



Draft Ecological Management Plan

Alternative to the Brynderwyn Hills – Brynderwyn Hills section

13 July 2026

Revision A

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Glossary of Acronyms and Abbreviations

Abbreviation / Acronym	Term
°C	Degrees Celsius
ACOs	Artificial Cover Objects
ADP	Accidental Discovery Protocol
DOC	Department of Conservation
EMP	Ecological Management Plan
ESU	Evolutionarily Significant Unit
FTAA	Fast Track Approvals Act
ha	Hectares
HFMP	Hochstetter's Frog Management Plan
IMP	Invertebrate Management Plan
km	Kilometres
LMP	Lizard Management Plan
LRA	Lizard Release Area
m	Metres
MHS	Manual habitat search
mm	Millimetres
MPI	Ministry of Primary Industries
NES-CF	National Environmental Standards for Commercial Forestry
NZTA	NZ Transport Agency Waka Kotahi
ONL	Outstanding Natural Landscape
QEII	Queen Elizabeth II
SH1	State Highway 1
WA	Wildlife Act
WSP	WSP New Zealand Limited

Glossary of Defined Terms

Term	Description / Definition
Accidental Discovery Protocol	Process to be followed should any Hochstetter's frogs, indigenous lizards or At Risk snails be discovered within a works area by contractors, as outlined in Section 5 of this document.
Arboreal	Living in trees
Artificial Cover Object (ACO)	Standardised artificial refugia deployed to attract and detect Cryptic lizard Species.
Cryptic	Flora or fauna that are difficult to detect, observe, or survey for. Reasons for crypsis may include factors such as excellent camouflage (e.g. lizards, frogs), Nocturnality (e.g. lizards, frogs), periodic reduced activity levels (e.g. lizards).
Iwi Representatives	Representatives authorised by Te Uri o Hau, Patuharakeke Te Iwi Trust Board and Te Parawhau (as relevant to their respective rohe).
Mammalian Pest Control	Wildlife management specifically aimed at reducing mammalian predator populations in order to influence their impacts on other Species or ecosystems.
Mitigation	'Mitigate' is to alleviate, or to abate, or to moderate the severity of something (Roper-Lindsay et al. 2018). For the purposes of this report, it is a catch-all term for avoidance, minimisation, and Remediation measures.
Nocturnal	Active at night.
Project	The construction, operation and maintenance of the Brynderwyn Hills Section of the Alternative to the Brynderwyn Hills Project.
Project Ecologist	The lead ecological specialist responsible for overseeing ecological aspects of a project, including survey design, impact assessment, development and implementation of management plans, and ensuring compliance with relevant consent conditions and environmental legislation.
Project Herpetologist	The lead specialist responsible for managing and overseeing all reptile and amphibian-related aspects of a project, including survey design, species identification, monitoring, capture and relocation, and ensuring compliance with relevant consent conditions and wildlife legislation.
Project Works	All Construction and Enabling Works.
Proposed Designation	The Proposed Designation(s) for the Project.
Refugia	Any natural or unnatural objects or material that provides cover and protection which is essential habitat for some Species.
Release Site	Site where salvaged Hochstetter's frogs, indigenous lizards or At Risk snails will be moved to if captured during Construction of the Project
Remediation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimised (DOC 2014).
Residual Effects	Effects remaining post-mitigation.
Site	The area defined by the boundary of the Designation(s).
Terrestrial	Land-based.
Treatment	Localised habitat treatment measures provided at Release Sites prior to salvage and relocation of protected wildlife

1. Introduction

1.1. Purpose and Scope of this Management Plan

This draft Ecological Management Plan (EMP) has been prepared to support the application for Wildlife Act (WA) Approvals for the Brynderwyn Hills section of the Alternative to the Brynderwyn Hills Project (the Project) under the Fast-track Approvals Act (FTAA) and is informed by material included in the Assessment of Effects for Terrestrial Ecology (Appendix B, Volume C of the Substantive Application).

This EMP is informed by relevant industry standard guidelines for preparing native fauna management plans, including key principles for fauna salvage and relocation (Lizard Technical Advisory Group, 2019), guidelines for producing management plans for New Zealand lizards (Lizard Technical Advisory Group, 2018), and lizard and frog guidance documents for developers, consultants and Department of Conservation (DOC) staff (Lizard Technical Advisory Group, 2023a, 2023b). It sets out the required actions and methods to, satisfy, in part, the requirements of Schedule 7 of the FTAA., in particular, “...*the methods to be used to safely, efficiently, and humanely catch, hold, or kill the animals and identify relevant animal ethics processes*”.

This EMP will be finalised in accordance with the conditions applied to the WA Approvals.

1.2. Objectives and Outcomes

The objectives of this EMP are:

- To define fauna-specific management plans and protocols that specify appropriate methods associated with salvage and relocation of Protected and At Risk fauna for pre-Construction, construction, and post-construction phases of the Project.
- To identify locations for use as Release Sites and the criteria for identifying and approving additional Release Sites (which will be confirmed in the final EMP).
- To define post-construction monitoring and reporting requirements.
- To enable activities authorised by the WA Approvals to be undertaken in a manner consistent with the purpose of the Wildlife Act, being the protection of wildlife.

Based on the objectives, the following environmental outcomes are to be achieved by implementing this EMP:

- The potential direct adverse effects on Hochstetter's frogs, native lizards, At Risk native snails during habitat removal are avoided and minimised through the timely implementation of fauna specific management across all phases of the Project.
- Fauna salvage, relocation, and release activities are undertaken effectively, such that the risk of fauna mortality and injury is minimised, and suitable habitat is maintained or treated within the Site.
- Fauna populations and habitats recover or function as anticipated post-construction and monitoring is used to evaluate the effectiveness of the relocations implemented under this plan .

1.3. Structure of this Ecological Management Plan

This EMP is a combined document that provides management measures and approaches for a range of protected wildlife found within the Site for the Project. Figure 1-1 below shows how the EMP is set out.

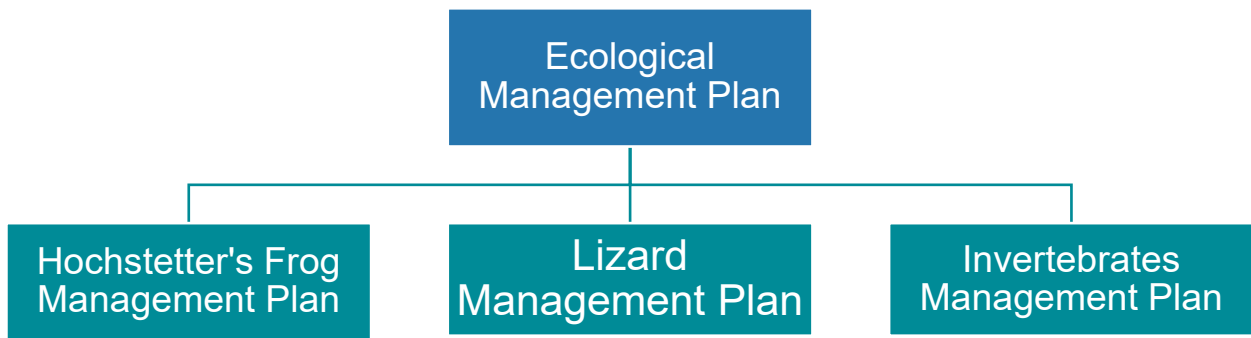


Figure 1-1: Content of the Ecological Management Plan

2. Hochstetter's Frog Management Plan

2.1. Introduction

This Hochstetter's Frog Management Plan (HFMP) sets out measures to minimise adverse effects on Hochstetter's frogs within the Site during habitat removal and disturbance through salvage and relocation protocols. The wider EMP outlines measures for providing habitat treatment and implementing pest control, where appropriate, to support the ongoing survival of relocated frogs.

The HFMP has the following objectives:

- Support the establishment of frog populations affected by habitat clearance at Release Sites; and
- Provide habitat(s) within the Release Sites that can support a viable population of frogs.
- These objectives will be achieved through pre-construction surveys, application of best practice capture and relocation methods, and implementation of recognised survey, monitoring, and hygiene protocols, including DOC's Herpetofauna Inventory and Monitoring (Department of Conservation, 2012) and the national Frog Hygiene Protocols (Department of Conservation, 2023).
- Given the uncertainty associated with large-scale salvage and relocation of Hochstetter's frogs, the Project will generate information about habitat treatment, monitoring that will improve understanding of relocation outcomes and long-term population persistence.

This HFMP addresses:

- A summary of the affected frog habitat within the Site;
- Methods for capture, handling, salvage and relocation;
- The proposed Release Sites and actions required to ensure their suitability for relocated frogs; and
- Post-works management, including post-release monitoring and pest control (where appropriate).

2.2. Project Herpetologist

An approved Project Herpetologist shall be appointed for the duration of all Hochstetter's frog management activities. The Project Herpetologist shall have the authority to:

- Determine the spatial extent, timing and intensity of frog salvage and relocation;
- Modify salvage methods and stages in response to Site conditions, survey results or safety considerations;
- Require cessation of works where they determine there is immediate or unacceptable risk to Hochstetter's frogs and their habitat;
- Identify and approve the Release Sites confirmed as part of the final EMP necessary for relocation prior to use, in accordance with the requirements of the HFMP and WA Approval conditions; and
- Recommend changes to post-release management measures in response to monitoring data.

2.3. Summary of Hochstetter's frog values

The Hochstetter's frog / pepeketua (*Leiopelma hochstetteri*) is one of three species of endemic frogs known to New Zealand and is scattered throughout the northern half of the North Island. However, recent taxonomic work has determined that this species may be comprised of 11 distinct taxa. The Brynderwyn Hills population forms part of the northern clade, which is genetically distinct within the Northern Evolutionarily Significant Unit (ESU) (Lillie et al., 2015). The northern clade of Hochstetter's frogs (*Leiopelma* aff. *hochstetteri* "Northland") is classified as At Risk – Declining (Burns et al., 2025) and is absolutely protected under the Wildlife Act 1953.

A review of the DOC Bioweb herpetological database confirmed multiple records of Hochstetter’s frogs within the indicative Earthworks Zone 2 area and a surrounding 10 km radius within the Proposed Designation. The presence of frogs was confirmed in 2023-2024 when WSP New Zealand Limited (WSP) undertook survey and salvage/relocation of Hochstetter’s frogs as part the Brynderwyn Hills Recovery Project.

Field assessments for the Project determined that the highest quality Hochstetter’s frog habitat was located within the Brynderwyn Hills Outstanding Natural Landscape (ONL) area. The ONL is a known stronghold for Hochstetter’s frog, and all streams were assessed as having high quality habitat. There is suitable habitat immediately to the north of the Brynderwyn Hills, however, no suitable habitat has been identified to the south. A full breakdown of the habitat present within each of the indicative Earthworks Zones (Appendix A) is provided in Table 2-1.

Table 2-1: Summary of Hochstetter’s frog habitat value within the four indicative Earthworks Zones.

Zone	Summary of habitat
1	The northern section of indicative Zone 1 consists primarily of large, open rivers and farm drains with high sediment and poor shading, offering low-quality habitat. In contrast, the northern Brynderwyn foothills contain moderate-quality habitat within smaller, shaded tributaries. While these streams feature the bedrock and hard-bottom structures favoured by Hochstetter’s frogs, their quality is currently hindered by livestock access and resulting sedimentation.
2	habitat quality in Zone 2 ranges from moderate in the Zentral Forest to high in the Brynderwyn Ranges. While the pine plantation suffers from historical harvesting sediment, it still supports frogs via dense leaf litter and steep headwaters. The Brynderwyn Range ONL represents a critical stronghold, offering a contiguous, high-quality environment of cascading waterfalls and rock-filled seepages. This area provides essential breeding and nesting grounds that allow for population dispersal across the wider region.
3	The majority of indicative Zone 3 is rural farmland providing little to no frog habitat due to a lack of riparian cover. However, pockets of moderate to high-quality habitat exist within QEII covenant areas and fenced native bush. These areas feature shaded bedrock streams and woody debris, though their overall potential is frequently limited by steep terrain, low water flow, and localized pugging or sedimentation from surrounding farm activities.
4	Indicative Zone 4 is divided between low-value pasture and high-value forested hills. Tributaries of the Wairau River offer no to low-quality habitat, whereas the southern streams flowing into the Kaiwaka River provide high-quality habitat. These southern headwaters are characterized by permanent flow, full native canopy cover, and an abundance of essential features like cobble beds, root masses, and dense leaf litter.

