Wahi North Project - Ecology and Landscape Management Plan Waihi Area

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PART A: INTRODUCTION AND OVERVIEW

1 INTRODUCTION

1.1 Overview

OceanaGold New Zealand Limited's ("**OGNZL**") mining operation at Waihi has had a prolonged presence in Waihi, and during that time has played a significant role in influencing the ecology and landscape values of the area.

To sustain its ongoing operation, OGNZL has commenced the Waihi North Project ("**WNP**") to extend the life of its Waihi operation. WNP comprises several components, being:

- The mining of a new pit near the existing Processing Plant;
- A new tailings storage facility to the east of existing tailings storage facilities;
- A new rock stockpile area north of and adjacent to the existing tailings storage facilities;
- Changes to the layout of the existing Processing Plant;
- Upgrades to the existing Water Treatment Plant and reconsenting of the existing discharge of treated water to the Ohinemuri River;
- A new Wharekirauponga Underground Mine ("**WUG**"), under the Coromandel Forest Park ("**CFP**") north of Waihi; and
- Site infrastructure supporting the mine, located on farmland located at the end of Willows Road.

These components are shown in Figure 1.

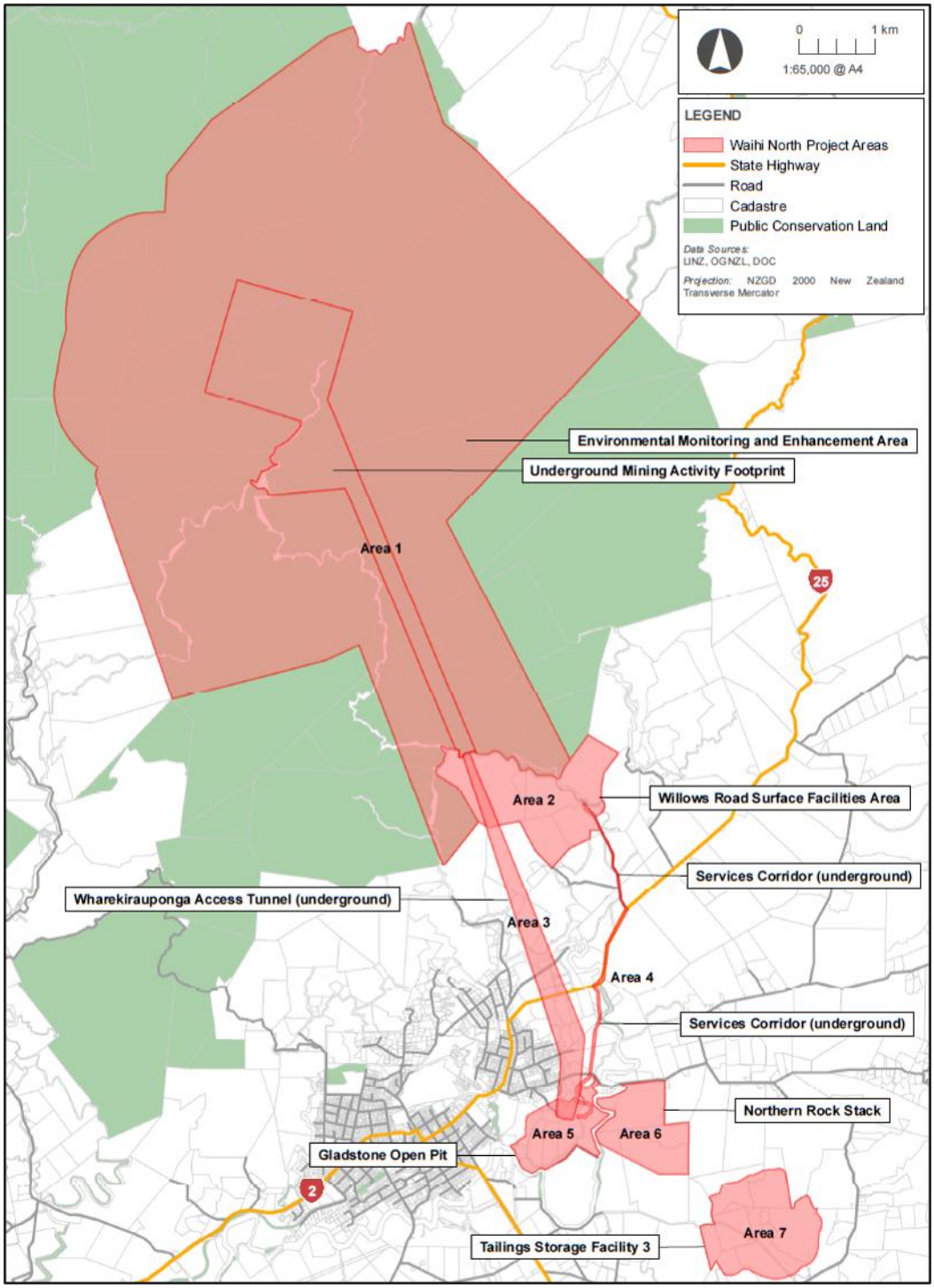

Figure 1 Waihi North Project Areas 1-7

This Ecology and Landscape Management Plan ("**Plan**") addresses the components of the WNP within the Waihi area. This plan does not address the ecological management of the WUG (activities in the CFP and in Area 2), as these are addressed in a separate Ecology and Landscape Management Plan ("**ELMP-WUG**").

Several reports been compiled to assess the ecology and landscape effects of the WNP and recommend actions to avoid, mitigate, remedy, compensate or offset (as appropriate) potential impacts to a level such that a Net Ecological Gain is the anticipated outcome. This Plan does not seek to replicate the assessments contained within those reports; rather this Plan seeks to collate the management actions required to manage the actual and potential ecology and landscape effects of the WNP.

1.2 Integrated Landscape and Ecological Response

The proposed mitigation for the Project has been developed as an integrated package of complementary measures that encompasses all landscape and ecological management initiatives and enhancements, with the intention that this coordinated effort achieves more than simply the 'sum of its respective components'. This Plan therefore largely addresses the ecological matters, as landscape management is included within the ecological management approach.

The Plan sets out the sub-plans relevant to the WNP however, as these are largely integrated measures, Section 15 provides summary tables of all integrated landscape ecological management measures across each sub-section.

1.3 Plan Objective

The objective of this Plan is to identify how the potential adverse effects of the WNP (Waihi Area) on the ecological, landscape and biodiversity values within the WNP Area and its surrounds will be avoided, remedied, mitigated and offset for:

(a) Vegetation;

(b) Habitats;

(c) Herpetofauna (lizards and frogs);

(d) Bats; and

(e) Avifauna.

This Plan details the methods to be used by OGNZL to comply with the relevant conditions of the authorisations for the WNP outlined within Hauraki District Council Consent, Waikato Regional Council Consents, and Hauraki District Council and Waikato Regional Council Combined Consents.

The ELMP-WUG sits alongside this plan, outlining the approach at the Willows site and Wharekirauponga.

1.4 Plan submission and review

Specific conditions apply to the review process for this plan, outlined in the 'Management and Monitoring Plans' section of the Combined HDC and WRC conditions – C4B-C6.

Amendments may be made at any time, provided they follow the certification process outlined in the 'Amendments to Plans' section, containing conditions C7 – C8D.

This plan is also to be sent to the Department of Conservation for review and comment, prior to certification by the Councils.

1.5 Reporting

Management actions undertaken to implement this plan will be formally reported in the following formats:

- **The Waihi North Ecological and Landscape Monitoring Report** ("**ELMR**") by 30th June covering activities addressed in the ELMP-WA for the previous 12 months. (Condition 205, HDC Conditions). This report will be provided to Hauraki District Council, the Department of Conservation, and the Iwi Advisory Group.
- Specific reporting requirements for each sub management plan are outlined in the appropriate sections of the Plan, and are summarised in Section N of this Plan.

1.6 Plan Structure

This Plan is split into several sections to address the various requirements of the proposed consent conditions, as follows:

Part A: Is this Introduction, which includes a high-level description of the WNP.

Part B: Contains the overarching Integrated Landscape and Ecological Response Plan.

Part C: Contains the Residual Effects Offset Plan.

Part D: Contains the Planting Plan.

Part E: Contains the Plant Pathogen and Weed Management Plan.

Part F: Contains Pest Animal Management Plan.

Part G: Contains the Lizard Management Plan.

Part H: Contains the Avifauna Management Plan.

Part I: Contains the Bat Management Plan.

Part J: Contains the Stream Diversion and Development Plan.

Part K: Contains the Stream Enhancement Riparian Planting Plan.

Part L: Contains the Landscape and Visual Mitigation Plan.

Part M: Contains the General Incidental Discovery Protocol.

