

MATAKANUI

GOLD LIMITED



Bendigo-Ophir Gold Project Terrestrial Invertebrate Management Plan

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Glossary

Specific terms	
ALAN	Artificial Light At Night
AMP	Avifauna Management Plan
ARP	Applied Research Plan for Cushionfields and Spring Annuals
ARAMP	Ardgour Restoration Area Management Plan
BPPMP	Biosecurity and Plant Pest Management Plan
BOGP	Bendigo-Ophir Gold Project ('the Project')
BOMP	Biodiversity Outcome Monitoring Plan
CIT	Come in Time gold deposit
CTCI	Camera Trap Catch Index
CODC	Central Otago District Council
DDF	Direct disturbance footprint
DOC	Department of Conservation
ELF	Engineered landform
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
FTAA	Fast Track Approvals Act 2025
HIMP	Habitat Impact Management Plan
LEMP	Landscape and Ecology Management Plan
LERMP	Landscape and Ecological Rehabilitation Management Plan
LMP	Lizard Management Plan
MGL	Matakanui Gold Limited
MPMP	Mammalian Pest Management Plan
MSMP	Matakanui Sanctuary Management Plan
NZTCS	New Zealand Threat Classification System
ORC	Otago Regional Council
RAS	Rise and Shine gold deposit
RMA	Resource Management Act
SRE	Srex East gold deposit
SRX	Srex gold deposit
TIMP	Terrestrial Invertebrate Management Plan
TLF	Tailings Storage Facility

1. INTRODUCTION

1.1. Bendigo-Ophir Gold Project

Matakanui Gold Limited (MGL) is applying for approval to establish the Bendigo-Ophir Gold Project (BOGP) in the Dunstan Mountains, about 20 kilometres north of Cromwell. Application is under the Fast Track Approvals Act 2024 (FTAA).

1.2. Plan Purpose

This Terrestrial Invertebrate Management Plan (TIMP) sets out the methods used to avoid or minimise adverse ecological effects on indigenous terrestrial invertebrates during the construction and running of the gold project.

2. OVERVIEW OF EFFECTS ON TERRESTRIAL INVERTEBRATES AND EFFECTS MANAGEMENT

2.1. Terrestrial invertebrate values

At least 222 native terrestrial invertebrate species have been found within the BOGP site (Habitat NZ 2025). This includes a total of 18 notable species that have been identified as threatened or at-risk under the New Zealand Threat Classification System (NZTCS), potentially new species (new sp.), or species that represent high conservation importance.

Table 1 lists the notable terrestrial invertebrate species found within the BOGP site and includes their national threat status. Lepidoptera (moth) species make up the majority of notable species along with several Coleoptera (beetles and weevils) and a single Orthoptera (grasshopper).

Table 1: Terrestrial invertebrate species in the BOGP site prioritised for management including the New Zealand Threat Classification System (NZTCS) threat category. An asterisk () represents a revised NZTCS threat category for NZ lepidoptera currently undergoing review.*

Threat status	Sub status	Species name	Type of Invertebrate
Threatened	Nationally Critical	<i>Sporophyla oenospora</i>	Moth
	Nationally Endangered*	<i>Homodotis</i> sp. A (NZAC-CO)	Moth
	Nationally Vulnerable	" <i>Pseudocoremia</i> " <i>cineracia</i>	Moth
	Nationally Vulnerable	<i>Pasiphila</i> sp. 'Olearia'	Moth
	Potentially Threatened	<i>Harpalus</i> new sp.	Ground beetle

Threat status	Sub status	Species name	Type of Invertebrate
New Species	Potentially Threatened	<i>Inophloeus new sp.</i>	Weevil
	Potentially Threatened	<i>Megadromus new sp.1</i>	Beetle
	Potentially Threatened	<i>Megadromus new sp.2</i>	Beetle
At Risk	Declining	<i>Phaulacridium otagoense</i>	Short-horned grasshopper
	Declining*	<i>Agrotis admirationis</i>	Moth
	Declining*	<i>Asaphodes recta</i>	Moth
	Declining*	<i>Elachista helonoma</i>	Moth
	Declining*	<i>Ichneutica toroneura</i>	Moth
	Declining*	<i>Nyctemera annulata</i>	Magpie moth
	Declining*	<i>Paranotoreas fulva</i>	Moth
	Uncommon*	<i>Ichneutica sistens</i>	Moth
	Uncommon*	<i>Meterana exquisite</i>	Exquisite owlet moth
Not Assessed	Of importance	<i>Scythris sp.1</i>	Moth

2.2. Potential effects on terrestrial invertebrates

Proposed mining and ancillary activities may cause a range of immediate and long-term impacts on terrestrial invertebrates at the BOGP site. Potential adverse effects may include:

Potential direct impacts

- Vegetation and habitat loss through clearance and earthworks
- Direct mortality or injury to eggs, larvae, pupae or adult specimens which may be harmed during clearance and earthworks activities

Potential indirect impacts

- Creating habitat edges can alter the composition and health of adjacent vegetation (i.e. habitat degradation), making the area less suitable for invertebrates
- Habitat fragmentation and isolation caused by the loss, reduction & severing access to different habitat types. This reduces the ability of invertebrates to disperse across the landscape for food, shelter, and breeding purposes.
- Immediate and ongoing disturbances, particularly on habitat margins/edges, through noise, dust, artificial lighting and blasting can impact invertebrates. e.g

disruption of nocturnal moth navigation and breeding behaviour from light pollution

- Increased invertebrate vulnerability due to mammalian predators that exploit disturbed habitats and edges
- Introduced exotic plant species can displace native host plants and alter habitat structure

2.3. Overview of effects management

Invertebrate management follows a structured approach to:

- Avoid impacts where possible
- Minimise unavoidable disturbances
- Rehabilitate, offset or compensate for remaining effects to ensure species viability.