Field surveys recorded Hochstetter’s frogs throughout many watercourses within the Brynderwyn Hills. Streams within the native forest area of the Brynderwyn Hills ONL had the highest abundance of frogs, while in the commercial pine forestry area, frogs generally had a lower abundance. A moderate population of Hochstetter’s frogs was also recorded in rural farmland within the northern Brynderwyn foothills, in a tributary of the Waihoihoi River. No frogs were found during survey to the north or south of the Brynderwyn Hills within the Proposed Designation, though suitable high-quality habitat was present.

A total of 318 Hochstetter’s frogs were recorded over 55 frog survey transects, undertaken over 48 hours of double observer survey time. A further 15 frogs were found through incidental manual habitat searches (MHS) across the Proposed Designation.

Two very small, low flow rocky headwater streams within the Brynderwyn Hills ONL recorded exceptionally high frog densities, with survey 2.25 recording 60 frogs over a 25 m transect (the survey was abandoned after 25 m as the stream was no longer safe to survey) and survey 2.29 recording 57 frogs over a 50 m transect. Both of these transects were situated in small headwater streams at the top of the catchment that were dominated by stacked rock habitat with dense leaf litter and wood debris. These results indicate these headwaters streams within the Brynderwyn Hills ONL have the highest frog habitat values across the Site.

2.4. Pre-Construction Survey Requirements

2.4.1. Additional pre-construction baseline surveys

Baseline field surveys have been undertaken to provide spatial coverage across the Site where suitable habitat was present or likely, with an emphasis on areas potentially affected by the Indicative Alignment and associated earthworks. However, there may be areas with undetected Hochstetter's frog's populations. This includes areas within the Proposed Designation north and south of the Brynderwyn Hills, where no frogs were found during survey activity, but where suitable high-quality habitat is present.

Following confirmation of the final Project design, further baseline surveys must be undertaken during the pre-construction phase within potential Hochstetter's frog habitat impacted by the Project. These surveys will confirm the presence/absence of frogs, as determined by the approved Project Herpetologist. The surveys should focus on areas where suitable habitat is present, but frog presence or baseline density remains uncertain due to lack of pre-consenting surveys. The Project Herpetologist has discretion to use MHS, transect surveys or any other appropriate search/survey method(s) to confirm the presence/absence of Hochstetter's frog.

For the purpose of this HFMP, Hochstetter's frog habitat quality is defined as described in Table 2-2.

Table 2-2: Hochstetter's Frog habitat Quality

Habitat quality	Description
High quality habitat where high numbers of frogs would be expected are typically:	Headwater or low order streams with permanent to intermittent flow, less than 2 m wide, fully shaded by native vegetation with bedrock or hardbottom stream beds on steep to moderate slopes. These streams generally consist of cascade complexes containing an abundance of microhabitats including small and large cobble/rock areas, woody debris and dams, root masses, dense leaf litter and crevices that often interact with each other to form complex microhabitats.
Moderate quality habitat where small numbers of frogs would be expected are typically	Low to high order streams with permanent or intermittent flow, less than 4 m wide, moderate shade by native and/or exotic vegetation, with sections of bedrock or hardbottom stream bed on steep to gentle slopes. These streams generally contain some suitable macrohabitat Refugia, including stacked small to large rocks, cobbles, coarse woody debris (logs or tree fall) and leaf litter, often stacked on each other creating microhabitats.
Low quality habitat where only very low numbers of frogs are typically	Ephemeral streams that are not flowing, areas of dry stream bed, higher order streams with no flow or very fast flow and/or that are greater than 4 m wider with high sun exposure (poor shading), steep stream banks where the wetted width and bank-full width are the same or very similar and/or with gentle to no gradient and/or a softbottom stream bed with high sedimentation. These streams generally lack or have very low available and suitable microhabitat and Refugia for native frogs.

2.4.2. Release Site Surveys

Within three months prior to any initial Hochstetter's frog relocation, baseline surveys shall be undertaken by a suitably qualified and experienced herpetologist at proposed Release Sites. The surveys should include:

- Transect surveys in accordance with Section 7.1.2
- Assessments of habitat quality, availability of Refugia, and carrying capacity for relocated frogs.
- The results of these surveys will support the Project Herpetologist to determine:
 - the number of frogs that can be relocated to each site; and
 - any habitat treatment measures required to improve site suitability (See Section 6.4 for further details).

2.5. Hochstetter's Frog Salvage and Relocation Overview

Frog salvage will be undertaken prior to construction within all suitable frog habitat that will be lost or made unsuitable for during Project Works using the methodologies described below. Suitable frog Habitat will be identified by the Project Herpetologist based on consenting and pre-construction surveys and their assessment of impacted frog habitat within the Site.

The protocols for frog salvaging and relocation specified below are consistent with standard methodologies from DOC's Inventory and Monitoring Toolbox: Herpetofauna¹. The Project Herpetologist has the discretion to change the staged approach for salvaging and relocation efforts where appropriate, based on their assessment of the specific population and habitat to be removed.

The Project Herpetologist must be present on Site during salvaging operations until they deem salvaging ecologists to be adequately trained.

2.5.1. Timing and Conditions

Frog salvages must be undertaken **between 1 October and 30 April** inclusive, when Hochstetter's frogs are easier to detect as water flow is lower and frogs are more likely to be active. Within this period, salvage will only occur under suitable daily weather conditions, defined as daily temperatures within the range of 10°C to 20°C inclusive.

2.6. Salvage Protocols

Salvaging and relocation efforts will be undertaken using a staged approach moving from Phase 1 to Phase 4. Salvage will typically extend between stream banks and up to 2 m from the stream edge and include all available Refugia such as loose stones, logs, vegetative matter, undercut banks, artificial debris, and crevices.

2.6.1. Phase 1 - ≥10 days pre-works

- Phase 1 of salvage and relocation will commence at least 10 days prior to vegetation clearance/earthworks within all suitable frog habitat.
- Daytime MHS and capture using two-person teams in which all suitable and accessible Refugia will be searched, with the exception of large boulders or deep crevices that cannot feasibly be searched. Crow-bars or similar equipment will be used to enable searching under larger boulders or coarse wood (e.g., downed logs) and tools will also be required to remove frogs from crevices or undercover retreats (where feasible). Head lamps will be used to increase the likelihood of detection.
- Due to the high potential for juveniles to be present in leaf packs, they will be searched twice, either over two separate days (if Phase 1 takes more than one day) or by two people separately.
- After being thoroughly searched, all potential Refugia (suitable rocks, coarse wood, and vegetative matter such as leaf packs) will be relocated out of the stream and up away from the stream banks once searched. This approach will reduce stream habitat availability for frogs and encourage undetected frogs, e.g. juveniles in leaf packs, are expected to move back into the stream.
- The re-deployment of suitable rocks once the length of stream has been searched shall be undertaken. These will be placed along the stream edges to provide optimal Refugia (Judas rocks) for displaced frogs that were undetected during phase 1 salvaging or for mobile Hochstetter's frogs that colonise the stream after Phase 1 searching.

¹ Department of Conservation (DOC). 2012. Inventory and Monitoring Toolbox: Herpetofauna. Department of Conservation, Wellington.

- Frog exclusion barriers will be placed upstream and downstream of the impacted stream reaches or habitat where suitable to reduce the likelihood of uncaptured frogs or transient frogs moving into the stream or habitat after salvaging and prior to works.
- Salvaged frogs are to be relocated to the final Release Sites in accordance with relocation protocols (see Section 2.7).

2.6.2. Phase 2 - ≥5 days pre works

- Phase 2 Salvage will commence a minimum of five days prior to vegetation clearance/earthworks within all suitable frog habitat.
- Two nights of Nocturnal searching using two-person teams (with headlamps) is to be undertaken to capture frogs not detected during Phase 1 salvaging. This method is not always employed for health and safety reasons and will be employed at the discretion of the Project Herpetologist.
- Salvaged frogs are to be relocated to the final Release Sites in accordance with relocation protocols (see Section 2.7). Where frogs are salvaged at night, for safety considerations they may be temporarily held overnight in suitable containers and conditions (see Section 2.7) to be released immediately the following day at the Release Site.

2.6.3. Phase 3 - Immediately prior to works

- Phase 3 salvage will commence immediately prior to earthworks and will include a final search and capture of frogs within impacted streams and under judas rocks after which these rocks will be moved to relocation Sites as a habitat treatment measure.
- Salvaged frogs are to be relocated to the final Release Sites in accordance with relocation protocols (see Section 2.7).

2.6.4. Phase 4 - During works

- Salvage will be undertaken during earthworks under ecological supervision and where feasible will involve the use of machinery to remove and capture frogs under large cover objects that could not be removed via manual salvaging.
- Salvaged frogs are to be relocated to the final Release Sites in accordance with relocation protocols (see Section 2.7).

2.7. Capture, Handling, Transport and Hygiene Protocols

Capture, handling and transport of Hochstetter's frogs will be under the supervision of the Project Herpetologist (or ecologists they have deemed to be adequately trained) to ensure appropriate handling of frogs occurs. All assisting staff on-Site, including contractors, shall be provided appropriate briefing by the Project Herpetologist to ensure handling and transport protocols are followed.

The transportation of all frogs will comply with the Animal Welfare (Transport within New Zealand) Code of Welfare (Ministry for Primary Industries, 2018) and the National Frog Hygiene Protocols (Department of Conservation, 2023).

For the capture, handling, and transport of any Hochstetter's frogs, the following protocols must be implemented:

- Handling time shall be minimised to reduce stress and to avoid side effects of stress;
- Salvaged frogs will be transported in a ventilated, moist and darkened plastic container (to maintain appropriate conditions and a low-stress environment);
- Containers shall be kept at a stable ambient temperature and protected from direct sunlight at all times;

- Frogs shall be kept in transport containers for no longer than six hours if caught during the day, or 10 hours if caught during spotlighting, prior to release at a Release Site; and
- Salvaged frogs will be released into appropriately prepared and protected habitat within the Release Sites suitable for Hochstetter's frogs, including placement of additional natural Refugia at the specific release location (See Sections 2.8 and 6.4 for further detail).

2.7.1. Hygiene

To minimise any possible spread of chytrid fungus (*Batrachochytrium dendrobatidis*) and other pathogens to, within and/or between salvage, release or monitoring Sites, the highest level of hygiene protocol will be implemented. A summary of the protocols is outlined below.

- All footwear, packs, rainwear, and gaiters must be cleaned, disinfected with Trigene, and dried between Sites;
- All clothing must be freshly laundered using hot water or Trigene (including outer clothing) between Sites;
- All frog handling/measuring equipment must be disinfected between Sites;
- Footwear and gaiters must be cleaned and disinfected at the point of entry to a frog field Site;
- All construction equipment used within frog habitat must be disinfected between Sites;
- Wherever a chemical disinfectant is used (e.g. Trigene, bleach, F10) this must be rinsed off after the disinfection time (Ethanol can be air dried);
- New glove(s) must be used for catching and handling frogs in each new stream, tributary or watercourse;
- The calliper or other measuring device used to measure the frog should be disinfected between frogs using alcohol wipes (air dry before measuring next frog); and
- Sick or dead frogs should be collected and held separately from all other frogs until delivered to the appropriate vet or frog specialist (See Section 2.9). All equipment should be thoroughly cleaned and disinfected after use.

