BATHURST
RESOURCES LIMITED

Pest Control and Elimination Plan

Buller Plateaux Continuation Project

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Contents

Glossary of Terms and Abbreviations 5

Executive Summary 6

1.0 Introduction 8

1.1 Project Background 8
1.2 Ecological Context 8
1.3 Outline of pest management package 8
1.4 Purpose and Scope 9
1.5 Relevant Resource Consent Conditions 13
1.6 Existing pest control 13
1.6.1 Opara Kiwi Area 13
1.6.2 Cypress Mine Predator Management Commitments 14
1.7 Current pest densities 14
1.8 Target pest species for control 17
1.9 Summary of Control Methods in Each Area 17

2.0 Buller Plateaux Pest Exclusion Fenced Areas 20

2.1 Pest Exclusion Fence Locations 20
2.2 Outline of Control 21
2.3 Pest Fence Design and Construction 27
2.4 Eradication methodology 28
2.4.1 Pre eradication requirements 28
2.4.2 Toxin use 29
2.4.3 Weka removal and relocation 29
2.4.4 Potential non-target impacts 29
2.4.5 Risk Mitigation 30
2.4.6 Trapping grids 31
2.4.7 Mop-up phase 37
2.4.8 Ongoing Maintenance, Surveillance, and Detection Post Eradication 37
2.4.9 Advanced surveillance technologies 38
2.4.10 Mouse eradication and reinvasion management 40
2.4.11 Incursion response 40
2.5 Targets and Thresholds in Elimination Areas 42
2.6 Pest control and monitoring calendar 42

3.0 Blackburn Pākihi Intensive Ground Control Area 44

3.1 Site Description 44
3.2 Pest Control Outline 44

3.3 Control methods – kill traps ... 47
3.3.1 Trap preparation & deployment ... 50
3.3.2 Lure types ... 50
3.3.3 Trap servicing protocols & frequency ... 51
3.4 Control methods – toxins ... 52
3.5 Control frequency & timing ... 53
3.6 Pest targets and thresholds ... 54
3.7 Pest control and monitoring calendar ... 54

4.0 Landscape Pest Control Area ... 57

4.1 Site Description ... 57
4.2 Pest Control Outline ... 57
4.3 Control methods – kill traps ... 60
4.3.1 Trap checks ... 60
4.4 Control methods – Aerial 1080 ... 60
4.4.1 Planning ... 63
4.4.2 Standard protocols ... 63
4.4.3 Post-operation monitoring ... 64
4.4.4 Timing and frequency ... 64
4.4.5 Risks ... 65
4.5 Pest targets and thresholds ... 65
4.6 Pest control and monitoring calendar ... 66

5.0 Ungulate management within the pest management programme ... 68

5.1 Rationale and objectives ... 68
5.2 Management approach by area ... 68
5.2.1 Pest exclusion fenced areas ... 68
5.2.2 Blackburn Pākihi intensive ground control area ... 69
5.2.3 Landscape control area ... 69
5.3 Methods of control ... 69
5.4 Monitoring and adaptive management ... 70

6.0 Pest animal monitoring ... 71

6.1 Overview ... 71
6.2 Tracking Tunnels ... 71
6.2.1 Tracking tunnel deployment ... 71
6.2.2 Tracking tunnel analysis ... 71
6.3 Chew card methods ... 72
6.3.1 Description ... 72
6.3.2 Chew card spacing ... 72

6.3.3 Frequency & timing 72
6.3.4 Chew card deployment 72
6.3.5 Chew card analysis 73
6.4 Camera trap methods 73
6.4.1 Description 73
6.4.2 Camera spacing 74
6.4.3 Timing and frequency 74
6.4.4 Camera settings 74
6.4.5 Camera deployment, orientation, and lure 74
6.4.6 Image analysis 76
6.5 'Smart' monitoring technology 77
7.0 Exceedance of pest thresholds 78
8.0 Data management & reporting 80
9.0 Adaptive Governance and Management Review 82
9.1 Annual Review 82
9.2 Five-Year Strategic Review 82
9.3 Managing Uncertainty 83
10.0 References 84
Appendix A. Fence Feasibility Assessment 88
Appendix B. Methods for Minimising Impacts on Pākihi Wetlands 89
General Principles for Working in Pākihi Wetlands 89
Trap and Bait Layout: Focusing on Margins and Firm Substrates 89
Device Modifications for Wet and Soft Substrates 89
Aerial Control Operations and Pākihi Protection 90
Ungulate and Pig Control in Relation to Pākihi 90
Timing and Access Management 90
Appendix C. Vertebrate Pesticides 91
Appendix D. Relevant Consent Conditions 92
Appendix E. Oparara KTA Overview From Cypress Kiwi Management Plan (2018) 93
Appendix F. Oparara Predator Control Summary From Cypress Predator Management PLan (2018) 102

Glossary of Terms and Abbreviations

Term	Definition
AI	Artificial Intelligence
Bathurst	Bathurst Resources Limited, including its subsidiary companies BT Mining Ltd, Bathurst Coal Ltd, and Buller Coal Ltd
BPCP	Buller Plateaux Continuation Project
BDC	Buller District Council
BOMP	Biodiversity Outcome Monitoring Plan
BRL	Bathurst Resources Limited
Buller Plateaux	A collective reference to the Stockton Plateau and Denniston Plateau
CCI	Chew Card Index – a method used to determine an index of pest abundance
CH	Camera hours – a method used to determine an index of pest abundance
CSL	Critter Solutions Limited
DOC	Department of Conservation
EPA	Environmental Protection Authority
ERMP	Ecological Rehabilitation Management Plan
FTAA	Fast-Track Approvals Act 2024
HSNO	Hazardous Substances and New Organisms Act
km	kilometres
PCEP	Pest Control and Elimination Plan
Lagomorphs	Rabbits and hares, introduced to New Zealand and now inflict significant browsing pressure
MPI	Ministry of Primary Industries
Mustelids	A group of carnivorous mammals including stoats, ferrets, and weasels, introduced to New Zealand, which are significant predators of native birds, lizards, and invertebrates.
NAWAC	National Animal Welfare Advisory Committee
OP-63	Operation
PAPP	Para-amino propiophenone – a mammalian specific toxin
Pest Exclusion Fence	A fence designed and built to exclude predators (typically mice, rats, mustelids, possums, feral cats, hedgehogs, rabbits/hares) and ungulates (namely deer, pigs, and goats)
PIR	Passive infra-red
Plan	Management Plan
Project disturbance area	The area to be disturbed by habitat clearance and earthworks associated with the Project
The Project	The Buller Plateaux Continuation Project
Ungulates	Hoofed mammals (e.g. deer, goats, pigs) that can affect ecosystems through browsing, grazing, and soil disturbance.

Executive Summary

The Buller Plateaux and its surrounding forest and Pākihi landscapes support some of the most distinctive and threatened biodiversity on the West Coast of New Zealand's South Island. These ecosystems support great spotted kiwi, native forest birds such as kākāriki, fernbird, and robin, and regionally significant invertebrate (including critically endangered *Powelliphanta* snails), and reptile communities. However, the ecological integrity of this landscape continues to be degraded by introduced mammalian predators and browsers.

To counter these pressures and deliver enduring biodiversity gains, Bathurst Resources Ltd, through the Buller Plateaux Continuation Project residual effects package, will implement an integrated pest management and elimination strategy encompassing approximately 27,622 ha of contiguous habitat across the Buller Plateaux and surrounding region. This initiative comprises three complementary components[1]:

1. **911 ha of pest exclusion fenced areas** on the Buller Plateaux, within which all mammalian pests will be eradicated and biosecurity maintained through continuous surveillance and fence management.
2. **An intensive 1,505 ha Blackburn Pākihi ground control area**, where year-round ground-based suppression (alongside aerial control as required), of rodents, possums, mustelids, feral cats (if present) and ungulates will be undertaken to protect high-value kiwi, forest, and wetland habitats.
3. **A surrounding landscape scale control zone of approximately 23,843 ha,** managed under an ongoing aerial 1080 programme and supported by permanent ground-trapping designed to maintain low predator densities (particularly stoats for the benefit of great spotted kiwi). In addition, a further 1,363 ha of existing ground control will be maintained.

This tiered approach integrates multiple pest management techniques — including pest eradication, aerial toxin operations, ground-based trapping and baiting — to create a resilient network of pest suppression across the wider Buller landscape. Regular monitoring of pest indices will guide adaptive management.

This Pest Control and Elimination Plan (PCEP, "this plan") outlines the methodologies which will be implemented to achieve the expected outcomes, including target species, toxic baiting and trapping methods, eradication strategies, surveillance and monitoring, frequency of control and pest targets. Pest management activities in the Blackburn Pākihi and landscape control areas will be undertaken for a period of 35 years, with the pest exclusion fenced areas maintained for a 50-year duration (post construction of the last fence) to ensure long lasting benefits.

The tools and techniques recommended for use in this plan are based on those currently available at the time of writing, but they should be supplemented or replaced with improved tools with proven efficacy as those come to market. These new tools will greatly enhance the efficiency of predator

[1] Weed management will also occur and is outlined separately in the Buller Plateaux Weed Management Plan (Bathurst Resources Limited, 2026)

control regimes. A review of emerging animal pest management tools and technology should be included as part of an annual review.

1.0 Introduction

1.1 Project Background

Bathurst Resources Limited, BT Mining Limited, Buller Coal Limited and Bathurst Coal Limited (together, Bathurst) are seeking approval for the Buller Plateaux Continuation Project (BPCP or the Project) under the Fast-track Approvals Act 2024 (FTAA).

Bathurst proposes to mine approximately 20 million tonnes of coal all destined for the export market with 96% of the coal being used in steelmaking, coking coal, and the balance sold as thermal coal, utilising the existing workforce and existing infrastructure facilities at Stockton. The Buller Plateaux is located approximately 15 kilometres (km) northeast of Westport on the West Coast of the South Island. The land ownership is a mix of Bathurst, Crown, Buller District Council and privately owned land (with existing approvals for the current mining operations across several areas of the Project footprint).

Ecological Solutions Limited (2026) have conducted an assessment of the terrestrial ecological effects of the BPCP. A Residual Effects Management Report for the BPCP has been completed by Alliance Ecology (2026). These reports provide detailed background as to the impacts of the BPCP and justification of proposed effects management (including the pest control measures proposed within this report).

In addition, the Biodiversity Outcome Monitoring Plan (BOMP) (BCEP-ENV-PLN-009) sets out the methods to verify that stated outcomes are achieved across ecological rehabilitation and offset/compensation sites within 35 years, and to inform the need for adaptive management or contingency actions if required.

1.2 Ecological Context

The Buller Plateaux and surrounding upland landscapes form part of the northern West Coast ecological region of New Zealand's South Island. This landscape is defined by its high rainfall (exceeding 4-5,000 mm annually), strongly leached soils, and a mosaic of podocarp–broadleaf forest, rātā–kāmahi forest, subalpine scrub, and Pākihi wetlands.

Collectively, the Buller Plateaux, Blackburn Pākihi, and adjacent landscape control areas represent a significant complex of upland forest and wetland ecosystems, supporting high native biodiversity and multiple threatened species. The area functions as a regional stronghold for great spotted kiwi, invertebrates, lizards and other at-risk forest birds.

1.3 Outline of pest management package

The wider managed landscape surrounding the Buller Plateaux, including the ecological catchments adjoining the Buller, Orikaka (Mackley), and Ngākawau Rivers, forms the broader management zone for the proposed ongoing pest control and biodiversity enhancement (see Fig. 1). In total, 27,622 ha will be subject to pest management (see Table 1 for a summary), which consists of:

- 911 ha of pest exclusion fences on the Buller Plateaux.
- 1,505 ha of intensive ground and aerial control in the Blackburn Pākihi area.

- 23,843 ha of landscape control in the surrounding area, maintained under a rolling regime of aerial 1080 operations combining a baseline three-year cycle of aerial 1080 operations with the ability to implement mast-responsive control when monitoring indicates elevated pest risk.
- 1,363 ha of existing ground control around the Stockton mine which will be maintained.

Integration across the different management tiers (exclusion fenced, intensive ground control, and landscape control) provides a layered control programme. Control will be managed adaptively as intensity and frequency will be based on results of the regular monitoring regimes.

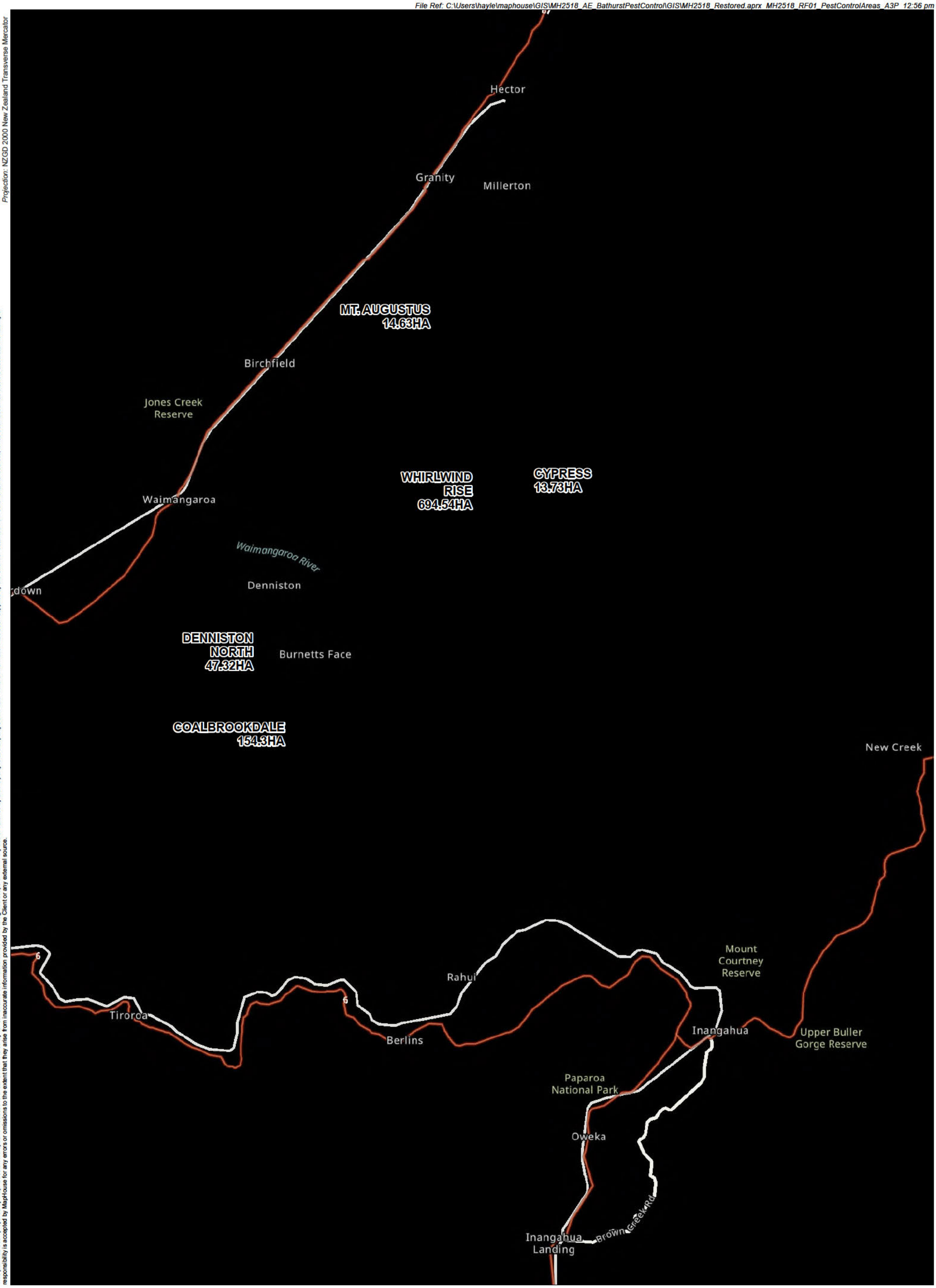
1.4 Purpose and Scope

This Pest Control and Elimination Plan (PCEP) sets out the methods that will be used to control mammalian pests (rats, mice, mustelids including stoats, weasels, ferrets (if detected), possums, feral cats (if detected), rabbits and hares), as well as ungulate browsers (deer, goats and pigs), across the various pest management and elimination areas.

In particular, this PCEP covers:

- Pest management areas (Fig. 1), namely (1) five full-height pest exclusion fences, within which all mammalian pests (including mice, rats, mustelids, possums, feral cats, ungulates, hedgehogs, rabbits and hares) will be eliminated, and (2) ongoing pest suppression via aerial and ground control in the Blackburn- Pākihi area and (3) pest suppression in the surrounding landscape to create a landscape scale reduction in stoats with aerial 1080 and targeted ground control.
- Target pest species information (for rats, mice, possums, mustelids, feral cats, hedgehogs, ungulates, rabbits and hares), including their ecology, distribution, population dynamics, and associated biodiversity impacts;
- Eradication protocols and ongoing surveillance/detection and incursion response protocols for all target pest species within the pest exclusion fenced areas;
- Protocols for ongoing predator trapping, including trap types, locations, lures, and servicing frequencies;
- Protocols for ongoing toxic baiting, including bait type and deployment timelines and frequencies;
- Pest animal monitoring protocols, using tracking tunnels, chew cards and camera traps;
- Performance standards of pest animal control, with targets and thresholds for additional control based on monitoring results;
- Methodologies for addressing exceedance in thresholds, and;
- Data management and reporting protocols.

Projection: NZGD 2000 New Zealand Transverse Mercator



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Locations of pest control areas

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Existing control maintained
- New intensive ground control
- New landscape scale control
- New pest exclusion fence

0 1 km

1:100,000 @ A3

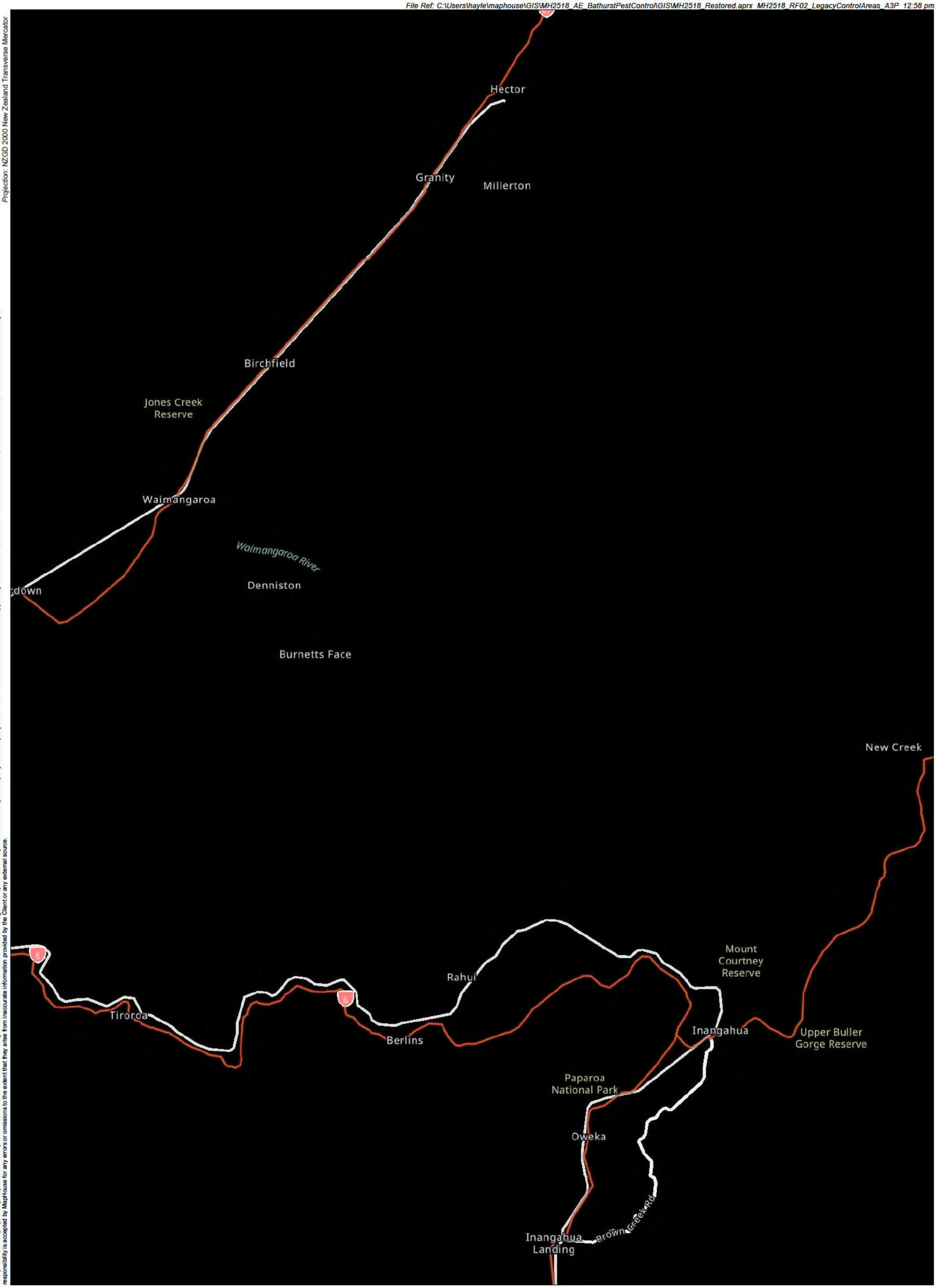
Data Sources: Alliance Ecology, Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Figure 1

Table 1: Summary of the three main pest management areas within the Buller Plateaux landscape, including primary pest species targeted in each area and key control methods and strategies applied. These approaches are designed to be complementary, integrating pest exclusion, suppression, and maintenance control to maximise biodiversity gains.

Management Area	Target Pest Species	Primary Control Methods	Operational Focus
Buller Plateaux – 911 ha Pest-Exclusion Fenced Areas	0% density of mustelids, rats, mice, possums, feral cats, hedgehogs, Ungulates (deer, goats, pigs). Weka exclusion for snail recovery.	• Complete pest exclusion via fence infrastructure. • Eradication of residual pests inside fence. • Ongoing biosecurity surveillance. • Rapid incursion response.	Pest exclusion fenced areas serve as a permanent protection environment for key native fauna and flora. Source for native fauna dispersal into wider landscape. Any predator or ungulate detection triggers immediate response protocol.
Blackburn– Pākihi – 1,505 ha Intensive Ground-Control Area	Stoats, rats, possums, feral cats, ungulates.	• Ground based trap network (stoats, rats, cats) • Rats/possums: bait-station grid, seasonal toxin pulses. • Ungulates: aerial culls (thermal-assisted), ground hunting.	Focus on sustained, year-round suppression to create low-predator and low-browser environment. Prioritisation of Pākihi margins, forest–wetland ecotones, and riparian benches for intensive control.
Landscape Control Zone – 23, 843 ha.	Stoats, rats, possums, feral cats, red deer, goats, feral pigs (maintenance level)	• Aerial 1080 on adaptively managed cycle • Ground trapping networks (stoats: c.1 km between lines, 200 m between traps). • Ungulates: periodic control and coordinated culling.	Low level landscape scale suppression of a key predator (stoats), particularly for great spotted kiwi recovery. Serves as buffer to maintain low reinvasion pressure on intensive and fenced areas.

Projection: NZGD 2000 New Zealand Transverse Mercator



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Legacy pest control areas

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Existing control maintained
- New intensive ground control
- New landscape scale control
- New pest exclusion fence
- Project footprint
- Disturbance area
- SEA
- DPPA
- WHEA
- DBEA

0 1 km

1:100,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Figure 2

1.5 Relevant Resource Consent Conditions

Proposed consent conditions that are relevant to this plan are listed in Table 2. The relevant resource conditions are provided in Appendix D.

Table 2: Proposed consent conditions

Consent	Description	Reference in Plan

Consent conditions to be inserted upon issue of the final decision.

1.6 Existing pest control

Current pest control on the Buller Plateaux and surrounding landscape consists of occasional aerial 1080 and limited intermittent ground-based rat/possum control. See Section 5 of the Residual Effects report (Alliance Ecology, 2026a) for a full review of existing pest control regimes. As outlined in that report, the existing legacy control areas (with the exception of the Oparara Kiwi Area – see below), are either maintained or integrated into this new package (Fig. 2), albeit with the majority of the areas of existing control being subject to increased intensity of control efforts (including pest elimination for pest fenced areas). In addition to the current 13,989 ha of existing control which will be maintained or intensified, a further 13,633 ha of new control will be undertaken (effectively increasing the total area under active pest management to 27,622 ha). This PCEP therefore represents a 97% increase in area (as well as intensity) from current pest control work.

Note: The Cypress Mine Predator Control Plan and Kiwi Management Plan are reproduced in Appendix E and F as existing consented management documents. These plans are referenced to demonstrate ongoing implementation of the Company's existing biodiversity commitments and should be read in conjunction with this Pest Management Plan. Operational methods described within those documents reflect the approved management framework at the time of preparation and may differ from contemporary best practice or technologies currently available.

1.6.1 Opara Kiwi Area

In addition to the pest management undertaken within the Buller Plateaux Continuation Project (BPCP) area, BT Mining Ltd will continue to implement the predator management programme within the 1,000 ha Oparara Kiwi Sanctuary, consistent with the requirements of the Cypress Mine resource consents. The Oparara programme forms an important component of the Company's long-term biodiversity commitments and complements the biodiversity outcomes sought through the BPCP.

Predator management within the sanctuary comprises an integrated programme of intensive ground-based trapping together with periodic aerial 1080 operations to suppress stoats, rats and possums and enhance the survival and recruitment of great spotted kiwi and other native fauna. The programme is implemented in accordance with the approved Cypress Mine Predator Control Plan and associated Kiwi Management Plan, which have been included in Appendix E in this plan. While these documents reflect the operational methods and technology available at the time they were prepared, they remain the current consented management framework and continue to guide implementation until formally reviewed or superseded.

Monitoring undertaken since establishment of the sanctuary demonstrates positive biodiversity outcomes from the programme. Recent assessments indicate increases in great spotted kiwi call rates

relative to baseline, sustained suppression of stoats and possums, increases in several forest bird species including weka and kākā, and continued maintenance of one of the highest quality mainland forest bird communities in New Zealand. These results provide ongoing evidence that long-term integrated predator management is achieving the intended biodiversity objectives.

1.6.2 Cypress Mine Predator Management Commitments

The implementation of predator management associated with the Cypress Mine will continue in accordance with the relevant resource consent conditions. This Pest Management Plan should therefore be read alongside those consent conditions where applicable.

The relevant Cypress consent conditions include:

- **Condition C32** – establishment and ongoing management of the Great Spotted Kiwi Treatment Area;
- **Condition C39** – objectives and requirements for the predator control programme;
- **Condition C40** – consultation, review and reporting requirements; and
- **Condition C41** – minimum management practices, monitoring requirements and performance standards for predator control.

Where management undertaken under the BPCP interfaces with existing Cypress biodiversity commitments, implementation will ensure consistency with these consent requirements and any subsequent approved amendments.

1.7 Current pest densities

A more detailed overview of current pest densities is provided in the Residual Effect Report (Alliance Ecology, 2026a). A detailed pest monitor of the Buller Plateaux has also been undertaken and is provided in the Pest Mammal Survey report (Alliance Ecology, 2026b). In summary, this report demonstrated that rodents and stoats were widespread (Fig. 3) and common across the Buller Plateaux even in a non-mast year. The results of the trial camera data (Alliance Ecology, 2026b), showed house mice increasing their detections from 25% of the cameras in the first survey to 58% in the second, and rats from 37.6% to 54%. The number of images of these species collected during the monitor also increased noticeably, from 135 rat images collected in the first monitor, to 430 images in the second monitor three months later. Similarly, mouse detections on cameras increased from 190 to 486 over the same period. During the second monitor (three months subsequent to the first), there was only three camera stations which did not detect rats or mice, suggesting a widespread distribution of rodents. Some camera images showed multiple rodents in the same shot (Fig. 3), which is usually a rare occurrence during camera monitoring. Stoat

Figure 3: Two rats caught simultaneously on camera during pest monitoring on the Buller Plateaux

detections were also common, and concerningly stoats were recorded in the same locations as kiwi within very close timeframes (Fig. 4).

Figure 4: Figure 4: A Great Spotted Kiwi on a trail camera (L), followed less than five hours later by a large stoat (R) at the same location. Stoats are the primary cause of decline in kiwi population

The monitoring undertaken by Alliance Ecology (2026b) indicated the potential for year-round predation and competition pressure, with an expectation of substantially worse conditions in mast years. The increase in rodent detections between monitoring rounds also demonstrated how rapidly pest pressure can rise over short timescales. Overall, the baseline indices during pest monitoring remained above levels required for recovery of predation sensitive taxa (particularly for kiwi, lizards and invertebrates, including the critically endangered *Powelliphanta patrickensis*), reinforcing that intermittent aerial control alone is unlikely to deliver durable biodiversity gains.

Figure 5: Pest mammal detections during trial camera monitoring on the Buller Plateaux indicated the rats and mice were common (top row) as were stoats (middle row) and deer were also detected on multiple cameras (bottom row).

In late 2025 – early 2026, camera monitoring for pests also commenced in the Blackburn Pākihi area, with initial data showing the presence of key pest species, including rats (on 25% of cameras), stoats and deer (see Fig. 6). There was also frequent evidence of browsing pests (including deer and goats), in the Blackburn Pākihi, demonstrated via the presence of scats, clear movement pathways, trampling and prints (ungulate damage in this area is also outlined in the Residual Effects Report (2026a)). Great spotted kiwi and kea were also captured on cameras during pest surveys, demonstrating their range overlap with a key known predator (stoats).

Monitoring on the Buller Plateaux has demonstrated that pest indices are generally higher than levels compatible with long-term biodiversity protection, reinforcing the need for sustained suppression across the wider landscape. Within the Blackburn area, targeted trail camera monitoring conducted in late 2025 – early 2026 recorded the presence of rats, stoats and deer, confirming that key predator and browsing species are already present despite the site's relative isolation and complex wetland-dominated habitat. While detections of possums and feral cats were not obtained during this monitoring period, such results should be interpreted cautiously, as camera-based monitoring provides conservative indices of presence and may underestimate true population size, particularly at low densities. Moreover, low possum and cat numbers are likely to be temporary in the absence of sustained control, as both species are known to rapidly reinvade and increase following reductions, especially in connected landscapes and during periods of elevated food availability. Current climate modelling and observational evidence indicate that the 2025/26 season is a significant beech mast year in the western and southern South Island, with heavy flowering and an anticipated large seed fall. Beech masts drive rapid increases in rodent and stoat populations, thereby elevating predation pressure on native fauna across the landscape, which will undoubtedly spill over onto the Buller Plateaux. Rodent and subsequently stoat numbers are expected to increase sharply as the high autumn seed fall occurs.