Protocols combine established conservation principles with new techniques tailored for threatened and newly discovered species at the BOGP site.

The effects hierarchy is applied across a range of management measures designed to protect the highest-risk invertebrate species where possible, their host plants, and their critical habitat. Targeted management measures include:

- Pre-clearance habitat assessments to inform operations
- Habitat clearance salvage and relocation for the at-risk grasshopper and newly discovered weevil species
- Host plant and habitat protection, enhancement, and relocation programmes
- Experimental invertebrate breeding programmes.

Pest exclusion fencing to establish ecosanctuaries, and comprehensive mammalian pest management will benefit all target species and other invertebrates within the Sanctuary areas. Managing Artificial Light at Night (ALAN) and improving cushionfield will provide broad-scale invertebrate protection. Additional measures include rock stack construction and wood salvage to enable microhabitats.

Table 2 outlines the effects hierarchy for each targeted high-risk species covered in this TIMP. Detailed protocols for each management strategy are provided in Section 1, with monitoring protocols in Section 6.

Table 2. Targeted management measures for invertebrate species prioritised for management under the TIMP

Species name	Type	Targeted management action
<i>Sporophyla oenospora</i>	Moth	- Alter Ardour Rise alignment to not impact habitat - Captive breeding study
<i>Homodotis</i> sp. A (NZAC-CO)	Moth	Nil
" <i>Pseudocoremia</i> " <i>cineracia</i>	Moth	- Pre-clearance habitat assessment - Plant relocation programme – olearia (<i>Olearia odorata</i>) - Host plant protection (<i>O. odorata</i>)
<i>Pasiphila</i> sp. 'Olearia'	Moth	- Pre-clearance habitat assessment - Plant relocation programme – olearia (<i>O. odorata</i> and <i>O. bullata</i>) - Host plant protection (<i>O. odorata</i> and <i>O. bullata</i>)
<i>Harpalus</i> new sp.	Ground beetle	Nil
<i>Inophloeus</i> new sp.	Weevil	- Pre-clearance habitat assessment - Salvage and relocation - Plant relocation programme – Taramea (<i>Aciphylla aurea</i>) - Host plant protection – Taramea (<i>A. aurea</i>)
<i>Megadromus</i> new sp. 1	Beetle	Nil
<i>Megadromus</i> new sp.2	Beetle	Nil
<i>Phaulacridium</i> <i>otagoense</i>	Short-horned grasshopper	- Pre-clearance habitat assessment - Salvage and relocation - Vegetation damage protection - Predator Proof Sanctuary - Captive breeding/ relocation programme
<i>Agrotis admirationis</i>	Moth	Nil
<i>Asaphodes recta</i>	Moth	Nil
<i>Elachista helonoma</i>	Moth	- Pre-clearance habitat assessment - Plant relocation programme – tussock (<i>Poa cita</i>) - Host plant protection (<i>P. cita</i>)
<i>Ichneutica toroneura</i>	Moth	- Pre-clearance habitat assessment - Plant relocation programme – tussock (<i>Poa cita</i> and <i>Fescue novae-zealandiae</i>) - Host plant protection (<i>P. cita</i> and <i>F. novae-zealandiae</i>)

Species name	Type	Targeted management action
<i>Nyctemera annulata</i>	Magpie moth	• Host plant control limited in BPPMP¹
<i>Paranotoreas fulva</i>	Moth	• Alter Ardgour Rise alignment to not impact habitat
<i>Ichneutica sistens</i>	Moth	Nil
<i>Meterana exquisite</i>	Exquisite owlet moth	• Pre-clearance habitat assessment • Planting & plant relocation programme – olearia (<i>Olearia odorata</i>) • Host plant protection (<i>O. odorata</i>)
<i>Scythris sp.1</i>	Moth	• Pre-clearance habitat assessment • Plant relocation programme – native broom (<i>Chamichaelia</i> spp.)

¹ Host plants' include the invasive ragwort (*Jacobaea vulgaris*). Site management will maintain ragwort populations to support the moth, particularly where native *Senecio* species are absent.