2.7.2. Data Collection

For each reach salvaged and release location for that reach, the following information shall be recorded:

- GPS coordinates of start and end of salvage reach and release location;
- Stream and reach identifier;
- Stream type (permanent, intermittent, or both);
- Major habitat type (e.g. stream, seepage);
- Length of stream reach being salvaged.
- Hochstetter's frogs captured during salvage operations shall be assigned a unique identifier.
- For the first 25 frogs recorded within each stream reach, and every 10th frog thereafter, the following information shall be collected:
 1. Capture Details
 - Date and time of capture
 - Snout-to-urostyle length (SUL; mm)
 - Life stage / age class (juvenile, sub-adult, adult)
 - General health and condition (e.g. normal, injured, lethargic)
 - At least one representative photograph
 - Weather conditions (e.g. rain/no rain, recent rainfall)
 - Salvage phase (Phase 1–4) and capture method

- Salvage team member
- 2. Capture and Release Location Information**
 - GPS coordinates of capture and release locations
 - Microhabitat at point of capture and release
 - Photograph of capture and release microhabitat
 - Type of release site treatment
- For all other frogs, only the salvage and release stream, and the reach identifier, shall be recorded.
- All frog records shall be compiled into a Project database and submitted to DOC databases (e.g. Bioweb Herpetofauna / ARDS) as described in Section 7.2

2.8. Release Sites

Salvaged frogs will be released during the day into rock refuges along stream headwaters and tributaries within one of the Release Sites as determined by the Project Herpetologist. See Section 6 for a detailed description of the Release Sites.

All frogs salvaged from streams within the Northern Release Site will be released into the Northern Release Site. Frogs salvaged from the Brynderwyn Hills may be released into either the Northern or Central Release Site.

Each frog will be placed under an individual rock. Where multiple frogs are found under the same rock, those individuals may be relocated under a single rock.

2.9. Accidental Injury or Death

The Project Herpetologist has the authority to immediately halt works in the event of the discovery of any injured or deceased Hochstetter's frog, pending investigation and implementation of appropriate response measures.

The following steps will be implemented if any frogs are found injured or deceased:

- The Project Herpetologist will be contacted immediately;
- DOC and the relevant Council will be notified at the earliest opportunity but within 24 hours after an injured or dead frog is found;
- Any dead Hochstetter's frog shall be sent to Massey University Wildlife Post Mortem Service for necropsy. If the Massey service is unavailable, a suitable alternative must be used, as agreed upon by the Project Herpetologist and DOC. The body is to be chilled if it can be delivered within 24 hours, or frozen if longer than 24 hours to deliver;
- Mana whenua should be consulted to determine any specific requirements for the remains following the post mortem;
- Injured frogs found during salvage will be taken to the New Zealand Centre for Conservation Medicine at Auckland Zoo as soon as possible for assessment and treatment. Injured frogs will be kept in an appropriate portable enclosure (i.e., a clean, well-ventilated plastic container) under the direction of the Project Herpetologist to ensure the animal is handled appropriately until the frog(s) can be assessed and treated;
- Frogs assessed by the vet or alternative specialist as uninjured, or otherwise in suitable condition for release, will be transported to the frog relocation Site(s) in the portable enclosure and released into habitat suitable for the species being relocated;
- Euthanasia of an injured frog shall only be undertaken under direction from DOC; and
- Changes to management measures to minimise further risk (where recommended by the Project Herpetologist).

3. Lizard Management Plan

3.1. Introduction

This Lizard Management Plan (LMP) sets out measures to minimise adverse effects on native lizards within the Site during Habitat removal and disturbance through salvage and relocation protocols. The wider EMP outlines measures for providing habitat treatment and implementing pest control, where appropriate, to support the ongoing survival of relocated lizards.

The LMP has the following objectives:

- Support the establishment of the population of each species of native lizard present in areas affected by habitat clearance at Release Sites; and
- Provide habitat(s) within the Release Sites that can support a viable population of all lizard species relocated.
- These objectives will be achieved through pre-construction habitat surveys, application of best practice capture and relocation methods and implementation of recognised survey and monitoring protocols, including Department of Conservation's (DOC) Natural Heritage Management System's Herpetofauna Inventory & Monitoring Toolbox and / or using new advances in tools and techniques not yet incorporated into the toolbox.

This LMP addresses the following:

- A summary of the affected lizard habitat and species within the Site;
- Methods for capture, handling, salvage and relocation;
- The proposed Release Sites and actions required to ensure their suitability for relocated lizards; and
- Post-works management, including post-release monitoring and pest control (where appropriate).

3.2. Project Herpetologist

An approved Project Herpetologist shall be appointed for the duration of all native lizard management activities. The Project Herpetologist shall have the authority to:

- Determine the spatial extent, timing and intensity of native lizard salvage and relocation;
- Modify salvage methods and stages in response to Site conditions, survey results or safety considerations;
- Require cessation of works where they determine there is immediate or unacceptable risk to native lizards and their habitat;
- Identify and approve the Release Sites confirmed as part of the final EMP necessary for relocation prior to use, in accordance with the requirements of the LMP and Wildlife Approval conditions; and

3.3. Summary of Lizard Values

Several species were identified as potentially occurring within the Site (Table 3-1) while field assessments confirmed the presence of copper skink (*Oligosoma aenum*: At Risk – Declining) only. A total of 16 copper skinks were identified during field surveys and a further six suspected copper skinks were observed but not able to be accurately identified as they escaped capture. All but one of the copper skinks (and one likely copper skink) observed were recorded within the northern part of the Site (north of the Brynderwyn Hills). The most common habitat type in which copper skink were detected during field surveys was within the edge habitat of native dominated vegetation, which had exposure to sun during the day. No other native lizard species were observed or identified across all survey methods. The introduced plague skink, however, was observed in high numbers across most of the Site.

Anecdotal observations of gecko species (likely Pacific and/or elegant gecko) in recent years were reported while undertaking field surveys on Site by landowners across three properties. These properties contain high-value, high-quality habitat for Arboreal gecko species and as such these observations were considered reliable

Table 3-1 Lizard species covered under the Lizard Management Plan

Scientific name	Common name	Threat status	Potential habitat	Likelihood
<i>Dactylocnemis pacificus</i>	Pacific gecko	Not Threatened	Broadleaf/podocarp forest, mānuka/kānuka scrubland, and exotic forestry.	Likely
<i>Mokopirirakau granulatus</i>	Forest gecko	At Risk – Declining	Broadleaf/podocarp forest, mānuka/kānuka scrubland, and exotic forestry.	Likely
<i>Naultinus elegans</i>	Elegant gecko	At Risk – Declining	Broadleaf/podocarp forest, mānuka/kānuka scrubland, and exotic forestry.	Likely
<i>Oligosoma aeneum</i>	Copper skink	At Risk – Declining	Forest margins, farmland, leaf litter, logs, rocks, long grass, discarded rubbish, and gardens.	Confirmed
<i>Oligosoma moco</i>	Moko skink	At Risk – Relict	Coastal vegetation, dunes, and rocks.	Unlikely
<i>Oligosoma ornatum</i>	Ornate skink	At Risk – Declining	Closed canopy forest, dense undergrowth, leaf litter, shrubland and thick rank grass.	Possible

3.4. Lizard Salvage and Relocation Overview

Lizard salvage will be undertaken prior to construction within all suitable lizard habitat that will be lost or made unsuitable for during Project Works using the methodologies described below. Suitable lizard habitat will be identified by the Project Herpetologist based on consenting surveys and, as many properties within the Site could not be accessed during the assessment period, pre-construction habitat assessments within the Site.

The protocols for the salvage and relocation of lizards specified below have been prepared in accordance with best practice and the protocols described in the DOC Inventory and Monitoring for Herpetofauna (Department of Conservation, 2012). The specific salvage methodologies will be guided by the Project Herpetologist, based on their assessment of the vegetation and habitat to be removed. A toolbox approach shall be adopted, whereby a range of salvage methods may be applied as appropriate to Site conditions and habitat characteristics. The Project Herpetologist has discretion to select and implement suitable methodologies, and to include or exclude areas based on the type and quality of habitat being cleared.

The Project Herpetologist must be present on Site during salvaging operations until they deem salvaging ecologists to be adequately trained.

3.4.1. Timing and conditions

Lizard salvage and disturbance to lizard habitat will be undertaken between **1 October and 30 April**, with the ability to extend up to two weeks either side of this period where conditions are suitable (at the discretion of the Project Herpetologist). Within this period, salvage will only occur under suitable daily weather condition, defined as daily temperatures above 15°C with little or no rain, and light to moderate winds.

These constraints are required to ensure lizards are sufficiently active to be detected and captured. Outside of these conditions, lizards may be in brumation, less active or sheltering from high temperatures, making them more difficult to detect and increasing the risk of injury or death during habitat clearance. Salvages will also be avoided during temperatures 26°C or higher where practicable as some species of lizards are less likely to be detected in hotter conditions.

3.5. Salvage Protocols

3.5.1. Artificial Cover Objects (ACOs)

When required by the Project Herpetologist, Artificial Cover Objects (ACOs) will be used to capture native lizards within potential lizard habitat. The ACO's consist of double stacked Onduline sheets measuring approximately 500 mm x 500 mm, with small sticks placed between each layer.

The ACOs will be appropriately placed in suitable high-quality microhabitat and deployed for a minimum of six weeks prior to vegetation and/or habitat removal. Each ACO will be placed approximately 5 to 10 m apart or by the discretion of the Project Herpetologist.

3.5.2. Manual Habitat Searches (MHS)

Prior to the commencement of any lizard habitat clearance, an ecologist will carry out a systematic manual search for lizards. MHS are to be undertaken where lizard habitat is identified and in addition to use of ACOs or trapping prior to vegetation / habitat clearance. Manual searches will be conducted in conjunction with invertebrate salvage protocols as described in the Invertebrate Management Plan (IMP). Manual searches before vegetation / habitat clearance will include:

- Turning over or pulling apart natural and artificial cover objects by hand (e.g. coarse woody debris, logs, rocks, debris, fence posts, and rubbish);
- Raking or pushing through leaf litter or ground cover (e.g. pampas or tradescantia); and
- habitat searches by hand of low growing epiphytes, dense low-growing vegetation, loose tree bark, fern skirts and woody debris.

The survey effort will be determined by the Project Herpetologist. If lizards, or evidence of lizards (scat / sloughed skin etc), is observed during MHS, ecologist/s will undertake additional effort in the immediate area which may include trapping and/or destructive habitat searching. If no lizards, or evidence of lizards is observed during MHS the Project Herpetologist may release these areas for habitat clearance which may include supervised vegetation habitat clearance.

3.5.3. Trapping

Where required by the Project Herpetologist, pitfall traps and/or gee minnow funnel traps may be deployed within suitable habitat, targeting the best habitats for skinks. Anecdotally, pitfall trapping is considered the most effective trapping method to capture the target species, copper skink. An approximately 5 m line transect, or 5 m x 5 m grid spacing will be employed across suitable habitat or as directed by the Project Herpetologist. Pitfall traps will have holes in the bottom to allow water to drain and shall be covered by an ACO. To reduce internal temperatures in traps 4 litre pitfall traps should be used (Turner et al 2023). Traps shall be baited with tinned pear and/or cut banana, have a small wet sponge at the bottom of the trap and be filled with some grass or leaf litter to reduce stress, desiccation, and allow caught skinks to evade any predator that may enter the trap (such as mice). Gee minnow funnel traps will be situated to be suitably shaded, reducing the risk of heat stress and to reduce human tampering.