Figure 6: Camera monitoring in the Blackburn Pakihi area showed detections of rats (top row), stoats (bottom left) and deer (bottom right)

1.8 Target pest species for control

The pest species targeted by this programme have well-documented, compounding impacts on native biodiversity, acting through predation, browsing, competition, and habitat modification. This is outlined in further detail the Residual Effects Report (Alliance Ecology 2026a). However, a summary of the key mammalian pests targeted by the programme, the primary mechanisms by which they affect native flora and fauna on the Buller Plateaux and surrounding landscapes, and the principal control tools proposed to mitigate those impacts are provided in Table 2. Together, these species account for the majority of ongoing pressure on threatened birds, lizards, invertebrates, and vegetation, and their integrated management is central to achieving durable biodiversity gains.

1.9 Summary of Control Methods in Each Area

The proposed pest management programme is spatially structured, with different tools applied at varying intensities across the pest exclusion fenced area, the intensive ground control area at Blackburn Pākihi, and the wider landscape control area. Table 3 outlines how control methods are deployed in each of these areas to achieve complementary outcomes, ranging from complete eradication within pest exclusion fenced areas to sustained stoat suppression at the landscape scale. This tiered approach is designed to reduce pest reinvasion, reduce mast-driven population surges, and maximise biodiversity benefits through a coordinated control framework.

Table 3: Target pest species, biodiversity impacts and control tools

Target pest species	Key biodiversity impacts	Evidence in Buller Plateaux / West Coast region	Management tools
Stoat (*Mustela erminea*)	Major predator of kiwi chicks and juveniles; predation on ground- and hole-nesting birds, lizards and large invertebrates. Stoat populations increase following rodent irruptions associated with beech mast events (McLennan et al., 1996; Innes et al., 2010; Kelly et al., 2013).	Stoats recorded in monitoring on the Buller Plateaux and surrounding forests (Alliance Ecology, 2026b). Stoat predation of kiwi currently likely on the Plateaux (Hilary Cameron Pers. Comms). Stoat irruptions following mast years documented widely across South Island beech forests (DOC monitoring summaries; Alliance Ecology, 2026a and 2026b).	Elimination of stoats in pest exclusion fenced areas. Permanent kill-trap networks; indirect suppression via aerial 1080 in Blackburn and landscape control areas. Camera monitoring.
Ship rat (*Rattus rattus*)	Predation on eggs, chicks, small birds, reptiles and large invertebrates including *Powelliphanta* snails (Walker 2003); a key driver of forest bird declines in New Zealand (Innes et al., 2010; Jones & Day, 2010; Walker, 2003).	Rats detected in monitoring across the Plateaux and Blackburn– Pākihi areas (Alliance Ecology 2026a); rat irruptions during mast years widely documented in South Island beech forests (Kelly et al., 2013; Alliance Ecology, 2026a). Rats known to be impacting *Powelliphanta* snails (Papworth 2024).	Elimination in pest exclusion fenced areas. Aerial 1080 knockdown; ground bait stations and traps (Blackburn Pākihi area); monitoring via tracking tunnels, chew cards and cameras.
Norway rat (*Rattus norvegicus*)	Predation on birds and invertebrates, particularly in riparian and wetland habitats (Towns et al., 2006; Innes et al., 2010).	Suitable habitat present in wetlands and riparian systems within the Blackburn Pākihi area; Norway rats commonly associated with such habitats in New Zealand (Towns et al., 2006).	Elimination in pest exclusion fenced areas. Aerial 1080; targeted ground bait stations and traps (Blackburn Pākihi area). Tracking tunnel, chew card and camera monitoring.
House mouse (*Mus musculus*)	Predation on invertebrates and reptiles and potential predation on juvenile *Powelliphanta*; mouse irruptions during mast years can drive increases	Mice recorded in monitoring on the Buller Plateaux; population eruptions during mast years are well documented in South Island	Elimination in pest exclusion fenced areas. Monitoring via tracking

Target pest species	Key biodiversity impacts	Evidence in Buller Plateaux / West Coast region	Management tools
	in stoat populations (Ruscoe et al., 2005; Angel & Cooper, 2006; Kelly et al., 2013).	beech forests (Ruscoe et al., 2005; Alliance Ecology, 2026a and 2026b).	tunnels, chew cards and cameras.
Brushtail possum (*Trichosurus vulpecula*)	Intensive browsing of canopy and understorey vegetation leading to reduced regeneration and altered forest structure; opportunistic nest predation and predation on *Powelliphanta* (Payton, 2000; Nugent et al., 2001; Walker, 2003).	Possums currently controlled (but reinvading) on the Plateaux but widespread in surrounding West Coast forests and capable of reinvasion (DOC monitoring summaries; Alliance Ecology, 2026a).	Elimination in pest exclusion fenced areas. Aerial 1080; ground bait stations for maintenance; camera and chew card monitoring.
Feral cat (*Felis catus*)	Predation on birds, reptiles and invertebrates and capable of killing adult kiwi; can exert significant ecological impacts even at low densities (Gillies & Fitzgerald, 2005; Medina et al., 2011).	While not detected in recent surveys, there is increasing concern about increasing feral cat distribution across New Zealand landscapes including alpine and forest ecosystems; camera monitoring indicates presence across many remote conservation areas (Nichols et al., 2019; NZ Government, 2025).	Elimination in pest exclusion fenced areas. Aerial 1080, targeted kill traps; corridor-focused control; camera detection.
Ferret / weasel (*Mustela furo, M. nivalis*)	Predation on birds, lizards and invertebrates; ferrets capable of killing larger birds (King, 2005; Innes et al., 2010).	Ferrets not detected on the Plateaux in recent surveys but recorded in parts of the West Coast region, particularly in open habitats and forest margins.	Elimination in pest exclusion fenced areas. Aerial 1080, mustelid trap networks; camera surveillance; targeted response if detected.
Hedgehog (*Erinaceus europaeus*)	Predation on native invertebrates and eggs of ground-nesting birds (Jones et al., 2005).	Hedgehogs occur widely in New Zealand landscapes including forest margins and open habitats on the West Coast.	Elimination in pest exclusion fenced areas. Contingent removal via existing trap networks; camera monitoring.
Ungulates (red deer, goats, pigs)	Browsing suppresses regeneration and alters forest structure; pigs cause rooting and trampling damage, particularly in wetlands and sensitive habitats (Wardle, 1991; Nugent et al., 2001).	Deer present on the Buller Plateaux and deer and pig sign recorded in the Blackburn Pākihi area (Alliance Ecology 2026a and 2026b).	Elimination in pest exclusion fenced areas. Sustained hunting and targeted removals; exclusion via fencing in key areas.
Weka (*Gallirallus australis*) –	Predation on large native invertebrates including *Powelliphanta* snails (Walker, 2003).	Weka present across the West Coast and known predators of large land snails in several regions.	Weka excluded and relocated from pest exclusion fenced areas.

Table 4: Application of control methods across management areas

Pest / group	Pest Fence Exclusion Areas	Blackburn– Pākihi Intensive Ground Control	Landscape Control Area
Stoats / mustelids	Eradication and exclusion with ongoing surveillance	Permanent traplines and aerial control.	Traplines on corridors to suppress between aerial 1080 cycles.
Rats & mice	Eradication and exclusion; ongoing surveillance	Continuous ground suppression via trap and bait station network, plus aerial benefits	Aerial 1080 knockdown.
Possums	Eradication and exclusion; ongoing surveillance	Continuous suppression with ground-based bait stations and trapping.	Aerial 1080 knockdown with maintenance control.
Feral cats	Eradication and exclusion; ongoing surveillance	Targeted control on corridors and ecotones.	Targeted control where detected.
Hedgehogs	Removed if detected	Contingent/opportunistic control via ground-based trapping.	Generally not targeted.
Ungulates	Excluded and removed within fences	Targeted removal via ongoing hunting	Ongoing hunting to reduce browse pressure
Weka	Excluded via removal from fenced areas and translocation	Not targeted	Not targeted

2.0 Buller Plateaux Pest Exclusion Fenced Areas

2.1 Pest Exclusion Fence Locations

The Buller Plateaux forms the central focus of the pest exclusion fenced areas (surrounded by protective landscape control areas – see Fig 1). Five separate pest exclusion fenced area will be constructed (Fig. 7), which will be built in a staged manner to coincide with disturbance and construction activities. Details of each fenced area in terms of habitat and biodiversity values are provided in the Residual Effects Management Report (Alliance Ecology, 2026a).

The five pest Exclusion fenced areas are shown in Figures 8 – 11 and include:

- The Denniston North Pest Exclusion Fence (~47 ha, Fig. 8), located on the northern edge of the Denniston Plateau will have an approximate fence length of 3690 m. Approximately 90% of the fenceline follows existing roads and tracks and crosses only small outflow streams. It is proposed to be constructed during the initial construction phase of the BPCP.
- The Coalbrookdale Pest Exclusion Fence (~`154 ha, Fig. 9) on the Denniston Plateau will have an approximate fence length of 6930 m. The fence will be built alongside roads or tracks, some of which are being established as part of the BPCP. Some areas of this fence cross streams and will require culverts. This fence is proposed to be constructed approximately three to five years following the commencement of the Project.
- The Mt Augustus Pest Exclusion Fence (~15 ha, Fig. 10). Located at the western extent of the Stockton Plateau with a fence length of approximately 1640 m. Approximately 40% of the proposed fence route is on existing roads and tracks. It is proposed to construct this fence in Years 4 – 6 following the commencement of the Project.
- The Whirlwind Rise Pest Exclusion Fence (~695 ha, Fig. 11). Located on the eastern extent of the Stockton Plateau, with a fence length of approximately 11,930 m. Approximately 75% of the proposed fence will be built on or alongside existing roads or tracks, with the remainder requiring earthworks to establish a suitable building platform. As the proposed fence cross a dissected stream, construction of several culverts will be required. Given that this is the largest fence proposed and to correspond with the extent of disturbance, it is proposed that the establishment of this fence occur around 10 years following the commencement of the BPCP.
    - *Note:* to fulfil the Cypress Mine Consent Conditions, Bathurst is now proposing a 14-ha pest exclusion fenced area built along the western edge of an engineered landform in the Cypress Mine area. The proposed pest exclusion fenced area in the rehabilitated Cypress mine site will be contiguous with the area of the 695 ha Whirlwind Rise pest exclusion fenced area proposed as compensation for the Project. When the Whirlwind Rise pest exclusion fenced area is built, the Cypress pest exclusion fenced areas will be incorporated into it to create a single 709 ha area.

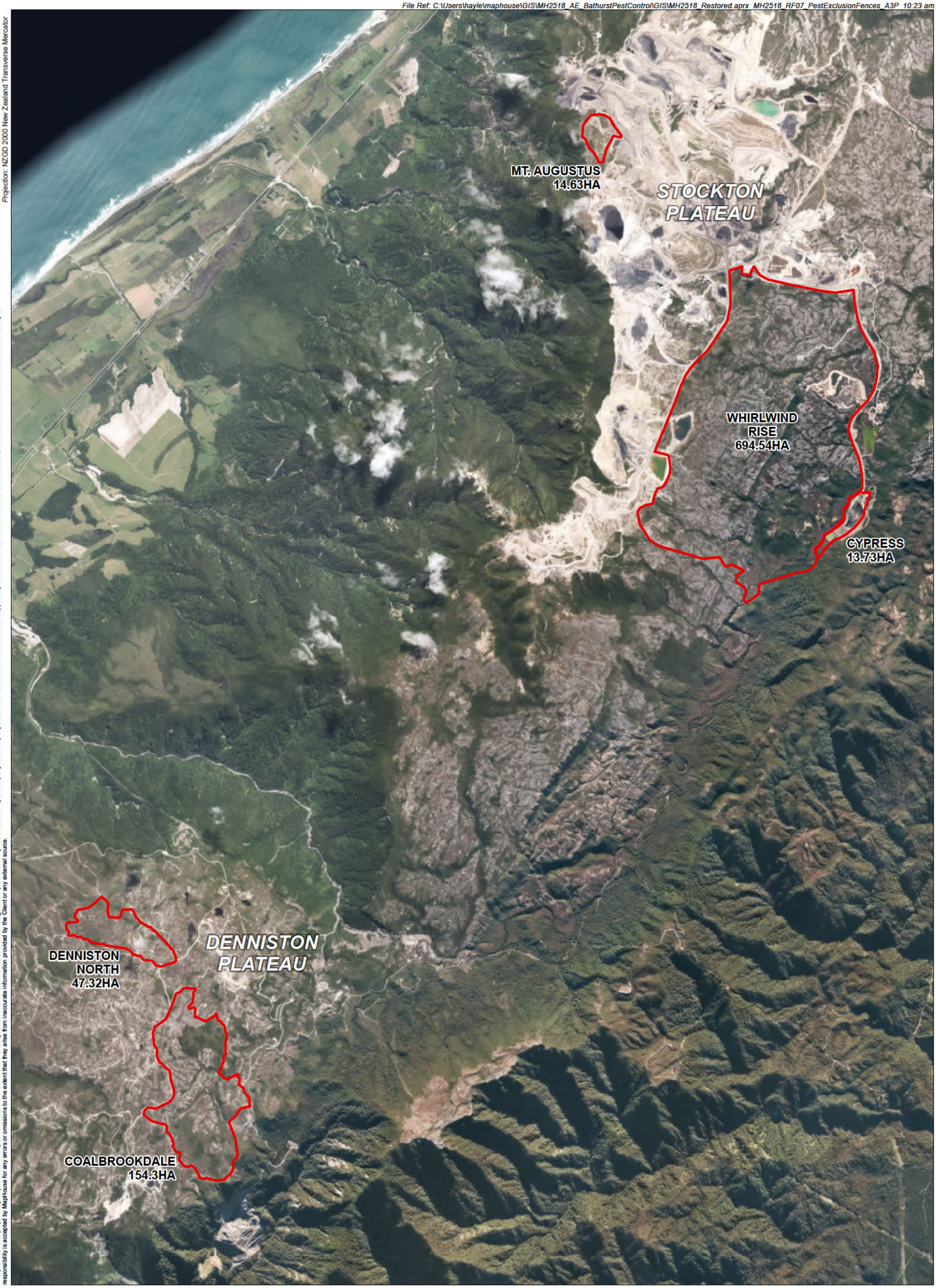
These fences will function as a long-term pest free area for 50 years (the expected maximum lifetime of the fence, which will allow for multiple protected life-cycles of native species).

2.2 Outline of Control

Within the fenced areas, the control regime is based on exclusion and eradication rather than ongoing suppression. Key components include:

- Complete eradication of introduced mammalian pests following fence completion.
- Removal and relocation of weka.
- Maintenance of a trap network around the outside of the fences, including near gates and high-risk sections for incursion response.
- Camera surveillance along the outside perimeter of the fence and via an internal network for enhanced incursion detection.
- The use of more advanced real-time detection technologies (e.g. CritterPic units and thermal AI cameras) to assist with rapid detection and responses to incursions.
- Deployment of conventional tracking tunnel lines and chew card deployments inside the fence to assist with detection of any incursions.
- Maintaining fence integrity through routine inspections and rapid repair.
- Rapid-response protocols to locate and remove any detected incursions.

Projection: NZGD 2000 New Zealand Transverse Mercator



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Locations of the pest exclusion fences

BATHURST PEST CONTROL AND MANAGEMENT

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Alliance Ecology MapHouse

LEGEND

Pest exclusion fence

0 1 km

1:40,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ

Figure 7

Projection: NZGD 2000 New Zealand Transverse Mercator

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Denniston North fence location

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Alliance Ecology MapHouse

LEGEND

Pest exclusion fence

0 50 m

1:6,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ

Figure 8

Projection: NZGD 2000 New Zealand Transverse Mercator

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Coalbrookdale fence location

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Alliance Ecology MapHouse

LEGEND

Pest exclusion fence

0 50 m

1:7,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ

Figure 9

Projection: NZGD 2000 New Zealand Transverse Mercator

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Mt. Augustus fence location

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Alliance Ecology MapHouse

LEGEND

Pest exclusion fence

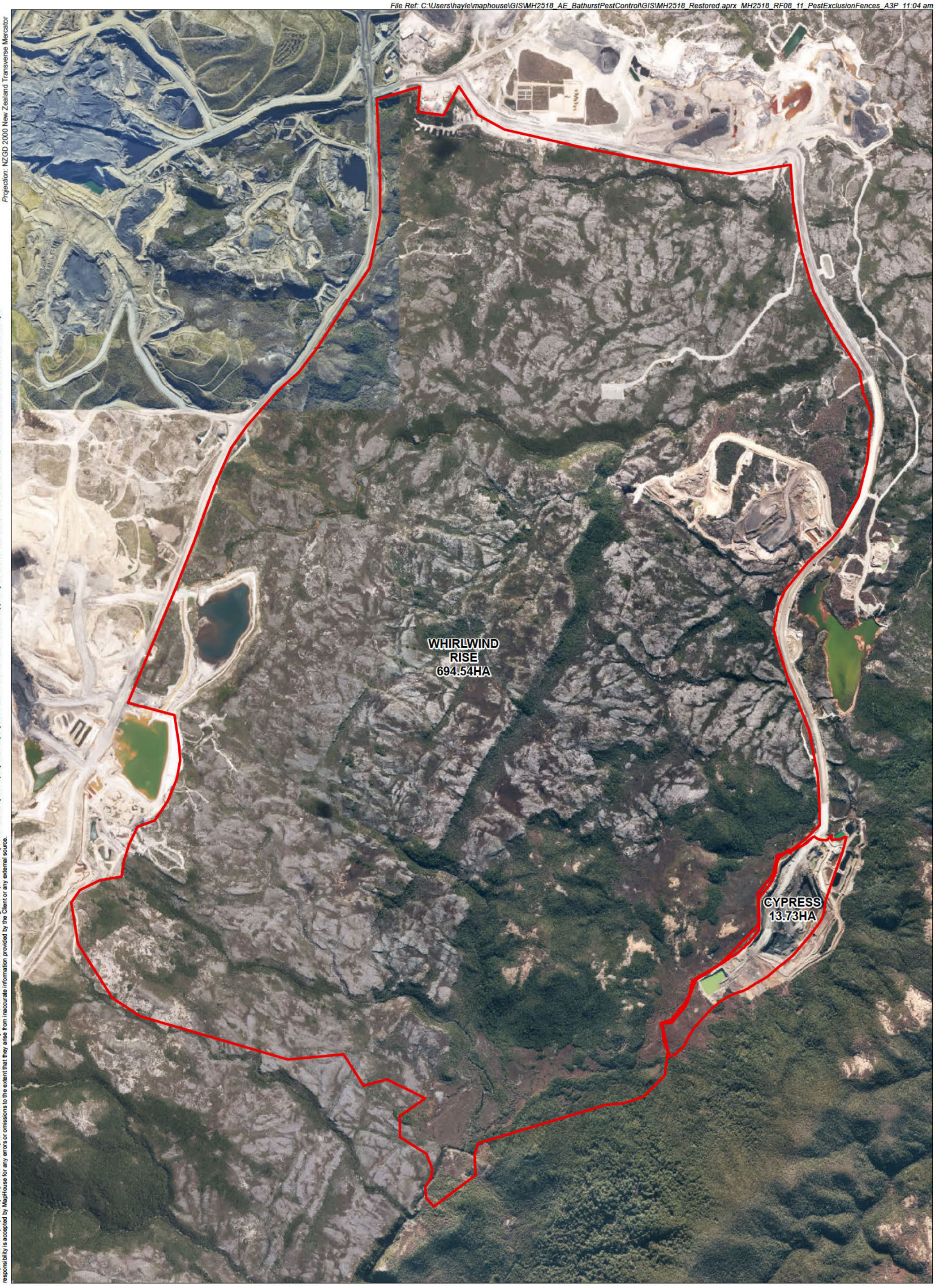
0 50 m

1:2,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ

Figure 10

Projection: NZGD 2000 New Zealand Transverse Mercator



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Whirlwind Rise fence location

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Alliance Ecology MapHouse

LEGEND

Pest exclusion fence

0 50 m

1:12,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ

Figure 11

2.3 Pest Fence Design and Construction

A full height pest exclusion fence is a fence designed and built to exclude the full range of introduced predators and browsers (typically including mice, rats, mustelids, possums, feral cats, hedgehogs, rabbits, hares, deer, pigs and goats). Multiple different fence designs exist, and designs have been refined over the years, with substantial learnings from earlier fences contributing to optimisation of current designs.

Existing ring-fenced sanctuaries (a fence that fully surrounds an area, as is proposed for here) include: Maungatautari (3,2404 ha), Wairakei Golf Course (180 ha), Rotokare Scenic Reserve (230 ha), Bushy Park (98 ha), Brook Waimarama Sanctuary (690 ha), Zealandia (225 ha), Orokonui Ecosanctuary (370 ha), the kiwi crèche at Lake Opouahi (40 ha), Warrenheip (16 ha), Macraes Flat 1 and 2 (22 and 11 ha) and Driving Creek Wildlife Sanctuary (1.5 ha).

Specifications and design details for the fences proposed here are provided in the Fence Feasibility Plan (Pestproof Fences Ltd, 2025), provided as **Appendix A**. A brief summary is provided in this section.

Five full height pest exclusion fences will be constructed on the proposed routes presented in Fig. 8 - 11. Note that minor alterations to the location of the fence lines may be required during the building process (e.g. to avoid historical features), but these are expected to be minimal and Pestproof Fences Ltd have walked the proposed fenceline locations to ensure they are able to be constructed (**see Appendix A**).

Figure 12: A full height pest exclusion fence (as constructed by Pestproof Fences Ltd)

The current 'best practice' design for these fences consists of a fence height of 1.9 - 2 m off the ground (see Fig. 12). Wire mesh is attached to wooden posts and a wide horizontal mesh skirt facing outwards, extending no less than 400 mm from the base of the fence, is pinned 50–100 mm underground. A folded and/or rolled sheet steel hood is mounted on top of the mesh, which extends 250–350 mm horizontally towards the outside of the protected area. These specifications are beyond the jumping ability of medium to large mammals (such as feral cats and possums) and also prevent animals from digging or burrowing under it. As mice are also being excluded, the aperture size of the mesh must be 6 mm or less across one dimension. (the smallest aperture any adult or juvenile mouse can fit through: Bell, 2014).

Earthworks will be required to clear a path for the fence and provide a solid foundation and vehicle access for inspection and maintenance. At least 5 m of open ground on the outside of the fence is also required to ensure predators are unable to jump inside with the aid of surrounding vegetation. Substantial efforts have been made during assessments on fenceline locations to ensure the use of

existing (or proposed) tracks and roads to reduce the amount of disturbance required for the fence build.

2.4 Eradication methodology

Following fence construction, eradication of all target species will occur. The methodology outlined in this section presents the currently recommended regime for eradication based on other successful projects, however, it is possible the specifics of these methods may vary following further consultation once the Project has commenced.

2.4.1 Pre eradication requirements

Before undertaking eradications inside the fenced cells, a formal pre-eradication planning and approvals phase consistent with New Zealand Hazardous Substances and New Organisms Act (HSNO) and Environmental Protection Authority (EPA) requirements will occur. In New Zealand, brodifacoum cereal bait for eradication (e.g., Pestoff Rodent Bait 20R) can only be applied in accordance with Operating Plan 63 (OP-63), which is a Ministry of Primary Industry (MPI) -approved operational framework that sets the legal and technical conditions for aerial or hand-broadcast brodifacoum use in eradication programmes. EPA approval conditions specify that any use of Pestoff 20R must follow OP-63 at all times (including bait preparation, pre-feed requirements, application method, sowing rates, carcass/non-target mitigation, signage, monitoring, and reporting).

Accordingly, prior to eradication the following will be prepared:

1) a site-specific eradication plan that explicitly references OP-63 and adapts its requirements to each fenced cell (including biosecurity layout, baiting method, timing window, monitoring design, non-target risk mitigation, carcass search/management, and contingency response);
2) secure all required permissions to lay vertebrate toxic agents (which on public conservation land requires a DOC (Department of Conservation) animal-pest-control permission/permit and adherence to DOC National Performance Standards for Pest Operations and signage/public-notification rules); and
3) complete a documented risk assessment under HSNO and health-and-safety frameworks, including exposure pathways for non-targets (e.g., kea, raptors, weka), bait-spillage prevention, and waste/carcass disposal.

Finally, OP-63 eradications are expected to be supported by a robust pre-eradication baseline and readiness check. This includes confirming the pest suite present (rodents, possums, mustelids, cats, pigs/ungulates if relevant), establishing pre-operation monitoring indices, and ensuring fence integrity and incursion-response capacity are in place before toxins are deployed. Because brodifacoum is highly effective but environmentally persistent, DOC and national reviews emphasise that its mainland use should be tightly planned, time-limited, and justified by eradication objectives rather than routine maintenance—making OP-63 alignment and strong pre-eradication preparation especially important in fenced sanctuaries.

2.4.2 Toxin use

Brodifacoum is the most widely used toxicant for eradications in New Zealand, and the most successful at eradicating mice (Broome et al., 2017). Brodifacoum is the most widely used toxicant for eradications in New Zealand, and of the 12 projects that aerially applied brodifacoum in accordance with DOC standards, all 12 (100%) were successful at eradicating mice (Broome et al., 2017). Successful mouse eradications include much larger areas such as Enderby Island (710 ha), as well as mainland ring-fenced sanctuaries such as the smaller cells of Maungatautari (35 ha and 60 ha), and Rotokare Scenic Reserve (which is 230 ha and surrounded by an 8.2 km-long fence completed in 2008, a comparable length to the proposed 7.6 km of the Mammalian Pest Exclusion Area).

Eradications will occur either via aerial delivery (for the larger fenced areas) or for smaller fenced areas via a ground based bait station network spaced 25 x 25 m apart (to target mice, as per Bowie et al., 2011; Thomas & Taylor, 2002), containing brodifacoum. Baits will be applied in late winter/early spring (between 1 June and 1 November) when bait uptake by rodents is highest (Speedy et al., 2007).

As per current DOC best practice (Broome et al., 2017), and per the protocol which was successful for the pest mammal eradications on Motutapu/Rangitoto (Griffiths et al., 2014; Griffiths & Towns, 2008), toxic bait will be applied in up to three separate applications at least 14 days apart, at a rate of 8 kg/ha. The bait proposed for use is 10 mm (2 g) Pestoff 20R rodent bait containing brodifacoum at 20 parts per million (ppm). If aerial techniques are used, bait will be applied along parallel flight lines guided by GPS and spaced to 50% of the effective swath width produced by the sowing bucket (i.e. swath overlaps of 50%). The orientation of flight lines will be different for each application.

The aerial bait applications will be accompanied by hand-spread baits immediately inside the fence to ensure complete coverage, along with trapping, and ground-based bait stations where necessary. There is likely to be at least a 10 m buffer inside the fence boundary where aerial bait application will not be targeted to minimise the bait that falls outside of the fence. A follow-up on-the-ground hand operation will occur to a) hand-sow baits along the inside boundary of the fence where aerial bait application did not achieve the required application rate, and b) to collect bait that landed on the outside of the fence.

2.4.3 Weka removal and relocation

Upon completion of the fence, and prior to the brodifacoum operation, weka will be removed from the fenced areas and relocated into the surrounding landscape. This is outlined in the Avian Management Plan, BPCP-ENV-PLN-003, Bathurst Resources (2026), which details how weka will be removed and relocated from within the pest exclusion fences on the Denniston and Stockton Plateaux to protect snails and lizards and how weka will be monitored following relocation).

2.4.4 Potential non-target impacts

As outlined in Section 2.4.1, a detailed non-target risk assessment for each pest exclusion fenced area will be undertaken as part of the OP-63 approval process. Brodifacoum is a second-generation anticoagulant with known persistence in vertebrate tissues, and its environmental behaviour has been extensively studied in New Zealand, particularly following island eradication programmes (Eason et al., 2002; Fisher et al., 2011).

The primary non-target risks associated with brodifacoum relate to secondary poisoning of non-target vertebrates, particularly scavenging or predatory species that consume contaminated rodents. In New Zealand, documented non-target impacts have most commonly involved raptors (e.g. harrier hawks) and omnivorous birds, rather than insectivorous species, reflecting exposure pathways via contaminated carcasses rather than invertebrate prey (Eason et al., 2002; Fisher et al., 2011). Secondary exposure risk is therefore greatest immediately following bait application, when poisoned rodents are most available.

Invertebrates are not physiologically susceptible to anticoagulant poisoning due to their open circulatory systems; however, residues can be detected in invertebrates that have consumed bait or carcasses (Booth et al., 2003). Empirical studies in New Zealand have shown that these residues are generally low, transient, and decline over time, and that population-level impacts on invertebrates or insectivorous birds are rarely observed when best-practice application methods are followed (Hoare & Hare, 2006; Fisher et al., 2011). This is particularly relevant in the context of fenced eradication operations, where bait application is time-limited and spatially contained, reducing long-term exposure pathways.

Non-target risks to reptiles and amphibians are considered low, with limited evidence of direct toxic effects; however, indirect exposure pathways (e.g. ingestion of contaminated invertebrates) remain a consideration and are addressed through monitoring and mitigation (Fisher et al., 2011). Similarly, risks to aquatic environments are generally low where bait is applied according to best practice, although care is required to avoid contamination of waterways, particularly in sensitive wetland environments.

Importantly, the proposed use of brodifacoum within the fenced areas is limited to a short-term eradication phase, followed by long-term biosecurity surveillance and targeted response, rather than repeated broadcast application. This approach substantially reduces cumulative environmental exposure compared with ongoing suppression regimes, which can result in repeated toxin inputs over time (Eason et al., 2002).

When considered in an ecological context, the risks associated with controlled brodifacoum use must be weighed against the well-documented impacts of introduced mammalian predators. The temporary and managed risks associated with a single eradication operation are considered proportionate to the substantial and enduring biodiversity gains achieved through predator removal.

A suite of mitigation measures (see following section) will be implemented to minimise non-target impacts. These measures, combined with the one-off nature of the eradication phase, are expected to reduce non-target risks to a low and acceptable level.