3. PROTOCOLS FOR EFFECTS AVOIDANCE AND MINIMISATION

3.1. Overview and Structure

This section describes the requirements and protocols for minimising effects on target terrestrial invertebrates, including:

- **Pre-impact protocols** implemented before any vegetation clearance or soil disturbance starts, including:
 - Pre-clearance habitat assessment
 - Target invertebrate salvage and relocation
 - Target host plant salvage and relocation
- **Post-mining relocations** (*Phaulacridium otagoense*)
- **Applied research** and experimental captive breeding study for *Sporophylla oenosporea* will be conducted if additional specimens are found. This research sits outside the avoidance, minimisation and offset management programme.
- **Disturbance minimisation** and ongoing construction management protocols that may happen at the same time as other programs during the project include:
 - Artificial Light At Night (ALAN) and vehicle disturbance management
 - Predator Proof Sanctuary development and maintenance
 - Host plant protection and enhancement.

3.2. Pre-clearance habitat assessments

Pre-clearance habitat assessment will be undertaken prior to any site disturbance. Habitat assessments guide salvage efforts and identify potential species locations, while accounting for patchy distributions and differing habitats across key invertebrates.

Pre-clearance assessments will identify, confirm, and document potential habitat and identify where further protocol actions are required, including but not limited to the following:

- Suitable habitat and designated areas for terrestrial invertebrate salvage and relocation targeting:
 - *Inophloeus* new sp.
 - *Phaulacridium otagoense*
- Areas of host plants of key species (see Table 3) scheduled for relocation under the LERMP, including:
 - Taramea (*Aciphylla aurea*)

- Fescue tussock (*Festuca novae-zelandiae*)
- Silver tussock (*Poa cita*)
- Native broom (*Carmichaelia* spp.) (removing foliage, not live plants)
- Olearia (*Olearia odorata* and *Olearia bullata*).
- Areas where pre-salvage surveys are required to establish baseline invertebrate numbers on existing host plants, prior to plant relocation.

Target host plant salvage and relocation programme will largely be guided by the LERMP and will require close coordination between the technical leads for Rehabilitation and Entomology.

3.2.1. Requirements for pre-clearance assessments

Field surveys (for pre-clearance habitat assessments) will include systematic visual inspections of the habitat, vegetation and any notable species sighted. These can be done in several stages, and must:

- Field surveys must be done a minimum of 2 weeks (recommended 6 weeks) prior to vegetation clearance
- Survey area must extend 50m beyond disturbance footprint
- Approximately 1 hour of effort per hectare of land within scope, although some less complex habitat (e.g. bare ground) may require less time
- When a survey is needed to identify if a target species is present before relocating plants, follow methods outlined in the monitoring section of this TIMP (section 6.2). TIMP driven plant salvage and relocations should only be done if the target invertebrates' presence is verified
- Documentation completed of all work undertaken, including production of maps and associated GPS locations of all areas which require for further action

Phaulacridium otagoense specific requirements

A conservative approach will be taken for *Phaulacridium otagoense* salvage and relocation due to the species' wide habitat range. At a minimum, salvage will target the following habitat types mapped during the BOGP Vegetation Values Assessment (RMA 2025):

- Mixed depleted herbfield and grassland
- Mixed tussock shrubland and exotic grassland
- Mixed scrubland
- Exotic pasture

Other areas identified during pre-clearance assessments will also require salvage operations (Section 5.3). Competent habitat assessors will determine at their discretion any additional areas requiring salvage.

3.3. Target Invertebrate Salvage and Relocation

The protocols for invertebrate salvage and relocation below are based on previous invertebrate relocations and expert knowledge. There is no standard or required methodology. The methods provided have been adapted for local site conditions at the BOGP.

Protocols are designed to ensure safe capture, transport, and successful establishment in suitable new habitats while minimising invertebrate stress during the process.

3.3.1. Purpose and objectives

This programmes measures aim to minimise the impact of vegetation clearance and prevent direct mortality of *Inophloeus new sp.* and *Phaulacridium otagoense*. The new *Inophloeus* species likely depends on Taramea herbfields, with approximately 2 ha of habitat (although plants are dispersed over at least 5 ha) directly impacted by mining (Habitat NZ 2024). *P. otagoense* is targeted for salvage as it was only found in the directly disturbed footprint (DDF) during the BOGP Terrestrial Invertebrate Survey (Habitat NZ 2024) and the site may be a stronghold of the population (Habitat NZ 2024, Alliance Ecology 2025).

Whilst relocating these species is experimental, similar species have been successfully moved both in New Zealand and other countries. Monitoring will determine success (Section 6), with adaptive management addressing unexpected outcomes.

3.3.2. Pre-clearance induction

Prior to starting pre-clearance, an induction will be conducted for relevant contractors, the Environment Manager, and other authorised personnel. The induction will cover the following:

- Description and photographs of target species
- Description of where to search
- Areas where salvage operations are undertaken
- Timeframe of operations.

3.3.3. Salvaging footprint and timing

Invertebrate salvage is proposed in areas within the DDF that are deemed suitable habitat for each target species. The exact delineation of the area will be determined by the pre-clearance habitat assessment (see section 3.2).

Seasonal timing requirements: Live invertebrate salvage must coincide with peak terrestrial invertebrate activity (October-March) and consider optimal species-specific windows:

- *Inophloeus* new sp.: Ideally during Taramea flowering, or if not practical, late October-March
- *P. otagoense*: December-March.