Trapping will occur during suitable weather conditions (warm, dry, settled) and traps will be checked daily. Traps will be left out and checked for a minimum of four consecutive days. Based on presence/number(s) of individuals caught, trapping may be rearranged after the first or second night to trap additional animals from any high abundance areas. If no lizards are caught during the four days, then no further trapping is required. If lizards continue to be captured, trapping will continue until no lizards have been captured over two consecutive days over all the traps in a cluster or an alternative method is proposed by the Project Herpetologist.

3.5.4. Nocturnal Spotlighting

Where required by the Project Herpetologist, Nocturnal spotlighting of suitable native arborescent vegetation for native geckos will take place. Nocturnal spotlighting surveys will include close-range spotlighting of vegetation and using binoculars from a distance will be used to look for both eye shine from the lizards and/ or lizard bodies. This will involve a slow walkthrough of suitable habitat using powerful headtorches and scanning shrub, tree branches, foliage, and trunks.

Spotlighting will occur for a minimum of two nights over one week within selected high-quality suitable connected habitat. If any lizard is observed during salvage and unable to be captured, the location will be recorded by GPS and flagging tape used. Additional spotlighting will be carried out and include additional intensive survey within a 20 m radius of this area.

If no geckos have been captured over two nights, the Project Herpetologist may release these areas for supervised habitat clearance.

3.5.5. Destructive habitat Searches

Where required by the Project Herpetologist, destructive habitat searches will take place. Hand removal of habitat is preferred where possible such as searching through and pulling apart dense groundcover, clumped vegetation, and natural and artificial debris. However, herpetologists may require the assistance of arborists or excavators to remove habitat or carefully prize apart habitat to allow for the searching for and active capture of lizards. Excavators used for habitat clearance should be equipped with a root rake or toothed bucket to minimise risk to lizards while vegetation can be scrapped back to ground level.

Destructive searches may commence at any time during lizard salvage under the direct supervision of the Project Herpetologist.

3.5.6. Supervised Vegetation / habitat Clearance

Where required by the Project Herpetologist, supervised vegetation / habitat clearance will take place. In many areas this will likely commence following salvage by ACOs, and/or trapping, and/or MHS, and/or spotlighting.

Supervised habitat clearance may involve tree felling and/or scraping back any vegetation or items that provide lizard habitat (e.g. scraping rank grass with a digger, lifting of heavy tree trunks). For higher quality native vegetation this may require checking tree branches, foliage and trunks (including cavities and loose bark) for Arboreal geckos. Low vegetation and small trees should be either cleared by machine or hand-felled (e.g. chainsaws) at their base, and large established trees (> 5 m tall) should be sectioned (deconstructed).

Felled arborescent native vegetation that provides higher quality/risk habitat for native geckos should be relocated into adjacent native vegetation and left in situ where practicable. Where this is not practicable, it should be relocated nearby and stockpiled into small windrows (no more than 3 m high) adjacent to existing standing vegetation to enable geckos to disperse into remaining habitat. This will require post construction vegetation searches of native stockpiled vegetation.

Upon completion of habitat removal, Site establishment or construction activities can occur. The impact area will remain bare, or unsuitable (i.e. grass no higher than approximately 50 mm), for the remainder of construction works at that Site, to avoid the likelihood of lizards moving back onto the construction Site.

If the construction Site cannot remain bare or <50 mm height (i.e.: due to sediment risk to adjacent watercourses), lizard exclusion fencing should be installed to isolate the cleared area and avoid the risk of impacting lizards that may recolonise the construction Site, or supervised clearance will need to be implemented.

3.5.7. Post Construction Vegetation Searches

Stockpiling cleared vegetation for post-construction searches has been found to be a very effective method for detecting geckos in some Projects but not successful on other Projects².

Therefore, the Project Herpetologist will determine when it is necessary to implement, likely in higher quality/risk habitat for native geckos.

If the Project Herpetologist confirms the methodology should be used, native vegetation that cannot be relocated to nearby undisturbed habitat, will be left undisturbed for approximately three weeks, then three diurnal and three Nocturnal surveys will take place until no geckos are found for two consecutive checks.

3.5.8. Lizard Exclusion Fencing

Locations on-Site may require the installation of lizard exclusion fencing. Exclusion fencing may be required to isolate the work Site from adjacent high quality lizard habitat to avoid lizards entering the works area or re-entering areas previously salvaged, should works be delayed. The exclusion fence should be created with steel waratahs to support a silt fence and plastic liner (polythene sheet). The polythene sheet will be on the outside facing the adjacent habitat, buried and extend vertically to create a fence at least 400 millimetres (mm) high to prevent lizards bypassing under or climbing over. The fence will be inspected daily during active works by contractors to ensure the integrity of the fence is maintained and any damage will be repaired immediately.

3.6. Lizard Capture, Handling, Transport, and Hygiene

Capture, handling and transport of native lizards will be under the supervision of the Project Herpetologist (or ecologists they have deemed adequately trained) to ensure appropriate handling of lizards occurs. All assisting staff on-Site, including contractors, shall be provided appropriate briefing by the Project Herpetologist to ensure handling and transport protocols are followed.

The following steps will be undertaken to ensure appropriate handling and transport of lizards:

- Herpetologists/ ecologists will thoroughly clean hands and equipment before undertaking any lizard salvage work.
- Lizards will be handled securely between thumb and fingers, either by shoulders, pelvis or feet (avoiding the tail) to capture data collection.
- Captured lizards will be processed and transferred to a lizard Release Site.
- Lizards will be kept in either catch bags and/or storage containers with appropriate ventilation.
- Lizards held temporarily in storage prior to processing, will be kept cool, away from direct sunlight or heat.
- Lizards will be transferred to Release Sites daily, or every few hours due to daily temperatures and perceived risk of heat stress, to be determined by the Project Herpetologist.

3.6.1. Data Collection

For each lizard captured, data collection will comprise:

- Date and time of collection
- Observer name/s
- Species
- Sex (where possible)
- Life stage (where possible)

² For example, in the NZTA Waka Kotahi Penlink lizard salvage Project, 88% of geckos were found during spotlighting efforts of felled vegetation which was stockpiled and left in place for up to three weeks within contiguous kanuka habitat (Tonkin & Taylor Ltd, 2023). However, during the Brynderwyn Hills recovery works which is largely within the Project Site, no geckos were recovered from this diverse native forest using this method (WSP, 2024).

- Length (snout-vent length and vent-tail length measurements)
- Tail regeneration length (if any)
- Photos (dorsal, lateral and ventral, and any injuries)
- GPS coordinates (of capture location and release locations)
- habitat Description
- Weather conditions

3.7. Release Sites

Salvaged native lizards will be released into species specific suitable microhabitats within the closest Release Sites. Terrestrial lizards (e.g. copper skink) to be released directly into refuge piles within the Release Sites. See Section 6 for a detailed description of the Release Sites and refuge piles that will be installed.

Both the Northern and Southern Release Sites have groundcover habitat suitable for Terrestrial skinks such as copper skink and suitable arborescent habitat for Arboreal geckos. Only one skink (likely copper but not confirmed) and no geckos were recorded during pre-consenting surveys at the Northern Release Site. No surveys occurred within the Southern Release Site. It is likely where skinks or geckos are present they are in low abundance, consistent with the wider project area.

3.8. Accidental Injury or Death

3.8.1. Dealing with Injured Lizards

If any injured native lizard is observed within the Site the Project Herpetologist will be contacted immediately who will then contact the DOC Hotline 0800 DOC HOT (0800 362 468) for advice. If the lizard is critically injured, the Project Herpetologist may euthanise the animal.

If deemed necessary with DOC, any injured lizard will be transported by a herpetologist in either a breathable cloth bag or container to a predetermined veterinarian or other lizard specialist for treatment.

Data collection for each lizard will include what is outlined in Section 3.6.1. In addition, the following will also be documented:

- the part of the lizard that is injured;
- an approximate time since the injury; and
- the probable cause of the injury.

3.8.2. Dealing with Dead Lizards

If any dead native lizard is observed the DOC Hotline 0800 DOC HOT (0800 362 468) will be contacted within eight hours, and the specimen offered for necropsy. They will be chilled (if delivered within 72 hours to DOC) or frozen (if delivery will take longer than 72 hours) in a labelled container with details of where and when the lizard/s were located.

Mana whenua should be consulted to determine any specific requirements for the remains.

Data collection for each dead lizard will include what is outline in Section 3.6.1. In addition, the following will also be documented:

- an approximate time of death; and
- the probable cause of the death.

3.9. Biosecurity

The plague skink (*Lampropholis delicata*) is classed as an “Unwanted Organism” by the Ministry of Primary Industries (MPI) (Biosecurity Act, 1993). They may have adverse effects on native lizards through competition for food and habitat resources. While they have not been recorded at the northern and

southern release areas, they have been recorded across the Project area and in adjacent habitats. Therefore, if not currently present would spread to the release areas naturally. While strict management is not proposed, plague skinks should not intentionally be introduced to the release areas. To minimise risk the following should take place:

- Plant materials such as wood or leaf litter repurposed for habitat treatment at the Release Sites should be checked for plague skink and their eggs; and
- Any soil and plant material used in containers to transport lizards to the Release Sites should be thoroughly checked for plague skinks and their eggs.

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4. Invertebrate Management Plan

4.1. Introduction

This Invertebrate Management Plan (IMP) sets out measures to minimise adverse effects on Protected, At Risk and notable invertebrate species within the Proposed Designation during habitat removal and disturbance through salvage and relocation protocols. The wider EMP outlines measures for providing habitat treatment and implementing pest control, where appropriate, to support the ongoing survival of relocated invertebrates.

The IMP has the following objectives:

- Support the establishment of each population of each of the native invertebrate species covered by the IMP in areas affected by habitat clearance at Release Sites; and
- Provide habitat(s) within the Release Sites that can support a viable population of all invertebrate species relocated.
- These objectives will be achieved through habitat surveys, application of best practice capture and relocation methods and implementation of recognised survey and monitoring protocols.

This IMP addresses the following:

- A summary of the affected habitat and species within the Site;
- Methods for capture, handling, salvage and relocation;
- The proposed Release Sites and actions required to ensure their suitability for relocation invertebrates; and
- Post-works management, including post-release monitoring and pest control (where appropriate).

4.2. Project Entomologist

An approved Project Entomologist shall be appointed for the duration of all management activities associated within native invertebrates covered under this IMP. The Project Entomologist shall have the authority to:

- Determine the spatial extent, timing and intensity of native invertebrate salvage and relocation;
- Modify salvage methods and stages in response to Site conditions, survey results or safety considerations;
- Require cessation of works where they determine there is immediate or unacceptable risk to Protected or At Risk native invertebrates and their habitat;
- Identify and approve the Release Sites confirmed as part of the final EMP necessary for relocation prior to use, in accordance with the requirements of the IMP and proposed Wildlife Approval conditions.

4.3. Summary of Invertebrate Values

Field surveys confirmed the presence of two At Risk - Declining Terrestrial snail species, *Amborhytida dunni* and kauri snail (*Paryphanta busbyi*) within the Site (Table 4-1). A total of eighteen kauri snails (12 empty) and 60 *A. dunni* shells (47 empty) were found during the surveys. Kauri snails are listed as a protected species under Schedule 7 of the Wildlife Act 1953. No other Threatened, At Risk or Protected invertebrate species records were identified.

Peripatus (*Peripatoides* sp.) were recorded during the field surveys and based on known distributions, the records are most likely *Peripatoides sympatrica*, a Not Threatened, or not protected species (Table 4-1). However, peripatus are considered a notable species as effects of development on the species are not well understood due to the limited knowledge of their taxonomy and ecology.

