> |
| Notes                  | Reasonably easy to grow and salvage.                                                                                                                                                        |
| Anticipated risks      | May need grazing, identification issues.                                                                                                                                                    |
| Confidence of success  | High.                                                                                                                                                                                       |

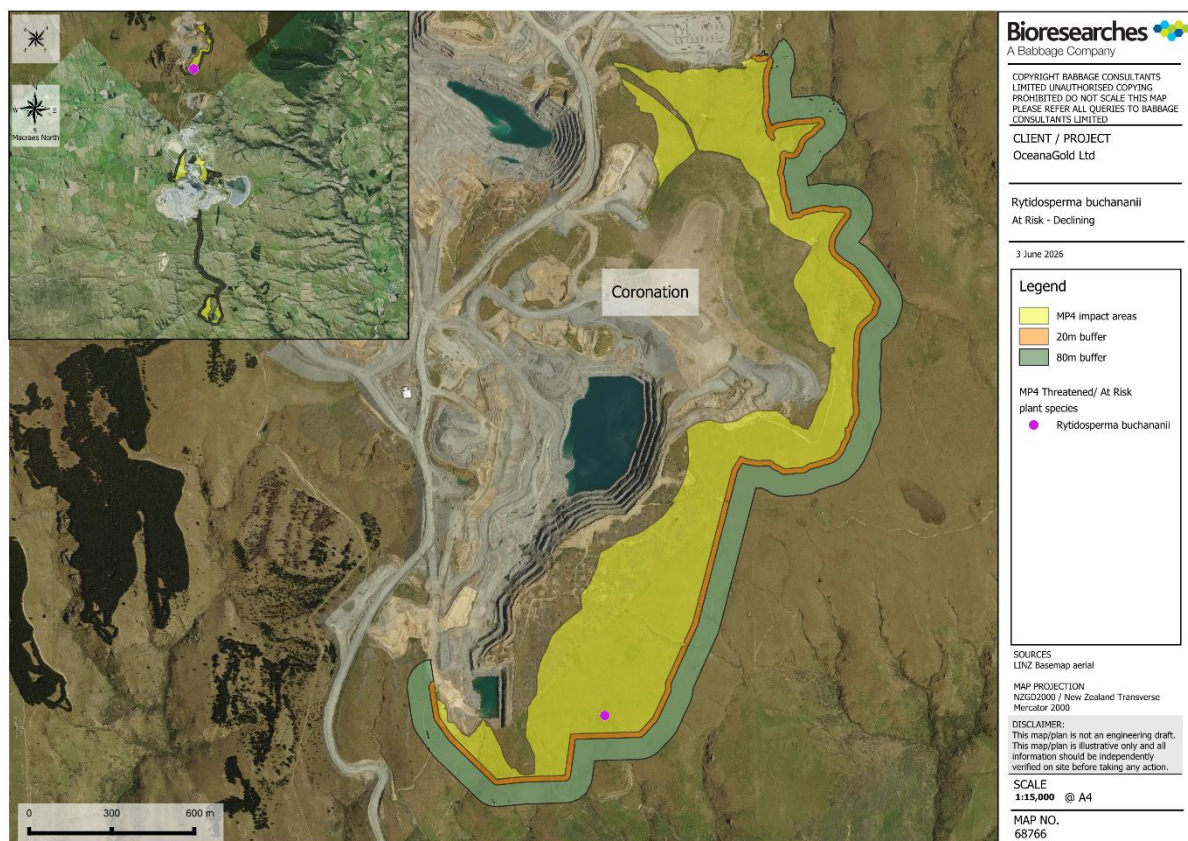
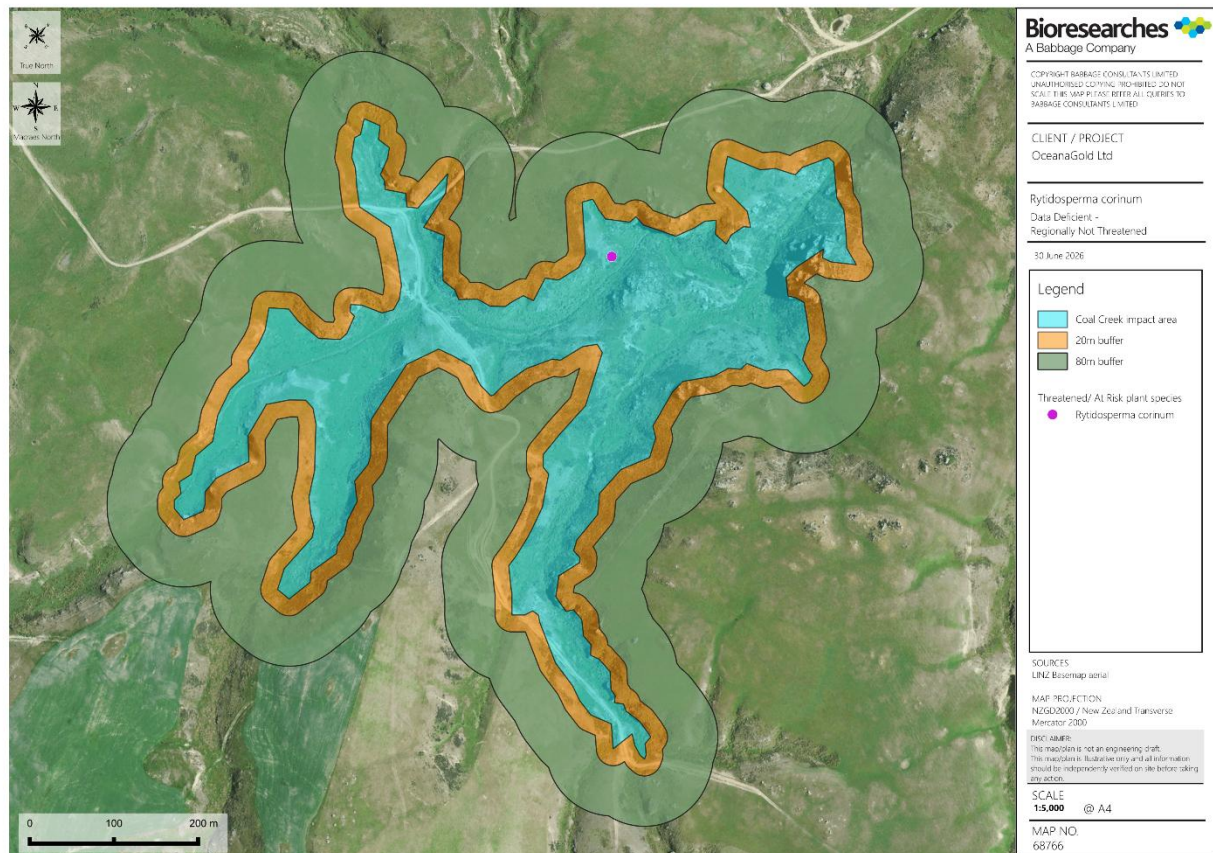