2.4.5 Risk Mitigation

To address potential persistence and secondary exposure pathways, the following mitigation measures will be implemented:

1. Single-Pulse Eradication Design

Brodifacoum will be used as part of a defined eradication phase within fenced areas, rather than as a recurring control tool. Limiting application to a one-off eradication substantially reduces cumulative environmental loading and long-term residue presence (Eason et al., 2002).

2. Application Timing

Operations will be timed outside peak breeding seasons for sensitive non-target species where practicable, reducing potential demographic impacts from any short-term exposure.

3. Carcass Monitoring and Removal

Where feasible, carcasses of target species will be monitored and removed in high-use areas to reduce secondary exposure pathways, particularly for scavenging birds.

4. Bait Formulation and Placement Controls

Approved bait formulations and application methods consistent with current New Zealand best practice will be used to optimise target uptake and minimise bait availability to non-target fauna (Eason & Spurr, 1995).

5. Post-Operation Monitoring

Monitoring will include:

- Residual pest detection
- Opportunistic monitoring of non-target mortality
- Assessment of key indicator species

New Zealand eradication programmes have consistently demonstrated recovery of invertebrate and bird communities following short-term post-application effects, with no evidence of sustained population-level declines in insectivorous birds where operations were conducted according to best practice (Fisher et al., 2011; Hoare & Hare, 2006).

6. Long-Term Benefit Context

Complete eradication of rats, stoats and possums removes chronic predation and browsing pressure. Sustained pest-free conditions reduce the need for repeated toxin applications and provide enduring biodiversity gains for species highly vulnerable to predation, including kiwi and Powelliphanta snails (McLennan et al., 1996; Walker, 2003; Norton & Warburton, 2015).

2.4.6 Trapping grids

A permanent trapping grid will be established within and surrounding all fenced areas (see Figures 13 - 16) prior to the bait application occurring. This grid will serve two purposes: firstly, to help with the eradication efforts, and secondly to provide for a permanent control infrastructure which can be left in place for monitoring and incursion response purposes. Traps will also be placed on the outside perimeter of the fences to intercept pests which may approach the fence and run along the fenceline looking for entry points.

Commencing with the first application of bait, the trapping grid will be activated and run continuously until no target pests have been trapped for a period of three months, after which time the trapping effort will be reduced). The trapping grid for rats, mustelids and hedgehogs will use a variety of trap types to account for the phobic behaviour some individuals may have towards a certain trap type. This will include DOC 200 and 250 traps in wooden tunnels (both run through and single set), or new

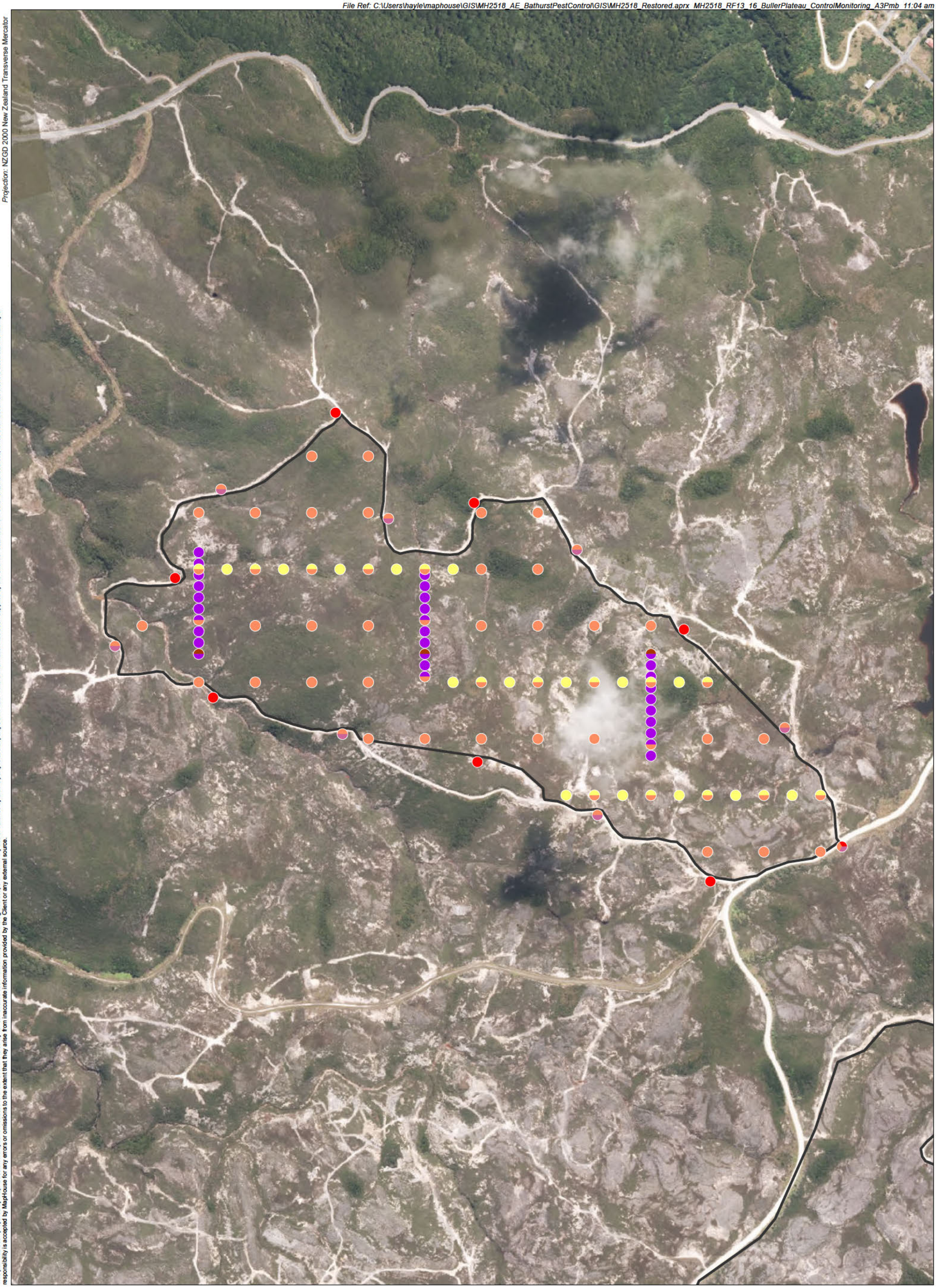
resetting traps with remote notifications (e.g. AT220, CSL Multi-trap.) If possums and feral cats need to be targeted, this will be via live-capture or kill-traps (e.g. SA Kat traps, Flipping Timmy traps or CSL Multi-traps, AT220 for possums only). Some traps are capable of capturing the full range of target species including mice (e.g. the CSL Multi-trap). In sites containing lizards it is also important to avoid using rodent traps (e.g. snap traps), which may put lizards at risk.

A variety of lures will be used in traps that are appropriate for the target species, and the lure type swapped regularly. Lure types include:

- For resetting traps (e.g. AT220 and CSL Mult-trap), these come with auto-dispensing lure systems;
- Standalone lure dispensing systems (e.g. EzyLure or ZIP lures) can be fitted to any other traps to allow for constant lure refreshment;
- For rats: fresh hens' eggs (as a visual cue, to be combined with a food scent), peanut butter, fresh rabbit, salted rabbit, chocolate, macadamia nuts, Eggsellent lure;
- For stoats: fresh hens' eggs (as a visual cue, to be combined with a food scent), fresh rabbit, salted rabbit, fresh stoat bedding (as a trial), Eggsellent lure;
- For possums: apple, cinnamon, possum dough, 'smooth in a tube', PoaUku long-life possum lure, Eggsellent lure, a white blaze of flour and icing sugar beneath tree-mounted traps (as a visual cue); and
- For cats: fresh rabbit, cat biscuits, fish, Eggsellent lure.

All traps will be checked weekly during the first three months post eradication, including resetting traps as required and refreshing any fresh food based lure on each trap check.

Projection: NZGD 2000 New Zealand Transverse Mercator



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Denniston North pest exclusion fence control and monitoring infrastructure

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Pest exclusion fence
- Fence camera (outside)
- Trail camera
- Chew card
- Tracking tunnel
- Rodent trap
- Mustelid trap
- Cat trap

0 50 m

1:6,000 @ A3

Data Sources: Alliance Ecology, Eagle Technology, LINZ

Figure 13

Projection: NZGD 2000 New Zealand Transverse Mercator

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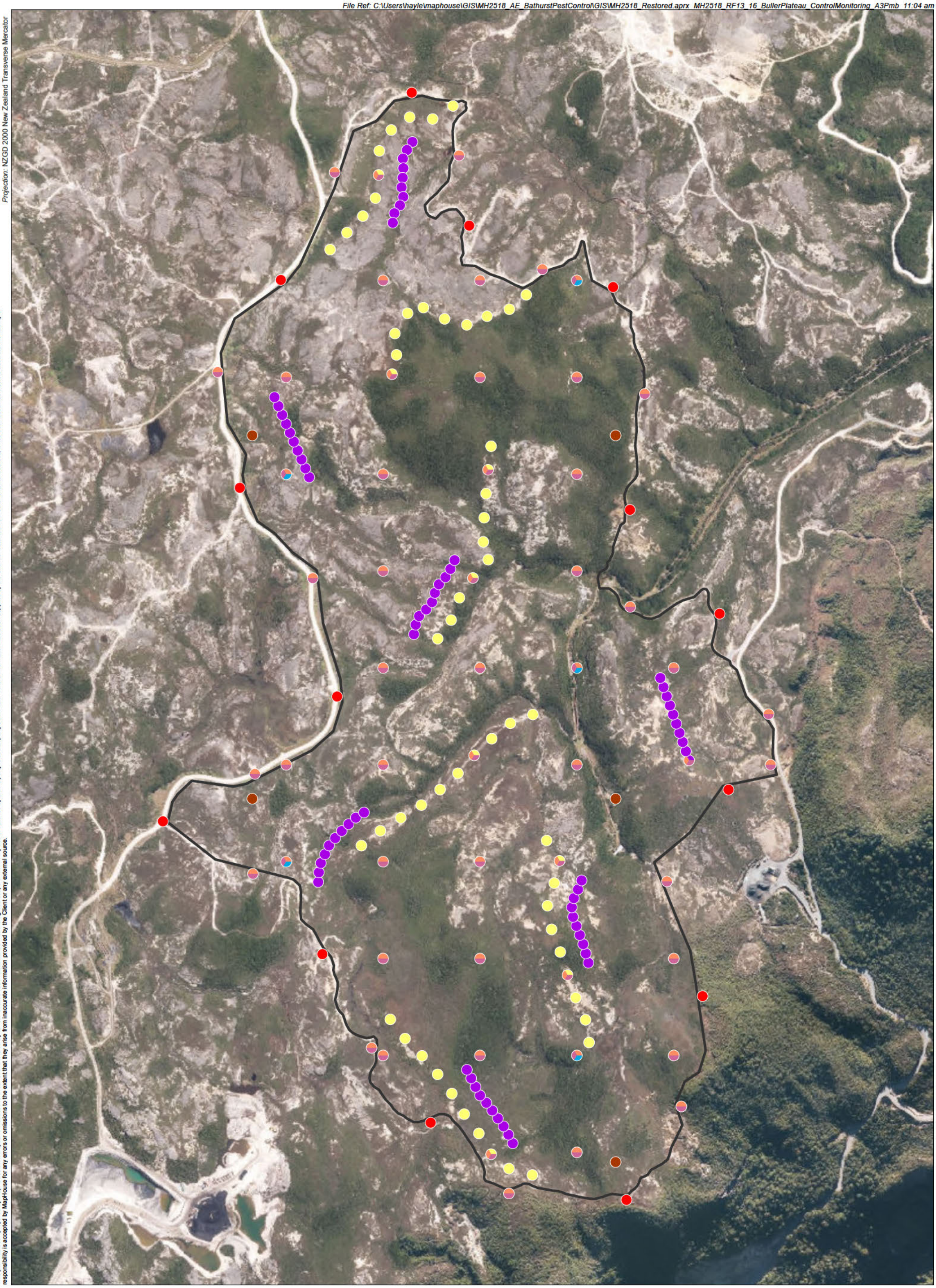

Coalbrookdale pest exclusion fence control and monitoring infrastructure

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Pest exclusion fence
- Fence camera (outside)
- Trail camera
- Chew card
- Tracking tunnel
- Rodent trap
- Mustelid trap
- Cat trap

Data Sources: Alliance Ecology, Eagle Technology, LINZ

0 50 m

1:7,000 @ A3

Figure 14

Projection: NZGD 2000 New Zealand Transverse Mercator

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Mt. Augustus pest exclusion fence control and monitoring infrastructure

BATHURST PEST CONTROL AND MANAGEMENT

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Alliance Ecology MapHouse

LEGEND

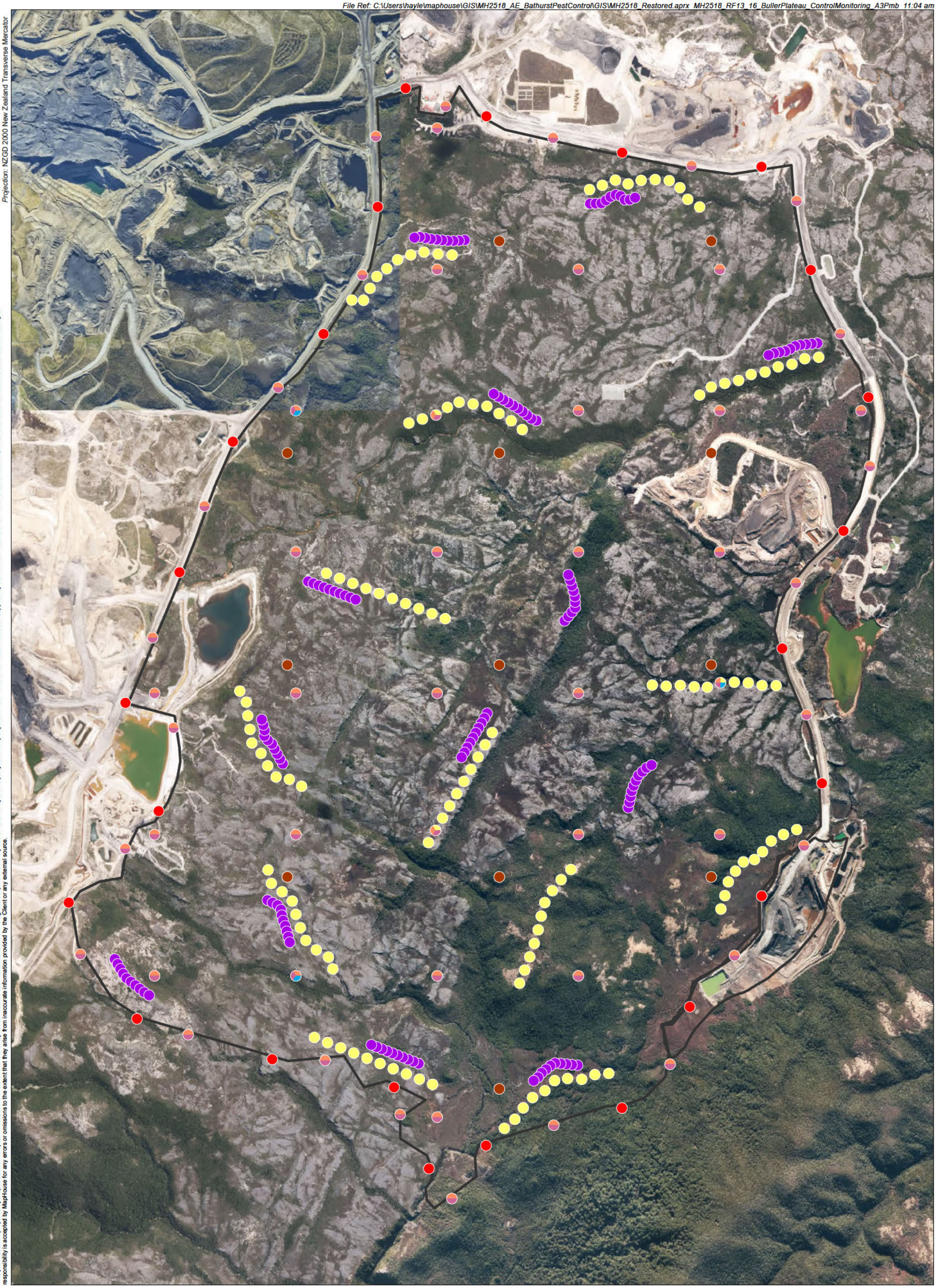
- Pest exclusion fence
- Fence camera (outside)
- Trail camera
- Chew card
- Tracking tunnel
- Rodent trap
- Mustelid trap
- Cat trap

Data Sources: Alliance Ecology, Eagle Technology, LINZ

0 50 m

1:2,000 @ A3

Figure 15



Projection: NZGD 2000 New Zealand Transverse Mercator

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Whirlwind Rise pest exclusion fence control and monitoring infrastructure

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Pest exclusion fence
- Fence camera (outside)
- Trail camera
- Chew card
- Tracking tunnel
- Rodent trap
- Mustelid trap
- Cat trap

0 150 m

1:12,000 @ A3

Data Sources: Alliance Ecology, Eagle Technology, LINZ

Figure 16

2.4.7 Mop-up phase

In the mop-up phase, eradication survivors will be detected via an intensive monitoring regime, including chew cards (for rodents and possums), tracking tunnels (for rats, mice, and hedgehogs), and camera traps (for rodents, possums, mustelids, cats, and ungulates). The locations of monitoring devices are shown in Figs. 13 - 16. For details on monitoring methods see Section 6.

Any surviving cats, possums and or rabbits/hares will be shot during spotlighting operations. Thermal scopes will be used to assist with locating any survivors. Trained predator detection dogs will also be required in follow up work to assist in detecting the presence of surviving pests. Detection dogs may be used following brodifacoum operations; however, their deployment will be subject to an appropriate stand-down period to minimise the risk of primary or secondary poisoning. Dogs will not be used while bait remains in the field or where carcasses are likely to be present, and any use will be undertaken in accordance with Department of Conservation best-practice guidelines for working dogs in toxin-treated areas.

Detection of any remaining pests will initiate a targeted response. The removal techniques used will depend on the species and will be selected from a wide repertoire of options depending on the species, the location/habitat type, and the other methods previously utilised. Options include live-capture traps, intensive trapping, toxic bait pulses at a high device density, shooting (including using thermal scopes), and pest detection dogs. For example, if a mouse or rat is detected a 15 × 15 m grid of bait stations will be activated, covering a 200 × 200 m area around the location of the detection, as per the methods of Watts et al (2022).

2.4.8 Ongoing Maintenance, Surveillance, and Detection Post Eradication

The threat of reinvasion by pest mammals into pest-proof fenced sites means that monitoring to detect such events is a key activity. Other management specifically associated with pest-proof fences includes the need to maintain both the condition of the fences and vegetation clearance around them. Although pest-proof fences are generally constructed of durable materials with a long life expectancy (Day and MacGibbon 2007) - even in coastal environments, e.g., marine grade stainless steel mesh - the fences require regular and frequent inspections to ensure all parts of the fence retain their pest-proof capability. However, most sanctuary managers consider incursions to be a rare event (Bell, 2014).

For most existing ring sanctuaries the main cause of incursion is through fence damage, such as due to wear and tear causing a wire to break forming a hole, or following a storm that may cause the grates on waterways to be blocked or a tree to fall on top of the fence (Bell, 2014). With this in mind, an intensive fence check should occur every month (as per Maungatautari: Bell, 2014), and following any events that may cause damage to the fence or surrounding vegetation (e.g. storms, heavy rain, and/or high winds), An automatic, instantaneous alert system will be fitted which will provide alerts if the fence experiences a major breach, such as a tree falling on top of the fence or a stream culvert gate is held open.

A permanent trap network will be maintained outside the fence and these traps are to be checked in line with fence checks. If a remote notification system is used on these traps, this checking interval can be reduced. Lures will also be replaced at least monthly (unless a long-life lure or dispensing system is used).

Automated surveillance and detection tools (e.g. thermal cameras with real-time notifications) will be employed inside the fence to provide instant notifications and alerts of pest breaches. In addition, conventional pest monitoring will occur quarterly, and further monitoring and control infrastructure will be deployed inside the fence following any breach or suspected incursion. Grass and weeds growing around the base of the fence will be regularly controlled to prevent them compromising fence effectiveness.

2.4.9 Advanced surveillance technologies

Significant investment has recently been directed toward the development and deployment of new wildlife monitoring technologies in New Zealand, particularly thermal imaging systems, artificial-intelligence-enabled camera traps, and automated monitoring platforms. These technologies are being actively developed and trialled as part of national predator control programmes such as Predator Free 2050, which funds research and innovation aimed at improving detection and management of invasive predators (Department of Conservation, 2024). Camera traps and associated artificial-intelligence tools are now widely used in New Zealand conservation monitoring to detect pest species and assess predator control outcomes, while new thermal and machine-vision cameras are capable of detecting predators more sensitively than conventional trail cameras (Manaaki Whenua – Landcare Research, 2023; Predator Free NZ Trust, 2024). In parallel, conservation groups are increasingly trialling smart trap networks and remote monitoring systems that transmit real-time data from traps and sensors, reflecting growing investment in technology-driven predator management across the country (Radio New Zealand, 2024).

Many of these more advanced technologies have higher rates of detection than conventional tools (Blackie et al. *in press*), and if they are deployed with their associated communications network provide for real-time surveillance. Trials in New Zealand have demonstrated that thermal (heat) camera systems can achieve substantially higher detection rates (being 3 – 3.5 times more sensitive) than conventional motion-triggered trail cameras, particularly for cryptic and fast-moving predators. (Ross & Ryan, 2019).

Tools such as CritterPic™ and OWL™ cameras (Fig. 17), have the advantage of operating continuously for longer periods (3 – 6 months) while providing real-time image updates of smaller species, including rodents and lizards. Trials in Australia of CritterPic units have demonstrated higher detection rates versus conventional cameras (Blackie et al. *in press*). These newer tools should be integrated as part of an adaptive management surveillance tool to account for faster detections of pest incursions and allow for more rapid management actions to address them.

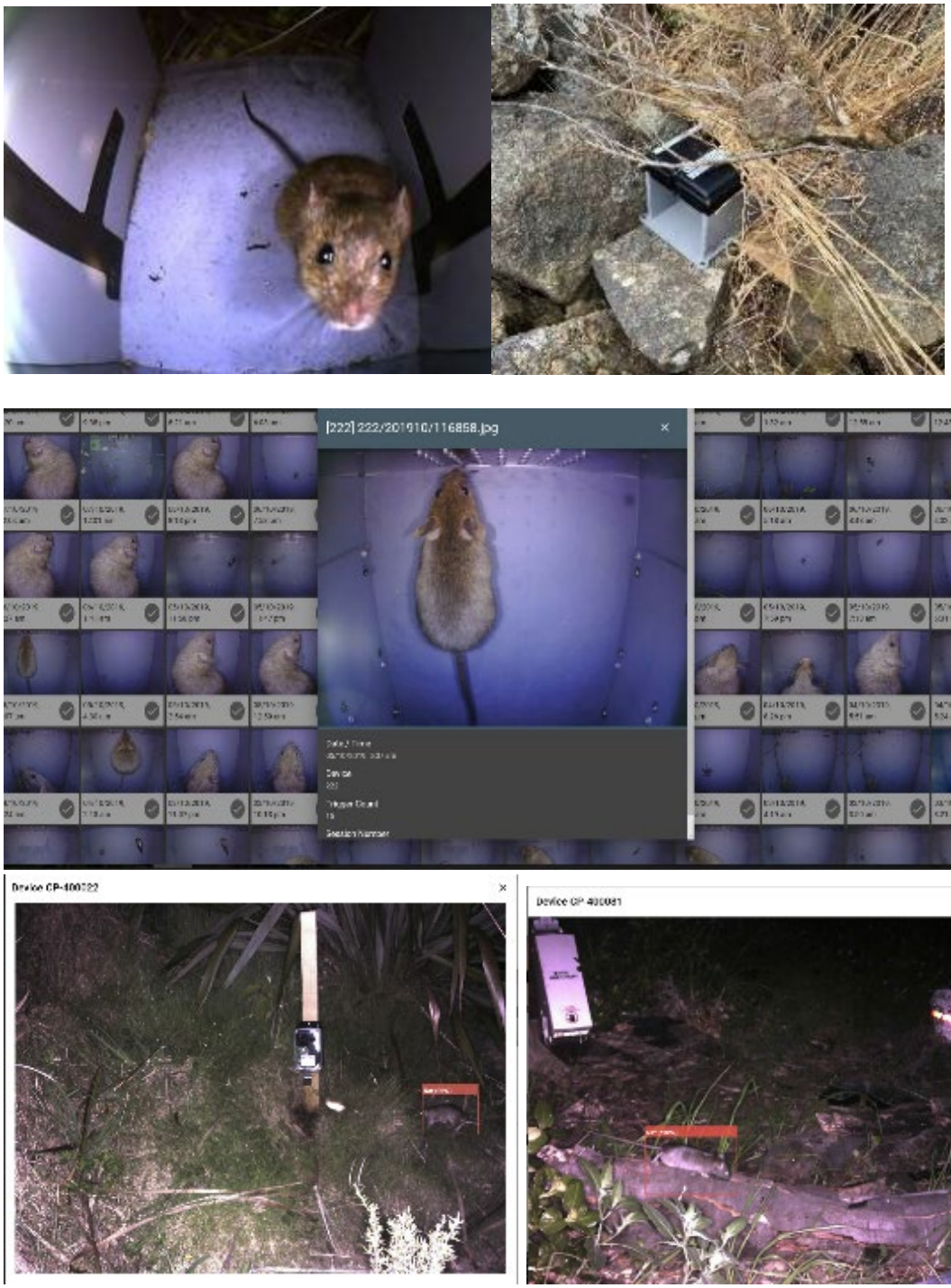


Figure 17: Newer pest detection and surveillance tools should be considered for use as part of adaptive management as they provide for more rapid pest detection and responses. Example images of mice detection from CritterPic™ units (top two rows of images) deployed in the field, and real-time rat detections (bottom images, see detection and identification in red boxes) from thermally triggered OWL™ cameras during landscape elimination projects

2.4.10 Mouse eradication and reinvasion management

Mice are widely recognised as the most challenging mammalian pest species to exclude from predator-proof fences due to their small body size, high reproductive capacity, and ability to exploit very small defects or breaches. Consequently, they are often considered the species most likely to reinvade fenced sanctuaries. However, more than two decades of experience from New Zealand pest-exclusion projects demonstrates that mouse incursions do not necessarily compromise the effectiveness of fenced sanctuaries, and in many instances mouse reinvasions can rapidly be addressed before any impact on biodiversity (Turner & Norbury, 2023). Modern predator-exclusion fences are designed to operate as part of an integrated biosecurity system incorporating surveillance, rapid-response capability, and ongoing maintenance. Under this approach, incursions are treated as manageable biosecurity events rather than evidence of fence failure, and can be detected and eradicated before populations become established or cause significant biodiversity impacts.

The Mokomoko fenced sanctuary provides one of New Zealand's strongest contemporary examples of successful long-term mouse exclusion. In June 2026 the sanctuary reported that it had remained mouse-free for more than four years, despite high mouse pressure in surrounding habitats, with ongoing surveillance continuing to detect no evidence of mouse presence (Central Otago Ecological Trust, 2026). This finding is particularly significant because mice are frequently cited as the most difficult mammalian pest species to exclude from mainland sanctuaries and are recognised predators of indigenous lizards and invertebrates. The Mokomoko results demonstrate that modern pest-exclusion fences, when combined with rigorous surveillance and maintenance programmes, are capable of maintaining mouse-free conditions over extended periods while simultaneously delivering substantial biodiversity gains.

While mice remain the most technically challenging mammalian pest species to exclude from fenced sanctuaries, the available New Zealand evidence demonstrates that long-term exclusion is achievable and that occasional incursions can be effectively detected and eradicated before they become established (Innes et al., 2012; Burns et al., 2012, Turner & Norbury, 2023). The risk of mouse reinvasion therefore does not undermine the ecological value of pest-exclusion fencing; rather, it reinforces the importance of robust surveillance, maintenance, and rapid-response protocols as core components of fence management. Experience from sites such as Mokomoko demonstrates that well-managed predator-exclusion fences can maintain near-zero predator abundance over extended periods, providing levels of protection for highly predator-sensitive taxa that are difficult or impossible to achieve through conventional suppression alone.

2.4.11 Incursion response

An incursion response plan will be developed for the fenced areas following their establishment. The response plan will contain the names and contact details of the key personnel to be alerted following a breach or suspected breach, where all the equipment is located, and the steps to follow. A copy of the response plan will be kept on site.

A breach may be detected during routine pest monitoring inside the fence (e.g. on camera or on chew cards), or via observation of any sign of target pests (e.g. prints or scat). A suspected breach may occur if the fence is damaged (e.g. following a storm, tree fall, or blocked water gate). The incursion response plan will therefore be based on the following steps:

1. **Ensure all key personnel are alerted and initiate these response protocols;**
2. **Determine the target pest(s) present, the number of individuals, and their approximate location within the fenced area.** This may involve deploying cameras, chew cards, tracking tunnels, live capture traps, and smart surveillance technology (e.g. Artificially Intelligent (AI) traps and smart AI cameras) throughout the fenced area. Species-specific detector dogs may also be used to locate and kill the invading target individual(s)
3. **Determine the location of breach/pathway of entry, and immediately fix any breaches in the fence (simultaneously with Step 2).** This will involve a detailed inspection of the fence, including all access gates and water gates, proximity of surrounding trees to the fence (e.g. overhanging branches or fallen trees), potential burrows or erosion around the base of the fence, holes in the fence mesh, and any damage to the top wire and hood of the fence. The automated alert system will also be reviewed for locations of any breaches;
4. **Deploy a variety of control tools, appropriate to the target species and the number of individuals suspected to be present**. Ongoing monitoring (initiated in Step 1) will help pinpoint effective locations for control efforts. Live-capture traps (and lures) will be checked daily, and kill traps (and lures) will be checked every 3 days. All traps will be GPS recorded, and good data management and recording practices in place. Control devices/techniques may include:
   - Rats – Live capture traps, appropriate kill traps, rodent detection dogs, localised toxic control;
   - Mice – Mouse capable traps at very high density (e.g. a 25 x 25 m grid) within a localised area (defined based on monitoring results), and lured with a range of lure types). Note that these traps must be low risk to non-targets (including lizards) Toxic control if appropriate (noting substantial monitoring efforts will be required to determine if the target individual is still present);
   - Possums – Live capture traps, appropriate kill traps, possum detection dogs, night shooting (spotlighting);
   - Hedgehogs – Live capture traps, kill traps;
   - Mustelids – Live capture traps, kill traps (with a wide variety of lure types), mustelid detection dogs;
   - Feral cats – Live capture traps, kill traps (e.g. SA2 Kat traps, SA Coni Traps, Timms traps), night shooting;
   - Rabbits/Hares – Night shooting operations (spotlighting).
   - Weka – as per the Avian management plan, BPCP-ENV-PLN-OO3 (Bathurst Resources Ltd, 2026).
5. **Monitor to ensure all invading individuals have been eliminated.** Monitor for up to one month once all individuals are believed to have been eliminated (e.g. confirmed via carcasses in traps or following shooting) and no further sign has been observed. Monitor for

at least three months if toxic methods have been used (i.e. 3 months since the last known sign was observed); and

6. **Report the results, and any lessons learned** (i.e. the cause of the breach, what was successful and unsuccessful, and any improvements to pest management practices).