Part N: Contains the Summary Integrated Landscape and Ecology Measures and the Summary Reporting Requirements.

2 EXISTING SYSTEMS

OGNZL already has significant systems in place to manage the ecology and landscape impacts of its activities. Through the existing operational consents and OGNZL's environmental philosophy, key controls have been established.

2.1 Site Responsibilities

Table 1 summarises the primary OGNZL responsibilities for landscape and ecological management.

Table 1: Responsibilities

Role	Responsibilities
Asset President/Project Director	**Approval of resources for ecology and landscape management.**
Superintendent - Environment	**Review and approval of all Ecology and Landscape Management Plans and reports.** **Management of resources to respond to biodiversity initiatives.**
Senior Environmental Advisor / Planner	**Author and reviewer of Ecology and Landscape Management Plans and reports, including the closely aligned Rehabilitation and Closure Plan.** **Coordination of initiatives and monitoring.** **Coordination of investigations into landscape and ecological impacts, both for existing projects and for new projects to enhance the sustainability of the operation.**
Environmental Advisor / Officers	**Monitoring of ecology and landscape management values as required.** **Supervision of contractors / consultants.**
All employees	**Avoidance of unnecessary detrimental impact on ecology and landscape values.** **Reporting of potential ecology and landscape impacts.** **Implementation, where appropriate, of relevant components of management plans.**

PART B: INTEGRATED LANDSCAPE AND ECOLOGICAL RESPONSE PLAN

3 INTEGRATED LANDSCAPE AND ECOLOGICAL RESPONSE PLAN

Table 2 and Table 3 provide an overview of the planting required to manage the ecological and landscape effects of the WNP within the Waihi Area. Figure 2 and Figure 3 provide the locations and visual representation of the extent of these areas. Planting obligations for Willows / Area 2 are outlined in the Ecology and Landscape Management Plan for Wharekirauponga Underground.

Table 2: Planting Referred to in Condition 195 of the Hauraki District Council Conditions

Area	Trigger Activity	Objective	Treatment	Timeframe / Performance Indicators
Offset Planting				
Lizard Habitat Enhancement Area	> Vegetation removal in Area 7	> To enhance an existing 1.3 ha area of known habitat for Nationally 'At Risk' moko skinks (Oligosoma moco). > To provide a safe (pest managed) refuge for relocated lizards. > General ecological and landscape enhancement with additional habitat creation of 4.04 ha adjacent to SNA T13UP166 (including the 1.3 ha of known habitat listed above).	> Stock exclusion; > Pine tree removal; > Provision of permanent lizard refuge structures; > Standard mass planting of targeted lizard habitat species, for example flax (*Phormium tenax*), Pohuehue (*Muehlenbeckia complexa*), Toetoe (*Austroderia toetoe*), Mingimingi (*Leucopogon fasciculatus*), Pohutukawa (*Metrosideros excelsa*) and Cabbage Tree (*Cordyline australis*). > Weed control. > Mammalian pest control (until the end of the 20-year plant monitoring period).	> Pine tree removal before any vegetation removal in Areas 5, 6 or 7. > Pioneer planting is complete by end of first planting season following vegetation removal in Area 7. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).

Area	Trigger Activity	Objective	Treatment	Timeframe / Performance Indicators
Waihi Biodiversity Offset Planting Area	> Vegetation removal in Area 7	> 17.5 ha of new planting in, adjacent to, and in the wider landscape of the SNA to offset loss of 8.3 ha of SNA vegetation. > 20 ha of new planting in wider WNP area to offset loss of 10.1 ha of site-wide indigenous vegetation. > General ecological and landscape enhancement	> Stock exclusion; > Site preparation; > Standard mass planting using native pioneer species; > Enrichment with WF11 future canopy species once the pioneer plantings have reached a sufficient size to shelter enrichment species; > Weed control. > Mammalian pest control.	> Pioneer planting is complete by end of first planting season following vegetation removal in Area 7. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).
Waihi Biodiversity Offset Enhancement Area	> Vegetation removal in Area 7	> 20 ha of enhancement actions within pine-dominant areas of SNA T13UP166 to offset loss of 1.2 ha of non-SNA native vegetation. > General ecological and landscape enhancement.	> Stock exclusion; > Pine tree removal or poison, top & delimb; > Infill planting SNA Enrichment species at 5 m spacing where pine trees are removed; > Weed control. > Mammalian pest control.	> Pine tree management, SNA enhancement planting (pine tree areas) is complete by end of first planting season following vegetation removal in Area 7. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).
TSF Buffer Area	> Vegetation removal in Area 7	> To rapidly buffer the edges of SNA T13UP166 to reduce weed reinvasion and other edge effects following vegetation removal. > General ecological and landscape enhancement.	> Buffer planting a minimum of 10 m wide along the southern boundary of the Southern Fragment of SNA T13UP166 with fast growing native shrubs. > Weed control.	> Pioneer planting is complete by end of first planting season following vegetation removal in Area 7.

Area	Trigger Activity	Objective	Treatment	Timeframe / Performance Indicators
			> Mammalian pest control.	
Replacement Planting Zones 1, 2 and 4	> Vegetation removal in Areas 5, 6 or 7	> Replacement planting for - unprotected planted vegetation (including pine) that would be removed. > Provide for and enhance ecological connectivity. > Provide ecological buffers to existing ecological values > General ecological and landscape enhancement.	> Stock exclusion; > Site preparation; > Standard mass planting using native pioneer species; > Enrichment with WF11 future canopy species once the pioneer plantings have reached a sufficient size to shelter enrichment species; > Weed control. > Mammalian pest control.	> Pioneer planting is complete by end of fifth planting season following vegetation removal in Areas 5, 6 or 7. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).
Replacement Planting Zones 5 – 9	> Vegetation removal in Areas 5, 6 or 7			> Pioneer planting is complete by end of seventh planting season following vegetation removal in Areas 5, 6 or 7. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).
Replacement Planting Zone 3	> Commencement of works at GOPTSF			> Existing pine trees retained whilst Gladstone Pit is in operation. > Pine tree management and pioneer planting completed within the first planting season following completion of surface mining in Gladstone Pit. This requires

Area	Trigger Activity	Objective	Treatment	Timeframe / Performance Indicators
				planting to occur before or whilst GOPTSF is in operation. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).
Replacement Planting Zone 10	> Vegetation removal in Areas 5, 6 or 7			> Pioneer planting complete by end of second planting season following vegetation removal in Areas 5, 6 or 7. > Enrichment planting undertaken once the pioneer plantings have reached a sufficient size to shelter enrichment species (likely to be between 3 and 5 years following pioneer planting).
Screen Planting	> As above	> To screen temporary stockpiles and Northern Rock Stack from Golden Valley Road.	> Establishment of fast growing native planting.	> Planting complete within the first planting season following the commencement of the consent
Other Terrestrial Planting on OGNZL owned land	> As above	> General ecological and landscape enhancement.	> Stock exclusion; > Site preparation; > Standard mass planting using native pioneer species; > Enrichment with WF11 future canopy species once the pioneer plantings have reached	> As soon as practicable but no more than 10 years following commencement of activities within Areas 5, 6 or 7.

Area	Trigger Activity	Objective	Treatment	Timeframe / Performance Indicators
			a sufficient size to shelter enrichment species; > Weed control. > Mammalian pest control	
Other Terrestrial Planting on land owned by others	> Vegetation removal in Areas 5, 6 or 7	> General ecological and landscape enhancement.	> Stock exclusion; > Site preparation; > Standard mass planting using native pioneer species; > Enrichment with WF11 future canopy species once the pioneer plantings have reached a sufficient size to shelter enrichment species; > Weed control. > Mammalian pest control	> As soon as practicable but no more than 10 years following commencement of activities within Areas 5, 6 or 7.

Table 3: Planting Referred to in Condition G21 of the Waikato Regional Council Consent conditions

Area	Trigger Activity	Objective	Treatment	Timeframe
Offset Planting				
Riparian Planting of Diversion	> Commencement of construction in Area 7.	> To offset for stream diversions > To recreate and enhance instream habitat and ecological	> Stock exclusion. > Low stature riparian planting to prevent bank erosion and provide bank stability	> As soon as practicable but within one year of the completion of construction works on the diversion.