Figure 67: Locations of *Rytidosperma buchananii* records within the MP4 project area

### 8.1.56 *Rytidosperma corinum*

|                        |                                                                                                                                                                                                                     |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Rytidosperma corinum</i>                                                                                                                                                                                         |
| NZTCS status           | Data Deficient                                                                                                                                                                                                      |
| Regional threat status | Regionally Not Threatened                                                                                                                                                                                           |
| Description            | Small tuft-forming grass of open rocky areas.                                                                                                                                                                       |
| Recorded locations     | Recorded from within the Coronation, Coal Creek and Golden Bar footprints.                                                                                                                                          |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage of plants in footprints</li> <li>Propagation from seed and plant division</li> <li>Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Highlay Hill.</p> |
| Notes                  | Rock specialist, moderately difficult to grow. Specific with moisture. Hard to find habitat. Likes slightly shaded rock faces. Managing existing populations is important.                                          |
| Anticipated risks      | May need grazing, identification issues.                                                                                                                                                                            |
| Confidence of success  | High.                                                                                                                                                                                                               |



**Figure 68: Locations of *Rytidosperma cornium* records within the MP4 project area**



### 8.1.57 *Rytidosperma thomsonii*

|                        |                                                                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Rytidosperma thomsonii</i>                                                                                                                                                               |
| NZTCS status           | At Risk - Declining                                                                                                                                                                         |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                          |
| Description            | Very small tufting grass of open grass areas.                                                                                                                                               |
| Recorded locations     | Within the Golden Bar and Coronation works footprints.                                                                                                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>Salvage</li> <li>Propagation from seed and plant division</li> <li>Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Highlay Hill.</p> |
| Notes                  | Grows easily. Plant in similar habitat to <i>C. corrugata</i> . Requires deep soil, doesn't like competition.                                                                               |
| Anticipated risks      | May need grazing, identification issues.                                                                                                                                                    |
| Confidence of success  | High.                                                                                                                                                                                       |