Operational timing requirements:

- Release site surveys should be completed a minimum two weeks prior to salvage and relocation
- Salvage and relocation should be completed prior to any disturbance and vegetation clearance (may occur in stages)
- A minimum of 8 nights of trapping is required for *Inophloeus* survey and salvage work completed in areas scheduled for disturbance.

Environmental requirements: Salvage and relocation must be conducted under the following favourable weather conditions:

- Temperature range: 10-25°C
- Wind speeds: Maximum 25km/h for short-horned grasshopper salvage
- No precipitation, ground frost, fog, or heavy dew that restricts visibility.

3.3.4. Personnel requirements

Salvage and relocation will be supervised by the Technical Lead (Entomology) and undertaken by trained invertebrate ecologists or entomologists with the required field collection skills (e.g. sweep netting) to ensure correct species id and handling.

3.3.5. Salvaging Protocol

- For both target species, the following work must be done in suitable habitat areas identified during the pre-clearance assessment: A minimum of 2 manual hours per hectare in suitable habitat with at least 100% coverage
- A minimum of eight nights live pitfall trapping at a rate of 25 traps per hectare, with daily checking, targeting habitat for both target species.

The following subsections detail specific requirements for *Inophloeus* new sp. (weevil) and the *Phaulacridium otagoense* (Short-horned grasshopper).

***Inophloeus* new sp. (Weevil)**

Inophloeus new sp. collection will use both manual searching and live pitfall trapping to maximise capture while minimising specimen distress.

Live pitfall traps: will be placed in suitable Taramea habitat for a minimum of eight nights at a rate of 25+ traps per hectare. Traps will be checked daily to minimise species stress and placed near suitable microhabitats. Pitfall work will generally follow DOC invertebrate pitfall trapping protocols (Sherley & Stringer, 2016). Traps will have drainage holes to prevent drowning of captured invertebrates.

Manual Searching: Field workers will carefully examine Taramea plants during peak activity periods, such as flowering, to manually collect using tongs/gloves for protection from plant spikes. If practical, the flowering spike may be cut off the plant and directly transported with the insect(s) instead of displacing the individuals off the plant.

Searches will be done during peak activity (10:00 AM - 4:00 PM) when individuals are most active and visible. Non-target species will be immediately released.

***Phaulacridium otagoense* (Short-horned Grasshopper)**

Live pitfall traps will be placed in suitable microhabitats for a minimum of eight nights at a rate of 25+ traps per hectare. Traps will be checked daily to minimise individual stress.

Manual Searching: Field workers will systematically search suitable habitat areas, focusing on sunny, sheltered microsites where grasshoppers bask during warm periods.

Searches will be done during peak activity (10:00 AM - 4:00 PM) when individuals are most active and visible. Searches should use slow, deliberate movements with sweep-netting as the most effective manual collection method. Non-target species will be immediately released.

3.3.6. Invertebrate relocation protocol

This section provides detail on the methods that will be used for target invertebrate transfer and relocation.

Handling and release protocol

Transport and release of individuals must occur within 24 hours of collection, adhering to the following minimum container requirements:

- **Capacity limits:** Maximum 10 weevils or 5 grasshoppers per ventilated container

- **Humidity:** Damp paper towel for moisture control
- **Substrate:** Small amount of fresh material (Taramea or grasses) for shelter
- **Temperature:** Keep cool (<25 degrees) during storage and transport
- **Handling:** Minimise movement and jostling of containers.

Individual handling during release will be minimised, and salvage will occur during favourable weather conditions unless exceptional circumstances arise (e.g., in unexpected poor weather where higher survivability risk occurs if individuals remain in transport containers).

Invertebrate relocation site

The Technical Lead (Entomology) will identify suitable release sites at least two weeks before starting salvage and relocation operations. Release sites must meet the following habitat matching criteria:

- Be located outside the directly disturbed footprint (DDF) to ensure long-term viability
- Have similar habitat characteristics to capture sites including aspect, elevation, and exposure
- Have vegetation type and structure similar to capture sites
- Have soil characteristics and drainage patterns similar to capture sites.

Release site requirements for each species will be evaluated during site selection:

- ***Inophloeus new sp.***
 - Presence of established Taramea plants for immediate host availability
 - Elevation above 800m
- ***Phaulacridium otagoense* (Short-horned Grasshopper)**
 - Must provide suitable shelter such as rocks or dense vegetation for refuge in cold temperatures.

Additional site considerations include:

- Fenced sanctuaries are preferred if fence construction is completed and current habitat is deemed acceptable
- Number of individuals per release site considered to prevent overcrowding

3.3.7. Data collection

Detailed and accurate recording is essential for determining relocation success. As a minimum, the following attributes must be recorded for salvage operations:

- **Personnel:** Staff details, competency and roles
- **Species data:** Species identification and number of individuals salvaged
- **Timing:** Date and time of salvage and release
- **Location:** GPS coordinates of salvage and release sites
- **Habitat:** Descriptions of salvage habitat including substrate and vegetation characteristics
- **Weather:** Conditions including temperature, wind, and cloud cover
- **Photography:** Photographs of Habitat and records of each species relocated
- **Mortality:** Description and number of individuals that did not survive transport.