Area	Trigger Activity	Objective	Treatment	Timeframe
		function of diverted watercourse. > To protect and enhance aquatic ecological values.	> High stature riparian planting to provide approximately 70% shade to stream channel. > Weed and pest browse control until riparian area matures (up to five-years).	
Waihi Riparian Planting within OGNZL owned Land	> Commencement of construction in Area 7.	> To offset for stream diversions > To protect and enhance aquatic ecological values > To enhance stream condition and connectivity throughout stream and river network of the Ohinemuri River catchment	> Stock exclusion. > Low stature riparian planting to prevent bank erosion and provide bank stability > High stature riparian planting to provide approximately 70% shade to stream channel. > Weed and pest browse control until riparian area matures (up to five-years).	> As soon as practicable but within one year after commencement of construction in Areas 5, 6 or 7.
Waihi Riparian Planting on land owned by others	> Commencement of construction in Area 7.	> To offset for stream diversions > To protect and enhance aquatic ecological values > To enhance stream condition and connectivity throughout stream and river network of the	> Stock exclusion. > Low stature riparian planting to prevent bank erosion and provide bank stability > High stature riparian planting to provide approximately 70% shade to stream channel.	> As soon as practicable but within one year after commencement of construction in Areas 5, 6 or 7.

Area	Trigger Activity	Objective	Treatment	Timeframe
		Ohinemuri River catchment	> Weed and pest browse control until riparian area matures (up to five-years).	

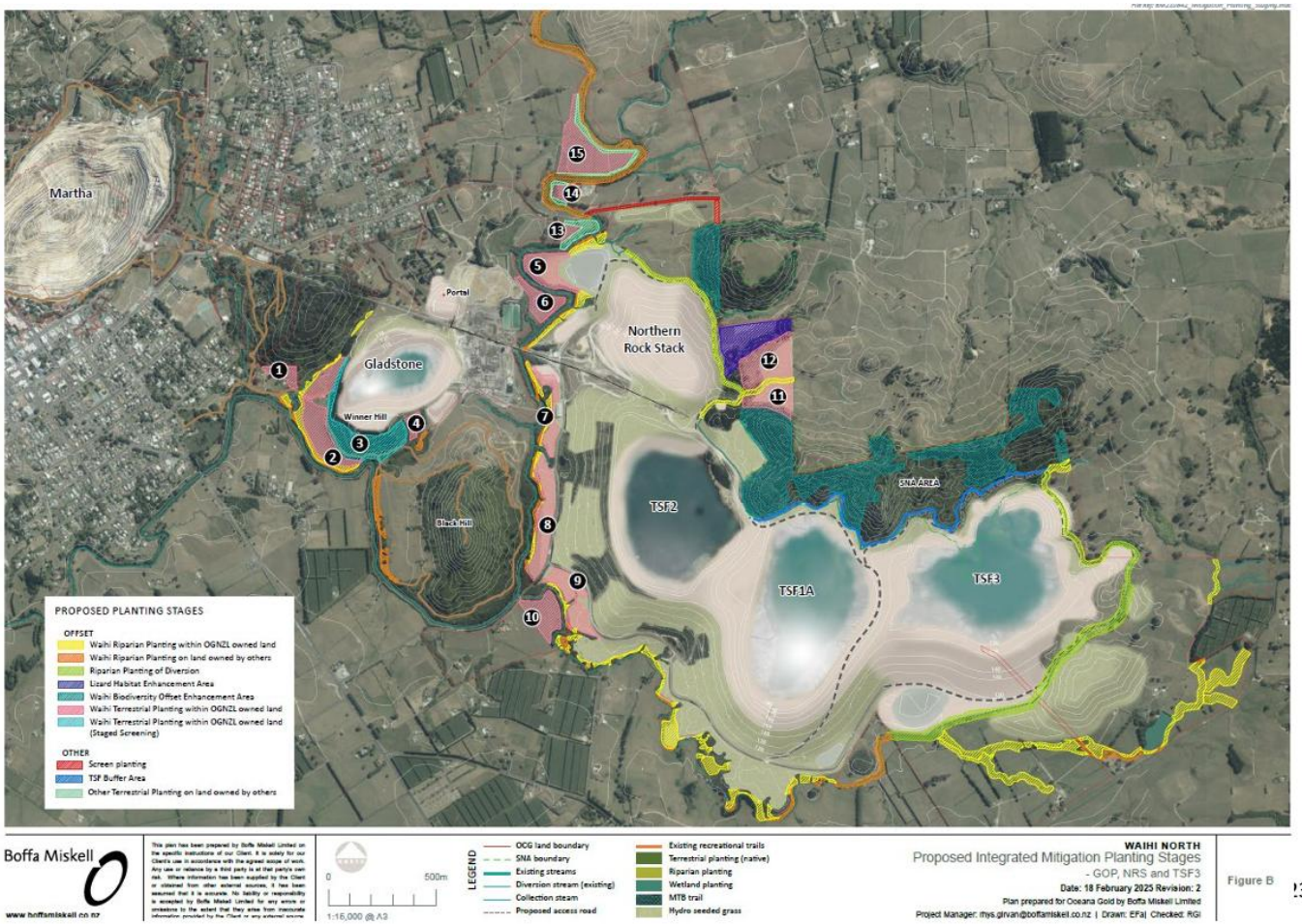

Figure 2 Proposed Integrated Mitigation Planting Plan – Waihi

Figure 3:Proposed Closure Planting Locations

PART C: RESIDUAL EFFECTS OFFSET PLAN

4 RESIDUAL EFFECTS OFFSET PLAN

4.1 Introduction

4.1.1 Overview

The WNP (Waihi area) will comprise three components, being:

- A new open pit at Gladstone (Gladstone Open Pit, GOP),
- An expansion of the Northern Rock Stack (NRS) and
- A new tailing storage facility (Tailings Storage Facility 3, TSF3), including two borrow pits within the footprint of the TSF3.

Modifications are also proposed to the existing processing plant, but as these will occur within the existing processing plant footprint and a small area of pastoral farmland to its west, the potential effects associated with this component are not considered.

The activities associated with the WNP (Waihi area) are expected to have direct and indirect effects on ecological values at each of the three components of the WNP (Waihi area). Where adverse effects on ecological values are expected to incur 'Moderate' or 'High' 'Level of Effects' as a result of a project, actions are considered necessary to minimise and mitigate them.

Within the WNP (Waihi area) expected effects on terrestrial ecology, including loss of vegetation and habitats, are generally considered to be no more than 'Low', except at TSF3 where vegetation and habitat removal will result in a moderate level effect. Most of the vegetation and habitats that are expected to be affected are planted compositions.

Together, the three components of the WNP considered in this report would require the removal of approximately 25.7 ha of native and exotic (planted and naturally occurring) vegetation. An assessment of terrestrial ecological values and effects identified that the loss of vegetation would result in moderate to very low levels of effects.

4.1.2 Purpose of Plan

The purpose of this Residual Effects Offset Plan is to determine the quantum of conservation actions (revegetation of new habitats and enhancement of existing habitats) required to offset the effects on terrestrial ecology values within the three Waihi components of the WNP, in order to demonstrate an overall net positive outcome for ecological values. Those actions are quantified and measured against losses and modelled, using a Biodiversity Offset Accounting Model ("**BOAM**"), developed by Maseyk and others (Maseyk et al. 2015; 2018) to achieve overall net biodiversity gain.

Biodiversity Offsetting is a recognised tool for counterbalancing significant residual effects on ecological values in New Zealand, as long as it aligns with the Effects Management Hierarchy (National Policy Statement for Indigenous Biodiversity ("**NPSIB**")). A summary of the Project's application of the Effects Management Hierarchy is detailed later in this report. This Residual Effects Offset Plan should therefore be read in conjunction with other reports and management plans that detail measures that will be taken to avoid, minimize, and remedy effects prior to offsetting. Mitigation measures such as fauna management plans are presented separately and should be considered as part of the wider terrestrial ecological management package.

4.1.3 Consent Condition Matrix

Table 4 sets out the relevant consent conditions associated with the Residual Effects Offset Plan and where they are addressed within this document.