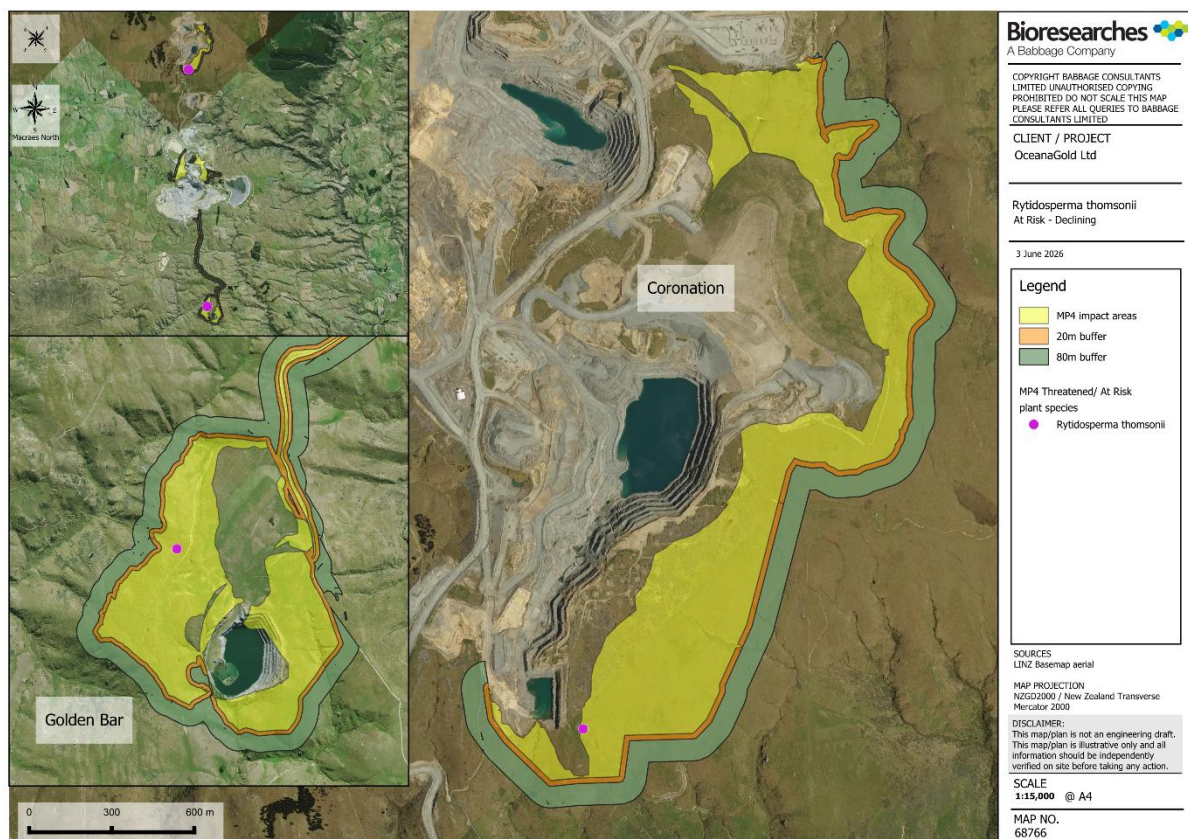
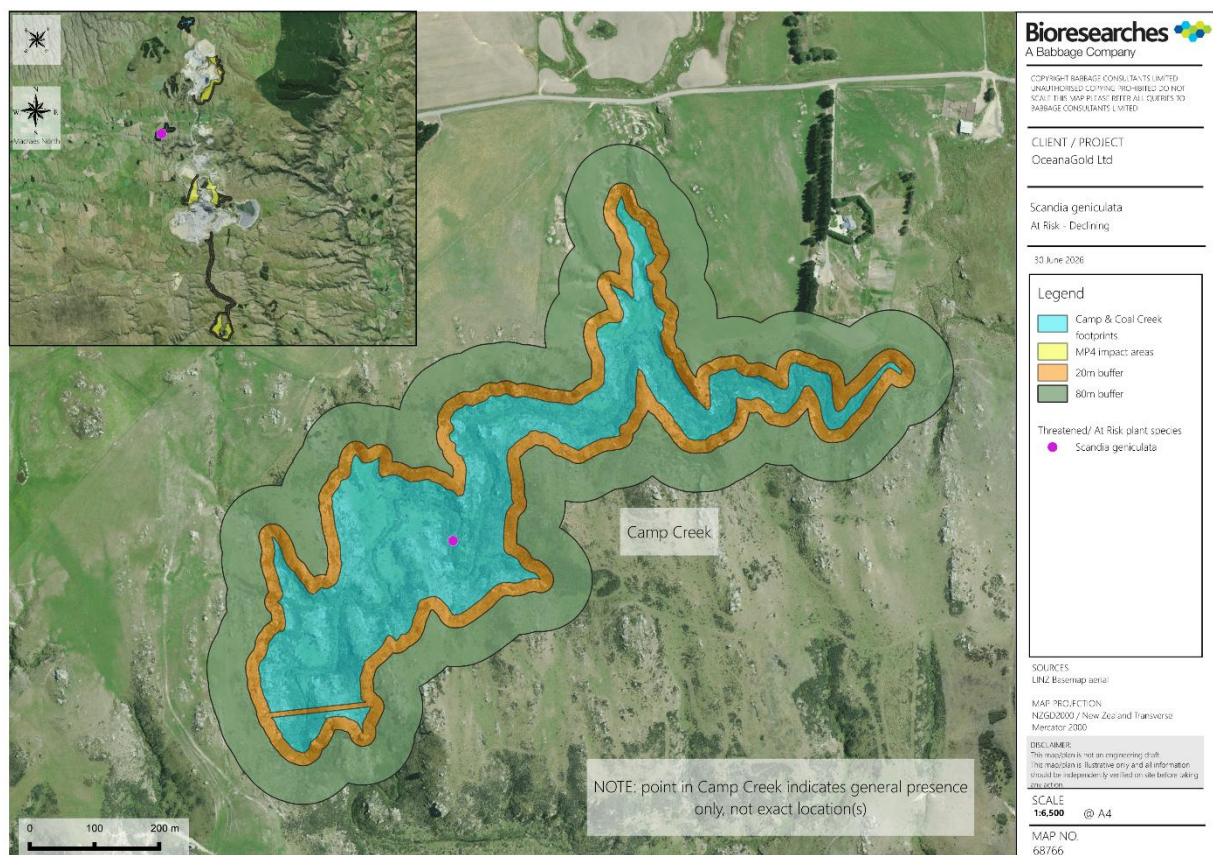