3.4. Host Plant Salvage and Relocation

3.4.1. Objective

Target native vegetation with known relationships to conservation (priority TIMP species) will be translocated from the DDF to nearby areas, outside the disturbance zone (as described in the LERMP). This approach aims to move both plants and threatened or at risk insects (adults or larvae) at the same time while also improving the habitat in the surrounding landscape

Given this technique is experimental, successful outcomes can't be guaranteed, and survival rates for both transplanted vegetation and invertebrates is unknown. Success will depend on a number of variables including:

- plant establishment,
- invertebrate survival during relocation,
- habitat suitability at recipient sites, and
- the species' ability to adapt to new environments.

3.4.2. Target Plant Species

Table 3 outlines native plants that have specific host-plant relationships with the invertebrate species covered in this plan. These host plants are included in the relocation programme of the LERMP.

Table 3: List of host plants targeted for relocation and their associated high-risk terrestrial invertebrate species

Target Host Plant Species	Associated Terrestrial Invertebrate Species
Taramea (<i>Aciphylla aurea</i>)	<i>Inophloeus new sp.</i> (Weevil)
Fescue tussock (<i>Festuca novae-zelandiae</i>)	<i>Ichneutica toroneura</i> (Moth)

Target Host Plant Species	Associated Terrestrial Invertebrate Species
Silver tussock (<i>Poa cita</i>)	<i>Ichneutica toroneura</i> (Moth) <i>Elachista helonoma</i> (Moth) <i>Ichneutica toroneura</i> (Moth)
Native broom (<i>Carmichaelia</i> spp.)	<i>Scythris</i> (Moth)
Olearia (<i>Olearia bullata</i>)	<i>Pasiphila</i> sp. 'Olearia' (Moth) <i>Meterana exquisite</i> (Exquisite owlet moth)
Olearia (<i>Olearia odorata</i>)	<i>Pseudoceramia cineracia</i> (Moth) <i>Pasiphila</i> sp. 'Olearia' (Moth) <i>Meterana exquisite</i> (Exquisite owlet moth)

3.4.3. Implementation

Salvage and relocation will be completed as described in the LERMP, with timing optimised to work best for both invertebrate activity (summer) and plant survival (winter). Branch transfer techniques will be used where insects can naturally move from trimmed olearia branches to established host plants, allowing root stock relocation during optimal plant survival periods.

Site selection will focus first on targeted terrestrial invertebrates, enhancing areas where populations of notable species are present that may benefit. The following added requirements for plant relocations outside of the LERMP and under this TIMP include:

- *Carmichaelia* plants (foliage only) will be relocated onto the same species outside of the DDF, with some of these planted near the Bendigo Sanctuary in areas that will not be disturbed during construction
- Silver and fescue tussock will be relocated within 100m of areas where *Ichneutica toroneura* and *Elachista helonoma* have been previously recorded
- Each release site for *Inophloeus new sp.* will require an extra 10 plants, if practical, while considering the total number of relocated plants
- Relocate small Olearia, if assessment indicates they are likely to survive.

Plants may also be moved into the Bendigo Sanctuary and Ardgour Sanctuary areas to support conservation efforts in those areas. However, plants should not be planted near perimeters or entrances where they might be damaged during fence building or maintenance. If planned relocations are not possible for any key species, substitute plants will be planted from nursery stock

3.4.4. Carmichaelia Plant Handling

For *Carmichaelia* plants, we know that successful relocation is not possible currently.. Plants will be inspected for *Scythris* larvae (reflective shine on branches at night) and

pupae (distinctive white webs). Check each plant, or at least 80% of them if checking every single one isn't possible. The plants will be physically tagged and their GPS coordinates documented for future relocation before vegetation clearing begins. During removal, the foliage will be cut and attached to corresponding *Carmichaelia* species within the rehabilitation, restoration, or sanctuary sites.

3.4.5. Pre-Relocation Invertebrate Survey Requirements

Pre-salvage invertebrate surveys will be done on donor plants and recipient sites using Section 6.2 methods. Recipient site surveys will determine existing occupancy. Unoccupied sites are assessed for habitat suitability, while occupied sites are assessed before relocation. Surveys provide baseline data for success monitoring.

3.5. Disturbance Minimisation

The following measures minimise ongoing disturbance to terrestrial invertebrate populations over the life of the mining project by reducing disturbance to habitats.

These measures are carried out under associated management plans and are summarised in the subsections below.

3.5.1. Artificial Light At Night (ALAN) Management

ALAN management at BOGP is tailored to work areas based on illumination needs and environmental sensitivity, where feasible. Computer modelling determines optimal light position and specs for exterior areas. The management approach uses spectral management (controlling colours), directional control, and flexible timing.

Lighting management protocols are tailored to specific work areas as follows:

- **Fixed Lighting - Camp and Office Areas:**
 - Low-output, warm-coloured LED lighting at 3,000K
 - Discrete building-mounted lighting with bollard support to limit horizontal and vertical light spill
 - Automated timing controls, dimming functions, and movement sensors to reduce unnecessary luminance.
- **Fixed Lighting - Plant and Infrastructure Areas:**
 - Horizontal and upward lighting fixture controls to contain light spill where feasible.
- **Mobile Wide Area Lighting - Plant, Infrastructure, Access Roads, and Mining Areas:**
 - Mobile rigs customised or retrofitted with manually controlled light fittings

- Guidelines for placement to minimise light spill into sensitive habitats.