Table 4 Residual Effects Offset Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Waihi North Project – Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following: Residual Effects Offset Plan – which determines the quantum of conservation actions required to offset the effects on terrestrial ecology values within Areas 2, 3, 5, 6,and 7 of the Waihi North Project, in order to demonstrate an overall Net positive outcome for ecological values.	C47B(2)(a): > Lead in times - Section 3 > Implementation timeframes -Section 4.6.2.1 > Duration of maintenance - Section 15 C47B(2)(b): > Monitoring - Section 4.6.2 > Triggers and remedial actions - Section 4.6.2.2 > Reporting requirements - Section 4.6.3 C47B(2)(c): > Performance indicators – Section 4.7.
Waihi North Project – Appendix B2 –HDC Conditions		

Consent Condition Number	Consent Condition Wording	Location within this Plan
199	The Waihi Biodiversity Offset Area, Waihi Biodiversity Offset Enhancement Area, and Ventilation Shaft Offset Area must: a. Be managed to achieve the biodiversity attribute values specified for those areas in accordance with the 'five-yearly monitoring targets for offset planting areas' table provided in the ELMP-WA; and b. Include any additional management actions deemed necessary in any 5 yearly Offset Monitoring report submitted in accordance with Condition 200. *Advice Note: Biodiversity attributes collectively describe the key values of the biodiversity components of the Waihi North Project, and comprise canopy height, native canopy diversity, native understory diversity, and avifauna diversity.*	Section 4.7
200	1. The Consent Holder must commission a suitably qualified and experienced ecologist to undertake ecological monitoring of the Waihi Biodiversity Offset Area, Waihi Biodiversity Offset Enhancement Area, and Ventilation Shaft Offset Area to determine the success of the modelled ecological outcomes and the Biodiversity Attributes specified for each Planting Area in the 'five-yearly monitoring targets for offset planting areas' table provided in ELMP-WA. 2. The monitoring must commence five years after the canopy species have been planted in a Planting Area and thereafter at 5-yearly intervals for at least 20 years. 3. After 20 years, if all Biodiversity Attributes in a Planting Area are met, monitoring of	Section 4.6

Consent Condition Number	Consent Condition Wording	Location within this Plan
	that Planting Area may cease. If Biodiversity Attributes are yet to be met in a given Planting Area, then monitoring in that Planting Area must continue and adaptive management contingency measures must be implemented in accordance with the ELMP-WA until such time as the Biodiversity Attributes in a Planting Area are met. 4. The monitoring must include: a. Vegetation monitoring within 20m x 20m plots, including: i. Four plots within enhancement planting (pine dominant SNA 166) and three plots within revegetation planting (one in each of the main planting areas). Final locations of the plots must be determined during the first monitoring period once access is confirmed with GPS coordinates and/or permanent markers used to establish boundaries. ii. Identification of all plant species to determine groundcover, understory and canopy species; iii. Recording percentage canopy cover iv. Recording canopy height; and v. Bird monitoring at the same locations as the vegetation plots comprising 5‑minute bird counts at each location, replicated quarterly every five years (i.e. in every fifth year a bird count is to occur in each season of that year).	
201	The Consent Holder must submit an Offset Monitoring Report to the Hauraki District Council following each 5 yearly monitoring programme required by Condition 200 which includes, as a minimum: a. The results of all aspects monitored including how they are tracking against the Biodiversity Attributes_in the' five-yearly	Section 4.6.3.

Consent Condition Number	Consent Condition Wording	Location within this Plan
	monitoring targets for offset planting areas ' table provided in the ELMP-WA; b. Records of any weeds encountered during monitoring; c. Records of any dead or dying plants encountered; d. Recommendations on any additional planting, enhancement or management actions that should be undertaken to assist with achieving the Biodiversity Attributes for each Planting Area in the provisions included in the 'five-yearly monitoring targets for offset planting areas' table provided in ELMP-WA.	

4.1.4 Site Overview

The existing environment within which the proposed activities will occur is a modified rural landscape and comprises property blocks held by OGNZL and other private landowners around the operation. Vegetation cover within the WNP project area includes pasture, exotic forestry, exotic and native scrub, and 10– 25-year-old native plantings undertaken through time by the operation (not for mitigation purposes).

Two Hauraki District Plan-recognised Significant Natural Areas ("**SNA**") are in the immediate landscape; SNA T13P165, (Ngati koi Domain) and SNA T13UP166 (two separate fragments Northeast of the current tailings storage facility ("**TSF**"). These features, along with the key components of the WNP, are shown on the following figure.

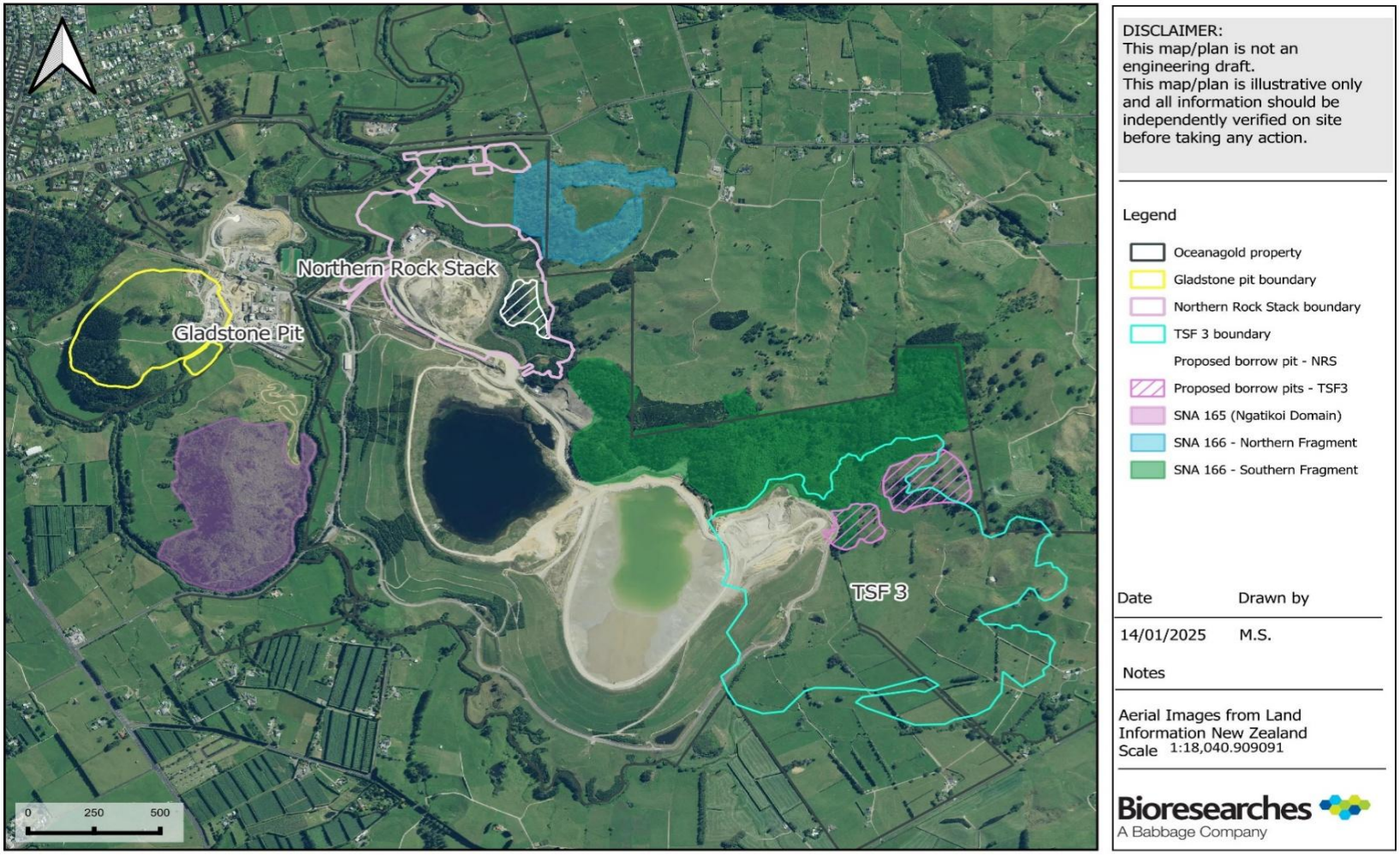

Figure 4: WNP components; GOP, NRS and TSF 3, including proposed borrow pit sites and SNA habitats

4.1.5 Summary of Ecological Values and Effects

Overall, the WNP (Waihi area) will require the removal of approximately 25.7 ha of vegetation, including 11.3 ha of native vegetation (including voluntary plantings), 6.1 ha of pines, and 8.3 ha of SNA.

Terrestrial ecological values within the WNP are generally moderate (SNA T13UP166) to low, with the exception of the presence of 'high value' copper skinks (*Oligosoma aeneum*, 'At Risk- declining). Fauna habitats and are associated with young (15-25 years old), planted or natural but low-diversity regenerating vegetation.

Some areas of planted vegetation provide buffer and connectivity functions, and habitat for planted kauri trees, localised copper skinks and common native birds.

Naturally occurring vegetation at TSF3 is of moderate value where it comprises part of the southern fragment of SNA T13UP166, a large (57 ha) fragment of young, predominantly native vegetation that supports few 'At-Risk – Declining' kauri. Smaller vegetation fragments to the east of the SNA T13UP166 southern fragment, within TSF3, are naturally regenerating and have low value.

The main values of planted areas associated with the proposed GOP and NRS are determined in part by ecological context whereby some of those areas provide buffer services to other ecological values, such as freshwater systems, or where they support 'High Value' copper skinks.