Figure 69: Locations of *Rytidosperma thomsonii* records within the MP4 project area



### 8.1.58 *Scandia geniculata*

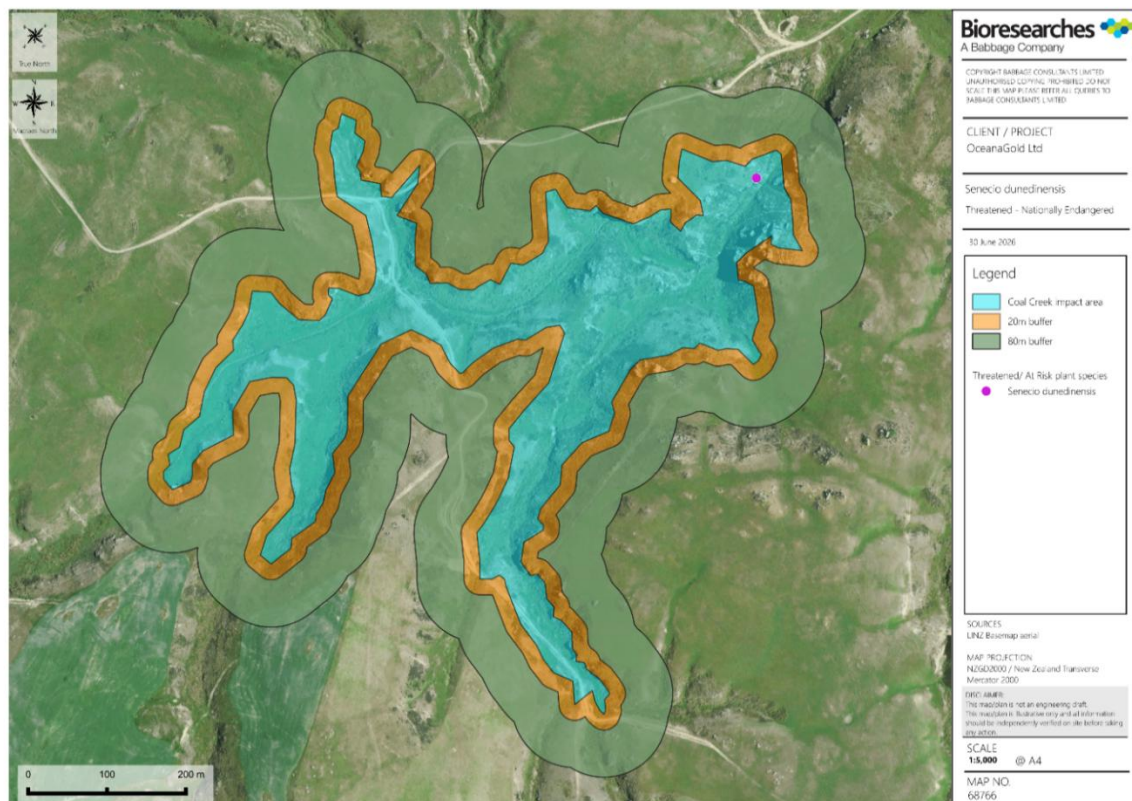
|                        |                                                                                                                                                                                        |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Scandia geniculata</i>                                                                                                                                                              |
| NZTCS status           | At Risk - Declining                                                                                                                                                                    |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                |
| Description            | Small-leaved aromatic vine of damp soils in grey shrubland.                                                                                                                            |
| Recorded locations     | Possible record in Camp Creek.                                                                                                                                                         |
| Management techniques  | <ul style="list-style-type: none"> <li>Survey</li> <li>Salvage</li> <li>Propagation from seed</li> <li>Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's fenced area.</p> |
| Notes                  | Grows ok from seed, but can be hard to find seed. Can try cuttings too. Likes low shrubby and rocky areas. Plant on constructed tors and amongst grey shrub.                           |
| Anticipated risks      | Herbivory.                                                                                                                                                                             |
| Confidence of success  | Moderate.                                                                                                                                                                              |



**Figure 70: Locations of *Scandia geniculata* records within the MP4 project area**

### 8.1.59 *Senecio dunedinensis*

|                               |                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Senecio dunedinensis</i>                                                                                                                                                                                                                                                                                                                    |
| <b>NZTCS status</b>           | Threatened - Nationally Endangered                                                                                                                                                                                                                                                                                                             |
| <b>Regional threat status</b> | Regionally Threatened - Endangered                                                                                                                                                                                                                                                                                                             |
| <b>Description</b>            | Clumping purple-green herb that grows in sheltered sites under grey shrubland or rocky overhangs.                                                                                                                                                                                                                                              |
| <b>Recorded locations</b>     | Within the Coal Creek footprint.                                                                                                                                                                                                                                                                                                               |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Survey Salvage</li> <li>• Propagation from seed</li> <li>• Post-salvage monitoring</li> </ul> <p>Planting areas: Cranky Jim's in existing shrublands, Murphy's in rocky areas and in shrublands.</p>                                                                                                  |
| <b>Notes</b>                  | Grows ok from seed, can be a bit fussy. Only present in summer, dies off in winter. Can be short lived. Likes rock faces, may need direct seed scattering. May do well in semi-shaded shrubland environments. Could try constructed tors too. Very limited in wider environment and often hard to access material for seed. A difficult plant. |
| <b>Anticipated risks</b>      | Short-lived, may resent root disturbance during salvage.                                                                                                                                                                                                                                                                                       |
| <b>Confidence of success</b>  | Low                                                                                                                                                                                                                                                                                                                                            |