Once an incursion has been detected or is suspected, these steps and an on-the-ground response initiated within 48 hours. Sufficient control tools, equipment and personnel resources must be in place to allow a rapid response (e.g. unset traps and monitoring equipment either deployed inside the fence or in storage nearby, contacts for suitably qualified contractors or personnel capable of conducting shooting operations).

2.5 Targets and Thresholds in Elimination Areas

Management targets in pest control relate to the "maximum allowable residual pest abundance targets" which allow native species to recover (Brown et al., 2015). That is, the management target for each species is the ideal goal that the control actions aim to achieve. The target pest densities within the full-height pest exclusion areas are 0% (Table 4). If at any stage a reinvasion or survivor is detected the incursion response plan will be initiated (see previous section).

Table 5: Pest targets and thresholds within the Full Height Exclusion Fenced areas of the Buller Plateaux

Pest Species	Management Target	Threshold	Monitoring frequency
Mammalian Pest Exclusion Fenced Areas			
All (rats, mice, weasels, stoats, ferrets, possums, cats, hedgehogs, rabbits, hares and ungulates)	All target species: 0% density	Any detection initiate control	Ongoing via advanced surveillance cameras. Four times per year using a range of detection devices including but not limited to trail cameras, chew cards, tracking tunnels, kill and live capture traps. Monitoring must also occur immediately following events that could cause a breach, and following any suspected incursion.

2.6 Pest control and monitoring calendar

The 12-month calendar in Table 5 outlines management and monitoring activities within the pest exclusion fenced areas (post eradication) on the Buller Plateaux. Tasks are designed to maintain biosecurity, ensure fence integrity and sustain predator-free status.

During the monthly full fence inspection (of the entire perimeter) the fence should be checked for vegetation clearance and any required fence repairs. Vegetation encroaching on the fenceline should be trimmed. There should also be an internal track and gate inspection to ensure double-door entry

systems (if fitted) are functioning. All fence skirts should be assessed for erosion, animal diggings, and flood damage. Check flood gates and drainage points after heavy rain events. Carry out fence integrity audit before winter storms; repair wire strain and mesh damage. Check culverts, floodgates, and drains to ensure free flow. An annual full-fence integrity inspection and sign-off should be completed by a suitably experienced professional with knowledge of pest exclusion fence builds.

Table 6: Buller Plateaux Pest Exclusion Fenced Areas activity calendar

Task / Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Fence inspection & maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Surveillance cameras	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tracking tunnel monitoring		✓			✓			✓			✓	
Chew card monitoring		✓			✓			✓			✓	
Mop-up response (if detection occurs)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fence and Biosecurity audit & reporting.												✓

3.0 Blackburn Pākihi Intensive Ground Control Area

3.1 Site Description

The Blackburn– Pākihi control area, covering approximately 1,505 ha (Fig. 18), occupies the north-eastern margin of the Stockton Plateau. The area is characterised by a complex terrain of upland forest and extensive Pākihi wetland systems, including peat bogs, shallow hollows, and scrub–grass mosaics. An overview of the habitat of this area is provided in the Residual Effects Report (Alliance Ecology, 2026a and Associated Appendix).

3.2 Pest Control Outline

The proposed control programme for the Blackburn Pākihi involves year-round pest suppression, integrating a trapping and bait-station network for rodents, mustelids, possums, and feral cats, as well as ungulate management. This will be supported by aerial 1080 operations. The aim of this approach is to provide a consistent, low-predator and browser environment required to support population recovery of great spotted kiwi, forest birds, and wetland specialists such as fernbird, while improving vegetation structure, wetland function, and overall ecosystem resilience across the Blackburn Pākihi landscape.

Central Pākihi wetlands are expected to support lower densities of some mammalian pests than adjacent forest and shrubland, due to their open, waterlogged and nutrient-poor character. However, Pākihi margins, shrub islands and internal ridges can act as predator travel corridors (evidence of ungulate travel routes, for example, is provided in the Alliance Ecology (2026a) Residual Effects Report). Control and monitoring will therefore be concentrated on these ecotones and features, while minimising disturbance to the wettest central areas.

Key components of work include:

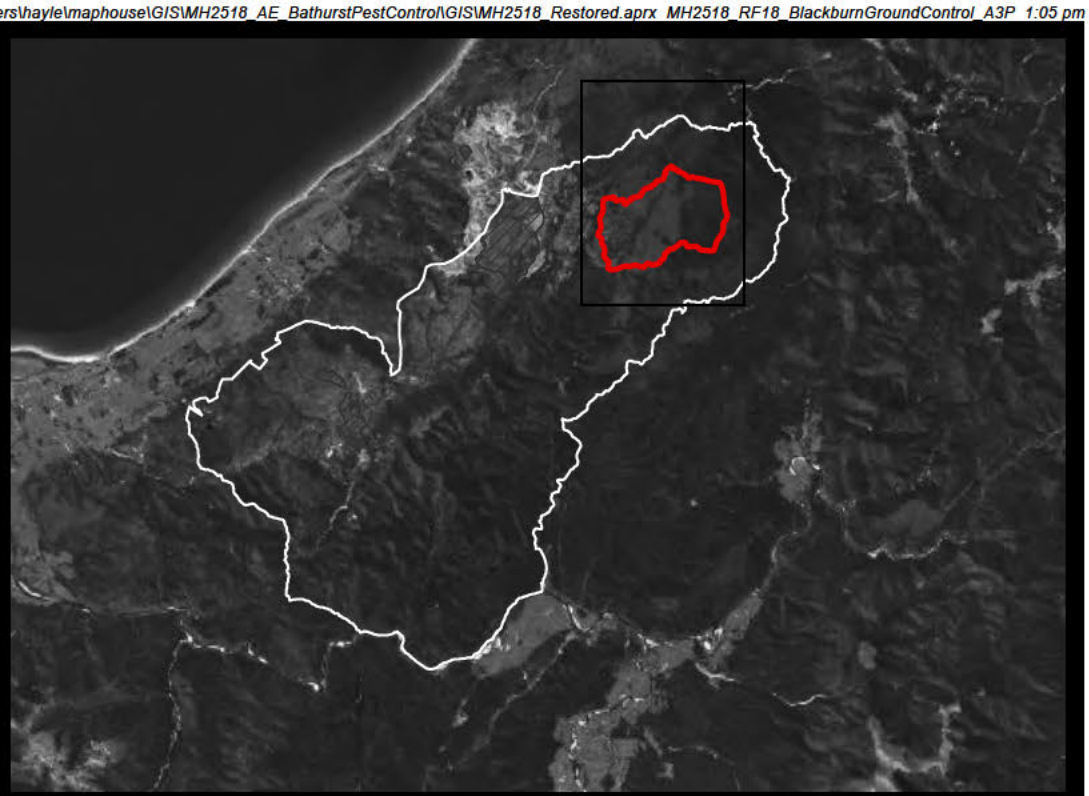
- Stoat and mustelid trapping spaced at 200 m along wetland edge and other key likely travel routes (ridges, rivers, tracks), with 800 m between lines.
- Rat and possum control using bait-station grids (100 - 150 m spacing in grids), as terrain allows, with seasonal and mast-responsive toxin pulses. Additional trap infilling if needed.
- Feral cat control (if detected during routine camera monitoring) using traps on roads, riverbeds and Pākihi margins at 600 m intervals.
- Ungulate control (red deer, goats, pigs) using aerial culling, ground hunting with dogs and thermal imaging.
- Chew card monitoring for rodents and possums, and trail camera monitoring for mustelids, cats and ungulates to guide adaptive management, target tracking and timing and intensity of bait-station operations.

The bait-station grid is consistent with established New Zealand best practice for intensive rat and possum control and is considered sufficient to ensure that individuals are within effective range of bait uptake across the management area (Pest Management Decision Support System, n.d.). When

combined with periodic aerial 1080 operations to achieve knockdown, this approach is expected to provide effective suppression of rat and possum populations within the Blackburn Pākihi area. While mice are not a primary management target, it is acknowledged that bait-station networks alone may be less effective at maintaining mice at very low densities due to their rapid population recovery and lower bait uptake (Innes et al., 2010; Ruscoe et al., 2011). The proposed mustelid trap network will also provide some incidental control of rodents; however, to increase operational resilience and align with integrated pest management principles, the inclusion of targeted trapping in high-risk areas (e.g. access routes, habitat edges, and identified activity hotspots) is recommended. This combined approach reduces reliance on toxins alone, provides redundancy in the control system, and represents a robust and defensible strategy for maintaining low pest densities over time.

Note: Details of aerial 1080 control operations and ungulate management are provided in the Landscape Control Section (Section 4).

Projection: NZGD 2000 New Zealand Transverse Mercator



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Blackburn-Pakihi ground control area

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

Intensive ground control area

0 250 m

1:25,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Eagle Technology, LINZ

Figure 18

3.3 Control methods – kill traps

A kill-trap, by definition, must kill the target animal and do so quickly and consistently. Traps that have passed testing under the guidelines laid out by the National Animal Welfare Advisory Committee (NAWAC) are considered to be humane for that species. An up-to-date list of traps that have been tested under NAWAC guidelines and either passed or failed can be obtained from https://www.bionet.nz/rules/performance-traps.

Rats, mustelids (being stoats, weasels and ferrets), hedgehogs, possums, and feral cats can all be effectively controlled by trapping if the appropriate trap type, spacing and lures are used. A mixture of trap types for each species is generally the best approach as individual animals will respond differently to different trap types and there will always be some animals that will avoid one trap type but may go into another.

Multiple new traps have been developed recently such as the AI self-resetting kill traps which can last for longer periods of time unattended (e.g. Critter Solutions Multi-trap). Resetting kill traps offer multiple benefits, including offering constant control between services and reducing the amount of servicing required (decreasing costs and reducing any target avoidance of traps due to human scent left during frequent servicing). AI-triggered traps also allow for a more open trap housing to overcome neophobia of target species, and thus potentially increasing trap rates while nearly eliminating risk to non-target species.

Table 6 outlines kill traps which are recommended for each target species, and it is recommended that traps are selected from this list. The pest control regime is designed to be adaptive, with the bait-station grid forming the core control network for rats and possums and additional tools, such as targeted trapping, deployed in response to monitoring results. This allows management effort to be focused where needed while maintaining consistent suppression of rats and possums across the wider area.

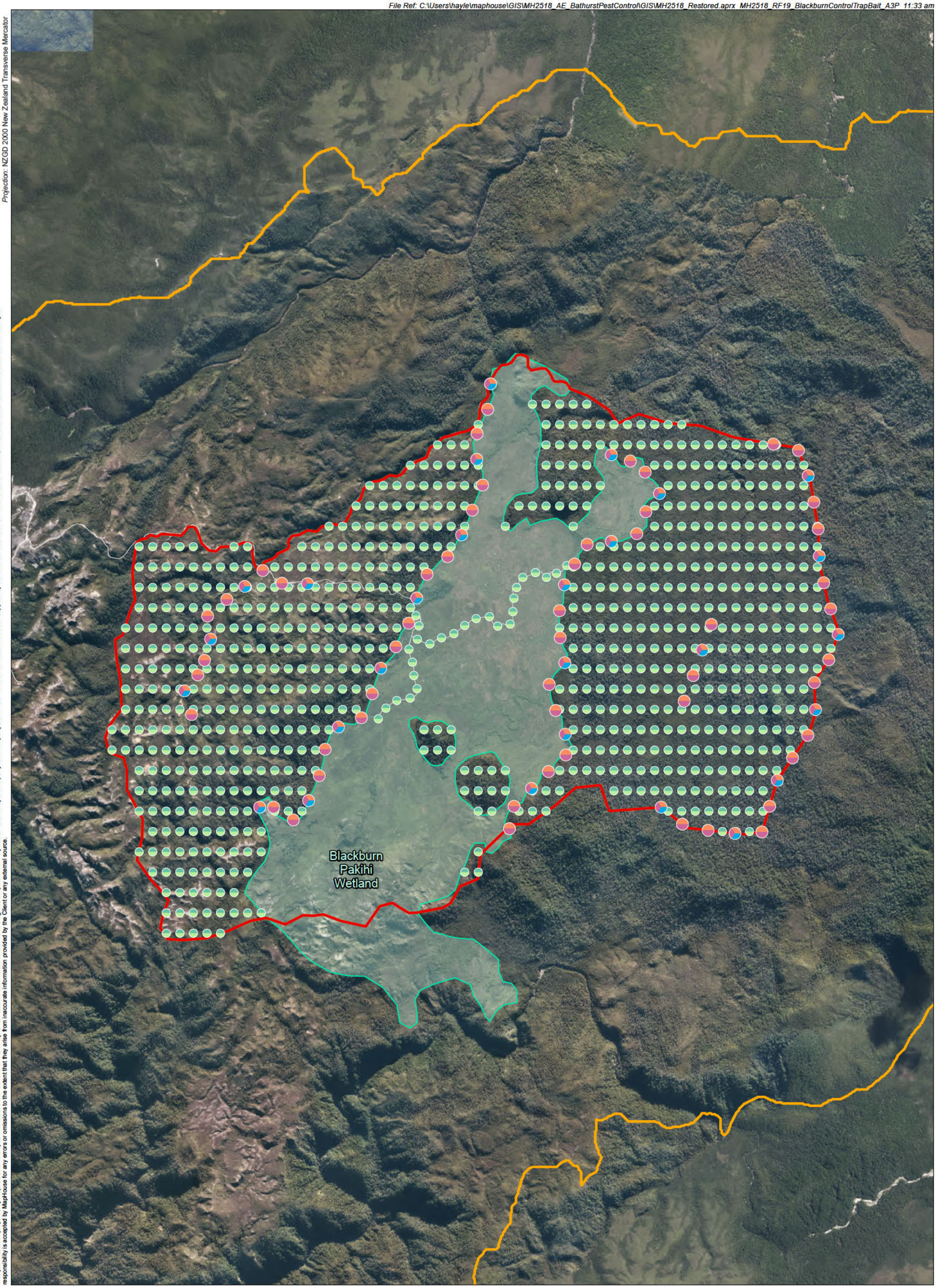
Each trap location will need to be micro-placed upon deployment (i.e. refined on a fine scale within several metres in the field, based on the broad-scale locations in Figure 19). This ensures each trap is placed within suitable micro-habitat for the target species to maximise capture success.

Most of the target predators are attracted to cover, so traps should be placed under cover, such as under trees or shrubs. The trap entrance needs to remain clear, so any vegetation around it needs to be cleared. Rats and mustelids also tend to move along linear features such along habitat boundaries, tracks, and fence lines.

Table 7: Summary of potential trap types and spacing for each target species in the Blackburn Pākihi Area. These tools should be updated as new technology becomes commercially available

Target species	Suitable approved traps	Recommended spacing
Rats	DOC200 Double-set DOC200 DOC250 Re:wild F-Bomb D-rat pro CSL Multi-trap* AT220* (NAWAC approved for ship rats only)	Rat capable traps and bait stations (100 m grid) adaptively used and placed when required. Noting that rats will be incidentally caught on the stoat traplines.
Possums	SA2 Kat trap Flipping Timmy AT220* CSL Multi-trap*	Possum traps to supplement bait station network *100 m grid) adaptively as monitoring results indicate.
Mustelids	DOC200 Double-set DOC200 DOC250 CSL Multi-trap* Re:Wild F-bomb	200 m along wetland edge and other key likely travel routes (ridges, rivers, tracks), with 800 m between lines.
Feral cats	Live-capture trapping SA Kat trap CSL Multi-trap*	Traps on roads, riverbeds and Pākihi margins at 600 m intervals.

*Indicates a resetting trap, i.e. a trap capable of resetting itself after each kill.



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Blackburn-Pakihi – Intensive Ground-Control

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Intensive ground control
- Landscape scale control
- Wetland (WCRC Schedule 2)
- Rodent trap
- Mustelid trap
- Cat trap
- Rodent bait
- Possum bait
- Existing track

0 250 m
1:25,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, © OpenStreetMap contributors, Eagle Technology, LINZ

Figure 19

3.3.1 Trap preparation & deployment

Before traps are deployed, all sharp edges on the wire entrance baffles of trap boxes need to be filed back to a smooth edge. All kill traps will be housed within kea-resistant trap boxes (unless AI triggered traps are used), designed to prevent access, displacement, or damage by kea. Boxes will be securely anchored and fitted with restricted entrances to minimise non-target interaction while maintaining effective operation for target species. This will reduce the likelihood of a target individual either avoiding the trap or entering the trap then backing out due to injury caused by any sharp edges and subsequently developing trap shyness. All traps need be test fired and checked for mechanical reliability prior to deployment.

All DOC200 traps should have their triggers calibrated to 70 grams (g) to ensure weasels are also targeted. The factory trigger weight for DOC200 traps is reported as 80 g (Haworth, 2018) meaning that female weasels at the bottom end of the size range will likely not trigger them. How to calibrate the trigger weight of DOC traps is available on DOC's YouTube channel *DOCskillable* (https://www.youtube.com/watch?v=11t9II2FpFk).

Upon deployment, traps should be ground-truthed to ensure the most effective placement to maximise target catch. This refers to the placement of the trap within the environment at a scale of metres, which can have a dramatic impact on capture rates. For example, mustelids and other predators are attracted to cover and tend to avoid open spaces, so traps should be placed near cover such as under a tree or shrub where possible. The person deploying the traps must:

- Ensure each trap is placed near cover;
- Orient traps to allow easy entry;
- Clear the entrance of vegetation and debris;
- Check all traps to ensure they are good working condition before deployment; and
- Record an accurate GPS location.

3.3.2 Lure types

Lure types in kill and live capture traps depend on the target species:

- Traps targeting rodents, mustelids, and hedgehogs (e.g. DOC series traps) should be baited with Erayz, a hens' egg and peanut butter and/or PoaUku long-life rat and stoat lures. In spring/summer (August to February inclusive), traps should be baited with fresh rabbit meat, or salted rabbit if fresh rabbit meat is not available, to better target mustelids. Other options include Eggsellent lure and fish, and for rats only, chocolate and macadamia nuts. Auto-luring devices such as EzyLures or ZIP lures can also be fitted to traps to allow for continuous lure deployment, which generally results in higher captures.
- Traps targeting possums should be baited with fresh apple and peanut butter, and/or PoaUku long-life possum lures. If the trap type is unable to support a large bait (e.g. Trapinators), peanut butter is able to be used on its own. Cat biscuits can also be an effective lure and be used intermittently to diversify lure type over time. Other options include Eggsellent lure, smooth in a tube and possum dough. A white flour and icing sugar blaze can be placed on the

tree trunk below tree-mounted possum traps to act as a visual lure. Auto-luring devices can also be attached to these traps.

- Traps specifically targeting cats (i.e. SA2 Kat traps, Timms traps, Critter Solutions Mult-trap (Cat version)) should be baited with a combination of salted rabbit, jelly meat, cat biscuits and/or fish.
- Newer resetting traps (e.g. AT220 and Critter Solutions Multi-trap) have inbuilt auto-luring mechanism to ensure fresh lure is automatically deployed at a regular interval.

To maintain an effective trap network, all lures need to be replaced at least once per month (unless auto-luring devices are used), increasing to once per fortnight between August and March (inclusive). The lure type used needs to be recorded and entered into the selected data management system to allow analysis of which lures are most effective for each target species.

Changing between lure types (e.g. every 3 months), may help to increase trapping success by targeting individuals with differing preferences. Using multiple different lures, such as both rabbit and an egg, will also likely attract a wider range of target species and individuals of the same target species with differing preferences.

3.3.3 Trap servicing protocols & frequency

Trapping should occur year-round to provide for continued suppression of pests. However, the frequency of trap checks varies depending on trap type and the time of year.

If not self-resetting (i.e. single-set), kill traps should be checked once per month year-round, increasing to twice monthly between August and March (inclusive), and when target population threshold are exceeded for a particular species. Care will need to be taken to use the same tracks and routes for trap checks to avoid trampling disturbance in sensitive areas (see **Appendix B** for methods for avoiding damage in sensitive Pakihi wetland areas). If self-resetting trap types are used, trap check can drop to every second month year-round. Many of these have self-reporting abilities and can remotely transmit data on status, kills, battery and lure levels which can drastically reduce servicing costs.

To ensure trapping is maintained to a high standard ensure that:

1. Lures do not become depleted or rotten;
2. The trap is regularly tested to ensure it is mechanically sound including checking for worn pivots and weakened springs and that its set to the correct trigger weight (if relevant);
3. Access to traps remains open i.e. the trap has not become overgrown, and if so, any obstructing vegetation is either sprayed or cut back;
4. Traps are secured to the ground, tree or post with wire to prevent being disturbed and removed by pigs and possums; and
5. Traps are clean and free of algal growth or other substances/debris that may make it unattractive to the target animal.

During routine trap checks, single-set triggered traps should be cleared, reset, and rebaited with fresh bait. Untriggered traps should be set off, reset, and rebaited with fresh bait. Once per year in spring, all traps must be audited, comprising a full clean (e.g. with a wire brush to remove mould, fur and other debris) and 'warrant of fitness' test.

3.4 Control methods – toxins

A permanent bait station network will be established across the Blackburn- Pākihi Area (as per the suggested placement in Fig. 19), targeting rodents and possums, and supplemented by a trap network (if required). Baiting for rodents and possums should adhere to the following specifications:

- To maintain suppression of resident rodent and possum populations, Philproof bait stations will be deployed across the Blackburn Pākihi area. Bait stations will contain either DoubleTap (diphacinone and cholecalciferol) or cholecalciferol, both of which are low-residue toxins suitable for ongoing maintenance control and do not require a Controlled Substance Licence. Where cholecalciferol is used, pre-feeding will be undertaken to maximise bait acceptance and effectiveness.
- Toxic control operations will be undertaken as discrete pulses, typically of 2–3 weeks duration, and continued until bait uptake declines to negligible levels or monitoring indicates that control objectives have been achieved. Following initial bait deployment, bait stations will be checked within 6–10 days (in accordance with label requirements) and replenished where necessary. Further checks will be undertaken after an additional 3–4 weeks, or more frequently where bait uptake remains high, to ensure that target species are able to consume a lethal dose. At the completion of each control pulse, all remaining bait will be removed to minimise non-target risk and avoid sub-lethal exposure and bait aversion.
- Seasonal pulses will typically be undertaken in spring and late summer, with additional responsive control implemented where monitoring indicates pest population increases (e.g. following mast events or where trigger thresholds are exceeded). While mice are not a primary management target, it is recognised that bait station networks may provide only partial control of this species; therefore, monitoring results will be used to guide any additional targeted control where required.
- In wet Pākihi environments, bait stations will be mounted on trees or raised platforms (e.g. bog boards) to maintain bait condition, reduce moisture exposure, and ensure visibility and accessibility to target species.

A summary of a commonly available vertebrate pesticides in New Zealand and recommended use cases is provided in **Appendix C**. If necessary, alternative pesticides can be selected from this list.

Para-aminopropiophenone (PAPP) provides an additional control tool targeted specifically at stoats and feral cats. It is a vertebrate pesticide that was registered in New Zealand in 2011 as a new tool for the control of stoats and feral cats, and it is currently being evaluated for ferrets. PAPP is absorbed into the blood stream via the stomach, and causes a condition called methaemoglobinaemia, which creates a lethal deficit of oxygen in cardiac muscle and the brain. Death in stoats and feral cats usually occurs within 2 hours after eating a lethal dose. It is considered humane in action, is not persistent in the environment and is unlikely to cause secondary poisoning, although care is needed to prevent dogs and pets from primary poisoning by eating baits directly. PAPP may be considered as an additional toxic control tool if camera monitoring demonstrates that populations are remaining above thresholds, but other species (rats/possums) are in low densities.

Toxic baiting using PAPP for stoats should follow the methods outlined in Dilks et al. (2011). Bait stations should be deployed on a grid at 200-300 m intervals across the control site. Bait stations

should be single Connovation tracking tunnels (Connovation Ltd., Auckland) or in wooden DOC or submarine style boxes (without the trap). If tracking tunnels are used, they can contain pre-inked tracking cards so that animal visitations and bait take could be monitored. Bait stations should be pre-baited with minced rabbit 3 weeks before the PAPP baiting. Toxic baiting should occur over at least 5 fine days.

Detailed best practice guidelines exist for feral cat control using PAPP (Boffa Miskell Ltd, 2018), which should be followed for any toxic operation undertaken with PAPP targeting cats.

3.5 Control frequency & timing

Trapping and baiting will be undertaken year-round to maintain suppression of pest populations. However, the frequency and intensity of these activities will vary depending on trap type, seasonal conditions, and pest pressure. Within the Blackburn Pākihi Intensive Ground Control Area, toxin use will be deliberately limited to two short-duration pulses per year to minimise environmental loading while maintaining effective pest suppression. These pulses are proposed for late winter/early spring and late summer/early autumn, timed to reduce rodent and possum populations prior to key breeding periods and anticipated mast-driven increases.

- Toxin applications will be integrated with continuous year-round trapping of stoats and feral cats, ensuring that predator populations remain low between control pulses. This approach reduces reliance on frequent toxin use while maintaining pest populations below biodiversity-impact thresholds. The pulsed toxin regime, combined with ongoing trapping, represents a best-practice integrated pest management approach and is particularly appropriate for ecologically sensitive Pākihi and wetland environments.
- In Year 3 (following establishment of infrastructure in Years 1 and 2), an aerial 1080 operation is recommended to achieve an initial landscape-scale knockdown of pest populations. The ground-based trap and bait network will then maintain suppression following this initial reduction.
- In subsequent years, toxic control operations will be undertaken twice annually (late winter/early spring and late summer/early autumn). Additional responsive “knock-back” pulses may be implemented where monitoring indicates pest population increases (e.g. following mast events).
- Trapping will be undertaken continuously between toxin operations to maintain low pest densities. Single-set kill traps will be checked approximately monthly year-round. Self-resetting traps will be inspected at least every two months to confirm functionality, replace lures or batteries as required, record kill data (where counters are present), and remove carcasses if necessary. Where remote reporting systems are in use, servicing may be undertaken on a responsive basis, with a minimum inspection frequency of every two months.
- Monitoring will guide adaptive management. If chew card indices indicate rat or possum presence exceeding 10%, additional control will be implemented within two weeks to restore pest populations to target levels.

3.6 Pest targets and thresholds

For the Blackburn Pākihi Area, management targets are defined for rats, possums, mustelids and feral cats (if detected), along with threshold levels that trigger additional control where these targets are not achieved. These targets and thresholds are outlined in Table7. If monitoring indicates that pest levels exceed the defined thresholds at any monitoring site, additional control will be implemented in accordance with Section 7 ("Exceedance of pest targets and thresholds").

Monitoring will be undertaken four times per year using a combination of chew card indices (CCI) and trail camera protocols (based on Camera Hours – CH). A full description of monitoring methods and deployment is provided in Section 6. Monitoring devices will be deployed in accordance with the spacing outlined in Figure 20.

Table 8: Pest targets for the Blackburn- Pākihi Area, based off Chew Card Indicies (CCI), and Camera Trap Hours (CH)

Pest Species	Management Target	Threshold	Monitoring frequency
Blackburn Pākihi Intensive Ground Control Area			
Rats	<5% CCI	≥10% CCI	Four monitors per year in February, May, August, and November
Possums	<5% CCI	≥10% CCI	
Stoats	<2 detections per 2000 CH	>3 detections per 2000 CH	
Ferrets	<2 detections per 2000 CH	>3 detections per 2000 CH	
Feral cats	3 individual cat detections per 2000 CH	>3 individual cat detections per 2000 CH	
Weasels	<2 detections per 2000 CH	>3 detections per 2000	

3.7 Pest control and monitoring calendar

The 12-month calendar in Table 8 outlines the annual schedule of pest control and monitoring activities for the Blackburn Pākihi Intensive Ground Control Area. This area is managed using continuous, year-round ground suppression targeting stoats, rodents, possums, feral cats and ungulates, with additional mast-responsive intensification where required. The calendar demonstrates how routine servicing, seasonal ungulate control, and quarterly monitoring are integrated to maintain pest populations below biodiversity-impact thresholds and prevent rebound between aerial control events.