Kauri snails, *A. dunni*, and peripatus may be present throughout all forested habitats along the Proposed Designation, including exotic forest. However, survey results suggest that if present north of the

Brynderwyn Hills, they occur in lower numbers than elsewhere within the Site. The likelihood of occurrence for all three species is higher in mature, native forest without stock access, where cool, moist leaf litter provides more suitable microhabitats. Nonetheless, individuals of all three species are known to inhabit pine forest, particularly at the base of pampas and ferns. Notably, *A. dunniæ* shells were also found within the Site in Poplar treeland, Lawson's cypress treeland, crack willow/exotic scrub and a patch of eucalyptus treeland showing clear signs of pugging.

Table 4-1: Invertebrate species managed by this IMP

Scientific name	Common name	Māori Name	Threat classification	Ecological value
<i>Amborhytida dunniæ</i>	Rhytid snail	-	At Risk - Declining	High
<i>Paryphanta busbyi</i>	Kauri snail	Pupurangi	At Risk - Declining	High
<i>Peripatoides sympatrica</i>	Peripatus	Ngaokeoke	Not Threatened	Low

4.4. Invertebrate Salvage and Relocation Overview

The protocols for invertebrate salvage and relocation specified below have been developed with a focus on the At Risk species identified on Site; kauri snail and *A. dunniæ*. Both live snails and empty shells are included in the salvage. Peripatus share similar habitat requirements and may be encountered during snail salvage efforts. If Peripatus are found, they will be relocated alongside the native snail species; however, no Peripatus-specific salvage methodologies are required.

Snail salvage will be undertaken prior to construction within all suitable snail habitat that will be lost or made unsuitable for during Project Works using the methodologies described below. suitable snail habitat will be identified by the Project Entomologist and, as many properties within the Site could not be accessed during the pre-consenting assessment period, pre-construction habitat assessments within the Site.

The protocols for the salvage and relocation of invertebrates specified below have been prepared in accordance with best practice and the specific salvage methodologies will be guided by the Project Entomologist, based on their assessment of the vegetation and habitat to be removed. A toolbox approach shall be adopted, whereby a range of salvage methods may be applied as appropriate to Site conditions and habitat characteristics. The Project Entomologist has discretion to select and implement suitable methodologies, and to include or exclude areas based on the type and quality of habitat being cleared.

The Project Entomologist must be present on Site during salvaging operations until they deem salvaging ecologists to be adequately trained.

4.4.1. Timing and Conditions

Salvage and relocation of invertebrates will be undertaken between **October 1 and April 30**, when warmer conditions support higher invertebrate activity.

4.5. Salvage Protocols

4.5.1. Manual Habitat Searches (MHS)

Prior to any vegetation clearance commencing, systematic MHS will be undertaken within two weeks before vegetation clearance is scheduled to begin. MHS will include searches for live snail specimens and for snail shells before vegetation clearance. MHS will be conducted in conjunction with lizard salvage protocols as described in the Lizard Management Plan (LMP). Searches will take place systematically, with an initial Site walk over to identify microhabitats with the most suitable habitat. Suitable habitats are those with moist soils, abundant leaf litter, rotting logs and debris, and/or low growing vegetation. Searches may include:

- Turning over or pulling apart cover objects by hand (e.g., coarse woody debris, rocks, and areas with thick fern leaf litter);

- Pulling apart large clump forming grasses (pampas and toetoe) by pulling apart these grasses by the base;
- Raking of leaf litter or ground cover (e.g., pampas, tradescantia, or dense grass);
- Searches of road-side ditches or areas that are depressed (kauri snails are frequently washed down banks during heavy rainfall); and
- habitat searches by hand of low growing epiphytes, dense low-growing vegetation, loose tree bark, fern skirts and woody debris.

The Project Entomologist has discretion to include or exclude areas for MHS based on suitability of habitat for native invertebrates. Considerations for exclusion include:

- Areas with no or little suitable habitat;
- Areas with intensive grazing/agricultural practices; and
- A combination of the considerations mentioned above, and the absence of snail observations from desktop assessments and previous field surveys.

4.5.2. Nocturnal Spotlight Searches

Native snail species are typically Nocturnal, including kauri snails which are known to burrow into soft soils and hide in leaf litter to avoid desiccation during the day. In addition, kauri snail hatchlings are known to spend time in trees and shrubs, sometimes up to 6 m above the ground. These behaviours may result in failure to detect kauri snails in MHS undertaken during daylight hours. Therefore, Nocturnal spotlighting searching for snails will commence a minimum of two weeks preceding scheduled vegetation clearance of suitable habitat using the described methods discovered above. Nocturnal spotlighting will be conducted in conjunction with spotlighting for lizards where appropriate.

Nocturnal spotlighting for invertebrates will only be undertaken in areas where there is a considerable risk to native invertebrates and/or in areas with potential suitable habitat (i.e. in mature indigenous forest). The Project Ecologist has discretion to include or exclude areas for Nocturnal spotlighting based on suitability of habitat for native invertebrates. Considerations for exclusion include:

- Areas with no or little suitable habitat;
- Areas with intensive grazing/agricultural practices; and
- A combination of the considerations mentioned above, and the absence of snail observations from desktop assessments and previous field surveys.

4.5.3. Construction Assisted Salvages

Construction assisted salvages will include Project Ecologists carrying out searches for native invertebrates with machine operators during vegetation clearance. Excavators with a tooth bucket or a root rake may be required during this work. Construction assisted salvaging during vegetation clearance activities will be undertaken in conjunction with:

- Clearance of low stature non-woody vegetation; and
- Removal of large cover objects that cannot be searched manually (e.g. large decomposing logs).

4.6. Invertebrate Capture, Handling, and Transport

The following steps will be undertaken to ensure appropriate handling and transport of:

- All equipment that may come into contact with the invertebrates during fieldwork (e.g., plastic enclosures, collection bags, scales, etc.) will undergo sterilisation;
- All persons involved with any salvage and relocation work are required to sterilise their hands;
- Salvaged invertebrates will be transported in well-ventilated plastic containers, ensuring that the containers are maintained at a cool temperature. A minimum of 30 mm of moist vegetation/leaf litter will be added to provide shelter and protection during transportation;

- Whenever possible, invertebrates will be placed in ventilated two litre plastic containers for a duration not exceeding eight hours during transportation to the relocation Site;
- Snail shells will be transported to the relocation Site in a plastic bag or container; and
- Salvaged invertebrates will be released into appropriately prepared and protected habitats suitable for the specific species being relocated.

4.6.1. Data Collection

For all individual invertebrate salvaged the following data must be collected for reporting purposes:

- Date and time of collection;
- The habitat type of where an individual specimen was found;
- GPS coordinates for where which each individual specimen was capture and relocated to;
- Photographs of the salvage Site, photograph of the invertebrate specimen, length measurement, and species identification of all individuals collected; and
- Measurement of shell height and shell weight for molluscs.

4.7. Release Sites

Salvaged kauri snail, *A. dunni* and *Peripatus* will be released into species specific suitable microhabitats within the closest, suitable Release Site as determined by the Project Entomologist. See Section 6 for a detailed description of the Release Sites

Both the Northern and Southern Release Sites include suitable microhabitat for native snails and *A. dunni* have been confirmed at both sites. Kauri snail, however, have only been confirmed at the Southern Release Site.

4.8. Accidental Injury or Death

4.8.1. Dealing with Injured invertebrates

If any injured At Risk snail is observed within the Site the Project Ecologist will be contacted immediately who will then contact the DOC Hotline 0800 DOC HOT (0800 362 468) for advice. If the snail is critically injured, the Project Ecologist may euthanise the animal.

If deemed necessary with DOC, any injured snail will be transported by an ecologist in either a breathable cloth bag or container to a predetermined specialist for treatment.

Data collection for each snail will include what is outlined in Section 4.6.1 In addition, the following will also be documented:

- the part of the snail that is injured;
- an approximate time since the injury; and
- the probable cause of the injury.

4.8.2. Dealing with Dead invertebrates

The following steps will be implemented if any At Risk snails are killed due to salvage or construction activities:

- The Project Ecologist will notify DOC at the earliest opportunity within 24 hours after the snail is killed;
- Ascertain from DOC whether the specimen is required for necropsy. If not, the shell should be taken to the Release Site (note that this will likely depend on the quality of the specimen);
- Photograph the snail; and
- Undertake appropriate measures to minimise further snail deaths.

5. Accidental Discovery Protocol

This Accidental Discovery Protocol (ADP) applies where:

- fauna identified in this EMP are discovered by contractors during unsupervised habitat clearance, outside of areas identified as suitable or confirmed habitat or at any other time during works when an ecologist is not present; or
- any At Risk or Threatened fauna species not identified in this EMP are discovered during Project works.

All personnel working on Site are responsible for alerting the Project Ecologist and the Contractor/Site Manager on the same working day as the discovery.

Following the accidental discovery of a species, works in the immediate area shall cease pending investigation and implementation of appropriate management actions.

If the fauna can be safely captured, it should be placed in a suitable temporary storage container with appropriate material (e.g. leaf litter) and kept in a cool, shady area away from the sun and construction works until it can be collected by a suitably experienced ecologist. If the fauna cannot be safely captured, it should be left undisturbed and the area protected from further disturbance.

A suitably experienced ecologist shall assess the Site and surrounds where further habitat impacts are expected and implement any required management actions, which may include MHS, supervised vegetation clearance, salvage, relocation, or other species-specific measures until satisfied the risk to indigenous fauna is minimised. Works shall not continue until approval has been granted by the Project Ecologist.

Any At Risk or Threatened species not identified in this Management Plan shall be reported to DOC and Iwi Representatives.

All accidental discoveries are to be recorded in a database with an incident register and log of actions taken for each discovery.

6. Release Sites

This EMP proposes three Release Sites which are intended to provide suitable habitat for the relocation of fauna salvaged under this EMP. Within each Release Site, specific release locations will be selected based on the habitat requirements of the fauna being relocated, including consideration of species, numbers, and Site-specific habitat conditions.

There is one Release Site north of the Brynderwyn Hills (Northern Site), one within Zentral Forest on top of the Brynderwyn Hills (Central Site), and one to the south of the Brynderwyn Hills (Southern Site). Each Site is described in detail below along with their suitability for specific fauna. There is additional suitable habitat outside of these Release Sites (predominantly the Brynderwyn Hills ONL area) which may be selected for releasing fauna, depending on species and their number requiring release, proximity to salvage location and ecological context.

The extent of the Release Sites will be confirmed following detailed design through finalisation of the EMP.

6.1. Northern Site

The Northern Release Site (approximately 20.9 ha) is located in the foothills of the Brynderwyn Hills forest complex. It comprises of a large contiguous tract of mature Kauri-podocarp and broadleaf-podocarp forests that was assessed as Very High value and is bordered by pastoral hill country and smaller native forest fragments (Figure 6-1). The Northern Site contains small, forested tributaries in the upper Waihoi River valley, which is suitable for Hochstetter's frog. Approximately 7.7 km of Moderate quality stream habitat is present that is considered suitable for a frog relocation. It also supports copper skink and *A. dunnaie* species due to the presence of suitable Refugia. This Release Site is also proposed as a Mitigation site as part of the wider Project, incorporating additional land to enable restoration planting of surrounding pasture, thereby expanding indigenous vegetation and improving connectivity between existing forest fragments.