3.5.2. Vegetation Damage Protection

Protection measures for fragile invertebrate ecosystems aims to reduce impacts from public access and vehicles like 4x4s and motorbikes. Target ecosystems include cushionfields and short tussock grasslands next to the new Ardgour Rise public access road, with mitigations outlined in the ARAMP and LERMP.

3.5.3. Host Plant Protection and Enhancement

The protection and enhancement of host plant communities forms a critical foundation for the protection of terrestrial invertebrates. The specific feeding relationship between invertebrates and their host plants means habitat quality is directly dependent on vegetation health and availability.

Protection measures focus on keeping and growing the important plants that priority invertebrates need to survive, including:

- Taramea herbfields essential for *Inophloeus* new sp.,
- Native tussocklands supporting leaf-mining moths,
- Shrublands hosting *Olearia* and *Carmichaelia* dependent species, and
- Cushionfields providing open habitats for specialised species.

4. POST-MINING SALVAGE AND RELOCATION (*PHAULACRIDIMUM OTAGOENSE*)

Phaulacridium otagoense (Short-horned grasshopper) will be relocated back to rehabilitated areas post-mining to maintain genetic diversity and ensure the insects remain in its original location. This requires enough insects to survive on their own or breeding them in captivity if there aren't enough.

A comprehensive plan will be created within a year prior to mine rehabilitation starting under the LERMP. The plan will be implemented no later than two years from the start of rehabilitation, provided appropriate habitat has been re-established. Care must be taken to not harm grasshoppers during this program, with implementation following an adaptive management approach. Programs should use current research on similar species relocations and resources such as the IUCN Guidelines for Reintroductions and Other Conservation Translocations (IUCN/SSC 2013).

5. CAPTIVE-BREEDING STUDY FOR SPOROPHYLA OENOSPORA

This experimental approach would assist in enabling protection for the nationally critical *Sporophyla oenospora*, aiming to help the population recover through a controlled breeding program. There is no clear negative effect on the species from mining and ancillary activities, as the disturbance areas have been adjusted from the current known recorded location. However, we cannot be certain that *S. oenospora* is not present within the DDF boundaries as the preferred habitat and specific host-plant relationship is unknown. As such, Matakanui Gold Ltd is proceeding with the programme as a precautionary measure to minimise potential risk of *S. oenospora* within the DDF. At such a time as a specific habitat and host-plant relationship is confirmed, there may be more certainty whether the species could be within the boundary.

Given the extreme rarity of this species, implementing the breeding study is dependent on finding enough individuals to start a captive programme. The programme will require a thorough understanding of the species life history traits, identification of the host plant and the ability to propagate host plants.

This activity sits outside the formal impact management programme and has been included as an applied research component.

5.1. Programme Phasing and Methodology

The programme involves several phases including:

- Survey phase:
 - Field detection surveys to locate and detect species presence
 - Field research to understand life history traits and behaviours
 - Field research to determine host plant
- Identification of host plant
- Host plant propagation trials
- Captive rearing and breeding trials.

Initial detection of *Sporophyla oenospora* happened during terrestrial invertebrate surveys in Nov 2024. Follow-up field detection surveys were done in March 2025 and although no evidence of the species was found at that time, the program is expected to continue in summer 2025-26 and beyond.

Field detection protocols may be modified through adaptive management at the discretion of the Technical Lead (Entomology).

5.2. Detection Response Requirements

If individuals are recorded, develop a detailed plan within three months, and include details for:

- **Host plant cultivation:** start immediately upon identification as this is essential for conservation success. Breeding in captivity depends on the availability of appropriate host plants.
- **Rearing methodology:** the Technical Lead (Entomology) will develop hand-rearing protocols based on field observations of:
 - life stages
 - host plant associations
 - insect behaviours from manual searches.
- **Protocol requirements** include:
 - appropriate environmental conditions
 - nutrition
 - disease prevention
 - stage-specific handling techniques from egg to adult emergence.

5.3. Programme Success and Adaptive Management

Given this program is experimental and we have limited species knowledge, adaptive management will be essential for success. Protocol refinements will be based on observations and expert consultation when challenges arise.

Adaptive management will guide processes, timelines, and requirements, determining when new phases begin. Program outcomes may inform alternative protection methods based on research findings.

All observations and findings will be documented regardless of outcomes for each programme stage. This information will contribute to scientific knowledge of this poorly understood species.

6. MONITORING SALVAGE AND RELOCATION SUCCESS

This section describes the work required to ensure quality monitoring, including the protocols where pre-operation monitoring is required (i.e. assessments of species presence in release sites).

6.1. Invertebrate Salvage and Relocation Monitoring

Long-term survival of salvaged and relocated individuals will be difficult to determine. However, relative abundance data can be obtained through pre- and post-relocation comparisons in target areas. This requires pre-release assessments followed by annual assessments during optimal seasons over a five-year period to document long-term establishment.