Table 9: Blackburn Pākihi Intensive Ground Control Area calendar of control and monitoring activities

Task / Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Stoat trap servicing (monthly)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Toxin pulse – rodents & possums (short duration)		✓	✓				✓	✓				
Feral cat trap checks (if detected)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ungulate control (deer, goats, pigs)	✓	✓	✓						✓	✓	✓	✓
Mast-responsive intensification (if required)					✓	✓	✓	✓				
Chew card monitoring			✓			✓			✓			✓

Task / Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Camera trap deployment (21 nights)			✓			✓			✓			✓
Annual Data analysis & reporting												✓

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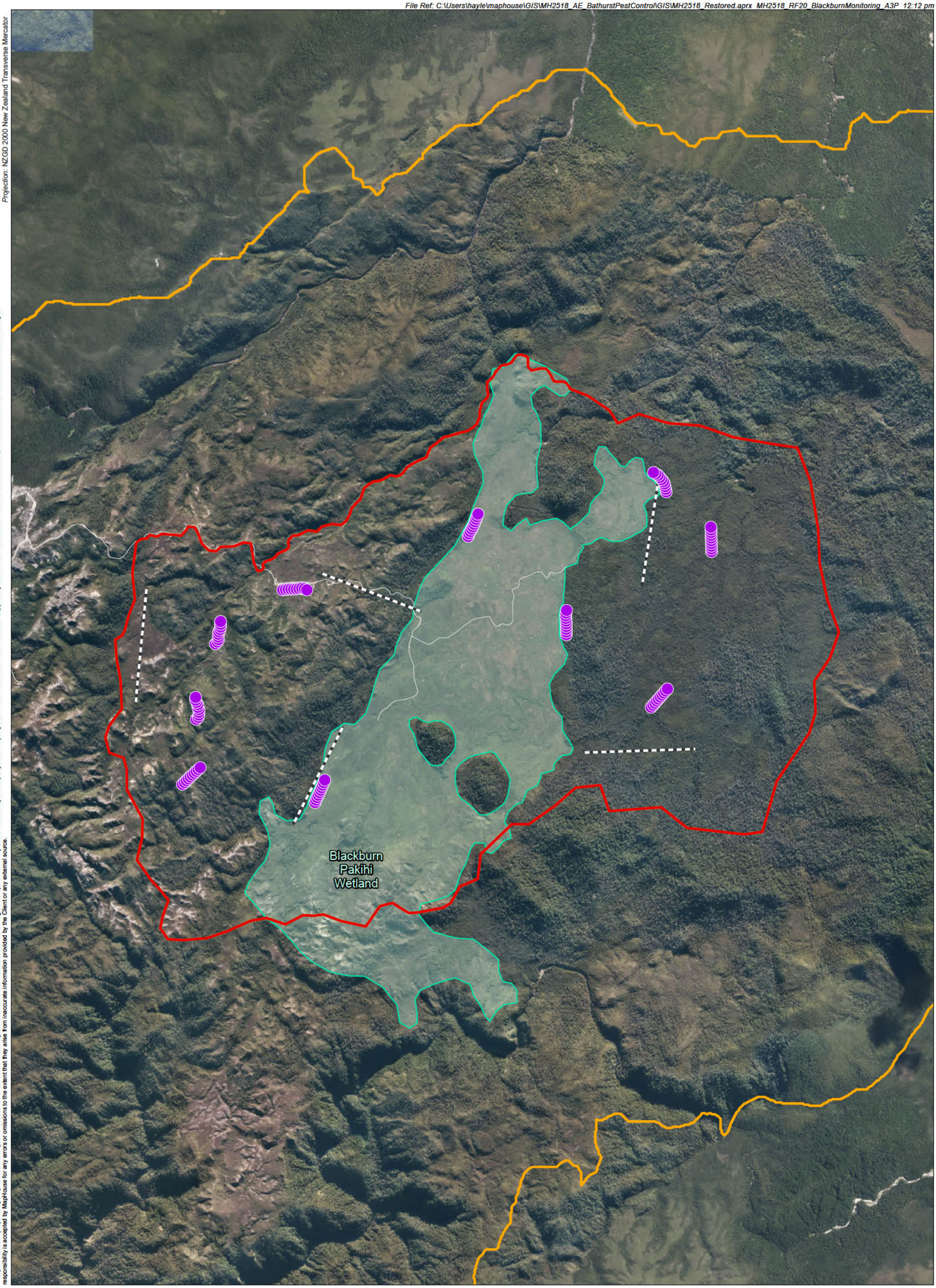
Projection: NZGD 2000 New Zealand Transverse Mercator



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Blackburn-Pakihi – Intensive Ground-Monitoring

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Intensive ground control
- Landscape scale control
- Wetland (WCRC Schedule 2)
- Chew card
- Camera lines
- Existing track

0 250 m

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Data Sources: Alliance Ecology, West Coast Regional Council, © OpenStreetMap contributors, Eagle Technology, LINZ

Figure 20

4.0 Landscape Pest Control Area

4.1 Site Description

The landscape control area encompasses the ecological catchments adjoining the Buller and Orikaka (Mackley) Rivers, and the lower Ngākawau catchment (Fig. 21). This landscape retains large tracts of relatively continuous indigenous forest and shrubland, interspersed with areas of historic mining disturbance and regenerating vegetation. The landscape control area forms a buffer around control and eradication work occurring on the Buller Plateaux and extends around the Blackburn Pākihi area to slow reinvasion. Together, these habitats form a critical ecological corridor linking the Buller Plateaux and Stockton uplands to the wider West Coast ranges. The landscape provides continuous habitat for native birds, invertebrates, and forest reptiles.

4.2 Pest Control Outline

The primary biodiversity objective of landscape-scale pest control is to reduce predation pressure on roroa (great spotted kiwi) and other indigenous fauna across the wider landscape. Achieving this objective requires suppression of rats, possums and stoats over a large and topographically challenging area that includes extensive steep terrain, remote ridgelines, deeply incised catchments and areas with limited or no practical ground access.

While ground-based control methods form an important component of the pest management programme, they are not sufficient on their own to achieve rapid, landscape-scale reductions in rodent and possum populations across the entire management area. The size of the area, combined with difficult access and the highly mobile nature of pest populations, would make exclusive reliance on ground-based methods operationally challenging and unlikely to achieve the level of suppression required to deliver meaningful biodiversity benefits at a landscape scale.

Aerial application of 1080 remains the only proven tool capable of achieving effective, simultaneous control of rats and possums across large remote areas within a timeframe that is ecologically relevant to threatened species management. This is particularly important in West Coast forest ecosystems, where beech mast events can trigger rapid increases in rodent populations, followed by corresponding increases in stoat abundance. These predator irruptions can substantially increase predation pressure on kiwi eggs, chicks and juveniles if not addressed at a landscape scale.

The role of aerial 1080 within this programme is to provide periodic landscape-scale knockdown of rats and possums, thereby reducing the prey base that drives subsequent increases in stoat populations. This approach is complemented by permanent ground-based stoat trapping networks, which are maintained to suppress residual stoat populations, intercept reinvading individuals, and provide ongoing protection for kiwi between aerial control operations. The two methods are therefore intended to operate as an integrated pest management system, with aerial control addressing landscape-scale pest abundance and ground trapping providing sustained predator suppression at a finer scale.

The use of aerial 1080 is therefore outcome-focused rather than method-focused. It is proposed because it is the most effective available means of achieving the biodiversity objectives of the programme, particularly the long-term protection and recovery of roroa populations within the wider

managed landscape. Operations will be implemented adaptively, informed by monitoring results, mast forecasting, and pest population trends, ensuring that aerial toxin use occurs only when required to maintain biodiversity outcomes and minimise ecological risk.

Although aerial 1080 control has been conducted intermittently in parts of the Buller and Orikaka catchments, the wider landscape remains subject to constant reinvasion and pest population reestablishment. Under the proposed programme, this management area will be maintained under a rolling regime of aerial 1080 operations.

An initial aerial 1080 operation is proposed in Year 3, following the establishment of ground-based control infrastructure in the Blackburn Pākihi and Landscape control areas (in Years 1–2). This operation will provide a comprehensive knockdown of pest populations prior to full activation of the ground-based trap and bait network. Subsequent aerial operations will be undertaken on an approximately three-year cycle, subject to monitoring results and ecological conditions.

In addition to the scheduled cycle, aerial 1080 operations will be implemented on a mast-responsive basis, where monitoring indicates rapid increases in rodent populations associated with beech seeding events. Such responsive applications are critical to preventing subsequent irruptions of stoats and other predators, which are known to cause significant mortality in vulnerable native species.

Where mast-responsive operations occur outside the standard three-year cycle, care will be taken to minimise the risk of bait aversion. This may include:

- alternating bait types or cereal formulations where appropriate
- ensuring sufficient intervals between operations where feasible
- integrating ground-based control to maintain suppression between aerial applications

The aerial 1080 regime is designed to work in conjunction with ongoing ground-based baiting and trapping, which will maintain pest populations at low levels between aerial operations. This integrated approach reduces reliance on frequent aerial toxin use while ensuring that pest populations do not recover to levels that pose a risk to biodiversity values.

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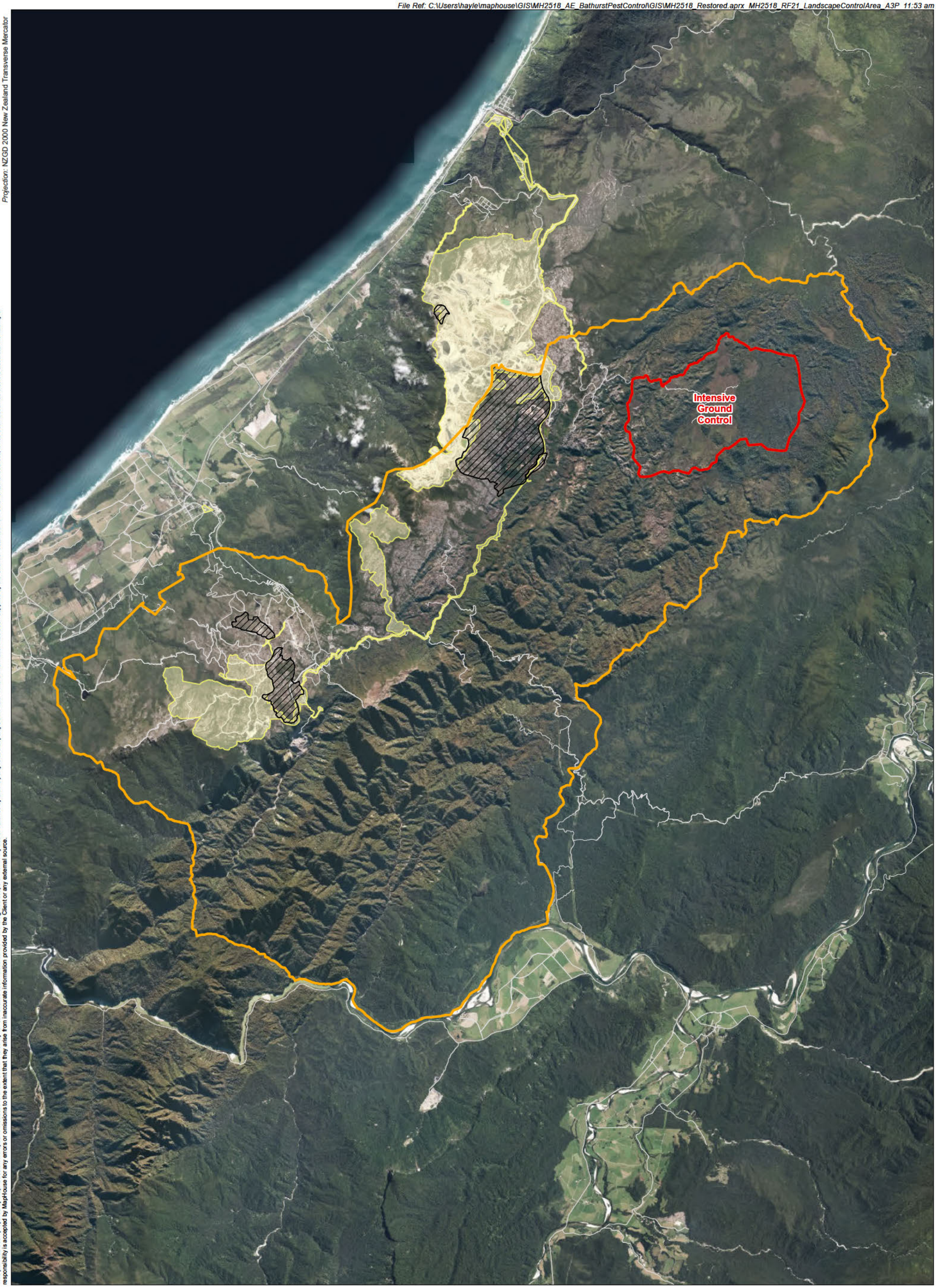

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Wider managed landscape - Surround Control Zone Area

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Intensive ground control
- Landscape scale control
- Pest exclusion fences
- Project footprint

0 1 km

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Data Sources: Alliance Ecology, West Coast Regional Council, © OpenStreetMap contributors, Eagle Technology, LINZ

Figure 21

The primary objective of ground-based stoat control in the landscape control area is to hold stoat activity below biodiversity-impact thresholds year-round, particularly during periods when aerial control benefits are waning or when mast-driven reinvasion risk is elevated.

The wider managed landscape will be managed under a maintenance-level suppression regime. The regime includes:

- Aerial 1080 operations on a three-year, mast-responsive cycle over suitable habitats (active mining areas may be excluded).
- Ground-based stoat control along ridges, valleys and key corridors using traplines.
- Periodic feral cat and ungulate control using targeted ground and aerial methods.
- Strategic trail camera monitoring to track predator trends and support adaptive management.

4.3 Control methods – kill traps

Stoat control will be achieved through a permanent network of kill traps deployed strategically across the landscape control area. Trap lines will generally be established at approximately 1 km spacing, with individual traps placed at 200 m intervals along lines (see Fig. 22), consistent with DOC recommendations for stoat suppression in large, open landscapes. Trap placement will prioritise:

- Ridgelines, spurs, and natural travel corridors
- Track networks, access routes, and fence perimeters
- Ecotones such as forest– Pākihi margins and riparian corridors
- Likely reinvasion pathways into fenced and intensive control areas

Traps will be housed in approved DOC tunnel designs (or alternative traps NAWAC approved traps for stoats with non-target mitigation implemented can be used – see Table 6). The network is designed to function as a suppression and interception system, rather than complete eradication, recognising the open nature of the landscape.

4.3.1 Trap checks

Traps will be checked and serviced on a regular rotational basis, with servicing frequency adjusted seasonally according to risk. Increased servicing will occur during:

- Late spring to early autumn, when stoat activity is typically higher
- Periods following rodent increases or predicted mast events
- Times of increased dispersal pressure from surrounding unmanaged areas

This adaptive servicing regime ensures control effort is concentrated when stoats pose the greatest risk to native fauna, particularly during roroa chick-rearing periods.

4.4 Control methods – Aerial 1080

Aerial 1080 remains the most viable pest control tool in rugged and remote terrain where ground-based methods are logistically constrained, and its use has been consistently associated with significant biodiversity gains in New Zealand forest ecosystems (Innes et al., 2010; Eason et al., 2011).

It is widely regarded as the most efficient large-scale control method for rats, possums and other susceptible pest species in difficult terrain (Department of Conservation, n.d.; Nugent et al., 2011). Kill rates for possums during aerial 1080 operations are typically greater than 90%, while rat populations are often reduced to near-zero levels immediately following treatment (Parliamentary Commissioner for the Environment, 2011). Although fewer studies have directly quantified stoat mortality, substantial reductions in stoat populations have been documented following 1080 operations, primarily through secondary poisoning via consumption of contaminated prey (Murphy & Bradfield, 1992; Murphy et al., 1998). Aerial 1080 will therefore be used in the early stages of the programme (Years 1–2) to achieve an initial landscape-scale knockdown of pest populations, prior to the implementation of ground-based control networks designed to maintain suppression over time.

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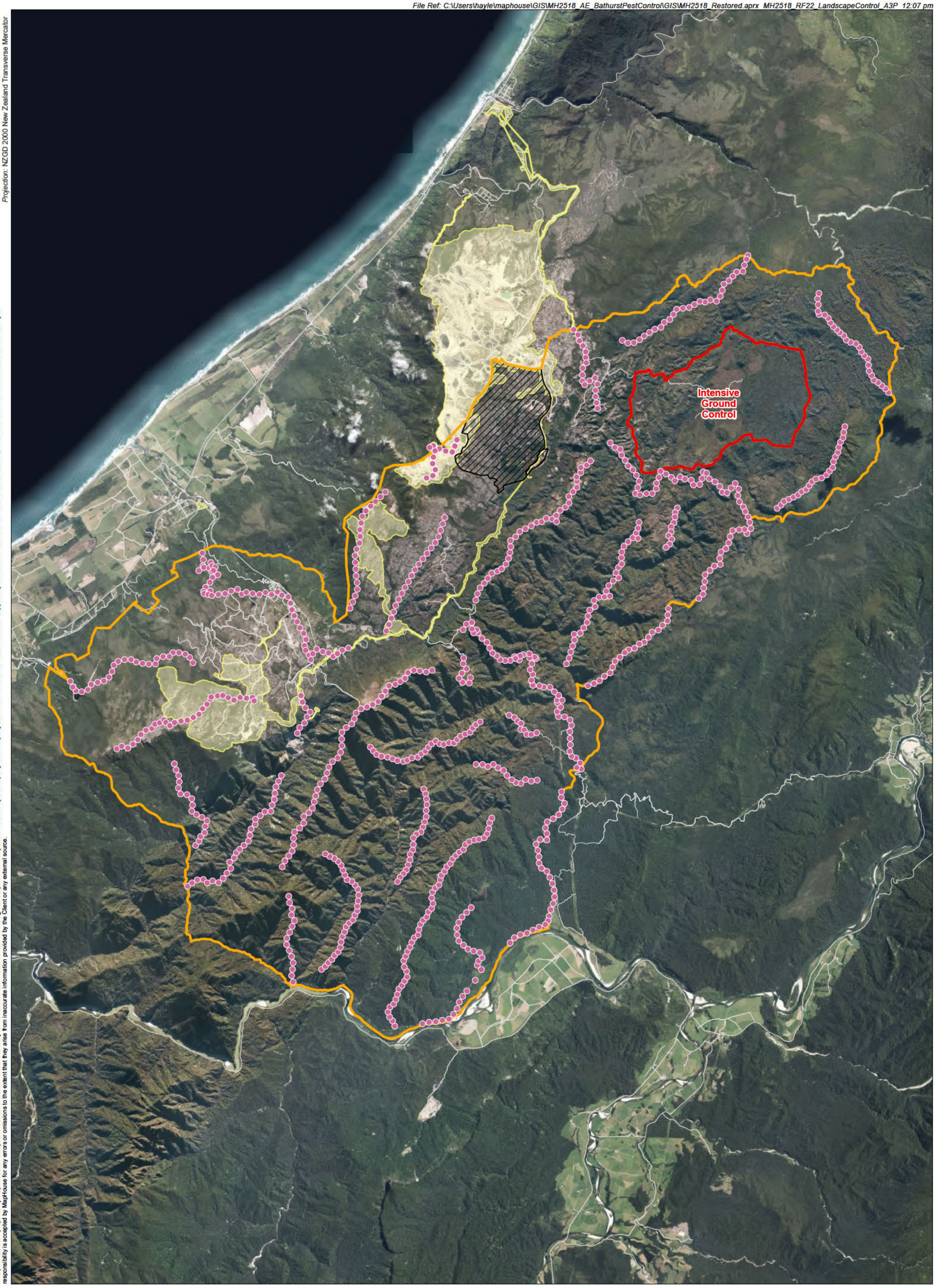

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Wider managed landscape - Surround Control Zone

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Intensive ground control
- Landscape scale control
- Pest exclusion fences
- Project footprint
- Mustelid trap
- Existing accessway

0 1 km

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Data Sources: Alliance Ecology, © OpenStreetMap contributors, Eagle Technology, LINZ

Figure 22

4.4.1 Planning

The area proposed for aerial 1080 control is shown in Fig. 21 and includes the entirety of the landscape control area including the areas surrounding the Buller Plateaux and the area of intensive control at Blackburn Pākihi (but excludes the pest exclusion fenced areas).

Planning should begin as soon as possible before an aerial 1080 operation. Planning should include key stakeholders, including iwi, hapū, local community, and DOC. During this stage, the exact area to be covered by the operation, the timing, and the people involved (including an Operations Manager, persons holding a Controlled Substance license, and pilots) will be finalised. Users of 1080 must be both an Approved Handler (AH) and hold a Controlled Substances Licence (CSL).

There are multiple conditions and consents required that must be completed. As per the DOC website, these include:

- Gaining consent of the landowner/occupiers within the operational area;
- Notifying neighbouring landowners, schools, early childhood centres, veterinary and health services about the planned operation;
- Putting public notices in the local papers before the operation;
- Identifying drinking water supplies within the area to exclude or temporarily close and to support water testing shortly after the operation;
- Working with Public Health Officers from the local District Health Board to minimise any risks and protect public safety; and
- Applying for permission under the Hazardous Substances and New Organisms Act 1996.

A draft operational plan will be developed for consultation, followed by a detailed operational plan for the aerial application of bait detailing the exact timing, personnel involved, bait quantities required, hand-sowing areas, flight plans, and other operational aspects will be developed prior to the eradication.

4.4.2 Standard protocols

Standard protocols for the aerial application of cereal pellets containing the anticoagulant toxin 1080 via helicopter are well established in New Zealand. There are several best practice guidelines which will be followed, and the procedures integrated into the operational planning.

Guideline documents to be followed include DOC's guidelines for aerial 1080 drops for biodiversity benefit will be followed (K. P. Brown & Urlich, 2005), and the current industry guideline document available from the Bionet website (National Pest Control Agencies, 2018a), unless more current guidelines are released. Note some information in the current industry guideline document is out of date regarding current legislative requirements. Part 3 of the industry guidelines contains information on the requirements for working with 1080, including legislative controls on 1080, training and licences, storage, record keeping and reporting, road transport, communication, permissions under HSNO, handling and use, operational signage, emergency management, incident management, and disposal. Part 4 of the industry guidelines covers the operational steps and requirements.

Best practice for the operational delivery of aerial 1080 will also be followed. Protocols are available from Landcare Research for both possums (Landcare Research Ltd, n.d.) and rats (Landcare Research Ltd, n.d.). In summary:

- To target both rats and possums, RS5 cereal pellets (20 mm, mean wt. 12 g) containing 0.15% 1080 should be used, made as per factory specifications. Baits should be lured with cinnamon as per factory specifications. Toxic baits must be dyed green as per factory specifications.
- Pre-feeding should be conducted for best results, using the same type of bait as the toxic bait. It should not contain green dye but should contain the lure. Pre-feed should be applied at the rate of 2kg/ha approximately 10 days prior to the toxic bait being applied, with a minimum of 5 days between prefeed and toxic.
- Toxic bait should be applied at a rate of 2 - 3 kg/ha. Reasons for going over 3 kg/ha are: high numbers of possums or other animals likely to consume bait, or steep/rugged terrain.
- Flight lines for the toxic bait should follow the same path as the prefeed flight lines, and there should be no gaps in coverage if possible.
- Toxic bait should be applied during a weather forecast of at least 2 fine nights post-drop. 16 mm RS5 baits begin to disintegrate after 5 mm of rain, and about 40% of the 1080 leaches out of the baits after 10mm of rain.

4.4.3 Post-operation monitoring

Toxicity monitoring - Signs must be maintained and remain in place until monitoring shows that bait and carcasses are no longer toxic. Once hazards associated with the aerial 1080 application no longer exist, or a prescribed minimum time is up (whichever is the longer), then signs must be removed.

Pest monitoring – The target pest populations (rats and possums) should be monitored via chew cards between 3 and 6 weeks following the operation to determine success.

4.4.4 Timing and frequency

The timing of aerial 1080 operations within the pest management programme is guided by ecological risk, pest population dynamics, and best-practice predator control principles, rather than fixed calendar intervals. Operations are primarily mast-responsive, recognising that rodent and mustelid populations in beech-influenced West Coast ecosystems can increase rapidly following heavy seedfall events. Beech mast events provide a pulse of food resources that drives rapid increases in rodent populations, which in turn support subsequent irruptions of stoats, resulting in markedly elevated predation pressure on native fauna.

Planning for aerial 1080 operations will typically commence at least 6 months in advance to allow for operational design, stakeholder engagement, and any required approvals. This early planning ensures that operations can be deployed at the optimal ecological timing, particularly in response to mast events, where delays can significantly reduce effectiveness. Final decisions on implementation will be informed by mast forecasting, on-the-ground monitoring, and regional intelligence from the Department of Conservation and research providers.

Where mast conditions are predicted or confirmed, aerial control will be scheduled prior to, or during the early stages of, rodent population increase. This timing maximises the effectiveness of control operations and prevents the secondary predator surge that typically follows mast events.

In non-mast years, aerial 1080 may still be undertaken on an approximately three-year cycle where monitoring indicates that pest populations are increasing, or where sustained low-pest conditions cannot be maintained through ground-based control alone. This ensures that the programme remains responsive to changing conditions rather than reliant on fixed intervals.

This adaptive approach ensures that toxin use is strategic and proportionate, targeting periods of highest ecological risk while minimising unnecessary environmental exposure. By integrating forward planning, mast forecasting, monitoring data, and landscape-scale coordination, aerial 1080 operations can be deployed at times when they will deliver the greatest biodiversity benefit and most effectively support long-term pest suppression across the wider landscape.

4.4.5 Risks

The application rate and sowing methods have been refined over many years to increase efficacy of reducing target populations, and the non-target kill of native species is normally very low. As with all predator control methods, there are some risks which need to be identified and appropriately mitigated.

As a toxin, 1080 must be handled, stored, transported, and deployed, as per strict protocols (National Pest Control Agencies, 2018a). It must always be used according to label instructions by personnel with a CSL and an Approved Handler license.

Notably, 1080 is particularly toxic to dogs, so any pests or hunting dogs must be kept out of the area during and post-operation.

4.5 Pest targets and thresholds

Pest population targets and trigger thresholds have been established to guide the timing of aerial 1080 operations, ensuring that toxin use is proportionate and ecologically justified. Thresholds are set at levels below which biodiversity gains can be maintained, with aerial control triggered only when monitoring indicates that pest populations are approaching or exceeding levels associated with increased impacts. This approach aligns with Department of Conservation best practice and supports an adaptive, outcomes-focused pest management programme.

Aerial 1080 operations will be initiated where monitoring indicates that thresholds are exceeded across multiple monitoring locations, or where a consistent upward trend in pest populations is detected in combination with mast forecasting or regional intelligence. This ensures that control is undertaken in advance of, or early in, periods of elevated ecological risk. This trigger-based approach avoids unnecessary toxin use while ensuring timely intervention before pest populations reach levels that compromise biodiversity outcomes.

Monitoring will be undertaken four times per year using a combination of chew card indices and trail camera protocols. Monitoring results from the Blackburn Pākihi area will also inform decision-making for the landscape-scale control. A full description of monitoring methods is provided in Section 6, and monitoring devices will be deployed in accordance with the spacing outlined in Fig. 23.

As outlined previously, aerial 1080 triggers are primarily driven by rodent population thresholds and trends, reflecting their role in driving subsequent predator irruptions, with stoat detections providing a secondary indicator of increased predation risk.

Table 10: Pest targets for the landscape control area, based off Chew Card Indices (CCI), and Camera Trap Hours (CH)

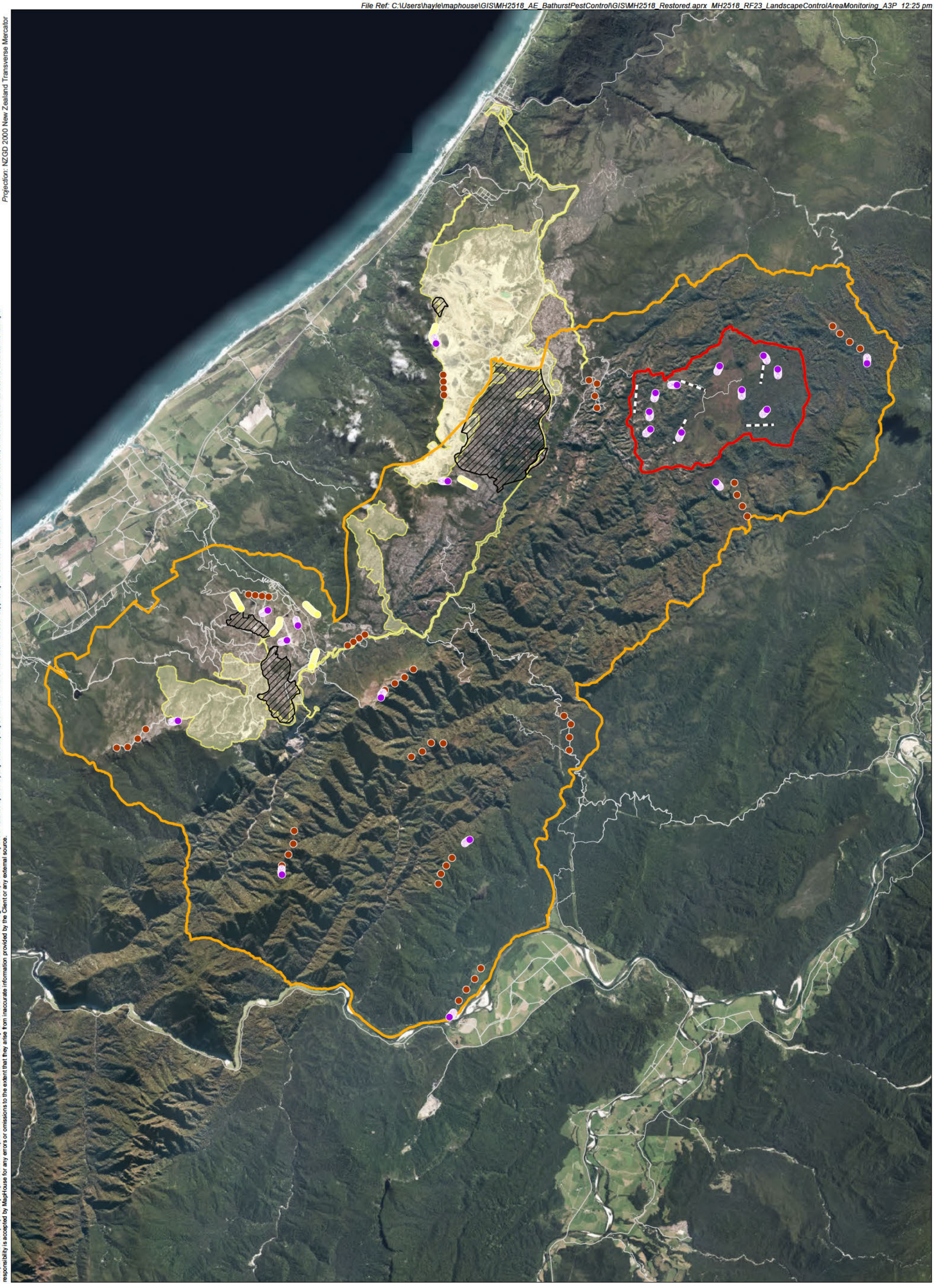
Pest Species	Management Target	Threshold/ 1080 trigger	Monitoring frequency
Landscape control Area			
Stoats	Near zero detections or <2 detections per 2000 CH	Increasing trend, repeated detections or >3 detections per 2000 CH	Four monitors per year in February, May, August, and November
Rats	<5% CCI	≥10% CCI or increasing trend (particularly pre-/post-mast)	As above
Possums	<5% CCI	≥10% CCI or increasing trend	As above

4.6 Pest control and monitoring calendar

The 12-month calendar in Table 10 summarises the annual timing of pest control and monitoring activities across the wider landscape. In areas subject to seasonal snow cover, stoat trap servicing frequency may be reduced during winter periods where access is constrained and pest activity is expected to be lower. Under these conditions, servicing intervals may be extended (e.g. to 6–8 weekly), provided traps remain functional and lures are effective. This approach reflects a risk-based adaptation of the control programme, balancing operational safety and practicality with continued pest suppression. Trap servicing frequency will increase again during spring and summer when pest activity and predation risk are highest. Where feasible, traplines in lower elevation or snow-free areas will continue to be serviced at standard frequencies, ensuring that overall network performance is maintained.

