MATAKANUI

GOLD LIMITED

Bendigo-Ophir Gold Project Terrestrial Invertebrate Management Plan

~~October 2025~~~~May~~June 2026

Citation: Habitat NZ Ltd. (2026~~5~~). Bendigo-Ophir Gold Project: Terrestrial Invertebrate Management Plan. Habitat NZ Ltd., Auckland.

DOCUMENT CONTROL

Revision	Authors	Organisation	Date	Approved by
V1	K. Barber, A. Walsh, Y. Singh, T. Barber	Habitat NZ Ltd.	25/07/2025	
V2	K. Barber, A. Walsh, M. Zwaagman	Habitat NZ Ltd.	31/07/2025	
V3	K. Barber, A. Walsh	Habitat NZ Ltd.	04/09/2025	
V4	K. Barber, A. Walsh	Habitat NZ Ltd.	16/10/2025	
V5	K. Barber, J. McTaggart	Habitat NZ Ltd.	16/06/2026	
V6	K. Barber, J. McTaggart, M.Zwaagman	Habitat NZ Ltd.	22/06/26	

Disclaimer

This report has been prepared by Habitat NZ Ltd. for Matakanui Gold Limited for the Bendigo-Ophir Gold Project. If used by other parties and/or used in any other context or for any other purposes, no warranty or representation is given as to its accuracy, and no liability is accepted for loss or damage arising directly or indirectly from reliance on the information in it.

The author of this report acknowledges that this report will be relied on by a Panel appointed under the Fast Track Approvals Act 2024 and these disclaimers do not prevent that reliance.

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 2024~~5~~
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~~ operation of the gold project. The plan includes specific management actions, clear success criteria, and adaptive responses if monitoring shows objectives are not being met.

1.3. Relationship to the BOGP Management Plan Suite

The TIMP sets out how adverse effects on terrestrial invertebrates will be avoided, minimised, and compensated for during construction and operation of the BOGP. It is a standalone document - field crews, contractors, and compliance monitors do not need to refer to other plans to implement or verify works under the TIMP.

The TIMP does not set landscape-scale restoration outcomes - those are established in the ARAMP and LERMP. What the TIMP does is ensure that invertebrate values are protected during the transition from existing habitat to restored or rehabilitated habitat, and that individual species at greatest risk receive targeted management where it is practical. The long-term ecological conditions that invertebrate communities depend on - pest-free sanctuary areas, native vegetation recovery, reduced predation pressure - are delivered through other plans in the suite. The TIMP works within that broader framework, focused on the period and activities where direct harm to invertebrates is most likely.

The relationship between this plan and others in the suite is summarised below:

- ARAMP and LERMP establish restoration targets and manage the rehabilitation of disturbed areas. Host plant salvage and relocation under the TIMP is coordinated with and largely guided by the LERMP. Where the TIMP identifies additional plant relocation requirements beyond those in the LERMP, those requirements take precedence for TIMP target species.
- BOMP monitors whether ecological outcomes are being achieved at the site level, including community-level invertebrate recovery across elevational gradients. Salvage and relocation monitoring under the TIMP is separate from

this - it focuses on whether specific targeted interventions have worked, not on broad community outcomes.

- BPPMP manages plant pests across the site. Pest plant control operations must be conducted in a manner consistent with this TIMP, particularly in areas of high invertebrate habitat value. Where pest plant control methods conflict with invertebrate management requirements - for example, host plant species that are also managed as pest hosts - resolution occurs through the AOP planning process in consultation with the Technical Lead (Entomology) and Technical Lead (Biosecurity).
- MPMP manages mammalian pests, which is a critical enabling condition for invertebrate recovery, particularly within sanctuary areas. Mammalian pest control is governed independently but supports the same outcomes this TIMP is working toward.
- MSMP governs land within the Matakanui Sanctuary. The sanctuary provides the landscape-scale pest-free conditions that underpin long-term invertebrate recovery. The TIMP operates outside the sanctuary boundary, though its salvage and relocation outcomes depend in part on the ecological conditions the sanctuary delivers.
- LMP sets management requirements for lizards, which share habitat with many of the invertebrate species covered in this plan. Where pre-clearance assessments, salvage, or relocation activities overlap with lizard management requirements, coordination occurs between the Technical Lead (Entomology) and Technical Lead (Herpetology).
-

1.4. Effects Context and Management Outlook

This plan focuses on two main objectives: to actively improve the ecological conditions and long-term trajectory of invertebrate communities outside the DDF, and to recover individuals from areas scheduled for disturbance before they are lost, where opportunities allow. It does not claim that habitat losses within the DDF can be fully offset on a like-for-like basis - that would not be credible given the nature of the effects and the current state of invertebrate conservation knowledge in New Zealand.

Programmes described in this management plan represent an opportunity to generate a conservation gain from a committed loss. If they fail, the outcome is no worse than not attempting them; if they succeed, even partially, they deliver a gain that would not otherwise have occurred.

Expected outcomes for individual species are described as uncertain throughout this plan. This uncertainty is acknowledged openly. For most species, there is insufficient

evidence to predict population-level outcomes in advance of management. This is a constraint shared across all invertebrate conservation work in New Zealand.