**Figure 71: Location of *Senecio dunedinensis* record within the Coal Creek area**

### 8.1.60 *Sonchus* aff. *novae-zelandiae* (a) (CHR 517718; “grassland”)

|                               |                                                                                                                                                                                                                                                                                                               |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Sonchus</i> aff. <i>novae-zelandiae</i> (a) (CHR 517718; “grassland”)                                                                                                                                                                                                                                      |
| <b>NZTCS status</b>           | Threatened - Nationally Vulnerable                                                                                                                                                                                                                                                                            |
| <b>Regional threat status</b> | Regionally Threatened - Endangered                                                                                                                                                                                                                                                                            |
| <b>Description</b>            | A rosette-forming dandelion-like herb of open grassland and rocky habitats.                                                                                                                                                                                                                                   |
| <b>Recorded locations</b>     | Within the Coronation works footprint.                                                                                                                                                                                                                                                                        |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>• Salvage</li> <li>• Propagation from seed</li> <li>• Post-salvage monitoring</li> </ul> Planting areas: Murphy’s, Highlay Hill.                                                                                                                                       |
| <b>Notes</b>                  | Very difficult to grow. Very rare in local environment. Highlay Hill has a population that requires management. Doesn’t like competition, dryland flat weed. Possibly suffering from climate change impacts.. Could try creating bare ground and direct seeding (although hard to get seed). Difficult plant. |
| <b>Anticipated risks</b>      | Root damage from salvage, competition from exotic weeds, may require grazing. Low seed viability and seed herbivory.                                                                                                                                                                                          |
| <b>Confidence of success</b>  | Low.                                                                                                                                                                                                                                                                                                          |





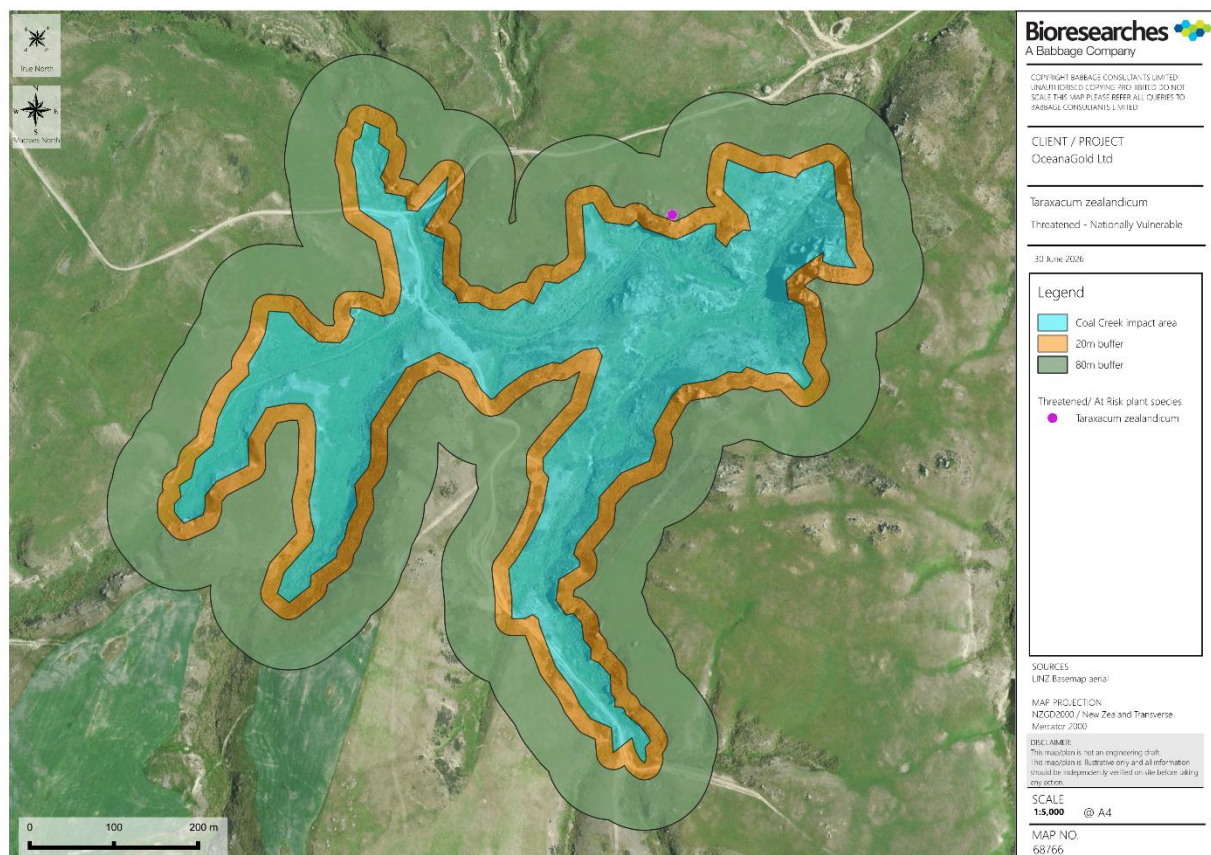
**Figure 72: Location of *Sonchus* aff. *novae-zelandiae* (a) (CHR 517718; “grassland”) record within the MP4 project area**