The Northern Release Site is intended as a Release Site for:

- Hochstetter's frogs
- Kauri snail and *A. dunnaie*
- Copper skink and native geckos

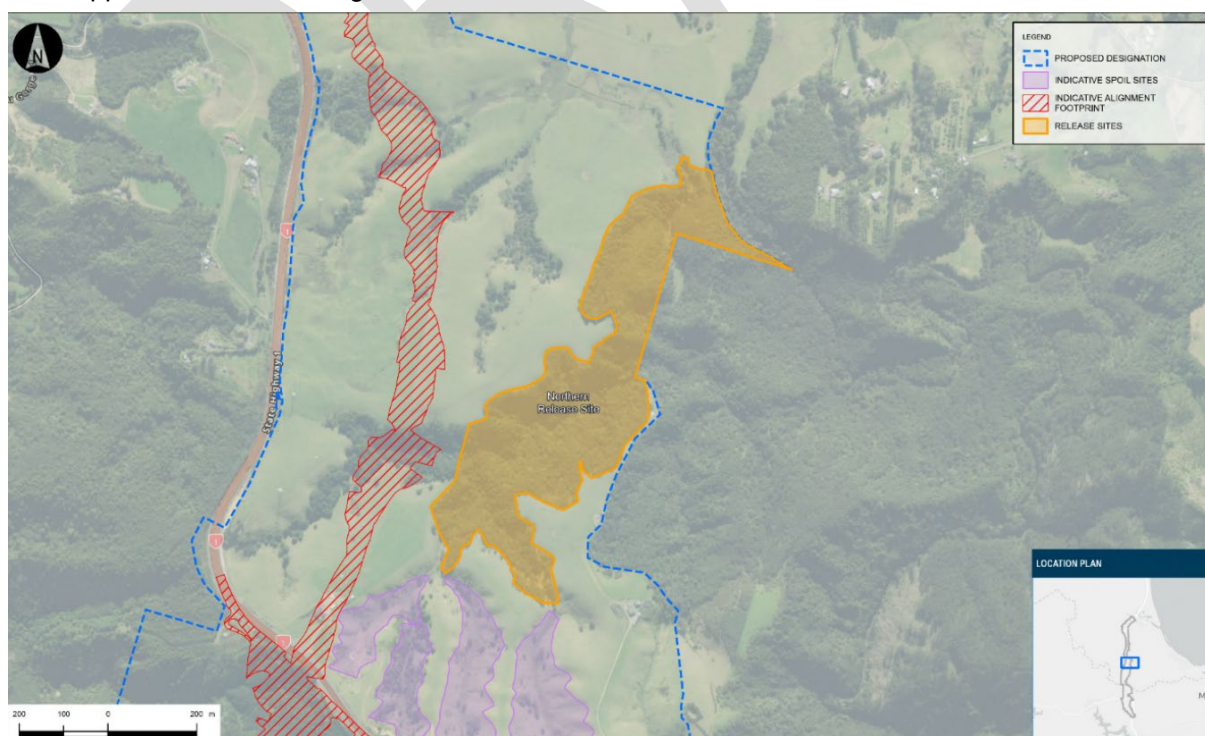


Figure 6-1 Northern Release Site

6.2. Central Site

The Central Release Site (up to approximately 95.9 ha) is located within the Zentral Forest property between the existing SH1 and the Indicative Alignment (Figure 6-2). The Release Site is predominantly comprised of existing rotational pine forestry, with small, scattered pockets of indigenous forest. It contains two sub-catchments of ephemeral, intermittent and perennial streams, which support low density populations of Hochstetter's frog. These streams will be used for staged frog releases, as required to support salvage activities associated with the Project. Streams (as indicated in Figure 6-2) will be progressively utilised for release from south to north, with progression contingent on the suitably qualified and experienced herpetologist confirming that sufficient numbers of frogs have been established in earlier release areas.

Management of the Central Release Site will focus not only on avoiding adverse effects from forestry operations, but also on improving long-term habitat quality and carrying capacity through measures such as sediment reduction, protection of high-value headwater habitats, and other habitat treatment measures identified by the Project Herpetologist. Management measures to facilitate successful frog relocation will be implemented as outlined in Section 6.5.

The Central Release Site is intended as a Release Site for Hochstetter's frogs only.

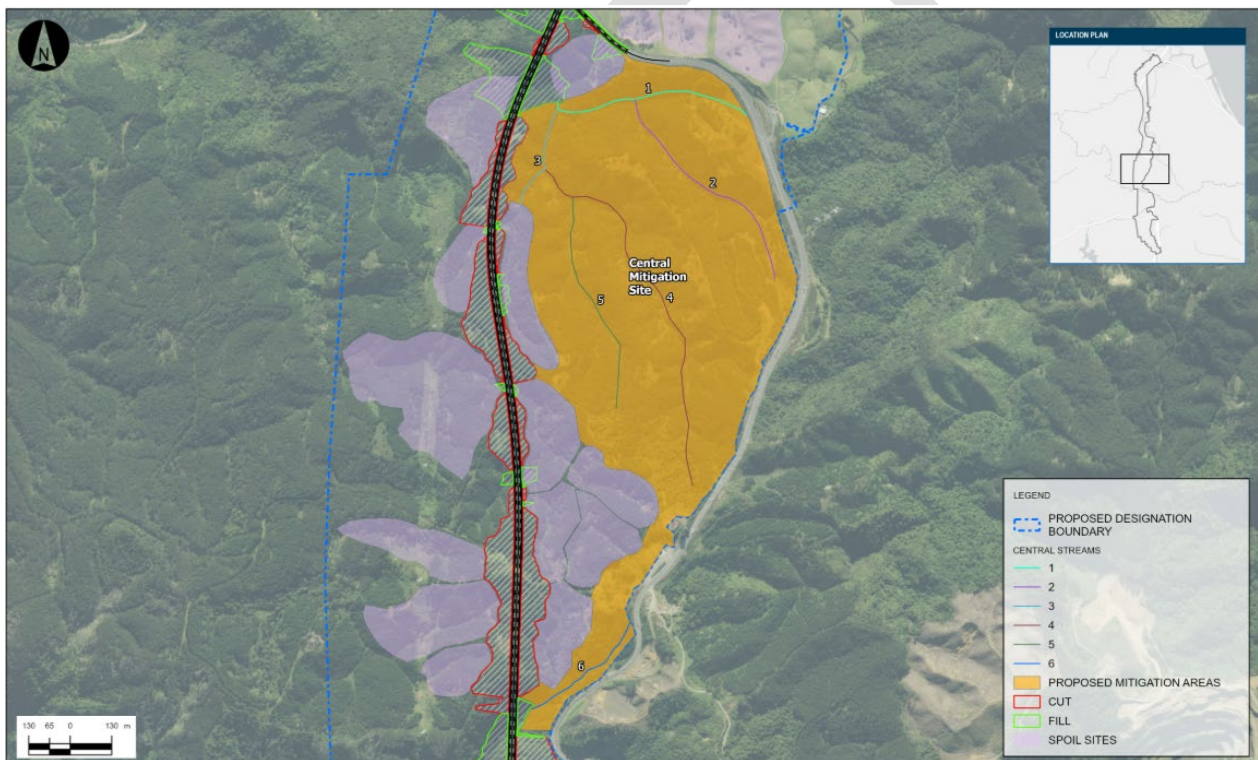


Figure 6-2: Central Release Site

6.3. Southern Site

The Southern Release Site (approximately 14.5 ha) is a large remnant tract of kauri-podocarp-broadleaf forest that is protected under a QEII covenant with pasture and scattered indigenous dominated remnants surrounding (Figure 6-3). The Southern Release Site supports copper skink, kauri snail and *A. dunnaie* but no Hochstetter's frogs were confirmed on Site. The Southern Site is possibly unsuitable for frog relocations due to the underlying geology influencing pH levels within streams. This Release Site is also proposed as a mitigation site as part of the wider Project, incorporating additional land to enable restoration planting of surrounding pasture, thereby expanding indigenous vegetation and improving connectivity between existing forest fragments.

The Southern Release Site is intended as a Release Site for:

- Kauri snail and *A. dunnaie*

- Copper skink and native gecko

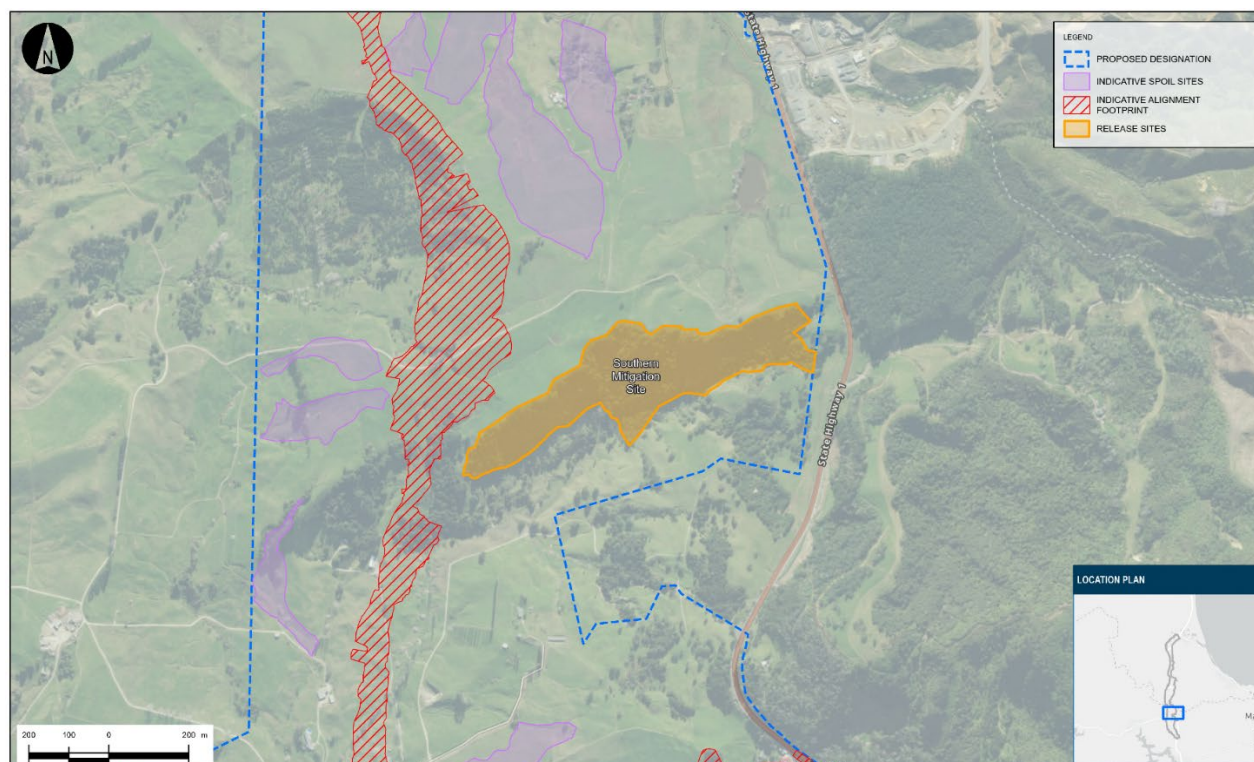


Figure 6-3 Southern Release Site.

6.4. Summary of Release Site Suitability by Species

Table 6-4 below lists native fauna recorded within each of the possible Release Sites in the past five years.

Table 6-4: Fauna present at each Release Sites

	Hochstetter's frog	Copper skink	Native geckos	Kauri snail	A. dunnaie
Northern Site	✓	✓	✓ (landowner obs.)		✓
Central Site	✓				✓
Southern Site				✓	✓

Table 6-5 provides a ranking on the existing suitability of each potential Site for each of the species, with 1 being the most preferred.

Table 6-5 Preferred Release Sites per species.