What the compensation package delivers in return for habitat loss is a genuine improvement in ecological condition,- primarily through the predator-proof sanctuaries at Bendigo and Ardgour, 35 years of active pest and weed management, and large-scale habitat rehabilitation under the LERMP and ARAMP. These deliver ecological conditions that do not currently exist anywhere in the surrounding landscape.

1.5. Roles and Responsibilities

Matakanui Gold Ltd will establish a governance structure to ensure oversight and long-term management of the terrestrial invertebrate communities affected by the BOGP. A dedicated Environmental Manager position will provide day-to-day operational leadership and implementation of this Terrestrial Invertebrate Management Plan.

Matakanui Gold Ltd will maintain ultimate responsibility for the project while delegating operational authority to the Environmental Manager. This governance approach balances professional management with expert guidance, ensuring both practical implementation and technical excellence in achieving the project's conservation objectives.

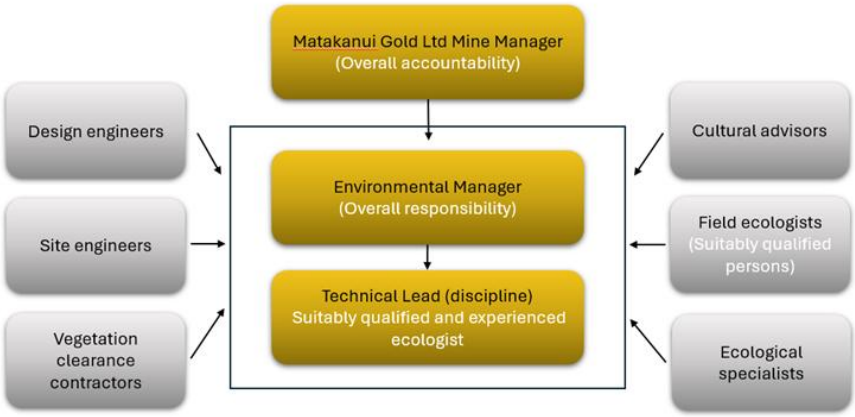

Figure 1. Management structure for the implantation of this TIMP.

1.6. Resource Consent Conditions for TIMP

The project resource consent conditions set out the requirements for the content of this TIMP. The table below identifies the key resource consent conditions relevant to TIMP and identify where they are addressed in this document.

[Placeholder: Additional conditions relating to the application of mātauranga Māori and exercise of kaitiakitanga.]

Table 1 Draft resource consent conditions relevant to the TIMP. ~~[PLACEHOLDER]~~

Condition number	Condition text	Relevant TIMP Section
C60	The consent holder must implement the Terrestrial Invertebrate Management Plan (TIMP) certified as part of the approval of the BOGP pursuant to Section 81 of the Fast-track Approvals Act 2024 (or as amended in accordance with relevant conditions), and which forms part of the consents. The objective of the TIMP is to avoid or minimise adverse effects arising from the BOGP on indigenous terrestrial invertebrates. The TIMP will describe management of terrestrial indigenous biodiversity, focusing on notable invertebrate species which are: a. Protected under the Wildlife Act; b. Threatened or At-Risk, having been assessed under the New Zealand Threat Classification System; or c. Species that represent high conservation importance.	All
C61	To achieve the objective set out in Condition C60 above, the TIMP must include, as a minimum: a. Measures to be taken by the Consent Holder prior to and during habitat clearance to avoid or minimise effects on terrestrial invertebrates, including: i) Pre-clearance surveys and measures; ii) Salvage and relocation protocols for *Inophloeus new sp.* and *Phaulacridium otagoense* and targeted host plants, including relocation site(s) selection and habitat	Section 3, Section 4, Section 6

Condition number	Condition text	Relevant TIMP Section
	enhancement measures, and post-mining salvage and relocation; and iii) Disturbance minimisation; b. Requirements for a research and captive breeding study for *Sporophyla oenospora* in accordance with Condition C64 (below); c. An implementation timeline for protocols and measures; and ~~a.~~d. Compliance monitoring and reporting requirements.	
C62	An annual Invertebrate Compliance Monitoring Report must be prepared by the Consent Holder and submitted to the Central Otago District Council every 12 months (as part of the overarching BOGP Annual Ecological Monitoring Report required under Condition C13), and include the following: a. Salvage and relocation operations (until 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 must include a collation of information over time); and Ongoing research and relocation components (when applicable), including descriptions, outcomes and recommendations from the post-mining salvage and relocation of *Phaulacridium otagoense* (under Condition C63 below), and *Sporophyla oenospora* captive breeding study (required under Condition C64 below).	Section 7
	Pre-clearance surveys – Terrestrial invertebrates	
C63	Pre-clearance terrestrial invertebrate habitat assessment surveys must be undertaken by a suitably qualified and experienced entomologist as follows:	Section 3.2, Section 3.3.2-3.3.5, Table 4