### 8.1.61 *Sophora microphylla*

|                               |                                                                                                                                                                               |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Species name</b>           | <i>Sophora microphylla</i>                                                                                                                                                    |
| <b>NZTCS status</b>           | Not Threatened                                                                                                                                                                |
| <b>Regional threat status</b> | Not Threatened (uncommon in the ecological district)                                                                                                                          |
| <b>Description</b>            | A small, generally single-trunked tree with divaricating juvenile form                                                                                                        |
| <b>Recorded locations</b>     | Recorded from within the Golden Bar waste rock stack area (20 m buffer)                                                                                                       |
| <b>Management techniques</b>  | <ul style="list-style-type: none"> <li>Propagation from seed and cuttings</li> <li>Salvage (if plants are small enough)</li> </ul> Planting areas: Cranky Jim’s shrubland     |
| <b>Notes</b>                  | This tree is a component of grey shrub communities and has been included in wider restoration plantings as part of compensation for MP4, as well as wetland buffer plantings. |
| <b>Anticipated risks</b>      | Browsing from pests                                                                                                                                                           |
| <b>Confidence of success</b>  | High.                                                                                                                                                                         |

### 8.1.62 *Taraxacum zealandicum*

|                        |                                                                                                                                                                                                                               |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Taraxacum zealandicum</i>                                                                                                                                                                                                  |
| NZTCS status           | Threatened - Nationally Vulnerable                                                                                                                                                                                            |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                                                            |
| Description            | A rosette-forming dandelion of open grassland habitats.                                                                                                                                                                       |
| Recorded locations     | Recorded from within the Coal Creek buffer area.                                                                                                                                                                              |
| Management techniques  | <ul style="list-style-type: none"> <li>• Propagation from seed</li> <li>• In-situ monitoring</li> </ul> Planting areas: Murphy's, Highlay Hill.                                                                               |
| Notes                  | This species likes slightly moister environments than <i>Sonchus</i> spp. Slightly darker cooler low vegetation, e.g. margins of rock bluffs. Was common grassland species in past. Cultivation uncertain but tentatively ok. |
| Anticipated risks      | Identification challenges, weed competition.                                                                                                                                                                                  |
| Confidence of success  | High.                                                                                                                                                                                                                         |



**Figure 73: Location of *Taraxacum zealandicum* record within the Coal Creek area**



### 8.1.63 *Veronica rakaiensis*

|                        |                                                                                                                                                                                             |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Veronica rakaiensis</i>                                                                                                                                                                  |
| NZTCS status           | Not Threatened                                                                                                                                                                              |
| Regional threat status | Regionally At Risk - Naturally Uncommon                                                                                                                                                     |
| Description            | A leafy, shrubby hebe of shrubland habitats, often riparian.                                                                                                                                |
| Recorded locations     | Within the Coal Creek works footprint.                                                                                                                                                      |
| Management techniques  | <ul style="list-style-type: none"> <li>• Salvage</li> <li>• Propagation from seed and cuttings</li> <li>• Post-salvage monitoring</li> </ul> <p>Planting areas: Murphy's, Highlay Hill.</p> |
| Notes                  | Ok to grow. This species inhabits rocky banks on stream sides, margins of rock bluffs. Prefers semi-shade,                                                                                  |
| Anticipated risks      | None                                                                                                                                                                                        |
| Confidence of success  | High                                                                                                                                                                                        |