The removal of planted vegetation within the WNP (Waihi area) will result in very low-level effects and is a permitted activity under the Hauraki District Plan ("**HDP**"). However, OGNZL intends for the WNP to achieve an overall net gain following mitigation and offset actions, and therefore the values of these plantings are provided for within this Residual Effects Offset Plan.

Despite being low level, OGNZL will also offset the effects of the loss of SNA vegetation (through enhancement and revegetation efforts that improve its integrity (enrichment, weed and pest control, connectivity etc) and through dense buffer planting to strengthen its edges.

The removal of vegetation and construction activities associated with the WNP are expected to result in direct and indirect adverse effects on the ecological values, which the provisions outlined in this Plan will offset to a net environmental gain.

Expected direct effects include:

- Vegetation and habitat loss through vegetation removal and earthworks.
- The creation of habitat edge effects, altering the composition and health of adjacent vegetation (i.e. habitat degradation), which may affect habitat suitability for flora and fauna.
- Direct mortality or injury to less mobile biodiversity (eggs and unfledged chicks of native birds, high-value lizards) during vegetation clearance or earthworks activities.
- Low-level habitat fragmentation and isolation, largely associated with the loss of plantings and associated habitats.

Potential indirect effects are expected to include:

- Edge effects at newly created edges (weed incursion, light & desiccation to habitats)

- Indirect damage to tree root networks that may reduce the long-term health of adjacent trees.
- Displacement of native fauna (reduced resources, competitive exclusion, increased susceptibility to predation);
- Construction related noise, vibration and dust effects.

4.1.6 National Policy Statement for Indigenous Biodiversity (NPS-IB)

The NPS-IB requires that identified adverse effects within SNAs are avoided, except where provided for under Clause 3.11, which allows for the extraction of minerals and ancillary activities that provide significant national or regional benefit (NPSIB, 3.11(1(aii))). An explanation of the Project proposal with respect to this exception is provided with the application, however where adverse effects are managed pursuant to subclause 3, the following is required to be demonstrated:

- How each step of the effect's management hierarchy will be applied;
- If biodiversity offsetting or biodiversity compensation is applied, how the proposal has complied with principles 1 to 6 in Appendix 3 has had regard to the remaining principles, as appropriate. These principles are identified in Table 7 and with an explanation of how the proposed offset for WNP will satisfy them.
- The effects management hierarchy is an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:
- Adverse effects are avoided where practicable; then
- Where adverse effects cannot be avoided, they are minimised where practicable; then
- Where adverse effects cannot be minimised, they are remedied where practicable; then
- Where more than minor residual adverse effects cannot be avoided, minimised, or remedied, biodiversity offsetting is provided where possible; then
- Where biodiversity offsetting of more than minor residual adverse effects is not possible, biodiversity compensation is provided; then
- If biodiversity compensation is not appropriate, the activity itself is avoided.

In respect to the approach that the WNP (Waihi area) is taking to the implementation of the effects management hierarchy, the loss of the areas of native vegetation proposed within the WNP (Waihi area) will result in low to high (loss of copper skink habitat) levels of effects. These effects will be managed in accordance with the effects management hierarchy (NPS-IB):

4.1.6.1 Adverse effects that are avoided:

Early design adjustments removed the Northern Rock Stack footprint out of a low-lying area south of the northern fragment of SNA T13UP166, which has avoided potential impact on identified moko skink (*Oligosoma moco*). Several management plans have been developed to manage the effects of the WNP on local flora and fauna – which are included later in this ELMP. Unnecessary vegetation clearance will also be avoided through the physical delineation of the footprint boundary.

4.1.6.2 Adverse effects that are minimised:

Species-specific adverse effects, particularly mortality to indigenous lizards, would be minimised as far as practicable with the implementation of a site-specific lizard management plan. The lizard management plan will provide details on how injury and mortality to any high-value lizards within the footprint will be minimised to ensure that there is no overall reduction in the size of populations of At-Risk lizard species (copper skink and other potentially-present species) and occupancy across their

natural ranges. The native lizard management plan will provide methods for capture, including trapping and / or search effort, timing of implementation, an assessment of the release locations, any habitat enhancement required and monitoring methods.

Pre-vegetation clearance during the bird breeding season (September to February inclusive) should be preceded by a nest check by a suitably qualified and experienced ecologist or ornithologist to minimise adverse effects to avifauna.

DOC's protocols for minimising the risk of felling occupied bat roosts should be followed to minimise adverse effects to bats.

All newly created edges at the abutment of TSF3 and SNA T13UP166, will additionally be buffered with dense plantings of indigenous shrubs to minimise edge effects, such as weed incursion, light, wind exposure and desiccation effects on habitats at exposed edges.

4.1.6.3 Adverse effects that are remediated:

No adverse effects are proposed to be remediated, because all vegetation and habitat values that are proposed to be removed, would be within the proposed pit and associated structures. However, all such losses, where they cannot be avoided, will be avoided, minimised, offset or compensated.

4.1.6.4 Residual adverse effects that are offset:

Offset planting and enhancement actions will be undertaken to achieve an overall Net Gain Project outcome. To achieve this, all native plantings, naturally occurring vegetation and pine throughout the Project will be offset, including where the losses are a permitted baseline and assessed as low-level effects. This approach is consistent with the objective of the NPSIB to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity.

The proposed biodiversity offsets are modelled using the Department of Conservation's BOAM (Maseyk et al. 2015) to provide a detailed and transparent analysis of biodiversity components that would be lost, against measurable, like-for-like gains that provide for short term (habitat enhancement actions) and longer term (revegetation) outcomes.

4.1.6.5 Residual adverse effects that are compensated:

At GOP: Revegetation and pest control will be modelled to ensure that the high level of effect expected as a result of copper skink habitat loss will be compensated. The quantum of revegetation and pest control is guided by a qualitative biodiversity compensation model (BOAM), which recognises important areas of habitats for high value copper skinks (*Oligosoma aeneum*) and provides recommendations to offset/compensate for adverse effects.

Table 5: Summary of vegetation removal, values and effects within the WNP (Waihi area).

Location	Vegetation type	Ecological value	Level of effect (without mitigation)	Area of removal (ha)	Proposed mitigation	Proposed offset / Compensation	Level of effect (with mitigation or offset)
Gladstone Open Pit	Native plantings	Moderate	Low	1	1. Timing of vegetation removal to avoid the main bird breeding season (or preclearance nesting surveys). 2. Implementation of a lizard management plan. 3. Adoption of bat tree-felling protocols. 4. Buffer plant new SNA edge 5. Planting Plan 6. Plant pathogen and weed management 7. Pest Animal Management Plan	20 ha of offset restoration plantings (for loss of 10.1 site-wide indigenous vegetation)	Net Gain
	Naturally occurring native	Moderate	Low	0.4			
	Pine	Very Low	Very Low	5.1		6.5 ha compensation for Copper skink habitat loss (includes pine)	
Total indigenous vegetation removal at Gladstone Open Pit				6.5			
Northern Rock Stack	Native plantings	Moderate	Low	8.1		20 ha of offset restoration plantings (for loss of 10.1 site-wide indigenous vegetation)	Net Gain
	Pine	Low	Very Low	1		No offset for pine	
Total indigenous vegetation removal at Northern Rock Stack				8.1			
Tailings Storage Facility 3	SNA	Moderate	Moderate	8.3		17.5 ha offset restoration plantings (for loss of 8.3 ha SNA vegetation)	Net Gain
	Naturally occurring native (Western Fragment)	Low	Very Low	1.2		20 ha offset enhancement of SNA T13UP166	
	Naturally occurring native (Eastern Fragment)	Low	Very Low	0.3		20 ha of offset restoration plantings (for loss of 10.1 site-wide indigenous vegetation)	
	Native planting (Southern Fragment)	Low	Very Low	0.3			
Total indigenous vegetation removal at Tailings Storage Facility 3				10.1			
Total indigenous vegetation removal site-wide:				24.7			

*This figure excludes the SNA and Western Fragment areas.