Condition number	Condition text	Relevant TIMP Section
	a. A minimum of 2 weeks prior to any site disturbance (including site disturbance caused by lizard salvage works); b. With a survey area that must extend 50m beyond the planned disturbance footprint; and c. With approximately 1 hour of survey effort per hectare of land (except for less complex habitat e.g. bare ground). 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: d. Suitable habitat and designated areas for terrestrial invertebrate salvage and relocation targeting: i) *Inophloeus new sp.*; and ii) *Phaulacridium otagoense*. e. Areas of host plants of key species scheduled for relocation under the Landscape and Ecological Rehabilitation Management Plan (refer Condition C13), including: i) *Taramea (Aciphylla aurea);* ii) *Fescue tussock (Festuca novae-zelandiae);* iii) *Silver tussock (Poa cita);* iv) *Native broom (Carmichaelia spp.) (removing foliage, not live plants)*; and v) *Olearia (Olearia odorata and Olearia bullata).*	

Condition number	Condition text	Relevant TIMP Section
	f. Areas where pre-salvage surveys are required to establish baseline invertebrate numbers on existing host plants, prior to plant relocation. All surveys must be documented and made available to the Central Otago District Council upon request.	
	Captive-breeding study for *Sporophyla oenospora*	
C64	If individuals are detected, the Consent Holder must undertake a captive-breeding research study for *Sporophyla oenospora* in accordance with the certified TIMP. The research study is to include: a. A survey phase to locate and detect the species, and conduct field research to understand life history traits and behaviours; b. Identification of the host plant(s); c. Host plant propagation trials (subject to availability of host plant); d. Captive rearing and breeding trials; e. Documenting all stages regardless of outcomes; and f. Adaptive management for the programme's success.	Section 4
	Salvaging of target terrestrial invertebrate species and host plants	
C65	Invertebrate salvage of *Inophloeus new sp* and *P. otagoense* must be undertaken within the Project Site where suitable habitat exists for each target species. Live invertebrate salvage must coincide with peak terrestrial invertebrate activity (October-March inclusive) and where practicable undertake salvaging within the following optimal species-specific windows:	Section 3.3

Condition number	Condition text	Relevant TIMP Section
	a. *Inophloeus new sp.*: Ideally during Taramea flowering, or if not practical, late October-March inclusive; and b. *P. otagoense*: December-March inclusive. A suitably experienced and qualified person is to identify and survey suitable release sites at least two weeks before starting salvage and relocation operations. Release sites must be located outside the DDF.	
C66	The Consent Holder must undertake post-mining salvage and relocation of *P. otagoense* back to rehabilitated areas within the DDF. The Consent Holder is to prepare a post-mining salvage and relocation plan 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.	Section 3.5
C67	The Consent Holder must undertake a programme to translocate target native vegetation with known relationships to conservation (e.g. the target species in Condition C63 [pre-clearance survey condition above] from the DDF to nearby areas outside the DDF, as described in the LERMP. The following added requirements for plant relocations outside of the LERMP and under the TIMP include: a. *Carmichaelia* plants (foliage only) to be relocated within the same species outside of the DDF, including near the Bendigo Sanctuary in areas that will not be disturbed during construction;	Section 3.4

Condition number	Condition text	Relevant TIMP Section
	b. Silver and fescue tussock with at least 90% of the root zone (to be relocated within 100m of areas where *Ichneutica toroneura* and *Elachista helonoma* have been previously recorded) during months tussock survival is most likely; c. Each release site for *Inophloeus new sp.* will require an extra 10 plants, if practical, while considering the total number of relocated plants and can be supplemented with nursery grown tussock; and d. Relocate small *Olearia*, if trials indicate more than 30% survival.	
C68	The Consent Holder will undertake long-term monitoring and annual reporting of relocated terrestrial invertebrates for three seasons over five years post-relocation, with two standard types of assessments (as described in the certified TIMP) undertaken annually, to assess the presence and relative abundance of relocated species, to determine the success of salvage and relocation. The results must be provided in an annual invertebrate monitoring report, which will form part of the BOGP Annual Ecological Monitoring Report required under Condition C12). The annual report must include: *Salvage and relocation operations:* a. Confirmation that management protocols were followed in accordance with the TIMP and these consent conditions, including: i) A description of the methods and results relating to salvage operations;	Section 5, Section 7.2

Condition number	Condition text	Relevant TIMP Section
	ii) Maps illustrating where management measures were undertaken b. Description and justification of relocation site selection for salvaged invertebrates; c. Progress results from baseline assessments and ongoing surveys carried out under the TIMP, displayed in an informative format, including: iii) Baseline and ongoing surveys of invertebrate release sites; iv) Assessment of target invertebrate presence on host plants for salvage; v) Baseline and ongoing surveys of host plant release sites; d. Recommendations for any potential changes to improve the efficacy of invertebrate management in relation to the TIMP scope; e. Photographs showing evidence of effects management measures being undertaken including documentation of: vi) Salvaged and relocated invertebrates; vii) Salvaged and relocated host plants, and associated invertebrates if possible; and viii) Relocation and release sites. *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:	

Condition number	Condition text	Relevant TIMP Section
	f. Descriptions, outcomes and recommendations from the *Phaulacridium otagoense* post-mining relocation programme; and g. Descriptions, outcomes and recommendations from the *Sporophyla oenospora* captive breeding study. The final Invertebrate Compliance Monitoring Report must include a collation of information over time.	