Using the same standardised procedures every time will allow us to compare results over time. While evidence shows weevil and grasshopper re-locations are generally successful, this experimental process may require adjustments to the monitoring method. All monitoring should maintain the ability to compare results over time through the following systematic approach.

6.1.1. Baseline Survey: Invertebrate Relocation Sites

This assessment establishes baseline numbers of target species at suitable release sites identified in Section 3.3. Baseline relative abundance data will improve accuracy of long-term trend analysis and will be collected through both Standard and Supplementary surveys.

The baseline survey will use the following standard survey protocol

- 25 pitfall traps per hectare operated for a minimum of 8 nights with daily checks
- Relative abundance measures (total individuals/trap)
- Behavioural observations during survey periods.

During *Taramea* flowering seasons, plant density counts will supplement baseline measures when pitfall traps yield limited data. If live-pitfall traps prove unsuitable for *Phaulacridium otagoense*, sweep netting transects will be used, with results recorded as catch per unit effort (CPUE) for comparative analysis.

6.1.2. Long Term Monitoring: Invertebrate Salvage and Relocation

Long-term monitoring will be done for three seasons over five years post relocation, with two standard types of assessments done annually. Consistent methods must be used between monitoring events, unless under exceptional circumstances.

These surveys will assess the presence and relative abundance of relocated species, to determine the success of salvage and relocation. This monitoring programme operates independently of the BOMP monitoring programme.

The following monitoring methods will be used:

- **Annual pitfall traps:** locations from the pre-release assessment will be maintained for the five-year monitoring period, with traps operating eight nights annually during optimal activity periods.
- **Annual manual searches:** using systematic sampling to provide an estimate of density or catch per unit effort (CPUE) measurements of both target species, specifically:
 - Visual manual searches of Taramea plant leaves, flowers, base and the surrounding ground for *Inophloeus* new sp. (Weevil)
 - Sweep netting transects for *Phaulacridium otagoense* (Short-horned Grasshopper) in relocated areas
 - Observations of behaviour and habitat preferences during searches, including examination of Taramea leaves for damage, feeding scars, and herbivore indicators for *Inophloeus* new sp.

The outcomes of these surveys will then be collated and presented in the reporting described in section 8.

6.2. Host Plants Salvage and Relocation Monitoring

The monitoring program for invertebrates on relocated host plants will use a before-and-after methodology. Starting with pre-relocation surveys to establish baseline target species numbers on existing host plants, followed by monitoring at specific intervals - within eight weeks post transfer, one year post transfer, and annually thereafter for a further four years. This monitoring will assess colonisation success on relocated plants. While surveys target priority species, detailed records of all species found will help identify other vulnerable species or new species within this TIMP.

6.2.1. Assessment of Invertebrates on Host Plants

Night surveys for tussocks, Olearia and Carmichaelia

The following method applies to:

- pre-salvage host plant assessment,
- pre-salvage recipient area assessment, and
- long-term monitoring

The standardised method includes the following activities:

- Night-time light trapping using UV lights with standard best practice (minimum 3 hours per 4 hectares of potential habitat)
- Spotlighting searches for *Carmichaelia* larvae
- Target 80% coverage of key habitat in large relocation areas
- Identify all specimens or record sufficient detail to id later.

All assessments must be described as a catch per unit effort (CPUE) measurement to allow for comparisons over time.

***Taramea* surveys**

The presence or absence of *Inophloeus new sp.* during salvage operations will be recorded for each area, with the assumption that adult presence indicates likely larval presence. Recipient site surveys and long-term monitoring will require density per unit area measurements with minimum effort of 1 person-hour per hectare.

6.2.2. Baseline Survey: Host Plant Relocation Sites

Pre-salvage assessments of recipient areas are required to determine baseline species numbers before any relocation proceeds. These assessments clearly measure if the program is working and will only happen if target species were recorded on the original host plant. The same methods will be used as described in section 6.2.1 above.

6.2.3. Long-Term Monitoring: Host Plant Relocation

Long-term monitoring will be performed for three seasons spread over five years post relocation to determine success. This monitoring programme operates independently of the BOMP monitoring programme.

Taramea surveys aim to assess the presence of invertebrates on the relocated plants over time. Monitoring protocols are designed to capture both immediate relocation impacts and longer-term colonisation patterns through:

- Immediate assessment (within 8-weeks post-relocation) using species-specific methods (described in section 6.2.1)
- Annual monitoring performed for three seasons spread over 5 years, including:
 - standardised survey techniques (described in section 6.2.1) with baseline comparisons to evaluate recolonisation
 - an assessment of feeding damage, larval presence, and reproductive success
 - vegetation survival rates and habitat availability.

Consistent methods must be used between monitoring events, unless under exceptional circumstances.

Success indicators

Relocation of invertebrates through movement of their host plants is experimental, success is indicated by the following:

- Plant survival rates as measured by the process in the LERMP
- Detection of target invertebrates on $\geq 40\%$ of the relocated species, if they were known to host the species prior to relocation.

Detection of species may include feeding damage, larval presence and reproductive success if applicable.

The outcomes of these surveys will be written in reports as described in section 8.