Table 6: Summary of vegetation loss, gains and enhancement

Vegetation type / location	LOSS (ha)	OFFSET: revegetation (ha)	OFFSET: Enhancement (ha)
Native plantings & naturally occurring / site wide (excluding Western Fragment)	10.1	20	
Pine / site wide:	6.1	0	
Total non-protected vegetation for offset 1:	**10.1**	**20**	
TSF3 SNA T13UP166	8.3	17.5	
Western Fragment	1.2		20
Total TSF3 vegetation for offset 2:	**9.5**	**17.5**	**20**
Total WNP Waihi area	**30.4**	**37.5**	**20**

Table 7: Summary of habitat compensation for 'At Risk' copper skink at Gladstone Open Pit

Copper skink habitat compensation at Gladstone Pit	LOSS (ha)	COMPENSATION: revegetation with pest control (ha)	COMPENSATION: pest control existing habitat (ha)
Native plantings	1	11.2	4.45
Rock outcrop	0.4		
Pine	5.1		
Total	**6.5**	**11.2**	**4.45**

4.2 Suitability of Vegetation and Habitat Values for Offsetting

The vegetation and habitats within the Waihi North project, where they occur within the footprints of GOP, NRS and TSF3 are suitable for using the DOC's Biodiversity Offset Accounting Model ("**BOAM**") because the existing values represent components of young, regenerating, simple systems. The key attributes of these systems can be described in terms of vegetation height, structure and diversity (canopy and understorey levels) and the diversity of indigenous avifauna these support as habitat.

The Department of Conservation (DOC, 2014) and Local Government New Zealand (Maseyk et al. 2018) provide guidance for offset design. These offset design guidelines represent current good practice for achieving a net environmental gain, as is the intention in this case (rather than 'no net loss'). Important aspects of offset design include:

- Restoration, enhancement and protection actions undertaken as a biodiversity offset are demonstrably additional to what will otherwise occur, including that they are additional to any avoidance, remediation or mitigation undertaken in relation to the adverse effects of the activity.
- Offset actions should be undertaken close to the location of loss, where this will result in the best ecological outcome.
- The values to be lost through the activity to which the offset applies are counterbalanced by the proposed offsetting activity, which is at least commensurate with the adverse effects on indigenous biodiversity. Where possible the overall result should be no net loss, and preferably a net gain in ecological values.
- The offset is applied so that the ecological values being achieved through the offset are the same or similar to those being lost ('like for like').
- The offset is legally protected in perpetuity, such as via a conservation covenant. Covenanted areas are required to have stock exclusion fences.

For additional confidence in achieving a Net Environmental Gain, the BOAM for loss of protected SNA and adjacent western fragment was cross-checked using a Biodiversity Compensation Model (BCM, Baber et al. 2021). While a different model, the BCM is functionally the same, and predicted that a 10% Net Gain outcome for biodiversity loss would be exceeded through the proposed actions, i.e. the compensation score is 43.6% higher than the impact score. The results and explanation of this model are presented in Appendix 4B.

4.2.1 Principles of Biodiversity Offsetting

The NPSIB provides specific principles that underpin Biodiversity Offsetting. These principles are listed in Table 8 as well as an explanation of how proposed offset for the WNP will satisfy them. The NPSIB requires that a biodiversity offset, or biodiversity compensation must comply with principles 1 to 6 and has regard to the remaining principles.

The effects management hierarchy requires that Biodiversity Offsetting is carried out where possible, and Biodiversity Compensation is only used in circumstances, where the principles of Biodiversity offsetting are not met. Here, we follow this hierarchy, and compensation is only used when considering the loss of copper skink habitat within the GOP area.

Table 8: Principles of biodiversity offsetting (NPS-IB, appendix III) and how these are achieved for WNP.

Principles / Criteria of biodiversity offsetting	How these principles are achieved
Adherence to effects management hierarchy: A biodiversity offset is a commitment to redress more than minor residual adverse effects and should be contemplated only after steps to avoid, minimise, and remedy adverse effects are demonstrated to have been sequentially exhausted.	The TSF3 footprint **avoids** key features of SNA T13UP166 that trigger its ecological significance, being the known moko skink location and a kauri tree stand. Precautionary, pre-felling bat surveys and implementation of bat roost tree protocols, where bats are identified, will also ensure avoidance of mortality to potentially present roosting bats. A separate Ecological Management Plan ("**EMP**") proposes to **minimise** potential mortality to other native fauna through management actions around timing of vegetation removal, to preworks surveys and associated capture and relocation (lizards) or avoidance actions where species are detected (active native bird nests, bats). Edge effects at TSF3 will be **minimised** through dense buffer planting. Following these measures, residual adverse effects associated with the loss of vegetation and habitats will be **offset**, and habitat loss to high value copper skinks is **compensated**.
When biodiversity offsetting is not appropriate: Biodiversity offsets are not appropriate in situations where indigenous biodiversity values cannot be offset to achieve a net gain. Examples of an offset not being appropriate include where: **(a) residual adverse effects cannot be offset because of the irreplaceability or vulnerability of the indigenous biodiversity affected:** **(b) effects on indigenous biodiversity are uncertain, unknown, or little understood, but potential effects are significantly adverse or irreversible:**	The biodiversity values (relatively young, planted, exotic or regenerating ecosystems) are suitable for offsetting because they are structurally simple and largely support low species richness, reflective of young, regenerating systems. Therefore, the values are well understood, measurable and there is high certainty of predicted outcomes, based on well-practiced restoration methods. It is acknowledged that some values cannot be replaced or offset, such as the habitat capacity provided by mature tree cavities (particularly those provided by exotic pines, and epiphytes supported by some individual (relict) trees. Therefore, while these attributes are not modelled, the restoration actions are proposed within the same landscape where proximity to seed source will support natural recolonization of indigenous biodiversity, as evidenced in some of the existing plantings in the landscape. Further, artificial bat roost provision is acknowledged by DOC as still requiring more research (DOC (2021) advisory note -6734955)

Principles / Criteria of biodiversity offsetting	How these principles are achieved
(c) there are no technically feasible options by which to secure gains within an acceptable timeframe.	and therefore it is difficult to predict performance of such provisions.
Net gain: This principle reflects a standard of acceptability for demonstrating, and then achieving, a net gain in indigenous biodiversity values. Net gain is demonstrated by a like-for-like quantitative loss/gain calculation of the following, and is achieved when the indigenous biodiversity values at the offset site are equivalent to or exceed those being lost at the impact site: **(a) types of indigenous biodiversity, including when indigenous species depend on introduced species for their persistence; and** **(b) amount; and** **(c) condition (structure and quality).**	The BOAM (Maseyk et al, 2015) is used here to demonstrate a net biodiversity gain for a range of biodiversity attributes, disaggregated to demonstrate gains for fauna (bird) diversity and habitat resources, and flora diversity at canopy and understory structural tiers. All of the biodiversity offset actions will be undertaken *in situ*, within the OGNZL landholdings in the immediate landscape, where the net gains are expected to apply to the same flora and fauna communities. Annual and five-yearly monitoring is provided to measure the offset outcomes against modelled and indicative targets. Adaptive management options are provided to respond to any outcomes that may fall short of modelled values, if identified from monitoring. Where targets are not met, contingency actions (such as additional planting, wider pest management area) would be presented, based on recalibrated offset models, to ensure offset success is not compromised and a final Net Gain is achieved.
Additionality: A biodiversity offset achieves gains in indigenous biodiversity above and beyond gains that would have occurred in the absence of the offset, such as gains that are additional to any minimisation and remediation undertaken in relation to the adverse effects of the activity.	There are no current or future plans to undertake any of the proposed revegetation or enhancement actions. The proposed revegetation planting would be undertaken in areas currently occupied by pasture. Revegetation areas will be protected where they currently have no protections.
Leakage: Biodiversity offset design and implementation avoids displacing harm to other	The biodiversity offset actions (revegetation and enhancement) will not cause harm to indigenous biodiversity at the site or other locations. All actions are well established methods for making net gains in

Principles / Criteria of biodiversity offsetting	How these principles are achieved
indigenous biodiversity in the same or any other location.	biodiversity. And are predicted to benefit biodiversity within the same landscape.
Long-term outcomes: A biodiversity offset is managed to secure outcomes of the activity that last at least as long as the impacts, and preferably in perpetuity. Consideration must be given to long-term issues around funding, location, management and monitoring.	All restoration actions (restoration planting and areas of enhancement) will be legally protected in perpetuity by way of covenant and monitored for a minimum 20 years to ensure offset targets are achieved at the modelled point of net gain. Pest control of planting and enhanced environments will be maintained for at least the life of the operation.
Landscape context: Biodiversity offsetting is undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district. The action considers the landscape context of both the impact site and the offset site, taking into account interactions between species, habitats and ecosystems, spatial connections, and ecosystem function.	All of the biodiversity offset actions will be undertaken *in situ*, within the OGNZL landholdings in the immediate landscape, where the net gains are expected to apply to the same flora and fauna communities.
Time lags: The delay between loss of, or effects on, indigenous biodiversity values at the impact site and the gain or maturity of indigenous biodiversity at the offset site is minimised so that the calculated gains are achieved within the consent period or, as appropriate, a longer period (but not more than 35 years).	The BOAM models account for time lags between loss of biodiversity values at the impact site and gains at the offset sites. While pest control in parts of SNA T13UP166 will likely have an immediate improvement on some values such as bird breeding success, the presented BOAM has taken a conservative approach, with consideration to removal of exotic pines.
Science and mātauranga Māori: The design and implementation of a biodiversity offset is a documented process informed by science and mātauranga Māori.	The design of the biodiversity offset is based on established and best practice methods for revegetation and restoration. Data used in the model are based on vegetation Recce plot data and fauna surveys and database reviews.
Tangata whenua and stakeholder participation: Opportunity for the	OGNZL recognises the special relationship that iwi have with the indigenous biodiversity, and that this