Table 11: Pest management control and monitoring activities across the landscape control area

Task / Month	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Aerial 1080 planning & consent checks	✓									✓	✓	✓
Aerial 1080 operation (mast-triggered or 3-year cycle)			✓	✓								
Stoat trapline servicing	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ungulate control (hunting/removals)	✓	✓	✓						✓	✓	✓	✓
Possum and Rodent monitoring (chew cards)		✓			✓			✓			✓	
Camera trap monitoring		✓			✓			✓			✓	
Annual reporting												✓



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Wider managed landscape - Surround Control Zone Monitoring

BATHURST PEST CONTROL AND MANAGEMENT

Plan prepared for Alliance Ecology | 27 March 2026

Alliance Ecology MapHouse

LEGEND

- Intensive ground control
- Landscape scale control
- Pest exclusion fences
- Project footprint
- Camera lines
- Trail camera
- Chew card
- Tracking tunnel
- Existing accessway

0 1 km

1:100,000 @ A3

Data Sources: Alliance Ecology, West Coast Regional Council, © OpenStreetMap contributors, Eagle Technology, LINZ

Figure 23

5.0 Ungulate management within the pest management programme

5.1 Rationale and objectives

Introduced ungulates, primarily red deer, with potential localised presence of goats and feral pigs, pose a significant long-term threat to the ecological integrity of the areas subject to pest control, particularly the Blackburn Pākihi area where damage is already evident (Alliance Ecology 2026a and 2026b). On the Buller Plateaux itself, deer and goats are known to be present but generally in lower numbers than the surrounding landscape. However, the surrounding landscape provides a source of continued reinvasion. Ungulate browsing suppresses palatable seedlings and understorey species, alters forest composition, and can result in long-term simplification of forest structure and loss of ecological function (Forsyth et al., 2002; Nugent et al., 2001). In Pākihi and wetland margins, ungulates and pigs can cause disproportionate damage through trampling, soil disturbance, and rooting, leading to vegetation loss, peat disturbance, and altered hydrology (Clarkson et al., 2011; DOC, 2023).

Ungulate management is closely integrated with predator control outcomes. Reduction of browsing pressure supports recovery of understorey and shrub layers, improving habitat structure, microclimate stability, and food availability for native fauna, including birds, lizards, and invertebrates (Innes et al., 2010). Additionally, ungulate suppression around fenced sanctuaries and intensive control areas helps maintain fence integrity and habitat quality, indirectly supporting the effectiveness of predator exclusion and suppression efforts (DOC, 2018).

The primary objective of ungulate management within the programme is to reduce ungulate densities to levels that allow regeneration of palatable vegetation, protect sensitive Pākihi and wetland habitats, and support recovery of fauna dependent on intact forest and understorey structure**.** In fenced areas, the objective is full exclusion and eradication; in open landscapes, the objective is sustained suppression to ecologically acceptable levels.

5.2 Management approach by area

5.2.1 Pest exclusion fenced areas

Within pest exclusion fenced areas on the Buller Plateaux, ungulate management will focus on complete exclusion and removal. Fence design will incorporate ungulate-proof specifications to prevent reinvasion. Any ungulates detected within fenced areas during the eradication or post-eradication phase will be removed promptly using targeted ground-based methods. Ongoing surveillance through cameras and routine fence inspections will ensure early detection of incursions, enabling rapid response before browsing pressure can re-establish (DOC, 2018).

This approach provides the highest level of certainty for vegetation recovery, particularly for palatable understorey plants and regeneration of forest canopy species (Nugent et al., 2001).

5.2.2 Blackburn Pākihi intensive ground control area

In the Blackburn Pākihi area, ungulate management will be undertaken as a sustained suppression programme, with particular emphasis on protecting Pākihi wetlands, wetland margins, and cryptogam-rich substrates. Control effort will prioritise Pākihi–forest ecotones, access routes, and areas where browse, trampling, or pig rooting is observed. Pig control is especially important in Pākihi systems, where rooting can destroy bryophyte mats, disturb peat and sand substrates, and cause long-lasting ecological damage (Clarkson et al., 2011; Fife & Meagher, 2016).

Control methods will primarily involve ground-based hunting and targeted removals**,** undertaken at regular intervals and intensified during periods of higher access and detectability (autumn–spring), consistent with DOC best practice for ungulate suppression in sensitive ecosystems (DOC, 2018).

5.2.3 Landscape control area

Across the wider landscape area, ungulate management will be implemented as a long-term, adaptive suppression programme designed to reduce overall browsing and trampling pressure and to limit reinvasion into fenced and intensive management areas. The objective is to maintain ungulate densities at levels that allow ongoing vegetation recovery and minimise damage to sensitive habitats (Forsyth et al., 2002; NZPCN, 2025).

Effort will be strategically directed to movement corridors between lowland and plateau habitats, forest types known to be sensitive to ungulate browse, and Pākihi and wetland margins vulnerable to trampling and rooting (Clarkson et al., 2011).

5.3 Methods of control

Ungulate management will rely primarily on ground-based hunting and targeted removals, undertaken by experienced personnel operating under approved health and safety procedures. Methods will include systematic ground hunting and opportunistic removals during other field activities, with a focus on maintaining low ungulate densities and preventing localised impacts on vegetation and sensitive habitats.

While ground-based methods are considered appropriate for ongoing control within the Blackburn Pākihi area, targeted aerial control may be undertaken where monitoring indicates that ungulate populations are increasing or where ground-based methods alone are insufficient to achieve management objectives. Any aerial operations would be carefully planned to minimise disturbance to sensitive Pākihi wetland environments and would be applied selectively to areas where access constraints or terrain limit the effectiveness of ground control.

This adaptive approach ensures that ungulate management remains responsive to changing conditions while prioritising low-impact control methods in ecologically sensitive areas.

5.4 Monitoring and adaptive management

Ungulate activity will be monitored using trail cameras, field sign assessments (e.g. browse lines, pellet counts, rooting damage), and incidental observations by field staff. Monitoring results will be reviewed regularly to assess whether suppression objectives are being met. Where evidence indicates increasing ungulate pressure or habitat impacts, control effort will be intensified or spatially refocused, consistent with adaptive management principles (Nugent et al., 2001; DOC, 2018).

6.0 Pest animal monitoring

6.1 Overview

Ongoing monitoring and adaptive responses are key to effective predator management. In all pest control areas, well-established monitoring tools will be used to monitor pest presence and assess their densities against the intended targets, and to initiate further control if particular thresholds are exceeded.

This section outlines the monitoring methods and protocols, namely for tracking tunnels, chew cards, camera traps, and new monitoring technology.

6.2 Tracking Tunnels

Tracking tunnels are a common, cost-effective, and sensitive detection and monitoring tool suitable for determining the presence, and providing a coarse index of relative abundance, of a range of pests (although particularly rats and mice). Tracking tunnels are sometimes used to monitor mustelids, however they are not always sensitive to the presence of mustelids when they are present in very low numbers, hence camera traps are preferred for monitoring mustelids (Department of Conservation, 2020; Smith & Weston, 2017; Dilks et al., 2020).

6.2.1 Tracking tunnel deployment

Tracking tunnel lines will contain 10 tunnels spaced 50 m apart (i.e. along 450 m-long lines), as per Gillies & Williams (2013) for monitoring both rats and mice within the two elimination fenced areas. Tracking tunnel lines must be spaced a minimum of 200 m apart at the closest point. Tracking tunnel monitors (of one night each) will be repeated four times per year (simultaneously with camera trap surveys).

An additional monitor using tracking cards may also be required if the threshold values of rats or mice are exceeded. The follow-up monitor should occur 4 weeks after the additional control measures to ensure the abundance of the target species has been successfully reduced to acceptable levels.

6.2.2 Tracking tunnel analysis

Tracking tunnel data will be collected and analysed in accordance with the standardised methods described by Gillies and Williams (2013). For each monitoring round, tracking rates will be calculated as the percentage of tracking tunnels containing identifiable footprints of target species over a single night deployment period. Tracking rates will be calculated separately for each species (e.g. rats and mice), and results will be summarised at the monitoring line and site level. Where multiple monitoring lines are present, mean tracking indices will be calculated to provide an overall estimate of pest activity across the management area, while also allowing spatial variation to be identified.

Tracking tunnel indices will be interpreted in relation to established management thresholds, with particular emphasis on detecting changes in rodent activity over time. Increases in tracking rates, especially where sustained across multiple monitoring lines or monitoring periods, will be used as an indicator of rising pest populations and may trigger additional control measures. Conversely, low tracking rates following control operations will indicate effective suppression.

All tracking data will be subject to standard quality assurance procedures, including verification of track identification where required. Data will be stored and analysed in a consistent format to allow comparison between monitoring rounds and across years

6.3 Chew card methods

6.3.1 Description

Chew cards are a common, cost-effective, and sensitive detection and monitoring tool suitable for determining the presence, and provide a coarse index of relative abundance, of a range of pests, including rats, mice, and possums. Chew cards, rather than wax tags, have been found to be more effective at attracting possums and rodents, and are recommended by DOC in their National Biodiversity Monitoring and Reporting Framework (Forsyth et al., 2018).

Chew card indices do not require calibration with other possum monitoring indices (e.g. leg-hold or wax tag indices; Forsyth et al., 2018), so can be directly compared to these data if required. Tracking tunnel lines, another widely-used pest animal monitoring method in New Zealand, are not suitable for obtaining reliable indices of possum abundance, meaning an additional monitoring method for possums would be required and monitoring would become less cost-effective.

Chew cards have been found to have higher rates of detections for mice than tracking tunnels, and correlate to tracking tunnel rates for rats (Sweetapple & Nugent, 2011). The higher rates of detections for mice makes them a suitable choice over tracking tunnels for this Project.

6.3.2 Chew card spacing

Chew card lines will contain 10 chew cards spaced 20 m apart (i.e. along 180 m-long lines), as per best practice for possums (National Pest Control Agencies, 2015). All chew card lines will need to be ground-truthed to ensure chew card locations are appropriate, accessible and in areas likely to provide preferred habitat for rodents and possums.

The same chew card lines are to be used year to year to enable trend monitoring and comparisons. However, lines may be repositioned in future if, for example, access becomes difficult.

6.3.3 Frequency & timing

Chew card monitors will be repeated four times per year (simultaneously with camera trap surveys): February, May, August, and November. The three night monitor is recommended by Ruffell et al. (2015) for monitoring both rats and possums, and also matches the best practice monitoring for possums (National Pest Control Agencies, 2015).

An additional monitor using chew cards may also be required if the threshold values of rats or possums are exceeded. The follow-up monitor should occur four weeks after the additional control measures to ensure the abundance of the target species has been successfully reduced to acceptable levels.

6.3.4 Chew card deployment

On each monitoring instance:

- Deploy cards for three nights when a mostly fine forecast is expected (no heavy rain predicted), as per the standard methodology for calculating the CCI.

- Fill the internal channels of the corflute material with peanut butter as a lure. Alternatively, cards pre-filled with herbal peanut lure can be used (available from Connovation Ltd).
- Nail each card to the closest suitable tree trunk 30 cm above the ground using 50 mm flat head nails angled upwards at 30 degrees.
- Label cards in permanent marker with the location, line number, card number, date of deployment and date of retrieval.
- Retrieve chew cards after the three-night period, then proceed to interpretation and analysis of bite marks.

6.3.5 Chew card analysis

Any bite marks recorded on the chew cards need to be identified to species level and CCI needs to be calculated to gain an estimate of relative population abundance for each target species.

For each target species:

- Count the total number of devices with bite marks of target species for each line. Assistance with bite mark identification can be found on the Landcare Research website (www.landcareresearch.co.nz).
- Divide the total number of devices with bite marks on each line by the total number of devices per line to get the proportion of devices with bite marks for each line.
- Calculate mean proportion of devices with bite marks for all lines for the site (i.e. the sum of the proportion of devices with bite marks of each target species).
- Multiply by 100 to get the CCI percentage.
- Calculate the standard error (SE). This is the standard deviation of the CCI / square root of the number of lines.
- Multiply the combined SE by 2 to calculate the approximate 95% confidence interval. Note that some statistical assumptions may be violated by the field layout, so the 95% confidence intervals are approximations only.

6.4 Camera trap methods

6.4.1 Description

Camera traps have become an increasingly used tool in the past 5 years (e.g. (Gillies & Brady, 2018; Glen, Cockburn, et al., 2013; Glen et al., 2014). Cameras are much more effective for detecting larger pest species (cats, ferrets and stoats) (Norbury et al., 2017), including in comparison to standard tracking tunnels (Department of Conservation, 2020; Smith & Weston, 2017; Dilks et al., 2020). This success of camera traps is likely due in part to the reduction of a neophobic response (the avoidance of new objects in the environment such as tracking tunnels) with this passive method (Smith & Weston, 2017).

Note: DOC's best practice guidelines for camera trapping (and potential indices from camera trap data for key target species) is currently under development and expected to be completed in 2026. Camera trap methods and

targets outlined in this document are based on the draft recommendations (Department of Conservation, 2024) and should be updated based on the final guidelines as they become available.

6.4.2 Camera spacing

For monitoring feral cats and mustelids, four cameras should be deployed along lines spaced 200 m apart in areas of preferred habitat for cats and mustelids. All lines should be spaced at least 1000 m apart, with a minimum of 4 lines.

6.4.3 Timing and frequency

Camera trapping along each line should occur four times each year, in February, May, August, and November. This information will help to determine pest presence and assist with determining where to focus control efforts (i.e. location of additional efforts).

On each instance, cameras should be deployed for 21 nights when fine weather is forecast.

6.4.4 Camera settings

The key settings to consider when setting up a camera trapping network for cats or mustelids include:

- Trigger speed (the time taken from when an animal is detected by the sensor until it is photographed);
- Sensitivity (low, medium, or high amounts of movement required to trigger the camera);
- Type of sensor (passive infrared (PIR) vs microwave);
- Type of flash (white vs infrared);
- Type of image recorded (still photograph vs video of specified duration); and
- Interval (time between trigger events).

Camera traps to detect mustelids and feral cats should be set to capture three rapid-fire still photographs (termed a 'photo burst') per trigger event, with a five-minute forced interval between photo busts. Capturing three images improves the chance that an animal which triggers the camera is successfully caught and able to be identified to species level. Still images also do not require the same time-consuming analysis as video. The three photos within one photo 'burst' are considered as one 'capture' if the animal appears in one or more of the three images.

Cameras should have a trigger speed of no more than 1.6 sec, medium sensitivity, use a PIR sensor and initially use cameras with an infrared flash. If images taken with a PIR sensor are unable to be identified, a white flash should then be considered, however, a white flash is more likely to frighten animals (Glen, Cockburn, et al., 2013). These settings are typically able to detect and allow clear identification of the key species of interest, including cats, stoats and rats (Glen, Cockburn, et al., 2013) and are in line with the recommended standard protocols for camera trapping (Department of Conservation, 2023).

6.4.5 Camera deployment, orientation, and lure

Each camera should be oriented so as to standardise the size of the detection zone, i.e. placing cameras at the same orientation and height (Glen et al., 2013). Cameras should be close to the ground (6–50 cm above ground).

Cameras need to be securely mounted to a firm structure, such as a tree trunk. Cameras can be attached to trees using a screw-in tree mount and/or straps. If no solid structure is available at the desired location, a waratah or strong wooden garden stake (2.5 x 2.5 x 1.5 m is suitable for most situations) can be hammered into the ground. Cameras can be secured with a screw. Stakes will need to be pre-drilled to prevent the wood from splitting and hammered at least 50 cm into the ground, or more if the ground is soft or in an exposed location. Avoid positioning cameras directly into the sun (i.e. at sunrise or sunset).

A lure needs to be placed in the centre of the camera's field of view (e.g. Fig. 24) to increase the probability of detecting a target animal in the area, and also to encourage animals to pause in front of the camera, which increases the likelihood of capturing a clear image (Glen et al., 2013). As per DOC's interim trail camera guide (Department of Conservation, 2023), the lure should consist of an approximately 150 g piece rabbit meat between two pieces of Erayz wrapped in chicken wire, threaded onto a c.150 mm W × c.260 mm H No.8 wire 'croquet style' hoop and pegged to the ground between 60 cm–1 m in front of the camera, perpendicular to the camera's line of sight (Fig. 24).

Figure 24: Camera trap set-up with the lure (comprising 150 g fresh rabbit meat between two pieces of Connovation's Erayz wrapped in chicken wire) pegged to the ground c.60cm in front of the device. Image from DOC's interim camera trapping guidelines (Department of Conservation, 2023)

6.4.6 Image analysis

All camera images need to be manually viewed and scanned for appearances of target predator species (in particular stoats, ferrets, and feral cats). Cameras should be set to take three rapid-fire still photos per trigger event to increase the likelihood of capturing a clear, identifiable image. As such, animals captured in one or more image within the photo burst should only be counted as a single capture during analysis.

The camera trap index of relative abundance for feral cats, mustelids and rats is expressed as the mean number of feral cat, stoat, weasel, ferret or rat detections per 2000 camera hours (2000 CH) per camera trap line (Department of Conservation, 2023). This is calculated as follows:

1. Total the number of detections on each camera and total these for each survey line. Do this separately for each of the target species.
2. Calculate the number of hours each camera was operating during the survey and total these for each line. For the purposes of this index, assume the camera traps have been operating from midday of the day they were set, until midday of the day they were recovered. So, for a 21-night survey session each camera is assumed to have been operating for 504 hours, with 4 cameras on a line (4 x 504 hours) the total is 2016 camera hours
3. If there is evidence to suggest a camera has malfunctioned during the survey, assume it was operating from midday of the day it was set, until either midday or midnight (whichever comes first) following the time stamp on the last photo taken. If no images are collected (including those of the operator placing or recovering the device) on a camera trap, assume the device has been inoperable for the duration of the survey.
4. Calculate the relative abundance index of the number of target animal detections (2000 CH) for each survey line based upon the following formula; do this separately for each of the target species:

   Detections per 2000 CH = (number of detections / number of camera trap hours) × 2000
5. Calculate the mean (average) number of target animal detections (2000 CH) over all the lines. To do this, add the number of target animal detections (2000 CH) from each line and divide the total by the number of lines. Do this separately for each species.
6. Calculate the standard error of the mean. The standard error (SE) is simply a measure of the precision of the mean. It is often very useful to express the mean number of target animal detections (2000 CH) plus or minus SE. If you use a calculator with statistics functions you can calculate the standard deviation ($^{\delta}$n-1 button) of your sample (of the target animal detections (2000 CH) from each of your survey lines). The standard error can then be calculated from the standard deviation. The standard error is equal to the standard deviation divided by the square root of the sample size, which for these surveys is the square root of the number of lines. Do this separately for each species.

6.5 'Smart' monitoring technology

In addition, new real-time monitoring technology should be incorporated into this plan as it becomes available, particularly those which allow for instant (real-time) detection of pests and tracking of populations. New technologies (such as thermal trigger based cameras) have the advantage of higher detections of all pest species, but particularly smaller species such as rats and mice. This greatly enhances management approaches by allowing rapid responses to pest increases, and the set-and-forget nature of these technologies also reduces human impact associated with frequent monitoring. Real time AI monitoring tools can also be used to detect the presence of larger predators e.g. feral cats and ungulates.

7.0 Exceedance of pest thresholds

If monitoring identifies that the thresholds for control targets have not been achieved, this will trigger a requirement for further control. This use of thresholds facilitates adaptive management and ensures that pest populations are continuously and effectively suppressed. See Table 11 for the suite of response measures which can be selected from for threshold exceedance for each target species.

Table 12: Summary of threshold exceedance response measures including additional control for each target pest species. CCI = Chew card index, CH = Camera Hours

Species	Threshold %	Exceedance response measures
Rats	>10% CCI	• Additional aerial control operation or consider a switch to a novel or new toxin. • Up to three additional ground-based toxic control operations will be repeated per year where possible (i.e. where bait station networks targeting rats have been established). Control may be localised to the area with higher densities. • Trap checks and rebaiting of any single-set rat capable traps needs to increase to once every two weeks, if not already at this interval. A follow-up monitor 4 weeks after the start of any additional toxic control operations needs to occur to determine whether the rat population has been successfully reduced to below the threshold.
Possums	>10% CCI	• Additional aerial control operation or switch to a new ground based toxin such as Feracol of Feratox (CSL required) • Up to three additional ground-based toxic control operations will be repeated per year where possible (i.e. where bait station networks targeting possums have been established). • Trap checks and rebaiting needs to increase to once every two weeks, if not already at this interval. A follow-up monitor 4 weeks after the start of any additional toxic control operations needs to occur to determine whether the possum population has been successfully reduced to below the threshold.
Mustelids	>3 detections per 2000 CH	• Trap checks and rebaiting of single-set traps needs to increase to once every two weeks, if not already at this interval. • A single ground-based toxic control operation with PAPP can be introduced with toxic baits placed in wooden DOC boxes (without the trap) or similar. Bait stations can be placed along all existing trap lines at 200-300 m intervals as suggested for stoats by Dilks et al. (2011) • Additional aerial 1080 control operation (likely only to occur if multiple pest species targets are in excess of the threshold/s). A follow-up monitor for 3 weeks after 1 week at the end of the PAPP toxic control operations needs to occur to determine whether the mustelid population has been successfully reduced to below the threshold. A follow-up monitor 4 weeks after the start of the aerial toxic control operation needs to occur to determine whether the mustelid population has been successfully reduced to below the threshold.
Feral cats	>3 detections per 2000 CH	• Trap checks and rebaiting needs to increase to once every two weeks, if not already at this interval. • A single ground-based toxic control operation with PAPP can be introduced with chimney and submarine bait stations. Bait stations can be placed along all existing

Species	Threshold %	Exceedance response measures
		trap lines at 500 m intervals as suggested for feral cats in the Best practice guidelines for the use of PredaSTOP™ for feral cat control • Additional aerial 1080 control operation (likely only to occur if multiple pest species targets are in excess of the threshold/s for multiple consecutive monitors). • Trap checks and rebaiting of DOC traps needs to increase to once every two weeks, if not already at this interval. A follow-up monitor 4 weeks after the start of the aerial toxic control operation needs to occur to determine whether the feral cat population has been successfully reduced to below the threshold. A follow-up monitor for 3 weeks after 1 week at the end of the PAPP toxic control operations needs to occur to determine whether the mustelid population has been successfully reduced to below the threshold.

8.0 Data management & reporting

All control data (including both trapping and toxic control), and all monitoring data need to be entered into a single, cohesive data management system as soon after field work as possible. TrapNZ is the recommended platform, as it is widely used across New Zealand, user friendly, and can record spatial distribution of traps and catches.

The data management system needs to be set up as soon as possible. The GPS waypoints of all ground-truthed traps and their type need to be entered into the system. This includes traps that are either pre-existing or those deployed as per this plan.

All contractors and other persons undertaking pest control need to record all trapping data on the selected system. Each person/group that needs to access the system, will need an account and be instructed on how to enter the required information correctly.

For each trap check, all data needs to be accurate and complete, as per the minimum information to be recorded below:

- Date of servicing;
- Name of the trap/toxin servicer;
- Device location, unique identifier, model type and model name;
- Lure type and whether the lure was refreshed;
- Whether the trap has been triggered (trap status);
- Trap catch (species); and if possible/relevant: sex and age of individual, number of individuals, or record trap catch as zero if nothing is caught;
- Bait type and quantity deployed (for bait stations); and
- General comments (e.g. if trap needs fixing or replacing, if bait is gone).

Maintaining accurate and precise records of both pest control and pest monitoring are crucial to evaluate the success of predator control at each site. Spatial and temporal trends in pest populations and catch rates can be identified in the analysis of this data, which can then inform future pest management decisions.

An annual pest management report will be prepared. Each annual report needs to include:

- A summary of all pest control activities undertaken in the preceding 12 months, detailing dates, and methods of each control activity:
- Maps of control devices/area, labelled by type;
- Summaries of trap catch statistics by species (both target and any non-target catch), including by trap type, trap location, lure type as well as CCI and CCH of rats, possums, and mustelids, with comparison to management targets and thresholds for additional control;
- Summaries of results of toxic control operations, including target species, bait type and bait take;
- An analysis of pest exclusion fence health and any incursion/incursion risks;

- Any trends in the data, such as high-catch/high bait-take locations, the main species caught and comparisons to previous years;
- An analysis of targets and threshold results and recommendations for (if required) for management into the next year; and;
- Any challenges/issues encountered in undertaking control or monitoring, and how these difficulties were overcome or if they remain ongoing.

9.0 Adaptive Governance and Management Review

The pest management programme will be implemented using an adaptive management framework that enables management actions to be refined over time in response to monitoring results, emerging scientific knowledge, operational experience, and observed biodiversity outcomes. Adaptive management recognises that ecological systems are inherently complex and that pest population dynamics, reinvasion rates, mast events, weather conditions, and species responses may vary over time.

The primary objective of the adaptive management framework is to ensure that management remains outcome-focused, with operational decisions guided by the achievement of biodiversity objectives. Monitoring data will therefore be used not only to assess pest abundance but also to evaluate whether the programme is delivering the intended benefits for target species and habitats.

9.1 Annual Review

Monitoring results, operational records, and biodiversity observations will be reviewed annually by the project team. It is also recommended that a Technical Advisory group (consisting of, for example, Bathurst team members, pest contractors, an independent technical expert and DOC), is established for the purposes of reviewing annual reports and assisting with adaptive management decisions and approaches. The annual review will identify whether management objectives and pest thresholds are being achieved and determine whether modifications to control methods, monitoring frequency, infrastructure density, or operational timing are required.

Pest control tools, technologies, and methods are evolving at a rapid rate, with many new tools coming into the market. These new tools will greatly enhance the efficiency of predator control regimes. A review of emerging pest management tools and technology will also be undertaken annually. Any new tools should be incorporated into the following years' pest management practice if suitable. The tools recommended for use in this plan are based on those currently available at the time of writing. However, they should be supplemented or replaced with improved tools with proven efficacy as those come to market, where there is benefit in doing so.

9.2 Five-Year Strategic Review

A comprehensive review of the programme will be undertaken at least every five years, or sooner if significant ecological or operational issues arise. The review will assess:

- progress toward biodiversity objectives;
- effectiveness of pest control methods;
- suitability of pest thresholds and trigger levels;
- emerging pest management technologies and methodologies;
- monitoring programme effectiveness; and
- opportunities for improving ecological outcomes.

Recommendations arising from the review may be incorporated into subsequent revisions of the management plan. Significant changes to management approaches will be supported by monitoring evidence and documented through the reporting process.

9.3 Managing Uncertainty

The programme acknowledges that ecological outcomes may be influenced by factors outside direct management control, including climatic variability, mast events, natural population fluctuations, and reinvasion from surrounding landscapes. This adaptive management framework provides a mechanism for responding to these uncertainties while maintaining focus on long-term biodiversity recovery objectives.

Ultimately, success will be assessed not solely on the basis of pest suppression metrics, but on the extent to which management contributes to sustained improvements in the condition, survival, recruitment, and resilience of indigenous species and ecosystems within the management area.

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APPENDIX A. FENCE FEASIBILITY ASSESSMENT

Pest exclusion fencing feasibility report

Denniston and Stockton Plateaux

Buller District

The western escarpment, Stockton Plateau, home to *Powelliphanta* snails and various skinks and geckos

Prepared for Alliance Ecology, Auckland

pestproof fences

April, 2025

Pestproof Fences Ltd [redacted] Ph: 021549462

Contents

Summary

1 ***Introduction***

2 ***General considerations***

- *terrain*
- *soil type and stability*
- *vegetation*
- *water inflows and outflows*

3 ***Proposed fence and typical cost***

- *the fence and capping system*
- *vehicle gates*
- *pedestrian gates*
- *inflow culverts*
- *outflow culverts*

4 ***Assessment of particular sites***

- *Denniston Plateau*
  - *Sites 1, 2, 3.*
  - *Sites 4,5,6*
  - *Site 7*

- *Stockton Plateau*
  - *Site 1*
  - *Site 2*

5 ***Conclusions and overall assessment***

6 ***Appendix***

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John McLennan, Ph.D QSM
Director, Pestproof Fences Ltd, Havelock North

Summary

The feasibility and practicality of creating fenced wildlife sanctuaries on parts of the Denniston and Stockton Plateaux, Buller District, was assessed during two site visits in late March 2025. The sites (9 in total) varied from 4 ha to over 360 ha in size and spanned a range of landforms. All of them were considered to be potentially "fence-able", but some were much easier than others. There were several good candidates on the Denniston Plateau in close proximity to each other; these could either be fenced individually or amalgamated together. Most of the potential fence routes on the Denniston Plateau took advantage of existing roads and tracks, thereby minimising disturbance during fence installation (should it proceed). Each of the plateaus had one large potential fence site, each requiring the installation of a large culvert system over an "outflow" stream/river. The Stockton one, which included Whirlwind Rise and adjoining tussock areas, would require extensive tracking on sandstone pavement areas that are currently untracked. For this reason, we ranked it lower than the large site on the Denniston Plateau.

For the purposes of this assessment we assumed the fences would be full height (1.9 - 2.0 m) with timber posts and stainless steel fittings - appropriate for the plateaux's harsh climates and acidic soils. Such fences are the most expensive pest exclusion fences currently available, but they are also the longest lasting, with lifespans of 40-50 years. The indicative costings in this report are based on those fences, recognising that it may be possible to use cheaper materials in some locations.