2. OVERVIEW OF EFFECTS ON TERRESTRIAL INVERTEBRATES AND EFFECTS MANAGEMENT

2.1. Terrestrial ~~i~~invertebrate V~~v~~alues

At least ~~222~~ 217 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 2 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 2: Terrestrial invertebrate species in the BOGP site prioritised for management including the New Zealand Threat Classification System (NZTCS) threat category. ~~An asterix (*) represents a revised NZTCS threat category for NZ lepidoptera currently undergoing review.~~

Threat status	Sub status	Species name	Type of Invertebrate
Threatened	Nationally Critical	*Sporophyla oenospora*	Moth
	Nationally Endangered~~*~~	*Homodotis sp. A (NZAC-CO)*	Moth

Threat status	Sub status	Species name	Type of Invertebrate
	Nationally Vulnerable	*"Pseudocoremia" cineracia*	Moth
	Nationally Vulnerable	*Pasiphila sp. 'Olearia'*	Moth
New Species	Potentially Threatened	*Harpalus new sp.*	Ground beetle
	Potentially Threatened	*Inophloeus new sp.*	Weevil
	Potentially Threatened	*Megadromus new sp.1*	Beetle
	Potentially Threatened	*Megadromus new sp.2*	Beetle
At Risk	Declining	*Phaulacridium otagoense*	Short-horned grasshopper
	Declining*	*Agrotis admirationis*	Moth
	Declining*	*Asaphodes recta*	Moth
	Declining*	*Elachista helonoma*	Moth
	Declining*	*Ichneutica toroneura*	Moth
	Declining*	*Nyctemera annulata*	Magpie moth
	Declining*	*Paranotoreas fulva*	Moth
	Uncommon*	*Ichneutica sistens*	Moth
	Uncommon*	*Meterana exquisita*	Exquisite owlet moth
Not Assessed	Of importance	*Scythris sp.1*	Moth

2.2. Community-level Invertebrate Values and Management

The invertebrates at the BOGP site function as an integrated community, not as a collection of independent species. Invertebrates at Bendigo play an important role in ecosystem function, including pollinating plants, providing food for lizards and birds, influencing how plants compete with each other, and cycling nutrients through the soil. These community-level functions are ecologically significant and independent of the threat status of individual species. Management under this plan therefore operates at both species and community levels.

At the species level, species of conservation interest (Table 1) has targeted management actions, which are described in Sections 3 and 4. At the community level, pest management, habitat protection, and rehabilitation programmes described in Sections 3.4.6 and 1.1 are designed to maintain and gradually improve the ecological conditions that invertebrate communities need to survive and thrive. This includes the availability and structural diversity of native host plants, reduced predation pressure,

and progressive rehabilitation of disturbed areas to native-dominated vegetation. Landscape-scale restoration and pest control will collectively improve conditions for invertebrate communities across the BOGP site, with these benefits potentially amplified within sanctuary areas where more intensive conservation effort is focused.

Community-level outcomes will be tracked through systematic monitoring of invertebrate recolonisation on rehabilitated surfaces, as described in the Biodiversity Outcome Monitoring Programme (BOMP). Monitoring will track the rate, composition, and ecological trajectory of recolonising invertebrate communities over time, including altitudinal variation and distance from intact habitat boundaries. The specific sampling design and methods will be determined through the BOMP process.

It is also proposed that sonogram monitoring be included in the BOMP invertebrate monitoring programme, to explore whether it can offer a cost-effective way of tracking the recovery of invertebrate communities. If successful, it would provide a practical tool for long-term adaptive management of invertebrates across the BOGP rehabilitation areas.

~~2.2.~~2.3. Potential E~~e~~ffects on T~~t~~errestrial ~~i~~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 to all life stages of native invertebrates, including eggs, larvae, pupae, and adults, 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, diminishing the overall integrity of the invertebrate metacommunity at the BOGP site .
- 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.~~2.4. Overview of ~~E~~effects ~~M~~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 following management measures are designed to protect, where possible, the highest-risk invertebrate species, 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 species and newly discovered weevil species.
- Host plant and habitat protection, and habitat ~~-~~enhancement.~~, and relocation programmes.~~
- Experimental invertebrate breeding programmes for at-risk grasshopper species and *Sporophyla oenospora*. ~~-~~

In addition to benefiting entire invertebrate communities, landscape-level habitat management will benefit also target species. This includes:

- Pest exclusion fencing to establish ecosanctuaries
- C~~, and c~~omprehensive mammalian pest management ~~will benefit all target species and other invertebrates~~ within the Sanctuary areas~~s.~~
- Managing Artificial Light at Night (ALAN)
- Improving cushionfield condition to benefit invertebrate communities
- ~~-~~Additional measures include rock stack construction and wood salvage to enable microhabitats.

Table 3 outlines the effects hierarchy for each targeted high-risk species covered in this TIMP. Not all invertebrate species present at the site are subject to active management.

- Tthe TIMP is focused on those species identified as at greatest risk from the project.