	Hochstetter's frog	Copper skink	Native geckos	Kauri snail	A. dunnaie
Northern Site	2	1	2	2	2
Central Site	1	Not proposed	Not proposed	Not proposed	Not proposed
Southern Site	Not Suitable	1	1	1	1

6.5. Management actions at the Release Sites

The following actions will be implemented at each of the Release Sites. Additional Mitigation (primarily planting) may also be implemented at the sites dependent on the effects management proposed as part of the wider Project (not just effects managed under the Wildlife Approvals):

6.5.1. Northern Site

- Stock exclusion from the entire Northern Site. If Mitigation planting is completed at the site, the fencing will incorporate areas for Mitigation planting.
- Legally protect the Release Site through a covenant and/or encumbrance (or similar legal mechanisms) to ensure the indigenous vegetation cannot be removed.
- Provision of additional refugia for specific fauna.
 - Placement of rock³ or other suitable microhabitat at frog release reaches, as specified by the Project Herpetologist.
 - Installation of refuge piles comprising stacked logs, woody debris, log discs and/or rock. Refuge features to be a minimum of 0.5 m × 0.5 m × 0.2 m and spaced approximately every 10 m in areas with limited natural refugia. Terrestrial lizards (e.g. copper skink) to be released directly into these features.
 - Placement of coarse woody debris, rock, or other suitable microhabitat in areas of limited natural refugia, as specified by the Project Entomologist.
- Mammalian Pest Control⁴ implemented at least three months prior to, and for three years following, completion of relocation of salvaged fauna to reduce stress to fauna following relocation, and to provide ecological benefits and protection to individuals. Target species will include:
 - Ungulates (pigs and goats).
 - Mustelids.
 - Rats and mice.
 - Possums.
 - Cats.
 - Hedgehogs.

The specific pest control regime will be developed by a specialist pest control operator prior to construction based on the location, terrain and pests present.

6.5.2. Central Site

- A minimum 10 m setback from all Hochstetter's frog habitat into which frogs are released.
 - This exceeds the 5 m setback required under the National Environmental Standards for Commercial Forestry (NES-CF) for perennial streams
 - The extended setback should apply to all utilised habitat, including ephemeral, intermittent and headwater streams and rocky seepages, not only the perennial streams to which NES-CF setbacks apply.
 - No forestry activities (including felling) will occur within the 10 m setback.
- Forestry activities (if any) within sub catchments containing frog release locations will implement erosion and sediment controls sufficient to ensure sediment levels within frog habitat do not exceed baseline conditions following activity.
 - An Ecologist will provide input into the design of the sediment and erosion control plan.
 - Baseline conditions will be determined at release sites prior to release
- All reaches identified for frog release areas will be assessed at least three months prior to release by a suitably qualified and experienced herpetologist to determine habitat quality and carrying capacity

³ Hochstetter's frogs were found under 18% of rocks deployed at relocation sites approximately one month after their relocation during the Brynderwyn Hills Recovery project salvage and relocation.

⁴ During field assessment possums, rats, dogs, hares, mice, stoat, rabbits, pigs, and goats were confirmed present within the Proposed Designation. Based on the rural landscape feral cats and hedgehogs may also be present.

- Where required, site-specific habitat treatment measures will be implemented within the 10 m setback to improve suitability for relocation.
- Measures may include sediment reduction, underplanting, and installation of refugia, applied as appropriate to the specific reach.
- The 10 m setback area will be legally protected through covenants and/or encumbrances (or similar legal mechanisms) to ensure the setbacks cannot be changed and indigenous vegetation cannot be removed.
- Mammalian Pest Control implemented at least three months prior to, and for three years following completion of relocation of salvaged fauna to reduce stress to fauna following relocation, and to provide ecological benefits and protection to individuals.
 - Pest control will target pigs and rats
 - The specific pest control regime will be developed by a specialist pest control operator prior to construction based on the location, terrain and pests present.

6.5.3. Southern Site

- The Southern Site is already fenced, if Mitigation planting is completed at the site, the fencing will be extended to incorporate areas for Mitigation planting.
- Protect the site in perpetuity through a covenant and/or encumbrance (or similar legal mechanisms) to ensure the indigenous vegetation cannot be removed.
- Provision of additional refugia for specific fauna.
 - Installation of refuge piles comprising stacked logs, woody debris, log discs and/or rock. Refuge features to be a minimum of 0.5 m × 0.5 m × 0.2 m and spaced approximately every 10 m in areas with limited natural refugia. Terrestrial lizards (e.g. copper skink) to be released directly into these features.
 - Placement of coarse woody debris, rock, or other suitable microhabitat in areas of limited natural refugia, as specified by the Project Entomologist.
- Mammalian Pest Control⁵ implemented at least three months prior to, and for three years following, completion of relocation of salvaged fauna to reduce stress to fauna following relocation, and to provide ecological benefits and protection to individuals. Target species will include:
 - Ungulates (pigs and goats).
 - Mustelids.
 - Rats and mice.
 - Possums.
 - Cats.
 - Hedgehogs.

The specific pest control regime will be developed by a specialist pest control operator prior to construction based on the location, terrain and pests present.

⁵ During field assessment possums, rats, dogs, hares, mice, stoat, rabbits, pigs, and goats were confirmed present within the Site. Based on the rural landscape feral cats and hedgehogs may also be present.

7. Monitoring and Reporting Requirements

7.1. Monitoring

7.1.1. Mammalian Pest Monitoring

Annual monitoring shall be conducted at all Sites where pest management is implemented.

Pre-management monitoring shall be initiated 12 months prior to any extensive pest control to understand the pest species and densities present, thereby informing responses. Monitoring shall continue annually during the management period to ensure the pest management is successful at suppressing the target species.

Monitoring for pest fauna could include:

- Chew cards.
- Tracking tunnels.
- Trail cameras
- Surveying for browsing indicators on susceptible indigenous flora species.
- Any incidental observations of mammalian pest indicators (e.g., tracks, droppings, pig rutting).
 - The specific pest monitoring regime will be developed by a specialist pest control operator prior to construction based on the location, terrain, pests present and specific fauna that the Site will be receiving.

7.1.2. Frog Monitoring

Post release monitoring shall be undertaken within the Release Sites where frogs have been relocated to. Given the potential scale of frog relocation and the inherent difficulties of monitoring a Cryptic species, the objective of the monitoring is to confirm the continuous presence of a breeding population of Hochstetter's frogs, rather than individual frog survival or population size.

The monitoring will comprise of 50 m transect surveys with a standardised search time of one hour per survey (some flexibility is allowed for this hour dependent on number of frogs found and consequent processing time).

For each transect, the following data will be recorded:

- stream width
- GPS coordinates
- riparian vegetation type
- dominant microhabitat type (rock, wood, vegetation/roots, and crevices/undercut banks) at 1 m intervals along transects
- start and end times for each transect

The double observer protocol will be used, with two suitably experienced ecologists conducting independent searches one after the other following standard methods (Longson et al., 2017; Whitaker & Alspach, 1999). Searching will progress upstream, overturning manageable rocks, woody debris, left litter and all other searchable habitat and using headlamps to aid detection. Searches will be restricted to stream beds and banks, extending up to two metres (m) above or away from the water level. To maintain the integrity of the double-observer approach, surveyors will carefully replace all refugia to their original positions after inspection. Co-detected frogs are recorded only once.

Where possible frogs detected will be recorded in situ, without handling. For each frog, the following data will be recorded:

- position along transect (m);
- microhabitat/refugia type;

- SUL, (mm);
- life stage (adult/juvenile); and
- photographs with scale where possible

Transects will be completed at a subset of stream reaches within the Release Sites. The number and location of the transects should be determined with input from a biostatistician once the extent of the Release Sites are confirmed to ensure that performance indicators can be reliably measured. Post Release Monitoring Schedule:

1. One-year post-release
2. Three years post-release
3. Two years post cessation of pest control
4. Five years post-cessation of pest control
5. 10 years post-cessation of pest control

Monitoring will be completed between November to April within each monitoring period.

Monitoring results will also be used to improve understanding of relocation outcomes and inform habitat management at Release Sites, including refinement of habitat treatment measures where monitoring indicates opportunities to improve outcomes for Hochstetter's frogs. Results from monitoring may also be used to inform future relocation programmes undertaken as part of the Project.

Performance Indicators

Monitoring results will be assessed against the following performance indicators:

- Consistent or increasing detection of Hochstetter's frogs across monitored transects between monitoring periods will indicate population persistence (i.e. no statistically significant decline in number of transects at which frogs are detected).
- Consistent or increasing detection of juveniles across monitored transects between monitoring periods will indicate persistence of a breeding population (i.e. no statistically significant decline in number of transects at which juveniles are detected at).

Following completion of the monitoring programme, if the performance indicators have been achieved, no further frog monitoring is required.

7.1.3. Lizard monitoring

Based on the lack of reliable monitoring methods to track population size, trends and survival for Cryptic lizard species such as copper skink, comprehensive post salvage monitoring is considered impractical and unlikely to provide meaningful outcomes. Monitoring is therefore focused on confirming population persistence and evidence of breeding, as outlined below.

Skink species

- If more than 20 individuals of a single skink species are released at a Release Site (or other approved release location), species-specific surveys will be undertaken in spring and autumn at two and five years post-relocation.
- Surveys will aim to determine population persistence and evidence of breeding at the Release Site (e.g. presence of neonate or juveniles).
- The surveys will include MHS during suitable weather conditions.
- If population persistence is verified after a single survey visit, the corresponding additional seasonal visit is not required.

Gecko Species

- If more than 20 individuals of a single gecko species are released at a Release Site (or other approved release location), species-specific surveys will be undertaken in spring and autumn at two and five years post-relocation.

- Surveys will aim to determine population persistence and evidence of breeding at the Release Site (e.g. presence of neonate or juveniles).
- The lizard survey will include spotlighting during suitable weather conditions.
- If population persistence is verified after a single survey visit, the corresponding additional seasonal visit is not required.
- If the monitoring outcomes are not verified (e.g. lizards do not persist at the Site and neonates or juveniles are not present), then mammalian pest control and associated pest monitoring will be implemented for an additional two years. No further lizard monitoring is required.

Pest monitoring (refer to Section 7.1.1) will also provide information relevant to the likelihood of population persistence, as suppression of mammalian pests is known to benefit native lizard populations.

7.1.4. Invertebrate monitoring

The snail species being managed under this IMP are Cryptic, making detection challenging. A failure to detect individuals during post-salvage monitoring would not reliably indicate that salvages were unsuccessful. Due to the inherent difficulties in assessing the success of snail relocations, no post-construction monitoring of *A. dunni* is proposed and the following is recommended for kauri snail.

- If more than 20 individuals are released at a Release Site, a survey will be undertaken in spring, two and five years post-relocation.
- Surveys will aim to determine population persistence at the Release Site.
- The survey will include both MHS and spotlighting during suitable weather conditions.
- If the monitoring outcomes are not verified (e.g. kauri snails do not persist at the Release Site), then mammalian pest control and associated pest monitoring will be implemented for an additional two years. No further lizard monitoring is required.

The pest monitoring described in Section 7.1.1 will also provide information relevant to the likelihood of population persistence, as suppression of mammalian pests is known to benefit native snail populations.

7.2. Reporting

7.2.1. Annual

A short fauna salvage and relocation report will be submitted to Northland Regional Council, Kaipara District Council, Whangarei District Council (for information only) and DOC annually (by 30 June each year). The annual report provides confirmation that frog, lizard, and invertebrate salvaging and relocation operations undertaken within the previous 12 months were carried out in accordance with this EMP and the Wildlife Act 1953. It will specifically include:

- Staff involved.
- Timeline of management measures implemented for Protected species.
- Summary of salvage methodologies, effort and locations.
- Salvage and relocation results including:
 - The locations, species, morphometric data, photos and number of any Protected species captured and released;
 - The locations, species, morphometric data, photos and number of any Protected species found dead; and
 - A detailed map of the collection and release points
- Confirm that fauna salvage was undertaken in accordance with the EMP and Conditions.
- Changes to management implemented and rationale.
- Any other reporting requirements outlined within the WAC must also be adhered to.

In addition, the following will be completed by 30 June each year:

- Amphibian and Reptile Distribution Scheme (ARDS) cards with details of all lizard and frog observations will be sent to DOC (herpetofauna@doc.govt.nz) for inclusion in the herpetofauna bioweb.
- Protected invertebrate capture and relocation data will be compiled, summarised, and submitted to DOC's national data repository for invertebrate records (the Bioweb Invertebrate database).