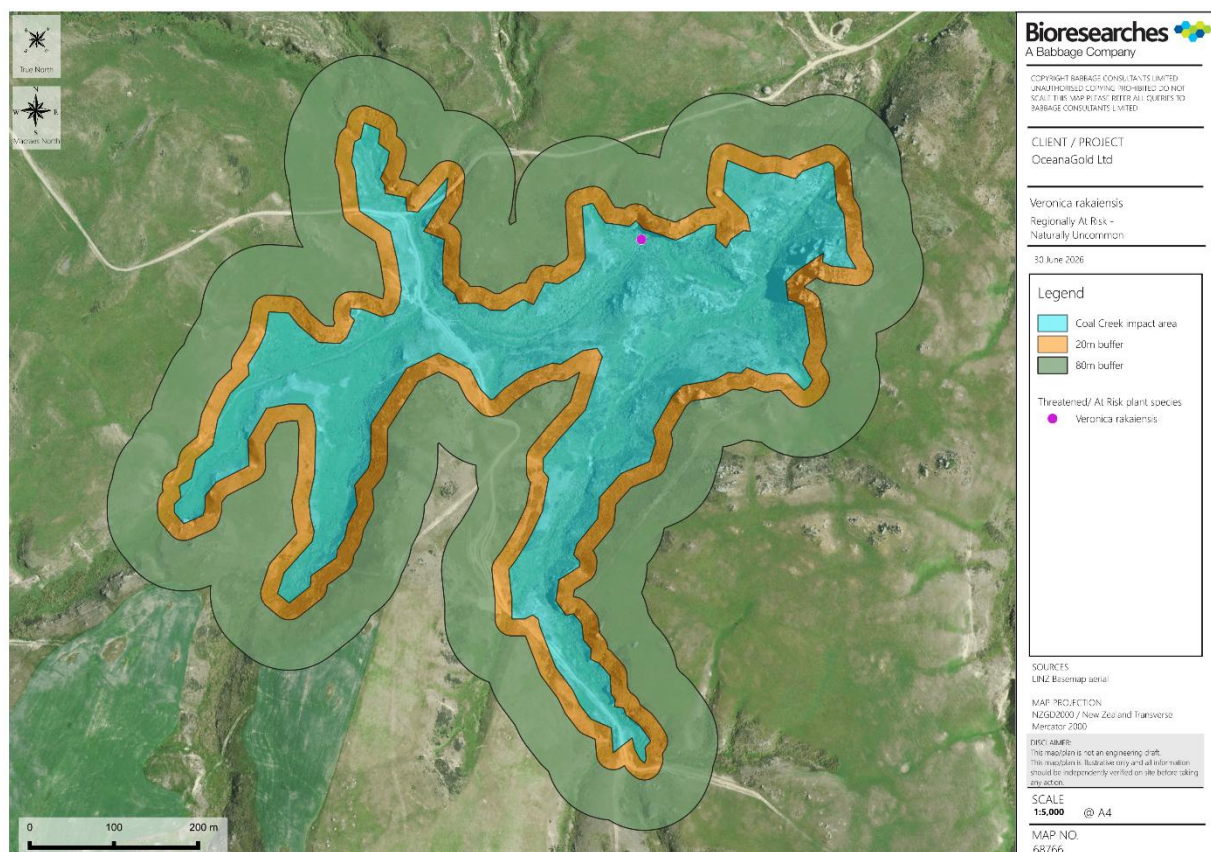


Figure 74: Location of *Veronica rakaiensis* record within the Coal Creek area



### 8.1.64 *Wurmbea novae-zelandiae*

|                        |                                                                                                                                                                                                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Species name           | <i>Wurmbea novae-zelandiae</i>                                                                                                                                                                                                                                                                 |
| NZTCS status           | Threatened - Nationally Endangered                                                                                                                                                                                                                                                             |
| Regional threat status | Regionally Threatened - Endangered                                                                                                                                                                                                                                                             |
| Description            | Small grass-like bulb of open grassland habitats.                                                                                                                                                                                                                                              |
| Recorded locations     | Within the Central buffer area.                                                                                                                                                                                                                                                                |
| Management techniques  | <ul style="list-style-type: none"> <li>Propagation from seed</li> <li>In-situ monitoring</li> </ul> Planting areas: Murphy's and Cranky Jim's ephemeral wetlands.                                                                                                                              |
| Notes                  | Can be common in some places in Macraes. Likes grassland environment with slight shade. Not wetland. Prefers shorter vegetation. Could plant in low growth vegetation along track edges. Difficult to propagate. Can grow from seed. Macraes likely to be national stronghold for the species. |
| Anticipated risks      | Challenges in propagation, competition from exotic weeds, cryptic species.                                                                                                                                                                                                                     |
| Confidence of success  | Moderate.                                                                                                                                                                                                                                                                                      |



**Figure 75: Location of *Wurmbea novae-zelandiae* record within the MP4 project area**