Detailed protocols for each management strategy are provided in Section 3~~1~~, with monitoring protocols in Section 5.

Table 3. Targeted management measures for invertebrate species prioritised for management under the TIMP.

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

Species name	Type	Targeted management action
Nyctemera annulata	Magpie moth	• Host plant control limited in BPPMP[1]
Paranotoreas fulva	Moth	• Alter Ardgour Rise alignment to avoid~~not~~ impact on habitat
Ichneutica sistens	Moth	• Landscape-level habitat management only~~Nil~~
Meterana exquisite	Exquisite owlet moth	• Pre-clearance habitat assessment • Planting & plant relocation programme – olearia (*Olearia odorata*) • Host plant protection (*O. odorata*)
Scythris sp.1	Moth	• Pre-clearance habitat assessment • Host p~~P~~lant relocation programme – native broom (*Chamichaelia* 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 *Sporophyla oenospora* will be ~~conducted~~ done if additional specimens are found. This research sits outside the avoidance, minimisation and offset management programme.
- **Contingency captive breeding** programme for *Phaulacridium otagoense*, if salvage and relocation outcomes are insufficient to maintain a viable population
- **Disturbance minimisation** and ongoing construction management protocols that may happen at the same time as other programmes 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~~ done prior to any site disturbance. ~~Habitat~~ These 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 4) 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 Ppre-clearance Aassessments

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

- Field surveys must be ~~done~~ completed a minimum of three months~~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 5.2). TIMP driven plant salvage and relocations should only be done if the target invertebrate~~s'~~ 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 Oobjectives

~~This programmes measures~~The Target Invertebrate Salvage and Relocation programme aims 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~~ note: 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 5), with adaptive management addressing unexpected outcomes.

3.3.2. Pre-clearance linduction

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 identification and assessment must be completed a minimum of three months prior to salvage and relocation operations. Release sites must be assessed against the habitat matching criteria in Section 3.3.6 and confirmed as suitable by the Technical Lead (Entomology) before salvage starts. Salvage operations will not start until at least one confirmed suitable release site is available for each target species~~Release site surveys should be completed a minimum two weeks prior to salvage and relocation~~
- Salvage and relocation should be completed three months~~-~~ 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*~~*P. otagoense* 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 field teams led by a Suitably Qualified and Experienced Person (SQEP) in invertebrate identification and handling. Supporting team members may include junior ecologists, students, or general labour, provided they are inducted into the relevant

identification and handling requirements and working under direct supervision of the SQEP.

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 person-hours per hectare in suitable habitat, with 100% coverage. Effort will be scaled to habitat complexity and quality at the discretion of the SQEP, up to a maximum of 4 person-hours per hectare.
- A minimum of eight nights live pitfall trapping ~~at a rate of~~with at least 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*~~ *P. 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. Pitfall work will follow DOC invertebrate pitfall trapping protocols (Sherley & Stringer, 2016). Briefly, t~~T~~raps will be placed near suitable microhabitat and checked daily to minimise stress. Traps will have drainage holes to prevent drowning of captured invertebrates.

Manual Searching: Field workers will carefully examine Taramea plants during peak activity periods (e.g.,~~, such as~~ flowering)~~,~~ to manually collect individuals 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 *P.otagoense* and otherwise following the same protocols as above, following DOC invertebrate pitfall trapping protocols (Sherley & Stringer, 2016). ~~-~~

Manual Searching: Field workers will systematically search suitable habitat areas, focusing on ~~sunny~~warm, sheltered ~~microsites~~ spots where grasshoppers are likely to bask ~~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 (i.e., ~~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 °C~~degrees~~) during storage and transport
- **Handling:** Minimise movement and jostling of containers.

Individual handling during release will be minimised, and ~~salvage~~ release 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~~a minimum of three months prior to any salvage ~~and relocation~~ operation~~s~~. Release sites will be assessed against the habitat matching criteria below. If no suitable site is available, salvage operations will be deferred until an appropriate release site has been identified and assessed. 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.** (weevil)
  - 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 h~~H~~abitat 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 (~~the priority TIMP species~~)~~ will be ~~translocated~~ relocated 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 no~~'~~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 4 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 4: List of host plants targeted for relocation and their associated high-risk terrestrial invertebrate species.

Target Host Plant Species	Associated Terrestrial Invertebrate Species
Taramea (*Aciphylla aurea*)	*Inophloeus new sp.* (Weevil)
Fescue tussock (*Festuca novae-zelandiae*)	*Ichneutica toroneura* (Moth)
Silver tussock (*Poa cita*)	*Ichneutica toroneura* (Moth) *Elachista helonoma* (Moth) *Ichneutica toroneura* (Moth)
Native broom (*Carmichaelia spp.*)	*Scythris* (Moth)
Olearia *(Olearia bullata)*	*Pasiphila sp. 'Olearia'* (Moth) *Meterana exquisite* (Exquisite owlet moth)
Olearia *(Olearia odorata)*	*Pseudoceramia cineracia* (Moth) *Pasiphila sp. 'Olearia'* (Moth) *Meterana exquisite* (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 currently not possible ~~currently~~.~~:~~ Therefore, for *Carmichaelia* plants in the DDF, ~~Plants A~~at least 80% of ~~each~~ 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 conducted on donor plants and recipient sites using methods described in Section 5.2. Recipient site surveys will determine existing occupancy. Unoccupied sites are assessed for habitat suitability before relocation proceeds. Occupied sites are assessed to determine whether existing population density at the recipient site is sufficient to preclude or limit further relocation to that location. Surveys provide baseline data for success monitoring.