7.2.2. Completion

A final Ecological Management compliance report will be submitted to Northland Regional Council, Kaipara District Council, Whangārei District Council (for information only) and DOC within three months of completion of all salvaging and relocation operations. The report provides confirmation that frog, lizard and invertebrate salvaging and relocation operations were undertaken in accordance with this EMP and the Wildlife Act 1953. It will specifically include:

- Staff involved.
- Timeline for all management measures implemented for Protected species.
- Summary of salvage methodologies, effort and locations.
- All salvage and relocation results including:
 - The locations, species, morphometric data, photos and number of any Protected species captured and released;
 - The locations, species, morphometric data, photos and number of any Protected species found dead; and
 - A detailed map of the collection and release points.
- Confirm that fauna salvage was undertaken in accordance with the EMP and Wildlife Act 1953.
- Changes to management implemented and rationale
 - Experiences, challenges, lessons and learnings;
 - Requirements of post-salvage monitoring requirements (if any); and
 - Any other reporting requirements outlined within the Wildlife Act Approval must also be adhered to.

8. References

Burns, R., Bell, B., Haigh, A., Bishop, P., Easton, L., Wren, S., Germano, J., Hitchmough, R., Rolfe, J., & Makan, T. (2018). Conservation status of New Zealand amphibians, 2017. (New Zealand Threat Classification Series 25, p. 7). Department of Conservation.

<https://www.doc.govt.nz/globalassets/documents/science-and-technical/nztcs25entire.pdf>

Department of Conservation. (2012). Herpetofauna inventory and monitoring. <https://www.doc.govt.nz/our-work/biodiversity-inventory-and-monitoring/herpetofauna/>

Department of Conservation. (2023). Generic Frog Hygiene and Handling Protocol.

Lillie, M., Grueber, C. E., Sutton, J. T., Howitt, R., Bishop, P. J., Gleeson, D., & Belov, K. (2015). Selection on MHC class II supertypes in the New Zealand endemic Hochstetter's frog. *BMC Evolutionary Biology*, 15(1), 63. <https://doi.org/10.1186/s12862-015-0342-0>

Lizard Technical Advisory Group. (2018). Guidelines and models for producing management plans for New Zealand lizards. Department of Conservation.

Lizard Technical Advisory Group. (2019). Key principles for lizard salvage and transfer in New Zealand. Department of Conservation.

Lizard Technical Advisory Group. (2023a). Reducing the impacts of development on New Zealand lizards: Guidance for developers, consultants and Department of Conservation staff. Department of Conservation.

Lizard Technical Advisory Group. (2023b). What information and permissions are required if lizard or frog habitat is to be disturbed or removed? Guidance for developers, consultants and Department of Conservation staff. Department of Conservation.

Longson, C. G., Brejaart, R., Baber, M. J., & Babbitt, K. J. (2017). Rapid recovery of a population of the cryptic and evolutionarily distinct Hochstetter's Frog, *Leiopelma hochstetteri*, in a pest-free environment. *Ecological Management & Restoration*, 18(1), 26–31. <https://doi.org/10.1111/emr.12240>

Ministry for Primary Industries. (2018). Code of Welfare: Transport within New Zealand.

Tonkin & Taylor Ltd. (2023). Lizard management learnings from the O Maurangi (penlink) roading Project. SRARNZ Conference.

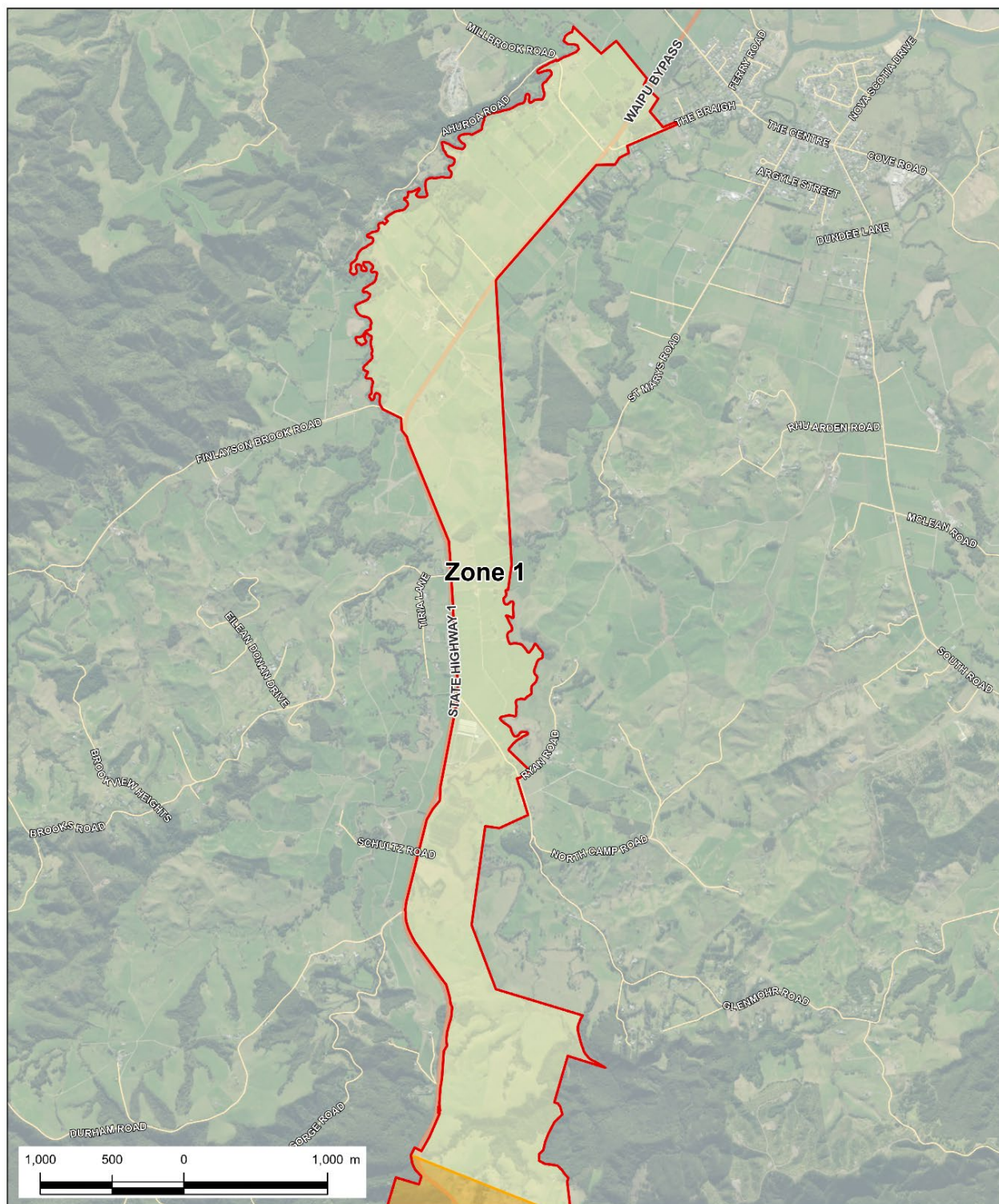
Whitaker, A. H., & Alspach, P. A. (1999). Monitoring of Hochstetter's frog (*Leiopelma hochstetteri*) populations near Golden Cross Mine, Waitekauri Valley, Coromandel (130; Science for Conservation). Department of Conservation.

WSP. (2024). Brynderwyn Hills Recovery Project. Ecology Compliance Report (p. 87) [Client Report prepared for NZ Transport Agency Waka Kotahi]. WSP.

Appendix A

Earthwork Zones

DRAFT



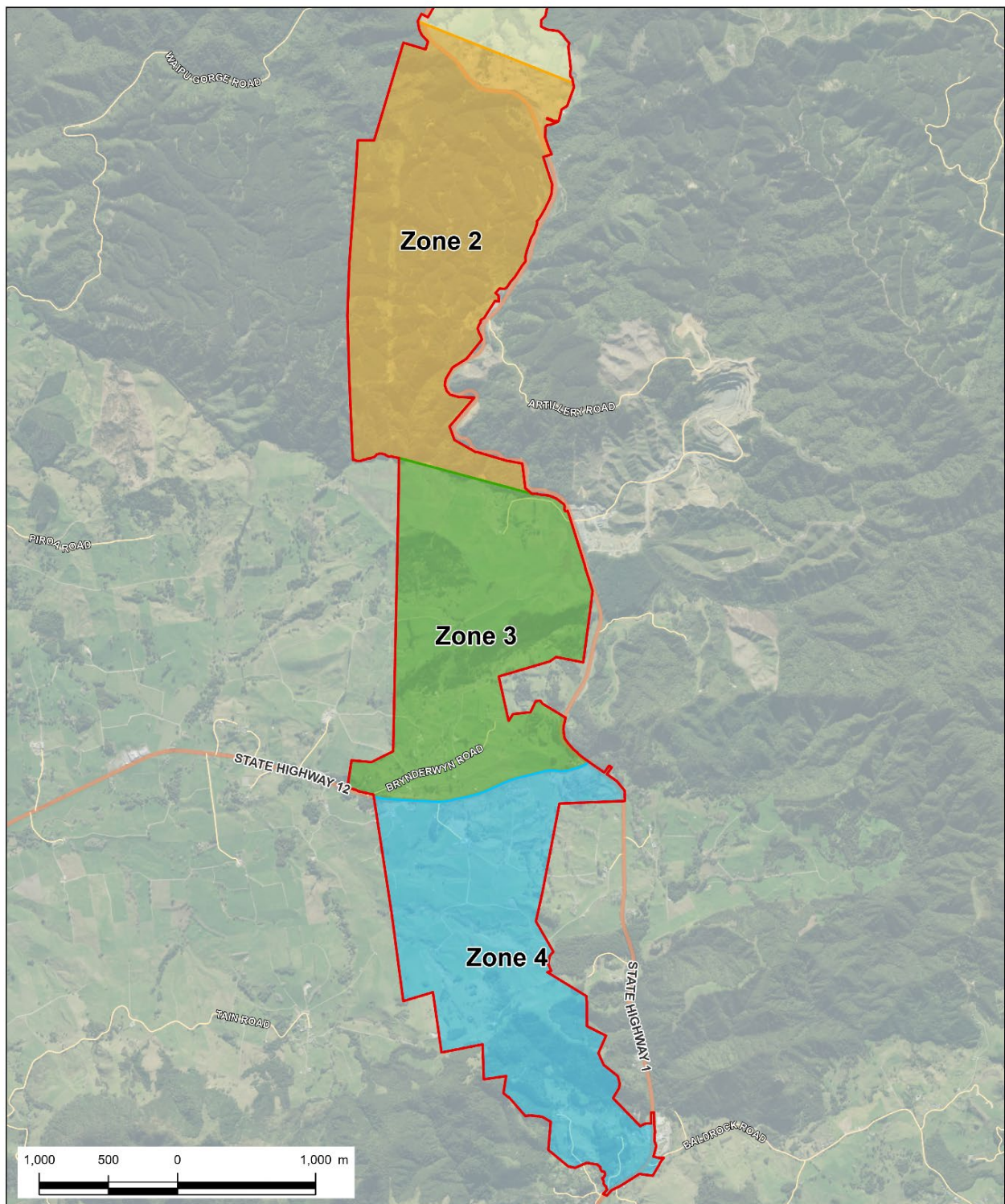
Earthworks Zones

LEGEND

EARTHWORKS ZONE

- 1
- 2
- PROPOSED DESIGNATION





Earthworks Zones

LEGEND

EARTHWORKS ZONE

- 1
- 2
- 3
- 4

PROPOSED DESIGNATION