Principles / Criteria of biodiversity offsetting	How these principles are achieved
effective and early participation of tangata whenua and stakeholders is demonstrated when planning biodiversity offsets, including their evaluation, selection, design, implementation, and monitoring.	relationship is important to spiritual and cultural wellbeing. Māori cultural values, interests and associations with indigenous biodiversity within the project area, and the potential impacts of the Waihi North Project on these, will be identified through iwi led Cultural Impact Assessments. Ngāti Hako, Ngāti Maru, Ngāti Hei, Ngāti Porou ki Hauraki, Ngāti Puu, Ngāti Tamaterā, Ngāti Rāhiri Tumutumu, Ngāti Tara Tokanui Ngāti / Koi and Ngaati Whanaunga have all communicated to OGNZL that they have cultural interests and associations within the proposed project area. OGNZL is active in the Waihi community and has well established, long-term relationships that are built on dialogue and collaboration.
Transparency: The design and implementation of a biodiversity offset, and communication of its results to the public, is undertaken in a transparent and timely manner.	OGNZL will deliver the biodiversity offset and document its key targets and outcomes through provision of regular monitoring reports and compliance meetings in liaison with Hauraki District Council, and where appropriate, the Department of Conservation. Contingency reports are part of this plan to ensure that if biodiversity offset objectives are not met in keeping with the BOAM parameters, further ecological enhancement/offset activities as remodelled, will be reported to ensure that net gain outcomes are achieved.

4.3 Ecological Restoration and Offset Plan

4.3.1 Overview

A Planting Plan has been prepared to identify how the WNP will address actual and potential adverse effects resulting from the loss of vegetation and habitats through strategic revegetation, enhancement, and fauna management. Specifically, this Plan sets out procedures for how OGNZL will minimise, remediate, and offset adverse effects associated with vegetation removal, including:

- A total of 20 ha of planting to offset the loss of 16.2 ha of not-protected vegetation (mostly voluntary plantings and pine) that will be removed;
- 17.5 ha of new planting adjacent to, and in the wider landscape of the SNA to offset loss of 9.5 ha of SNA vegetation;

- 20 ha of enhancement actions (pine removal and infill planting) within pine-dominant areas of SNA T13UP166 to offset loss of 1.2 ha of non-SNA native vegetation;
- Full planting schedule comprising species diversity, plant grade and spacing, provision of flower and fruit resources for birds;
- Monitoring and maintenance of offset outcomes; and
- Legal protection of replanted areas on Company and privately owned land.

4.3.2 Proposed Restoration Activities: Revegetation and Enhancement

This Plan adopts a comprehensive approach to offset planting, targeting areas within the WNP landscape that will preserve and enhance ecological values and integrity by reinforcing existing natural assets and improving habitat connectivity across the surrounding environment. Weed and animal pest control and stock exclusion fencing (where appropriate) will be provided for all restoration plantings.

A vegetation offset plan will ensure that the terrestrial ecological effects of the WNP (Waihi area) will be effectively managed to achieve an overall net ecological gain by providing best practice methods for the establishment and enhancement of vegetation and habitat resources. The plan provides for the following:

(a) Within SNA T13UP166: Pine removal and revegetation, long-term pest animal and weed control as calculated using a biodiversity offset accounting system, for the loss of 8.3 ha of SNA and 1.2 ha of Western Fragment. The resulting revegetation and enhancement will:

i. Be contiguous with SNA T13UP166 where possible, or within the immediate landscape where it enhances ecological integrity through buffering and connecting existing biodiversity values;

ii. Where practicable, enhance significant values of SNA T13UP166, including as kauri trees and moko skink.

(b) At GOP: Revegetation and pest control to compensate for the high level of effect expected as a result of loss of habitat for high value copper skinks. The quantum of revegetation and pest control should be guided by a biodiversity compensation model and resulting actions be contiguous with existing copper skink habitat.

(c) Offset planting to achieve and overall Net Gain Project outcome, for the loss of 10.1 ha of indigenous vegetation and other low to moderate value vegetation. Planting will be undertaken within the immediate landscape where it enhances ecological integrity through buffering and connecting existing biodiversity values

(d) Buffer planting in and adjacent to SNA T13UP166 to minimise newly created edge effects along the southern edge of SNA T13UP166 (Southern Fragment).

(e) Legal protection of replanted areas on Company and Privately owned land

4.3.3 Offset Planting for Loss of Non-Protected Indigenous Vegetation

A total of 37.5 ha will be planted throughout the WNP with a focus on buffering the Ohinemuri River wildlife corridor where it runs between SNA T13UP166 and SNA T13P165 (Ngatikoi Domain).

The locations of the plantings have been identified in general proximity to areas of loss GOP but also provide for and enhance ecological connectivity and provide ecological buffers to existing ecological values.

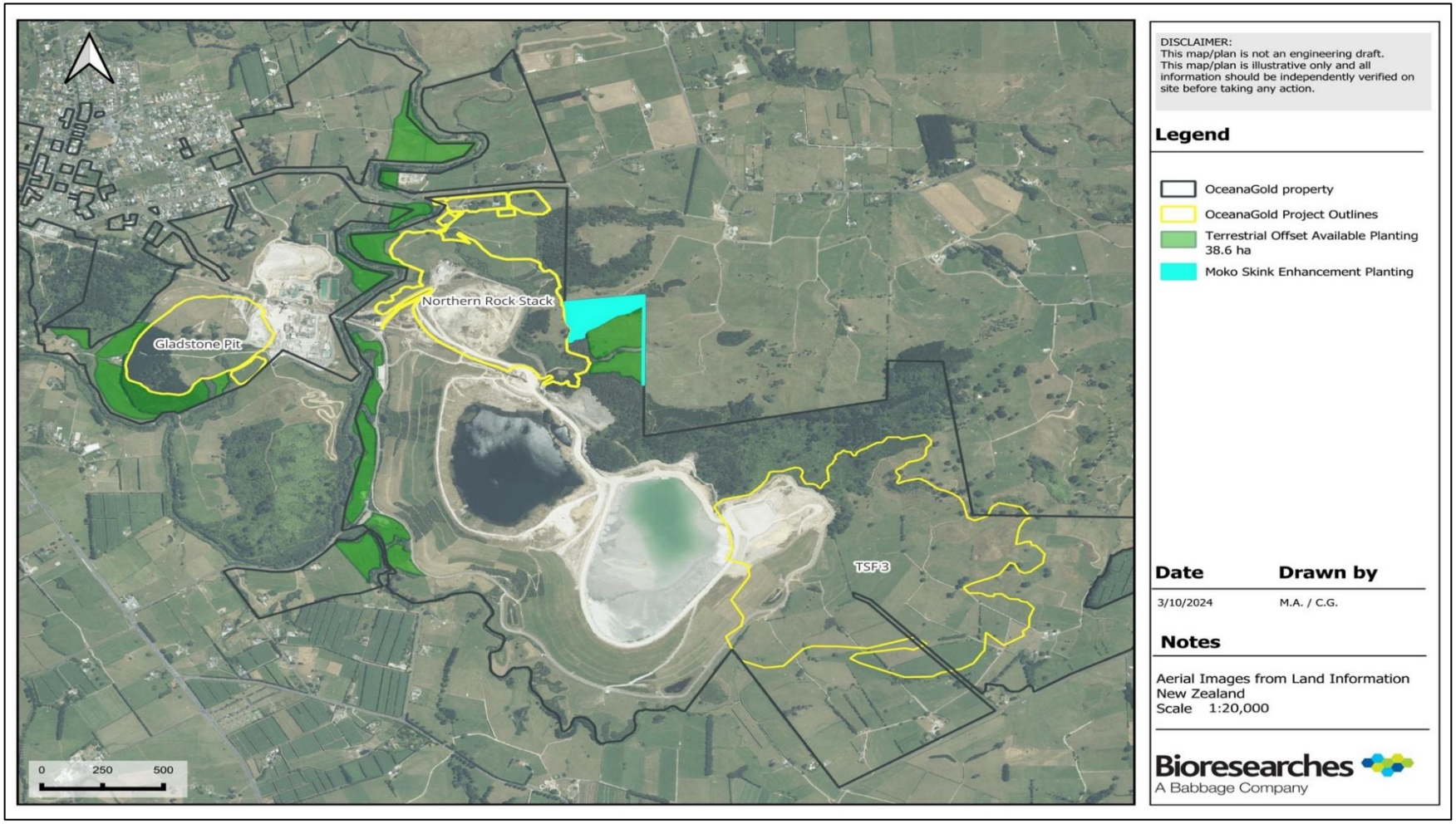

Figure 5: Areas (38.6 ha) available for 37.5 ha of offset replanting within OGNZL landholdings to offset the loss of 10.1 ha of non-protected indigenous vegetation and 8.3 ha of SNA T13UP166