~~3.4.6. Pre-salvage invertebrate surveys will be done on donor plants and recipient sites using Section 5.26.2 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.~~

~~3.4.7.~~3.4.6. Disturbance Minimisation

The following measures ~~minimise ongoing disturbance to~~ help protect terrestrial invertebrate populations ~~over~~ throughout the life of the mining project by ~~reducing~~ minimising disturbance to their habitat~~s~~.

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

Artificial Light At Night (ALAN) Management

ALAN management at BOGP is tailored to work areas based on illumination needs and environmental sensitivity, based on environmental zone A1 (Dark) as per the Light Management Plan. ~~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:~~**
  - Zero upward waste light, with physical back-shield or side shield where ~~practical to do so~~possible.
  - Low-output, warm-coloured LED lighting at 3,000K (except where there is a health and safety requirement for neutral daylight or high colour rendering properties and safety shower lighting).
  - Discrete building-mounted lighting under eaves or similar structures where possible.~~with bollard support to limit horizontal and vertical light spill.~~
  - Mounting heights to give the best overall outcomes considering need while minimising total flux beyond the target area.
  - Aiming lights away from external locations (i.e. into the Project Site).
  - Automated timing controls, dimming functions, and movement sensors to reduce unnecessary luminance.
  - Blinds to be installed to windows and glass doors where buildings are used after dark.
- ~~**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:~~Light Platforms**
  - Conform as far as practical to fixed lighting requirements.
  - Mobile rigs customised or retrofitted with manually controlled light fittings.
  - ~~Guidelines for placement to minimise light spill into sensitive habitats~~Placement of MLP and aiming of lights to minimise light spill beyond the target area.

Light spill management applies across the full project area. Before any lighting is installed, photometric modelling will be carried out to confirm that light spill is contained within the 1,183ha potential invertebrate effects area~~.~~, A maximum of 0.3 lux at the boundary of the potential invertebrate effects area is the project-wide standard for light spill into sensitive habitat. Where photometric modelling identifies a risk of exceeding this threshold, lighting specifications or placement must be adjusted prior to installation. Modelling results will be documented and available for compliance review.

~~***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.***~~

Host Plant Protection and Enhancement

The protection and enhancement of host plant communities is a critical foundation for terrestrial invertebrate management. The feeding relationships between invertebrates and their host plants mean habitat quality is directly dependent on vegetation health and availability - this applies to priority species and broader invertebrate communities alike. Protection and enhancement measures for key vegetation communities are set out in the LERMP and ARAMP, including:~~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.
-

3.5. Post-Mining Relocation

Phaulacridium otagoense (Short-horned grasshopper) will be relocated back to rehabilitated areas post-mining to maintain genetic diversity and re-establish the species within its original range. The primary source population for reintroduction will be individuals salvaged under Section 3.3 and maintained within the predator-proof sanctuaries during the mining period.

~~3.5. Post-Mining Salvage and Relocation (*Phaulacridium otagoense*)~~

~~*Phaulacridium otagoense* (Short-horned grasshopper) will be relocated back to rehabilitated areas post-mining to maintain genetic diversity and re-establish the species within its original range. The primary source population for reintroduction will be individuals salvaged under Section 3.3 and maintained within the predator-proof sanctuaries during the mining period. 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~~ detailed relocation plan will be ~~created within a year~~developed no later than 12 months prior to mine rehabilitation ~~starting~~ commencing under the LERMP. ~~The plan~~Reintroduction 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).~~Habitat readiness will be assessed by the Technical Lead (Entomology) against the following minimum criteria:

- Native tussock and herbfield cover re-established across at least 50% of the target reintroduction area.
- Mammalian pest control active across the reintroduction area, including targeted mouse control, established prior to reintroduction and maintained for a minimum of three years post-reintroduction.
- Suitable shelter microhabitats present.

3.5.1. Contingency Captive Breeding

Where post-mining relocation outcomes are insufficient to establish a self-sustaining population on rehabilitated surfaces, *P. otagoense* will be reintroduced to rehabilitation areas once vegetation cover meets the habitat readiness criteria defined in Section 3.6. Individuals will be sourced from nearby wild populations at that time.

Captive breeding will only be considered if no viable source population exists at the time reintroduction is required, and only if the Technical Lead (Entomology) assesses that a captive programme is technically feasible and can be delivered without unacceptable risk to donor wild populations.. The captive breeding programme will address

- Rearing methodology and environmental conditions.
- Nutrition and disease prevention protocols.
- Stage-specific handling from egg to adult.

- Target population size before reintroduction.
- Defined success criteria and adaptive management responses.

All outcomes from both programmes will be documented and reported annually as described in Section 8, regardless of result. This information will contribute to the broader understanding of *P. otagoense* ecology and inform future management of the species.