Lastly, the Appendix includes an assessment of a potential fencing site away from the Plateaux, at Okari Bush, on the coastal plain near Cape Foulwind. This assessment showed it would be exceptionally difficult to fence the bush remnant, and the site is not worthy of further investigation.

1 Introduction

This report describes the feasibility and costs of building long-lasting pest-exclusion fences on various parts of the Denniston and Stockton Plateaux, Buller District. The feasibility assessments were undertaken by Nigel Broadbridge and John McLennan, representatives of Pestproof Fences Ltd, a company with more than 20 years experience building pest-exclusion fences in various parts of Aotearoa New Zealand.

The assessments are based on site visits and map studies. They were undertaken at the request of Dr Helen Blackie and Dr Matt Baber, Directors of Alliance Ecology Auckland; and the sites that were visited on the plateaux were chosen by them. The sites collectively contain a range of vegetation types and landforms, and many of the plateaux's faunal 'hotspots'. None of the sites is likely to be mined in the future.

Nigel Broadbridge and John McLennan initially spent two days on the plateaux with Helen Blackie and Matt Baber, and then Nigel returned the following week for a further four days to undertake more detailed investigations. Representatives of Bathurst Resources Ltd were also present during the field assessments (Fig.1).

The potential fencing sites varied from a few hectares to several hundred hectares in size and the potential fence routes around them were walked and examined in detail. Generally, water inflows and outflows in all sites were examined carefully, since these can profoundly affect the integrity of pest-exclusion fences in the longer term. Whenever possible, potential fence routes were selected that took advantage of existing roads and tracks, to minimise substrate disturbance and the loss of vegetation during fence construction.

This report was written by John McLennan and Nigel Broadbridge and the photos in it were taken by them.

[redacted]

2 General considerations

The Denniston and Stockton Plateaux (600 m - 880 m a.s.l.) are rocky and windswept with harsh cold climates characterised by high rainfall (6m per annum), frequent fog or mist, and winter snowfalls at higher altitude. The soils are thin, water-logged and acidic, with pH values as low as 3.5 - 4.0. In many places there are large expanses of bare eroded sandstone rock, sculptured by wind and rain, with no soil at all (Fig. 2). In short, the plateaux are challenging places in which to build 2m high pest exclusion fences.

Fig. 2: *Typical geology and landform on the plateaux, with exposed sandstone, thin localised soils, stunted vegetation and perched water tables.*

2 Fence design and cost

Pest exclusion fences come in a variety of designs and materials, appropriate for different situations. On the plateaux, the primary considerations for design are severe wind loadings, intermittent snow loadings, and low pH soils, potentially capable of corroding and shortening the life of metals in contact with the ground. Good drainage and the management of water are also of critical importance, to ensure both that culvert screens remain clear and permeable, and that substrates concealing buried mesh skirts are not washed away during high rainfall events.

The fence depicted in Fig. 3 satisfies the design requirements. The posts are treated *radiata* pine, with a minimum small end diameter of 150 mm. They provide outstanding support when driven into drilled holes at 2m spacings, eliminating vibration and wind chatter on the upper sections of the fence. All of the metal components (capping, brackets, fittings and mesh) are 316 stainless steel to minimise corrosion. Hybrid fences, which use a mix of different metals, are prone to electrolysis and are not recommended for the plateaux. The fence has a 400 mm wide mesh skirt, buried where substrates allow, or cemented and bolted directly to exposed sections of rock[1]. The mesh is spiral woven from 1.25 mm diameter wire, with an 8 mm x 6mm aperture, small enough to exclude all pest mammals and birds, including mice.

A variety of different culvert systems allow water to pass under the fence, with the size of the pipes, concrete wing-walls and screens dependent on predicted flows. The larger units incorporate hinged flap gates which open during floods then close afterwards (Fig. 4). The gates also come in a variety of designs, depending on requirements (Fig. 5).

The base cost of 1.85m - 2.0 m high 316 stainless steel pest exclusion fences with spiral woven mouse-proof mesh is currently [redacted] (Table 1). This figure includes everything - materials, transport and installation costs[2]. Stainless steel gates and culvert systems with stainless steel screens are additional to the base cost, with the price dependent on their size. The base cost assumes that there is machinery access around the entire fence route: costs increase if hand construction is required (typically on very steep slopes) or if workers have to abseil (typically on cliff overhangs).

Footnote 1. There are a variety of options for managing the skirt, including burying it under fill imported from elsewhere. The fill could contain lime to raise the pH and increase skirt longevity. It is beyond the scope of this report to explore all of these options in detail.

Footnote 2. Most of the metal components are imported and thus are subject to exchange rate variations. The base price in Table 1 assumes an exchange rate of $US 1 = $NZ 1.79.

THE FENCE

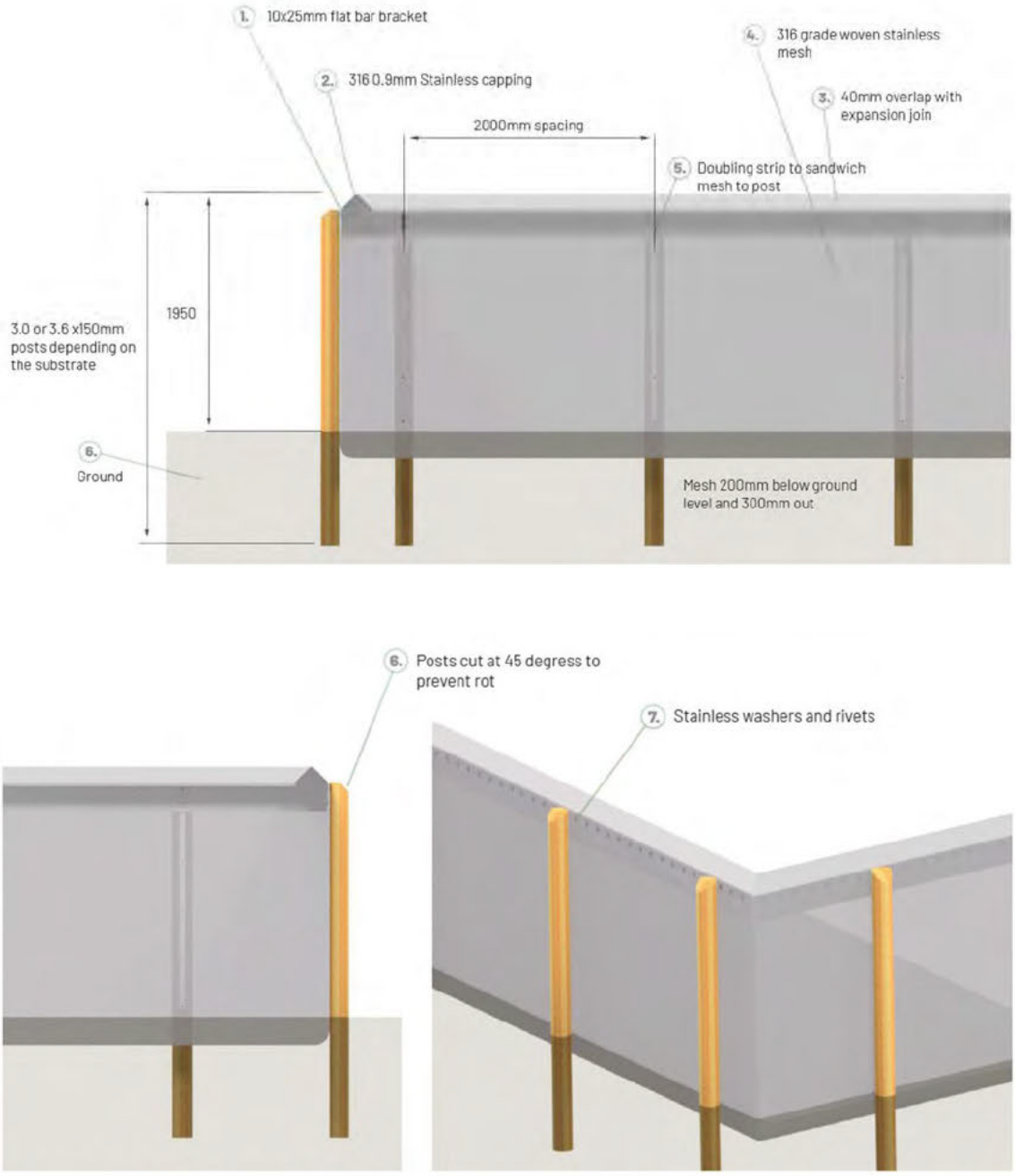

Fig. 3: *Standard design of a Pestproof Fences Ltd stainless steel pest exclusion fence. These fences are immensely strong, capable of withstanding heavy snowfalls and cyclonic winds.*

Fig. 4: Examples of pest-proof culvert systems applicable to the Stockton and Denniston Plateaux.

Fig. 5: Examples of pest-exclusion gates. 3.6 m wide vehicle gate (above); simple pedestrian gates (below). Double gate systems, which eliminate the risk of a gate being accidentally left open, are also available.

Table 1: *Current cost of stainless steel mouse-proof exclusion fences*

Item	$NZ
Base fence	[redacted]
Pedestrian Gates	
Vehicle Gates (3.6 m wide)	
Small culverts with fixed screens	
Medium culverts with fixed screens and/or flap gates	
Very large culverts over permanent streams	

4 Assessment of particular sites

4.1 Denniston Plateau

4.1.1 Sites 1, 2 and 3.

The physical locations of these three sites are shown in Fig. 6, and their grid locations are as follows: **Site 1**: 41° 44' 50.16"S, 171° 47' 28.92"E; **Site 2**: 41° 44' 47.88"S, 171° 47' 57.35"E; **Site 3**: 41° 45' 08.46"S; 171° 48' 30.21"E. Their features are described in Table 2.

Table 2: Features of Sites 1-3, Denniston Plateau. The cost for each site includes one vehicle gate and an allowance for culverts.

Site Number	Approx fence length (m)	Area protected (ha)	Existing tracks ?	Approx # of culverts	Difficulty Score
1	1560	15.9	75%	2	2
2	820	4.1	100%	1	1
3	980	6.4	40%	3	4

[redacted]

Fig. 6: *Locations of Sites 1, 2 and 3 (green outlines) on the Denniston Plateau.*

In terms of 'construction difficulty', Sites 1 and 2 are routine and straight-forward (Score of 1 or 2 = very easy and easy). Site 3 is difficult (Score 4 on a scale of 5) but potentially 'doable'. The field notes for this site are as follows: *The proposed fence route runs down the Burnett Face Road (on the lower side) - with many inflow culverts that could carry substantial flows. The eastern ridge is easy going, but then it drops very steeply into a creek. This steep section would not be able to be constructed with machinery and there is no obvious route to avoid this. Installing a large inflow culvert plus the fence sections either side of this gully without machinery and with the aid of abseiling equipment/ personnel would make this line of the fence very expensive. Unless there is something particularly special about this area, it is not worth pursuing this option.* No indicative price is given for Site 3 in Table 3 because it is outside the normal range and difficult to estimate.

Site 2 is entirely (100%) encircled by existing roads and tracks and Site 1 is partially encircled (75%). Some additional ground disturbance is therefore required to establish a building platform at Site 1 if a fence was to be erected there.

4.1.2 Sites 4, 5, and 6

Sites 4, 5 and 6 (labelled b, c and d in Fig. 7) are potential extensions of Site 1 (which is labelled Den NW a in Fig. 7). Their grid references are as follows: **Site 4:** 41° 44' 59.21"S, 171° 47' 19.28"E; **Site 5:** 41° 44' 36.83"S, 171° 47' 26.25"E; **Site 6:** 41° 44' 37.90"S, 171° 47' 26.47"E.

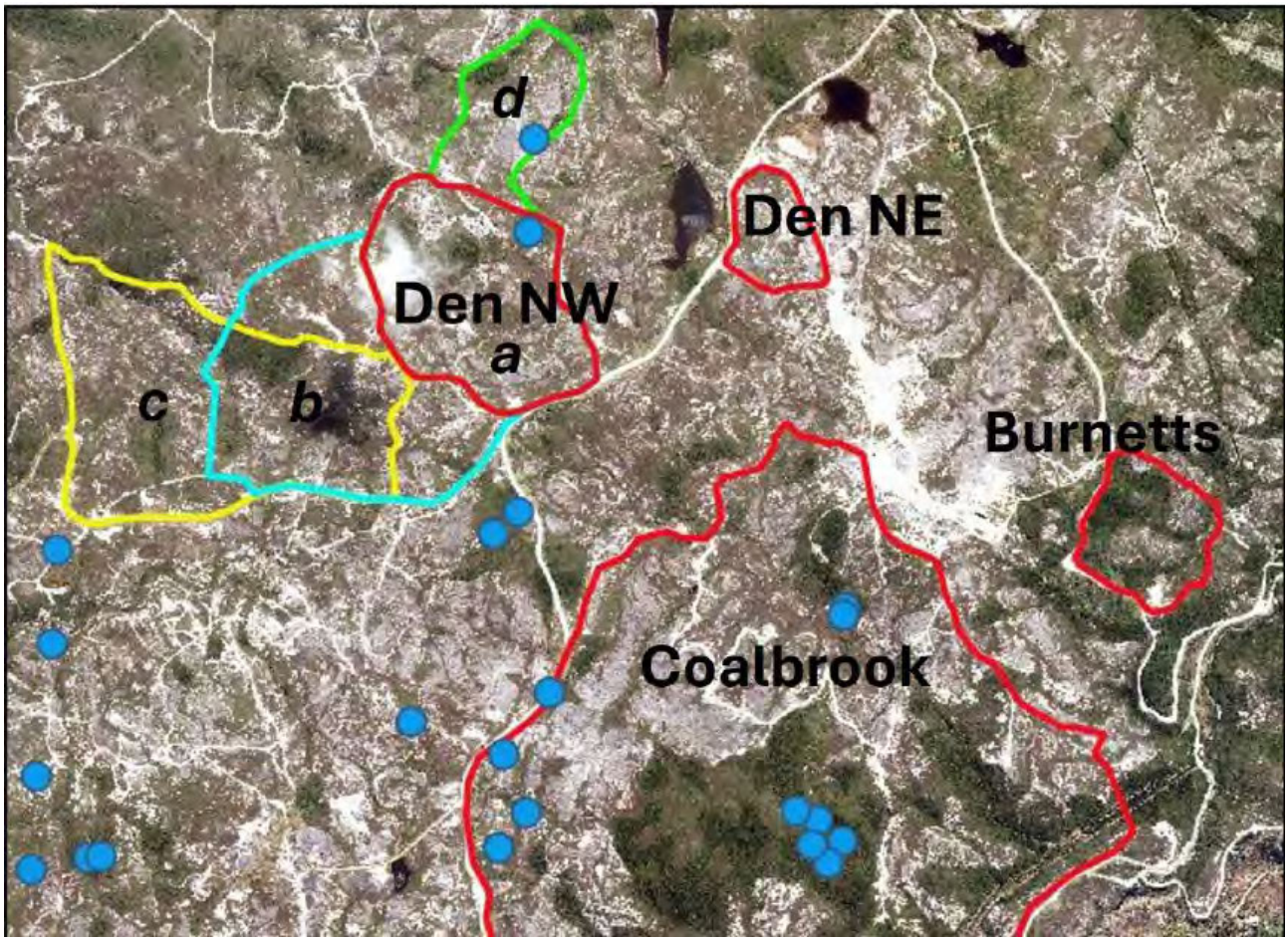

Fig. 7: *Locations of Site 4 (blue line), Site 5 (yellow line) 2 and Site 6 (green outline) on the Denniston Plateau.*

The potential fence around Site 5 (yellow line) was walked during the first field trip, and most of the routes of Site 4 (blue line) and Site 6 (green line) were walked during the second field trip. The features of Sites, 4, 5 and 6 are listed in Table 3. Fig 8 shows a typical portion of the existing track around Site 5, with a gentle sloping section in the background. Fig. 9 shows the erosion that can happen on these gentle slopes when the movement of water is uncontrolled; and Fig. 10 shows the outflow stream at the bottom of the catchment that would require a large culvert to bridge.

Site Number	Approx fence length (m)	Area protected (ha)	Existing tracks ?	Approx # of culverts	Difficulty Score	[redacted]
4	1120*	14.3	80%	4	3	
5	2420	29.5	60%	5	2	
6	1410*	11.5	80%	4	1	

Table 2: Features of Sites 4, 5 and 6, Denniston Plateau. Conventions as for Table 2.
* = the extensions to Site 1.

Fig.8: *Example of the potential building platform around Site 5. The gradient varies from flat to gentle and machine access is possible around the entire route. As potential builds go, it is relatively straight-forward, with a difficulty score of 2.*

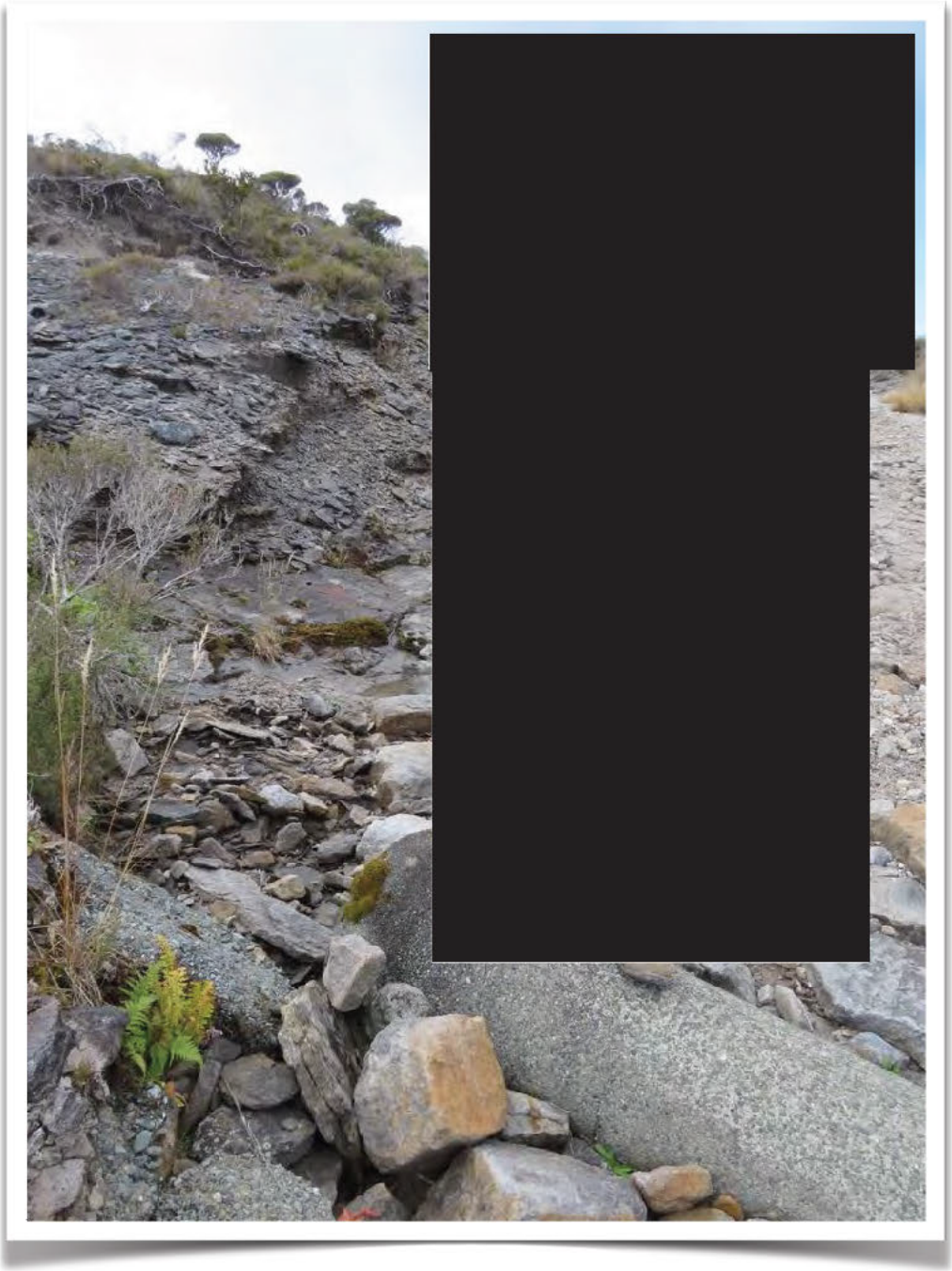

Fig. 9: *Erosion on a gentle slope. On both plateaux, effective water management will be essential to maintain the integrity of pest exclusion fences. Here the culvert has blocked and water has run down the outside of the pipe, exposing it and scouring the road.*

Fig. 10: *An 'outflow' stream on Site 5, so named because the water flows out from the proposed fenced area into the surrounding unprotected area. Outflow streams are easier to manage than inflow streams. The stream shown here has a relatively small catchment but a large rise and fall during significant rainfall events. Such streams require substantial culvert systems, with flap gates, to accommodate peak flows.*

4.1.1 Site 7

Site 7, named “Coalbrook” in Fig. 7 and shown in its entirety in Fig. 11, is the largest of the potential fence sites on the Denniston Plateau, approximately 145 ha in extent, with a perimeter of 6450 m. The proposed fence route straddles the upper Waimangaroa River.

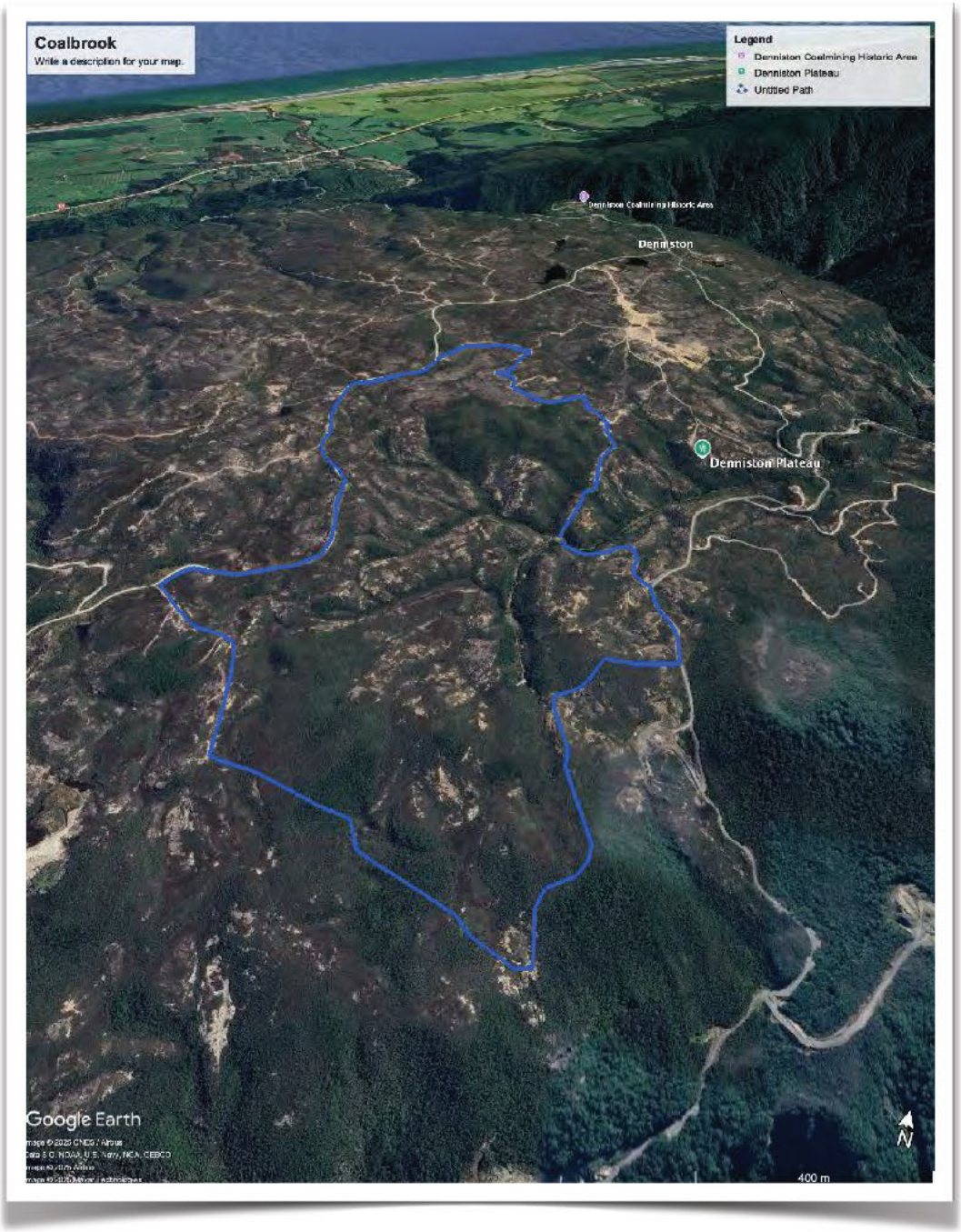

Fig. 11: *Site 7 (blue line) on the Denniston plateau.*

Fig. 12: *The proposed fence route for the "Coalbrook" site crosses the upper Waimangaroa River in a location similar to this one. It is technically feasible to fence crossings of this size with a flap gate weir on a concrete footing.*

For most of its length (90%) the proposed route utilises an existing road, drill track and planned haul road, apart from approximately 590 m on the northern side of the Waimangaroa River. A large outflow weir would be required to cross the Waimangaroa

River (Fig. 12): and numerous inflow culverts are required on the eastern side along Whareata Road.

A great deal of additional work is required to cost the Coalbrook fence with some accuracy, but its clearly going to be at least [redacted] Much depends on the weir structure for the Waimangaroa River, the exact location of the proposed haul road, the remedial works required to upgrade existing drill tracks, and the size and number of culverts along other sections of the fence route.

4.2 Stockton Plateau

Two potential fence sites were inspected on the Stockton Plateau: a 14 ha site on the western escarpment between Mt Augustus and Millerton; and a 363 ha site on the western slopes of Happy Valley (Fig. 13). A third site around the 'new' Mt Augustus summit was also investigated and considered to be 'fence-able" - noting that its installation would inevitably disturb the remnant *P. augusta,* population and its remaining habitat. This 'third' fence is not considered further here.

Fig. 13: Locations of two potential fence sites (red outlines) on the Stockton Plateau.

4.2.1 Stockton Site 1 Western escarpment

The western escarpment site (41° 39' 43.80"S, 171° 51 21.76"E) includes the ridge-line itself and the eastern slopes immediately beneath the ridge-line (Fig. 14). It is an exposed site, 850 m a.s.l., the highest of all of the potential sites considered in this report. Approximately 40% of the proposed route is road and drill track; the remainder of the building platform would need to be established, mainly by bulldozing exposed sandstone pavement. The western side of the fence is fully exposed to westerly winds (Fig. 15).

Fig. 14: *Site 1 on the western escarpment, Stockton Plateau*

The gradients are gentle except in one short section (about 10 m long) where hand building and hand-drilling may be necessary. Overall, the site is easy (Difficulty score 2). The potential fence is about 1640 m long, and it encloses an area of 14 ha. The approximate build [redacted]

Fig. 15: *Western edge of site 1 on the escarpment, Stockton Plateau.*

4.2.2 Stockton Site 2. Whirlwind Rise and adjoining pavements

This site was inspected closely over two days, exploring various routes across the sandstone pavements and around Whirlwind Rise. The route shown in red is feasible and preferred (Fig. 16) taking in an area of red tussock on the south-eastern corner of Whirlwind Rise. The blue route is an alternative option for the southern side; it circumvents the need for a large outflow culvert, but excludes the area of tussock. It also has some steep-sided creeks that would require longer (than normal) culverts and imported fill to cross.

The red route encircles about 365 ha and is about 8330 m long. In most places, a build platform would need to be established from scratch, creating a 3m wide road/track on

Fig. 16: *The Whirlwind Rise site on the Stockton Plateau. The red line is the preferred option. The blue line eliminates the need for one large outflow culvert; while the green line minimises damage to pavements by making use of existing roads.*

sandstone pavements that are currently undisturbed. As mentioned, a large outflow culvert is required in the southeastern corner and there is a good location for it (Fig. 17).

Fig. 17: *Potential location (beneath finger) for a large outflow culvert in the south-eastern corner of the Whirlwind Rise fence site.*

Additional culverts are required elsewhere around the site, all but one of them “outflows”. The indicative cost of the Whirlwind Rise fence is about [redacted] The build difficulty is 3 - ‘doable’ but challenging in some places.

5 Conclusions and overall assessments.

All of the potential fence routes examined on the two plateaus are ‘doable’. They are not, however, equivalent in terms of 1) construction difficulty; 2) their requirements for large and expensive culverts, and 3) the extent to which the landscape and surrounding environment is likely to be harmed by their installation. They are also likely to differ in their maintenance requirements; those on slopes with a number on “inflow’ culverts will inevitably require more frequent checking to prevent screen blockage and erosion. The fences themselves are likely to last 40-50 years in all locations, even though some will be more exposed to wind and snow than others.

The fences also vary in terms of their cost/benefit ratios (Table 3). Short fences enclosing small areas are cheaper to build to begin with, but have the lowest cost/ benefit ratios (capital cost/ ha protected). Shape also influences cost/benefit ratios. When fence longevity is factored in (cost/ha/yr over a 50 year lifespan) the ‘big’ fences again work out to be cheapest in the long run.

Site	Area (ha)	Length (m)	Indicative cost	Cost/ha	Cost/ha/yr
D1	15.9	1560	[redacted]		
D2	4.1	820			
D5	29.5	2420			
D7	145	6450			
S1	14	1640			
S2	365	8330			

Table 3: *Cost effectiveness of the fence sites considered in this report. D= Denniston, S = Stockton. Fence life is assumed to be 50 years.*

In our view, Site 1 on the Denniston Plateau is the pick of all the sites. It is big enough to support significant populations of snails and lizards, and - if required- can easily be extended in the future to include nearby ponds and neighbouring patches of significant

habitat. It is on gentle terrain, with a significant portion of the proposed fence route on existing tracks and roads.

For the reasons given previously, our least preferred site is Site 3 on the Denniston Plateau. We would avoid this if possible. The riskiest sites are the two largest ones, with each of them requiring substantial and expensive culverts. We think they can be fenced, if consents can be obtained for the culverts. The environmental disturbance associated with fence installation would be substantially less at "Coalbrook" (Denniston Plateau) than on Whirlwind Rise (Stockton Plateau).