7. IMPLEMENTATION TIMELINE AND SEQUENCING

The TIMP performs across the entire project lifecycle, with conservation measures tailored to each phase's specific requirements and opportunities. Implementation follows a structured timeline, ensuring critical protective measures are established before disturbance begins. Active management is maintained throughout operations, and transitions to long-term stewardship during closure. This phased approach maximises conservation efficacy by aligning management approach with project impacts, while building towards sustainable long-term outcomes.

- **Pre-Construction Phase (Year 1):** All pre-clearance surveys will be completed, host plant propagation started, initial rock stack installed in representative areas, and lighting management protocol implemented.
- **Construction Phase (Years 1-3):** Ongoing species relocation will proceed with clearance activities, supported by habitat relocation programmes, continued monitoring and adaptive management. Annual reporting with protocol refinement.
- **Operations Phase (Years 4-15):** Long-term monitoring programmes will be maintained alongside habitat management and maintenance, scientific research continuation, and adaptive management implementation.
- **Closure Phase (Years 16-20):** Rehabilitation completion will be accompanied by long-term monitoring transition, knowledge transfer and documentation, and final conservation outcome assessment.

8. COMPLIANCE MONITORING AND REPORTING

Compliance reports described in this section will be submitted to Council.

8.1. Regulatory Compliance Requirements

The TIMP operates within a comprehensive regulatory framework requiring strict adherence to legal requirements and consent conditions for compliance and environmental protection. Compliance demonstrates Matakanui Gold's commitment to responsible environmental stewardship while providing regulatory certainty through systematic implementation of approved conservation measures. The framework covers legal obligations and specific consent conditions, with robust documentation and reporting ensuring transparency and accountability:

- **Legal compliance:** full implementation of TIMP measures, supported by regular monitoring and reporting integrated with broader environmental management systems.
- **Consent requirements:** specific adherence to invertebrate-related consent conditions through comprehensive documentation of management actions, prompt non-compliance reporting, and immediate corrective action.

8.2. Annual invertebrate compliance monitoring report

The annual invertebrate monitoring report will sit within the overarching BOGP Annual Ecological Monitoring Report and shall include:

Salvage and relocation operations

- Confirmation that invertebrate effects management protocols were followed in accordance with the TIMP and associated consent conditions, including:
 - A description of the methods and results relating to salvage operations
 - Maps illustrating where management measures were undertaken
- Description and justification of relocation site selection for salvaged invertebrates
- Progress results from baseline assessments and ongoing surveys carried out under the TIMP, displayed in an informative format, including:
 - Baseline and ongoing surveys of invertebrate release sites
 - Assessment of target invertebrate presence on host plants for salvage
 - Baseline and ongoing surveys of host plant release sites
- Recommendations for potential changes to improve the efficacy of invertebrate management in relation to the TIMP scope

- Photographs showing evidence of effects management measures being undertaken including documentation of:
 - Salvaged and relocated invertebrates
 - Salvaged and relocated host plants, and associated invertebrates if possible
 - Relocation and release sites.

Annual reporting of salvage operations via the TIMP will cease once invertebrate salvage is complete and the three seasons spread over five years of post-relocation monitoring has been carried out. The final invertebrate compliance monitoring report shall include a collation of information over time.

Ongoing research and relocation components

Annual reporting of ongoing operations under the TIMP will continue for the duration of each respective programme, and will include when applicable:

- Descriptions, outcomes and recommendations from the *Phaulacridium otagoense* post-mining relocation programme
- Descriptions, outcomes and recommendations from the *Sporophylla oenospora* captive breeding study.

8.3. Interim or Incident Reports

Time-sensitive developments may require immediate communication and consultation to protect vulnerable species. Interim reporting covering changes to management, notable species discovery or responses to incidents may be required.

9. REVIEWS AND PROCEDURE UPDATES

This TIMP operates as a living document that evolves in response to new scientific knowledge, changing environmental conditions, and operational experience gained through implementation.

9.1. Reviews

Regular review processes ensure conservation measures remain effective, scientifically current, and compliant while maintaining stakeholder confidence. The framework includes:

- **Annual performance review:** Comprehensive evaluation of management effectiveness with performance benchmarking, adaptive recommendations, and protocol refinements including current scientific understanding.
- **Major review triggers:** Comprehensive reviews initiated by conservation status changes, scientific breakthroughs, regulatory updates, or operational modifications affecting management delivery.

9.2. Updates to Protocols and Procedures

Effective implementation of the TIMP requires systematic procedures for incorporating updates and modifications, ensuring that changes are technically sound, stakeholder-supported, and legally compliant before implementation. These include:

- Stakeholder consultation for significant changes ensures that proposed modifications align with community expectations and incorporate diverse perspectives that may identify challenges or opportunities not apparent to technical specialists.
- Expert review of proposed modifications provides independent scientific validation of management approaches, ensuring that protocol changes are based on current best practice and peer-reviewed evidence rather than untested assumptions.
- Regulatory approval for major updates where legal compliance may be in question.
- Staff training on updated procedures to ensure implementation consistency and to minimise risks to conservation outcomes through inadequate understanding of protocol changes.

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