4. ~~CAPTIVE-BREEDING STUDY FOR~~MANAGEMENT OF *SPOROPHYLA OENOSPORA*

Sporophyla oenospora is a small moth, Nationally Critical under the NZTCS. Two individuals were detected on the same day during a terrestrial invertebrate survey in November 2024, outside the DDF. No further individuals were found during follow-up surveys in March 2025, November 2025, or March 2026. The species' host plant and preferred habitat remain unknown, limiting confidence about whether it occurs within the DDF.

Management follows a defined hierarchy: primary avoidance of known habitat, secondary disturbance minimisation, pre-disturbance survey to detect any additional occurrences, and a defined contingency pathway if further individuals are found.

4.1. Primary Mitigation - Avoidance

The Ardgour Rise road alignment has been adjusted to avoid the location where the two specimens were recorded, with the DDF boundary set no closer than 250 m from that location. This eliminates direct disturbance risk at the only known occurrence of the species on the project site. No ground disturbance, vegetation clearance, or earthworks will occur within 250 m of the recorded location without prior written approval from the Technical Lead (Entomology) and notification to the relevant consent authority.

4.2. Secondary Mitigation - Artificial Light at Night (ALAN)

Within 250 m of the recorded location, light spill must not exceed 0.3 lux at the habitat boundary. Compliance will be confirmed by photometric modelling prior to lighting installation and verified by biennial field measurement during nighttime operations.

4.3. Buffer Zone Protection

No ground disturbance, vegetation clearance, or earthworks will occur within 250 m of the recorded location.

4.4. Contingency Pathway - Additional Detections

If one or more additional individuals of *S. oenospora* are detected within 250 m of current or proposed ground disturbance works, ground disturbance within 250 m of the detection location will continue only under a modified works protocol agreed with the Technical Lead (Entomology) within 24 hours of detection. The modified protocol will specify any additional monitoring measures required in the vicinity of the detection. The Technical Lead (Entomology) must provide a written assessment to the consent

authority within 10 working days documenting the detection, the modified protocol applied, and any recommended pathway from the options below.

~~If one or more additional individuals of *S. oenospora* are detected anywhere within the DDF or its surrounds (outside the 250 m buffer zone), the following applies:~~

~~*Immediate response*: Ground disturbance within 250m of the location is suspended pending assessment. The Technical Lead (Entomology) must be notified within 24 hours, and a written assessment must be provided to the consent authority within 10 working days.~~

~~*Assessment*: The written assessment will document the number of individuals detected, location and habitat context, proximity to the DDF, and whether the detection suggests a population rather than isolated occurrence. It will recommend one of the following pathways:~~

- ~~**No further action** - if the detection is outside the DDF and the 250 m buffer remains adequate. Disturbance may proceed.~~
- **Salvage** - if individuals are detected within an area scheduled for imminent disturbance, a salvage attempt will be made by the SQEP prior to works proceeding, following the protocols in Section 3.3.
- **Buffer adjustment** - if the detection indicates the buffer boundary requires revision, a revised buffer will be agreed on with the consent authority before disturbance resumes.
- **Captive breeding study** - only considered if: (a) multiple individuals are detected, (b) the host plant has been or can be identified, and (c) the Technical Lead assesses a viable founding population can be established without unacceptable risk to wild individuals. A detailed programme plan will be developed within three months of that decision.

Captive breeding will not be initiated solely on the basis of a single detection, given the risk of removing individuals from a critically small wild population and the current lack of knowledge of *S. oenospora's* host plant. If the host plant remains unidentified, the programme defaults to habitat protection, ALAN management, and continued survey effort.

4.5. Ongoing Survey

Detection surveys for *S. oenospora* will continue annually during the construction and early operations phases (November–March each year), beginning in the 2025-26 season and continuing for a minimum of five years. Surveys will cover suitable habitat within the Mining Regeneration Zone, Ardgour Restoration Area, and sanctuary areas. Surveys will

include UV light trapping and targeted manual searches. If additional individuals are detected, a detailed response plan will be developed within three months, covering host plant identification and cultivation, hand-rearing methodology, and captive rearing protocols. Results will be reported in the annual invertebrate compliance monitoring report (Section 8.2). Survey protocols may be refined by the Technical Lead (Entomology) through adaptive management as knowledge of the species improves~~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.~~

~~3.6. 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).

3.7. 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.

3.8. 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.

~~4.~~5. 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).

~~4.1.~~5.1. 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~~for the comparison of results over time. However, ~~W~~while evidence shows weevil and grasshopper re-locations are generally successful, this experimental process may require adjustments to the monitoring methods. All monitoring should maintain the ability to compare results over time through the following systematic approach.

~~4.1.1.~~5.1.1. 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 s~~S~~tandard and s~~S~~upplementary 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.

~~4.1.2.~~5.1.2. 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 will operate~~s~~ 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 S~~s~~ection 7.

~~4.2.~~5.2. 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.