Finally, it should be noted again that all of the costings here are for full height stainless steel mouse-proof fences - the most expensive of all pest-exclusion fences. Substantial savings are potentially possible by lowering fence height, and by substituting galvanised components for the stainless ones. These options are worth considering in more detail if a decision is made to build in one or more of the sites.

Appendix

The brief also asked for a fencing feasibility assessment of Okari Bush - a potential "off site" offset area for the mines on the Stockton and Denniston Plateaux. Okari Bush (41° 49' 29.47"S; 171° 28' 48.19"E.) is on the coastal plain, near Cape Foulwind (Fig. 18).

Fig.18: *Okari Bush, Cape Foulwind, Westport*

The entire perimeter of the bush was not walked during the visit, but enough of the site was assessed to conclude that: 1) an exclusion fence along the perimeter would require the removal of a large amount of mature native bush (to achieve adequate separation between the fence and neighbouring landowners); and 2) the Okari River, which meanders through the forest, would be extremely difficult and expensive to fence (Fig. 19).

The recommendation is that Okari Bush is **not** a suitable site for a pest exclusion fence. Further detail is available, if required.

Ends.

Fig. 19: The Okari River in Okari Bush. It would be extremely difficult to make this river 'pestproof' while at the same time making provision for the unimpeded movement of native fish.

APPENDIX B. METHODS FOR MINIMISING IMPACTS ON PĀKIHI WETLANDS

Pākihi wetlands are ecologically sensitive, nutrient-poor, and hydrologically fragile systems. Once disturbed by drainage, rutting, pugging, or heavy vehicle use, Pākihi hydrology and vegetation can take decades to recover. The pest management regime has therefore been designed to minimise physical disturbance and hydrological alteration while still achieving effective predator and ungulate control.

General Principles for Working in Pākihi Wetlands

- Adopt a precautionary approach: treat Pākihi wetlands as high-sensitivity zones where ground disturbance, drainage or compaction must be avoided wherever practicable.
- Minimise new ground disturbance: avoid creating new tracks, drains or repeated vehicle passes across Pākihi.
- Maintain hydrology: avoid any activity that might lower water tables, concentrate runoff or create preferential flow paths.
- Focus control on edges and natural dry features: favour traplines/bait stations. and access routes along forest– Pākihi ecotones, low ridges, old terrace faces and shrub islands rather than gridding or repeatedly traversing the wettest areas.

Trap and Bait Layout: Focusing on Margins and Firm Substrates

- Route primary traplines and bait station lines along firmer margins such as forest– Pākihi boundaries, riparian terraces, low ridges and historical exploration tracks.
- Avoid running dense grids of traps and bait stations across the centre of deep Pākihi unless there is a clear, defensible reason to do so.
- Use existing animal pads or old linear disturbances where possible, rather than cutting new lines through intact wetland vegetation.
- Keep quad and vehicle access off Pākihi surfaces; where access is unavoidable, limit to a single, lightly used route and avoid use during very wet periods.
- Recognise that introduced predators tend to move along ecotones, shrub islands and ridges; placing devices on these features can deliver high capture rates without extensive wetland crossing.

Device Modifications for Wet and Soft Substrates

- Mount traps and bait stations on short posts, bog boards or small platforms to keep devices off the saturated surface and provide a firm footing for staff during servicing.
- Use wooden boards (e.g., 1–1.2 m planks) under trapping and bait stations in the wettest areas and reuse them rather than leaving loose materials scattered across the wetland.
- Prioritise natural ‘dry’ micro-sites such as manuka or Dracophyllum clumps, hummocks and shrub islands for device placement
- Use chew cards fixed to stakes or shrub stems on firmer patches in central or marginal Pākihi.

- Ensure all plastic, card and temporary materials (chew cards, flagging, etc.) are recovered after monitoring rounds to avoid littering the wetland.

Aerial Control Operations and Pākihi Protection

- Map Pākihi extent accurately and treat mapped Pākihi as sensitive polygons in aerial operation planning.
- Use GPS-guided sowing with explicit instructions to avoid or substantially reduce sowing rates over core Pākihi where feasible, while maintaining full coverage over surrounding forest and shrubland.
- Plan flight lines parallel to Pākihi margins rather than repeatedly traversing the centre of open bogs to avoid unnecessary rotor wash and bait deposition.
- Rely on treatment of adjacent forest and shrubland to expose rodents and possums using Pākihi margins to toxin, rather than attempting uniform sowing across all Pākihi surfaces.

Ungulate and Pig Control in Relation to Pākihi

- Focus ungulate culling effort (deer, goats, pigs) on surrounding forest, ridges, terraces and Pākihi margins so that these animals are less likely to live in or frequently cross central Pākihi.
- Use aerial deer and pig control where appropriate to reduce the need for repeated, ground-based access across sensitive wetland areas.
- When ground hunting is required, work from ridges, terraces and Pākihi edges rather than criss-crossing the wetland.
- Minimise repeated use of the same dog routes through Pākihi, as this can create visible paths and pugging.
- Where historic wheel ruts or drains are present, avoid deepening or extending them; where practicable, consider minor blocking with brush or bunds to reduce artificial drainage of Pākihi.

Timing and Access Management

- Schedule the heaviest ground-based work (trap installation, major servicing, ungulate ground control) during relatively drier periods when water tables are lower and Pākihi surfaces are less prone to deep pugging.
- Combine tasks where possible so that trap servicing, baiting and monitoring (chew cards, cameras) occur on the same visit, reducing total foot traffic across sensitive areas.
- Consider installing short sections of boardwalk where staff must regularly cross the same very soft area; this concentrates disturbance and protects the remainder of the wetland.
- Implement clear field protocols that discourage ad hoc vehicle or foot travel across Pākihi.

APPENDIX C. VERTEBRATE PESTICIDES

Summary of commonly available vertebrate pesticides in New Zealand and recommended use cases. CSL – Controlled Substance Licence.

Toxin	Effective on	Single or multi feed	Advantages	Disadvantages	CSL required?	Antidote
Brodifacoum	Possums, mice, rats, hedgehogs.	Single	Effective knockdown tool.	Second generation. Builds up in the environment. High risk of secondary poisoning.	No	Yes
Bromadiolone	Rats	Single	Effective knockdown tool and for ongoing control.	Builds up in the environment. Medium-to-high risk of secondary poisoning.	No	Yes
Cholecalciferol	Possums, rodents	Multi	Occurs naturally as Vitamin D3. Low risk of secondary poisoning.	Acute toxin so requires multiple feeds. More expensive than other options.	No	No
Coumateralyl	Rats, mice	Multi	Less potent than Brodifacoum, lower risk of secondary poisoning.	Not a knockdown tool. First generation, requires multiple feeds.	No	Yes
Diphacinone	Ferrets, rats, mice	Multi	Less potent than Brodifacoum, lower risk of secondary poisoning. Useful for ongoing control.	Not a knockdown tool. First generation, requires multiple feeds.	No	Yes
Pindone	Rats, rabbits, possums	Multi	Less potent than Brodifacoum, lower risk of secondary poisoning. Useful for ongoing control.	Not a knockdown tool. First generation, requires multiple feeds.	No	Yes
PAPP (Para-aminopropiophenone)	Stoats, feral cats	Single	Low risk of secondary poisoning.	Does not work on other species e.g. possums.	Yes	Yes
Double-Tap (diphacinone + cholecalciferol)	Possums, rats (and likely mice)	Single	Potency of second-generation baits (that use actives like Brodifacoum) without the residue concerns. Minimal risk of secondary poisoning. No pre-feeding required.	Relatively untested as new to market.	No	

APPENDIX D. RELEVANT CONSENT CONDITIONS

Consent conditions to be inserted upon issue of the final decision.

APPENDIX E. OPARARA KTA OVERVIEW FROM CYPRESS KIWI MANAGEMENT PLAN (2018)

4. Compensation: off-site management in the Oparara kiwi treatment area

4.1 Aims and methods

Predator control required by condition C39 and BNZONE (Bank of New Zealand Operation Nest Egg) (if necessary) will be undertaken in the 1,000 ha Oparara KTA in the Oparara Valley, Karamea, from the commencement of mining until 20 years after mining ceases plus an equivalent period to that between the commencement of mining activities and the commencement of predator control,. The location in the Oparara Valley is shown on Figure 1. The context of the new location is shown on Figure 2.

There are two management targets:

- To ensure over each five-year period that an average of at least 50% of chicks hatched or sourced from the Oparara KTA survive to the critical weight of 1000 g, the weight at which they cease to be vulnerable to stoats (McLennan et al. 1996);
- To arrest population decline in the treatment area.

Current rates of chick survival in the treatment area are unknown but are presumed to be typical of those in mainland forests in the absence of predator control (i.e. to vary from 0% to 15% per annum). The current rate of population decline is also unknown, but is probably similar to the average value (-2% per year) for great spotted kiwi throughout its current range (Holzapfel, 2008). The goal of arresting population decline may be difficult to achieve if young kiwi disperse away from natal areas and settle outside the treatment area.

Intensive stoat trapping and rat poisoning will be the main management technique, along with three-yearly aerial 1080 poisoning to control possums. Possums will also be controlled (using ground-based poisoning) once each year – or more often if the mean RTCI (Residual Trap Catch Index) in the Oparara KTA exceeds 10% on two monitoring lines or an average of 3% across all monitoring lines.

The control programme should provide adequate protection for chicks in all years except those immediately following heavy beech mast seeding or podocarp mast seeding when both stoats and rodents become extremely numerous. These 'plague' years are expected to occur once every 3-7 years and may require additional 1080 application within the Oparara KTA.

If necessary, BNZONE - which involves collecting eggs from the field, hatching them in captivity, and then returning the chicks to the wild when they have reached safe size - will be employed along with predator control in stoat plague years to ensure that the target of 50% chick survival is achieved.

The Department of Conservation will generally carry out 1080 application in the area in beech mast seeding and podocarp mast seeding years (if such years do not coincide with beech mast years or other 1080 application carried out by the Animal Health Board). Bathurst will apply 1080 to the Oparara KTA in the same year if monitoring shows this is necessary, and will then resume three-yearly aerial application of 1080.

4.2 The Oparara KTA operational area

The 1000 ha Oparara KTA (Figures1 and 2 below) straddles the middle reaches of the Oparara River (Karamea district) in the south-western corner of Kahurangi National Park. The Oparara River basin is a well-known tourist destination, noted for its spectacular limestone river arches, cliffs and complex cave systems.

[redacted]

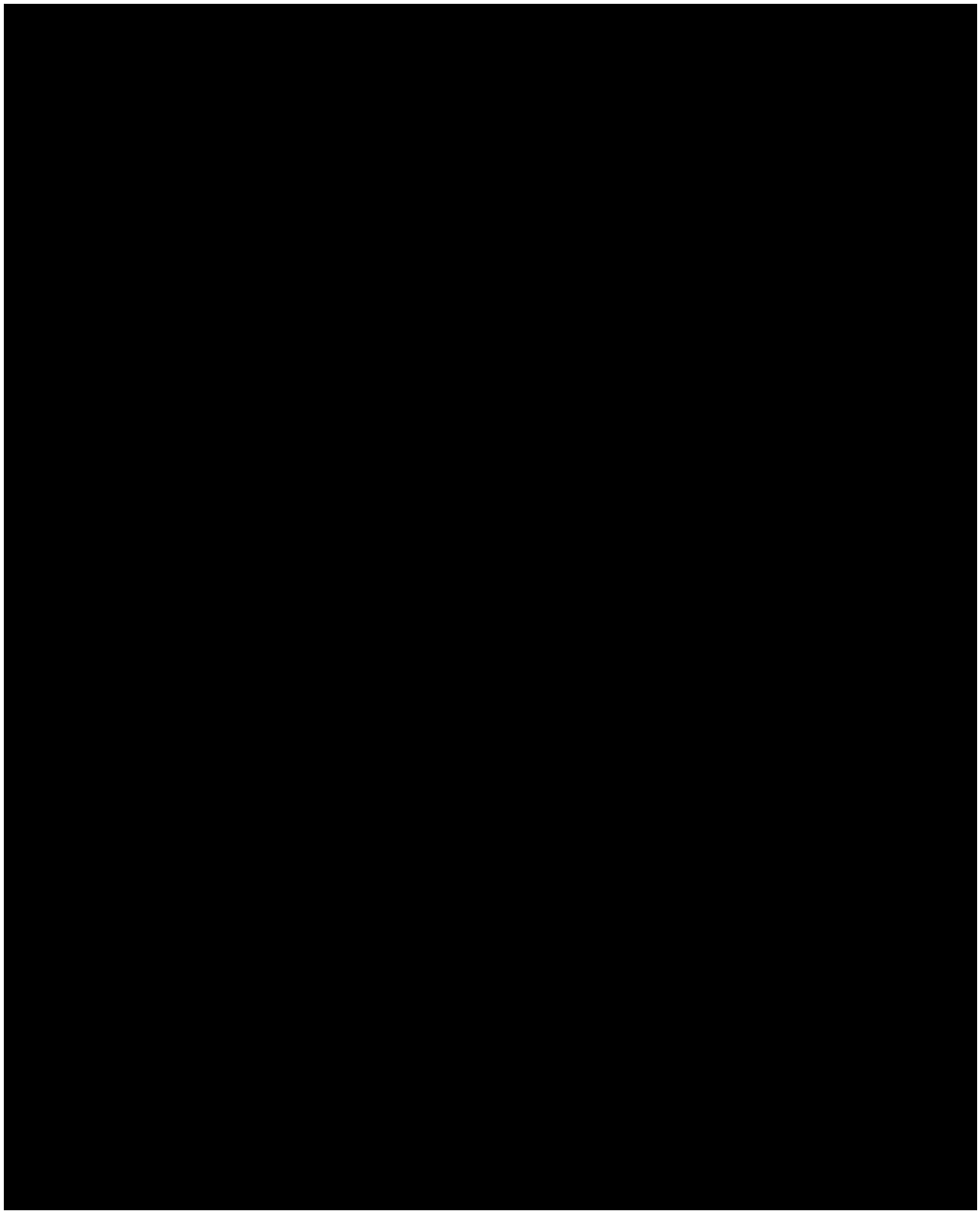

Figure 2: Location / context of the Oparara KTA.

(Note: updated since approval of Kiwi Management Plan).

The biological and landscape values of the Oparara Basin are recognised in part by its National Park status. The Department of Conservation also recognises additional values, ranking the 'Oparara Management Unit' (mainly the Oparara Basin) as a priority for management in its recent nationwide assessment of significant habitats. The Department has also identified, under its 'Operation Ark' initiative, the Oparara Basin and some of its immediate surrounds as a priority site for treatment with aerial 1080 in years when rodents and stoats irrupt following beech and/or podocarp masting. This 'Oparara Beech Mast/Rat Response Operational Area' comprises 33,000 ha and supports three (two species of bats and blue duck) of the five species (yellowhead and orange fronted parakeet in addition to the three species already mentioned) that the 'Operation Ark'

programme aims to protect. The Department's whio/blue duck recovery plan also identifies the Oparara River and neighbouring Ugly River as a 'security site' for whio (blue duck) - one of 8 'security sites' selected nationwide for blue duck conservation (Glaser et al., 2010). The aim of management in the Oparara/Ugly is to increase the local blue duck population to 50 pairs, up from the 14 pairs present when the restoration programme started in 2007.

The Oparara KTA is not aligned to any obvious geographical features, other than tributaries of the Oparara River. It is more-or-less square in shape to minimise the length of its perimeter and maximise the size of its 'protected core'. It can be expanded in all directions to provide additional offsets, if required, at some later stage. The underlying geology is 350 million year-old granite, overlaid by a thin layer of limestone with mudstone on top. The predominant forest type is podocarp/hardwood with some beech at higher altitudes; parts of the Oparara KTA were logged in the 1970s. Most of the Oparara KTA is less than 350 m a.s.l. It supports the full suite of forest birds still extant in the Buller/Karamea region. Species with patchy distributions and or threatened species rankings include kakariki, kaka, blue duck, kea, weka, rifleman and great spotted kiwi. There are insufficient open habitats in the Oparara KTA to support pipits but fernbirds are present in some localised shrublands bordering disused forestry roads.

Various surveys over the last 25 years show that great spotted kiwi are widespread in the Oparara Basin. The most recent call-count survey in November 2010 (Stewart, 2010) detected an average of 5.1 calls per hour in 32 hours of listening. Stewart's survey area comprised about 1700 ha and included all the 1000 ha in the Oparara KTA. Seven of his 16 listening locations were located entirely within the Oparara KTA and another three were alongside it: kiwi were detected at 8 of the 10 listening stations in or alongside the Oparara KTA. Stewart (2010) estimated that mean territory size was somewhere in the range of 42-57 ha, and that some 40 pairs were responsible for the calls he and his team heard. He noted that his density estimates were lower than those recorded in both the Hurunui Mainland Island (29 ha/pair; Keye, 2008) and the Saxon Downs area on the Heaphy Track (25 ha/ pair; McLennan and McCann 1991), implying that the existing population in the Oparara is below carrying capacity.

There is no information on the age-structure of the kiwi population in the Oparara Basin but it is probably typical of areas where there is limited pest control. Juveniles less than 1000 g in weight are likely to be rare in most years, and in most parts of the Oparara KTA, because of constant predation by stoats. The aerial poison in 2010 may have improved chick survival in the following breeding season, resulting in a recruitment bulge that may still be measurable. Great spotted kiwi juveniles remain with their parents for 2-3 years, so the beneficiaries of the aerial drop are probably only just beginning to leave their natal territories now. Chick survival in the territories immediately alongside the Oparara River may also be slightly higher than elsewhere in the Oparara KTA because of the blue duck protection programme. The intensive stoat trapping along waterways and roads seems to be paying off, with the numbers of blue duck in the Oparara/Ugly

security site trebling since 2007 (DOC unpublished data). It could well be making a difference for kiwi too.

Overall, the Oparara KTA is in a good location for a long-term predator control and ONE programme. It has excellent all-weather road access and an extensive internal network of tracks. Much of the infrastructure required to establish and maintain the predator control programme already exists: the remaining components (mainly trap-lines, traps, bait stations and trap markers) will be installed once a management agreement is established with the Department of Conservation.
The Oparara KTA supports plenty of species that are likely to benefit from pest control, with great spotted kiwi top of the list. The expectation is that kiwi density should increase in the Oparara KTA following intensive restoration management, with population expansion made possible because of spare carrying capacity.

The predator control programme will ultimately enhance both biodiversity in the Oparara Basin and the experience of visitors. It would be difficult to find another site that ticks so many boxes.

4.3 Predator control in the Oparara KTA

The Predator Control Plan for Cypress Mine (Bathurst, July 2018) describes the methods that will be used to control predators to increase the survival rates of great spotted kiwi and other birds (blue duck, kaka, kakariki, robin, tomtit, weka, tui, bellbird and kereru) in the treatment area for the period required.

Predator control aims to provide great spotted kiwi and other forest birds with year-round protection from stoats, rats and possums. Stoats are the main predator of young kiwi less than 1,000 g in weight. They are also the main predator of hole-nesting species including blue duck, kaka, kakariki (and bats). Rats and possums are the main predators of open-nesting birds, such as bellbirds, kereru and tui. Two species of rat (ship rat and Norway rat) probably inhabit the Oparara Valley.

Most of the Oparara KTA has not previously received any ground-based control and is receiving only intermittent aerial 1080 under Department of Conservation management. The Cypress programme in the Oparara KTA will ensure three-yearly aerial 1080 application plus continuous ground-based stoat, rat and possum control. The Oparara KTA was previously treated with 1080 in February 2010 and most recently in September 2016.

Stoat Control

Best practice techniques of stoat control, as defined by DOC, will always be used. These are certain to evolve over the course of this management programme as better control devices, control practices, and baits and lures become available.

The plan initially is to control stoats mainly by intensive kill-trapping and rats and possums by ground-based poisoning, supplemented with secondary poisoning from aerial 1080 in years when it

is applied. Kill-traps will be positioned at an average density of one trap per 1.25 ha throughout the entire treatment area, at 100 m spacing, on marked tracks cut along rivers, streams and major ridgelines (approximately 960 traps). A DOC 150 trap set under a 900 mm wooden cover with a double mesh entrance to exclude weka will be used at each trap site to begin with. These traps generally have a long life, and are expected to remain serviceable for at least 15 years. Thereafter they might be replaced with something else, depending on what is available at the time. The traps will be baited with locally sourced hen eggs or other suitable bait and operated continuously throughout the year, with service rates varying seasonally from once per fortnight (November to February) to once every two months (mid-winter) (on average eight times per year).

The three-yearly 1080 drops will kill stoats and rats directly, and will help to 'purge' the Oparara KTA of 'trap-shy' stoats that establish in the years between the 1080 operations..

The trapping operation will be suspended for six months following each aerial 1080 application within the Oparara KTA unless monitoring shows it should continue. Monitoring will take place within a month of the 1080 operation and again three months later. Stoat numbers in the Oparara KTA are likely to remain low for at least six months following a 1080 operation. Additional controls over that period are expected to be unwarranted but the monitoring proposed will test whether this is the case.

Possum Control

Possum control in the Oparara KTA will be achieved with a combination of ground-based and aerial poisoning operations. There will be one ground-based poisoning operation in winter each year as a matter of course, supplemented by three-yearly (on average) aerial applications of 1080 as described above. Additional ground-based operations will be undertaken if the possum RTCI's exceed the thresholds listed above but this is not expected to be necessary.

Rat Control

A network of bait stations will be established and operated year-round to control rats in the Oparara KTA. The stations will be spaced 100 m apart, sufficient to ensure that all rats in the Oparara KTA have access to at least one station. First generation anti-coagulant poisons will be the standard baits, wired into each station to prevent removal. The methodology will be reviewed frequently to ensure the method is achieving the outcome desired. The stations will be checked and filled (if necessary) eight times per year (approximately 6-weekly). Any mouldy and/or unpalatable bait will be removed during each inspection and taken out of the Oparara KTA to be disposed of in an approved facility.

This bait-station poisoning operation will be suspended for a six month period whenever 1080 is applied unless the post 1080 monitoring set out above indicates additional controls are required.

Buffer Zone Surrounding the Oparara KTA

Predator control carried out by DOC in the area surrounding the Oparara KTA will enhance predator control within the Oparara KTA, by effectively placing a large buffer zone around it, and minimizing re-invasion of predators from outside the Oparara KTA. This reduces the density of traps required around the margin of the Oparara KTA that would otherwise have to be provided by the Oparara KTA programme. In recognition of this Bathurst will provide funding to the Department of Conservation to assist with predator control in the area surrounding the Oparara KTA.

4.4 Protective rearing using BNZONE

BNZONE will be used to enhance kiwi chick survival in the Oparara KTA if the predator control programmes fail to produce the expected benefits. Outcome monitoring (described below) will show whether or not chick survival targets are being achieved. If BNZONE is require to boost chick survival rates, approximately 12-15 adult male kiwi in or alongside the Oparara KTA will be caught (using trained dogs) and radio-tagged, sufficient to yield least 9 eggs/chicks in the following spring. This number of eggs is likely to equate to about half of the annual production in the Oparara KTA during the first few years of its existence.

The males will be tagged with 'smart' transmitters that provide information about their reproductive state. The males will then be left alone until the last week of October, when those with eggs or young chicks will be located by radio-tracking from a fixed-wing aircraft. Ground crews will then be directed to each nest, and the eggs/chicks from all nests will be collected on the same day. As many as five different crews may be required to complete the pick-up. The eggs will be taken to an incubation facility in either Hokitika or Christchurch. Thereafter they will be subjected to standard procedures (Colbourne et. al., 2005) with the chicks being raised in either a fenced creche or on an offshore island. When they reach the safe weight of 1000 g, the juveniles will be returned to the Oparara KTA or released elsewhere, subject to whatever the Department of Conservation and Ngati Waewae think is best at the time. Appropriate translocation proposals will be prepared, if required.

The transmitters will be removed from all males, irrespective of whether they have bred or not, immediately after egg collection in late October. Efforts will be made to catch a different mix of males whenever BNZONE is employed again. Males living alongside the Oparara KTA will be targeted as well, to increase the chances of catching 'new' males that have not been caught before. This will minimize disturbance to individual males, and ensure that the juveniles that are released back into the Oparara KTA are sourced from as many different breeding pairs as possible.

4.5 Outcome monitoring

Two variables will be measured to monitor kiwi in the Oparara KTA and their response to predator control: 1) call counts and 2) adult/juvenile ratios.

Regular Call Count Survey of Kiwi

Call count surveys will be undertaken once every three years to measure changes in adult abundance and distribution in the Oparara KTA. Calls will be counted at six elevated sites with good listening coverage in the first 2 hours of darkness over four nights in late November / early December. Consecutive nights will be used if weather conditions are favourable for listening. The same six sites will be used during each survey. The measures of mean call rate will provide an index of relative abundance, and the estimated locations of calling birds will provide some indication of the distribution of paired adults.

In years when BNZONE is implemented, an additional call count survey will be undertaken in winter when the ground crews have completed catching and radio-tagging adult males. Over 2-3 nights, observers will again listen for calls, but this time they will also record which calls are attributable to radio-tagged individuals and which ones are not. The ratio of 'tagged' to 'untagged' calls will provide an absolute measure of male abundance, which will show categorically whether the number of territorial males in the Oparara KTA is increasing over time.

The first baseline call-count survey of kiwi in the Oparara KTA was carried out in January 2015.

Adult/Juvenile Ratios as Indicators of Successful Recruitment.

Recent studies show that juvenile great spotted kiwi remain in their parents territory for their first 2-3 years of life and often shelter with them during the day. This behaviour means that recruitment rates can be assessed relatively easily, simply by sampling the adult population over a week or so and determining which ones have young with them and which ones do not.

Adult/juvenile ratios will be measured at least once every five years – either as a programme in its own right or as part of a BNZONE initiative. Over a 2-3 week period in autumn, kiwi found by trained dogs in day-time shelters will be weighed and measured to determine whether they are adult or juvenile. Juveniles will be assigned to a year class, depending on their size. Family groups with adults and a mix of offspring of varying age will provide measures of cumulative recruitment in the three years preceding the assessment. If the predator control programmes work as expected, juveniles should increase from about 7% to 30% of the population during the first three years of the predator control programme. Alternatively, cameras may be used to determine adult /juvenile ratios if preliminary trials currently underway in the KTA prove that cameras can be useful for measuring the abundance of mature and immature kiwi.

Counts of Forest Birds other than Kiwi

The response of forest birds to predator control will be measured biennially in autumn using the 5-minute count technique (Dawson and Bull, 1975) on 20 one-km-long transects distributed more or less evenly throughout the Oparara KTA. Baseline counts will be obtained in late spring / early summer 2014.

4.6 Predictive monitoring

From 2014 onwards, rodent abundance in the Oparara KTA will be indexed with foot-print tracking tunnels four times each year using standard methods.

APPENDIX F. OPARARA PREDATOR CONTROL SUMMARY FROM CYPRESS PREDATOR MANAGEMENT PLAN (2018)

Great Spotted Kiwi Treatment Area (1,000 ha) (C 41a)

Objective

Predator control in the 1000 ha kiwi treatment area ("KTA") focuses on the control of predators of kiwi and other forest birds, targeting stoats, rats and possums.

The management target in the kiwi treatment area is to ensure that over each five-year monitoring period an average of at least 50% of chicks hatched or sourced from the KTA survive to the critical weight of 1000 g, the weight at which they cease to be vulnerable to stoats. An average of nine chicks per year needs to survive to adulthood in the treatment area to replace the chicks that might have resulted from breeding of kiwi within the Cypress Mine site (if predators were not present). As set out in the Kiwi Management Plan the number of kiwi will be monitored and adjustments to the methods and or boundaries will be made if monitoring indicates that the target is not being achieved. Achieving this target will require stoat numbers to be maintained as low as possible all year round.

Forest birds (kaka, kakariki, robin, tomtit, weka, tui, bellbird and kereru) and bats (long- and short-tailed) will be protected during their breeding season (spring and summer) from the impacts of possums, stoats and rats.

A table showing the frequency of the various types of predator control and the monitoring to be undertaken in the KTA is provided in Appendix 4.

Stoat Control

Stoats will be controlled mainly by intensive kill-trapping, supplemented with secondary poisoning from aerial 1080 in years when it is applied. Kill-traps will be positioned at an average density of one trap per 1.25 ha throughout the entire treatment area, at 100 m spacing, on marked tracks cut along major ridgelines (approximately 800 traps). The type of trap currently recommended by the Department of Conservation for use at the commencement of this programme is the DOC 150 set under a 900 mm wooden cover with a double mesh entrance to exclude weka. The trap type may be changed in future if agreed by the Department of Conservation. The traps will be baited with locally sourced hen eggs or other suitable bait and operated continuously throughout the year, with service rates varying seasonally from once per fortnight (November to February) to once every two months (mid-winter) (eight times per year). Trapping will be suspended for six months whenever aerial 1080 is applied since stoats are likely to be extremely sparse and perhaps absent altogether in the KTA in the months immediately following a 1080 application.

Baits, trap types and other aspects of predator management are subject to continuous refinement and experimental testing of their efficacy by the Department of Conservation and others in the field of predator control. Accordingly, trap type and layout, bait type, service frequency and other aspects of stoat management may be progressively modified according to the most recent information available at any given time. Different baits and lures may be tested as better alternatives become available.

Rat Control

A bait station grid will be established throughout the 1000 ha at an average spacing of 100 m between stations (one bait station per ha) and operated continuously throughout the year. The bait station will be serviced and filled eight times per year (approximately 6-weekly). The poisons will be changed from time to time to minimize bait shyness; and only poisons approved for use on DOC-administered land will be used in the KTA. Bait station operation will stop for six months following each aerial 1080 application unless rat indices rise above 5% when monitored two weeks after the 1080 operation. * Note bait station operations ceased at the request of DOC , after Pindone poison was identified as a risk to Short-Tailed bats in the Oparara catchment

Possum Control

Ground based possum control will be carried out once annually. Aerial 1080 applications will be undertaken three yearly and whenever mast seeding by beech or podocarps exceeds DOC thresholds. Intermittent seeding is a feature of all beech and podocarps species. Possums: RTCI monitoring, using standard National Possum Control Agency (NPCA) Protocol methods (NPCA July 2008 or subsequent revisions) will be used to monitor possum numbers annually in the KTA.

The KTA in the Oparara was treated with 1080 in the spring of 2014 and again in the spring of 2016. 1080 Treatment Operations have occurred approximately every 3 years since.