Where relocated host plants die or fail to establish, the monitoring programme will not simply lapse. Plant survival will be recorded as a primary indicator under the LERMP and BOMP. Where survival rates fall below acceptable thresholds, the Technical Lead (Entomology) and Technical Lead (Rehabilitation) will jointly assess whether replacement planting is warranted and whether invertebrate monitoring in that area should be maintained, suspended, or redirected to alternative host plant patches. Loss of relocated host plants will be recorded as an adverse outcome in the annual compliance report.

~~4.2.1.~~5.2.1. 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 identify 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.

~~4.2.2.~~5.2.2. 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 5.2.1 above.

~~4.2.3.~~5.2.3. 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~~is 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 5.2.1)
- Annual monitoring performed for three seasons spread over 5 years, including:
  - standardised survey techniques (described in section 5.2.1) 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. Plant survival rates alone are not a reliable indicator of invertebrate relocation success, and , success ~~is indicated~~ will be assessed using ~~by~~ the following invertebrate-specific measures:

- ~~Plant survival rates as measured by the process in the LERMP~~
- Detection of target invertebrates on ≥40% of relocated host plants that were known to host the species prior to relocation, assessed through targeted searches at defined intervals post-translocation~~the relocated species, if they were known to host the species prior to relocation~~.
- For *Inophloeus* new sp., success requires both confirmed host plant establishment and evidence that the weevil is present on relocated taramea plants for at least two years.

For moth species, detection includes evidence of feeding damage, larval presence, or adult presence on relocated host plants. Detecting whether a species is present or absent has limitations as a success measure, given how difficult many target species are to find and how little is known about their life histories. It is nonetheless the most practical measure available and provides a consistent basis for comparison over time. Plant survival rates will continue to be recorded under the LERMP and BOMP as a supporting indicator of habitat availability.

The outcomes of these surveys will be written in reports as described in section 7.

~~5.~~6. IMPLEMENTATION TIMELINE AND SEQUENCING

The TIMP ~~performs across~~covers the full life of the~~entire~~ project ~~lifecycle~~, with conservation measures tailored to each phase~~'s specific requirements and opportunities~~. ~~Implementation follows a structured timeline, ensuring critical~~Key protective measures ~~are established~~will be in place before any disturbance begins~~,~~. a~~A~~ctive management ~~is maintained~~will continue throughout operations, and ~~transitions~~ the focus will shift to long-term stewardship during closure. This phased approach ~~maximises conservation efficacy by aligning~~ensures management ~~approach~~ actions align with project impacts at each stage, ~~while building~~working 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):** As r~~R~~ehabilitation is complete~~d,ion will be accompanied by long-term~~ monitoring will transition to long-term oversight, knowledge ~~transfer~~ and findings will be documented and handed over~~documentation~~, and a final assessment of conservation outcomes will be carried out ~~assessment~~.

~~6.~~7. COMPLIANCE MONITORING AND REPORTING

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

~~6.1.~~7.1. 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.

~~6.2.~~7.2. 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. Updates and planning associated with *Phaulacridium otagoense* captive breeding study, if it is initiated.
- Descriptions, outcomes and recommendations from the *Sporophyla oenospora* captive breeding study.

~~6.3.~~7.3. 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.

~~7.~~8. 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.

~~7.1.~~8.1. 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.

~~7.2.~~8.2. 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, which ensures that proposed modifications align with community expectations and incorporates 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.

REFERENCES

Alliance Ecology (2025). Assessment of Ecological Effects; Bendigo-Ophir Gold Project. Alliance Ecology, Auckland.

Derraik, J. G. B., Barratt, B. I. P., Sirvid, P., Macfarlane, R. P., Patrick, B. H., Early, J., Eyles, A. C., Johns, P. M., Fraser, P. M., Barker, G. M., Henderson, R., Dale, P. J., Harvey, M. S., Fenwick, G., Mclellan, I. D., Dickinson, K. J. M., & Closs, G. P. (2001). Invertebrate survey of a modified native shrubland, Brookdale Covenant, Rock and Pillar Range, Otago, New Zealand. *New Zealand Journal of Zoology*, 28(3), 273–290.

Derraik, K. J. M. D., Derraik, J. G. B., Rufaut, C. G., & Closs, G. P. (2005). Ground invertebrate fauna associated with native shrubs and exotic pasture in a modified rural landscape, Otago, New Zealand. *New Zealand Journal of Ecology*, 29(1), 129–135.

Habitat NZ Ltd. (2025). Bendigo-Ophir Gold Project: Terrestrial Invertebrate Survey. *Habitat NZ Ltd*.

~~IUCN/SSC (2013). Guidelines for Reintroductions and Other Conservation Translocations. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission, 57 pp.~~

Paler, K., Monks, A., Leschen, R. A. B., & Ward, D. F. (2021). Determining species diversity and functional traits of beetles for monitoring the effects of environmental change in the New Zealand alpine zone. *Ecological Indicators*, 121, 107100.

Patrick, B., (1994). The importance of invertebrate biodiversity: an Otago Conservancy review. Conservation Advisory Science Notes No. 53, Department of Conservation, Wellington. 13p.

Sherley, G., & Stringer, I. (2016). Invertebrates: Pitfall trapping v1.0. *Department of Conservation, Wellington*.