4.3.4 Biodiversity Offset for Vegetation Removal at SNA T13UP166 and Western Fragment

The affected vegetation within the southern fragment of SNA T13UP166 consists of 8.3 ha mixed seral rewarewa forest with areas of emergent pines and tree fern dominant scrub. There are three smaller (non-SNA) fragments south and east of the southern SNA fragment that will also be affected. These are: Western Fragment, Eastern Fragment and Southern Planted Fragment (Figure 6). While none of these smaller fragments are protected, the Western Fragment supports similar vegetation values to the higher value parts of SNA T13UP166, and therefore its values are incorporated into the proposed offset.

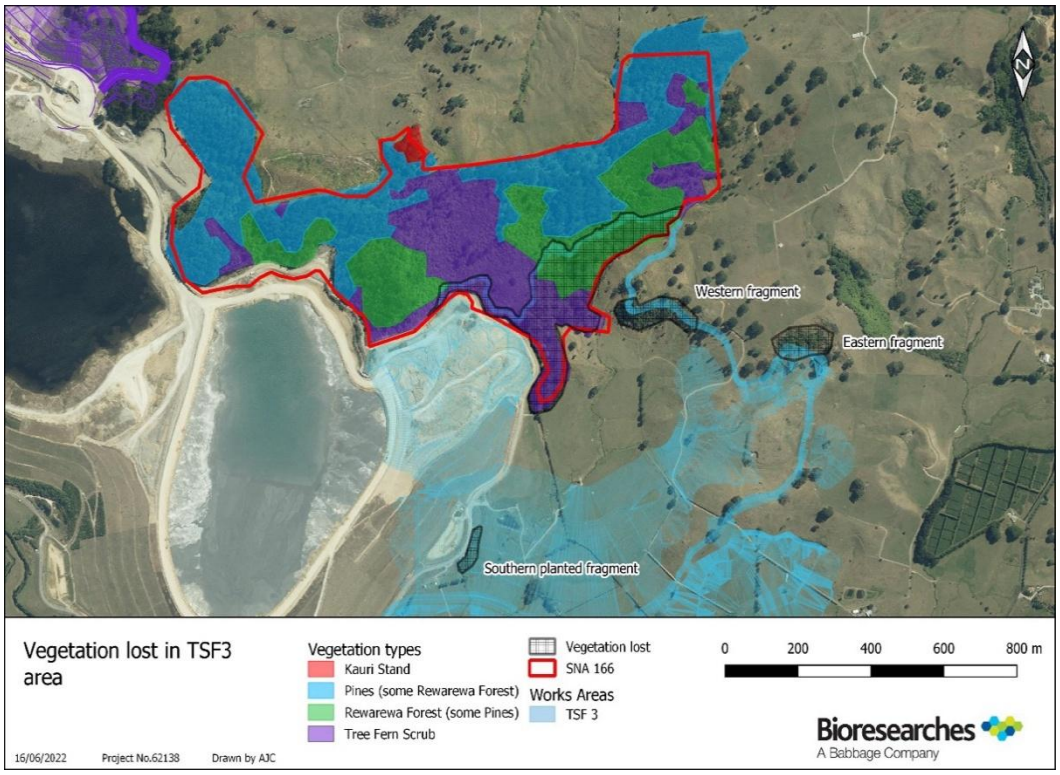

Figure 6: Areas of vegetation at TSF that will be affected by the WNP

4.4 Explanation of BOAM: Accounting Model Features

4.4.1 Overview

The Biodiversity Offset Accounting Model (BOAM) compares the biodiversity features at the impact site(s) to a 'benchmark'. It is important to note that the approach to calculating biodiversity offsets was settled by the Expert Panel for the WNP and this approach does not need to be revisited.

The benchmark provides a reference point for a similar biodiversity type in a 'natural' condition, against which to evaluate the biodiversity losses and gains. Due to historical land use practices, the affected ecosystem type (broadleaved species scrub- VS5, (Singers & Rogers 2014)) within the southern SNA T13UP166 fragment is a highly modified seral community that will be expected to naturally transition to its original cover, (kauri, podocarp, broadleaved forest, Type WF11, Singers & Rogers 2014). The broadleaved species scrub within the WNP is generally deficient of many elements of a future WF11 forest (such as future canopy saplings). Therefore, a key conservation objective for the BOAM actions is to facilitate succession of SNA T13UP166 towards its historic state (in addition to counterbalancing

loss in extent of protected vegetation). The benchmarks for broadleaved species scrub are explained here.

4.4.2 Biodiversity Type and Benchmarks

The biodiversity type is classified as 'broadleaved species scrub'- VS5, (Singers & Rogers 2014). This is a regenerating ecosystem type - a community of pioneer flora and fauna that occur or regenerate following disturbance (human or natural). Diversity of broadleaved species scrub is highly variable, and is influenced by many factors, including fragment isolation, topography and seed source. It can be dominated by a mosaic of species commonly found in the subcanopy and edges of more mature forests. It can also be dominated by few species, such as tree ferns (e.g. SNA T13P165 / Ngatikoi Domain), kāmahi, māpou or kōhūhū (Singers et al. 2017). Given the highly fragmented, isolated and poor condition of many naturally occurring, regenerating ecosystems throughout both the Waikato Region and Waihi Ecological District, a benchmark for broadleaved species scrub with similar bioclimatic and topographic influences is not known. Therefore, a conservative model is described here, whereby a very good condition example of a broadleaved species scrub will support a high species richness, with future kauri podocarp broadleaved canopy species present in the understorey.

4.4.3 Biodiversity Component

The biodiversity components are based on the two dominant vegetation communities within the broadleaved species scrub / forest (rewarewa dominant scrub and tree fern dominant scrub). These have been measured separately but share the same benchmark. A third component of the offset considers the non-SNA Western fragment, which supports a mixture of rewarewa scrub and pōhutukawa trees, as distinct from the composition of the adjacent SNA vegetation.

4.4.4 Biodiversity Attributes

Five biodiversity attributes ('Currencies') were selected for the Accounting Model for vegetation and habitats that collectively describe the key values of the biodiversity components. These attributes are canopy height, native canopy diversity, winter fruiting and flowering species, native canopy cover, native canopy diversity, native understorey diversity, and avifauna diversity.

4.5 Accounting Model Results

4.5.1 TSF3

The biodiversity values of SNA T13UP166 and the Western Fragment are described in detail in Bioresearches (2025a). The differences in structure and diversity of the components of the different vegetation types (rewarewa dominant, tree fern dominant, Western Fragment) are recognised in three separate BOAMs. These models demonstrate that, for each biodiversity component, there will be a net biodiversity gain at 20 years as the restoration matures.

The values presented within each BOAM are explained in subsequent tables, as informed by planting schedules and vegetation plots undertaken at existing plantings (comprised of similar species composition) in the surrounding Waihi landscape (up to 20 years old).

The outcomes of the BOAMs indicate, with high confidence, that a total of 17.5 ha of revegetation will offset the loss of 3.6 ha of rewarewa forest and 4.6 ha of tree fern scrub within SNA T13UP166. This revegetation does not include a further 20 ha of revegetation, which will offset the loss of 10.1 ha of voluntary plantings which occur predominantly beyond TSF3.

A further 20 ha of enhancement within SNA T13UP166, by way of pine tree management and infill planting, will offset the complete loss of 1.2 ha of the Western Fragment.

4.5.2 Site-wide voluntary plantings and pine

The modelling undertaken indicates, with high confidence, that 10.1ha of voluntary plantings (14-25 years old) would be offset with 20 ha of new plantings. The attributes modelled in the BOAM, for existing plantings, apply a conservative dataset to describe their value, being total indigenous diversity recorded throughout all plantings in different locations (various areas support substantially lower diversity) and maximum height, as observed from the oldest plantings (8 m – 25 years, with many of the planted compositions being 5-6 m tall). With this approach, and the performance of those plantings within the Waihi landscape, a very high level of confidence that a diverse, ecosourced community of new plantings will similarly perform to a high standard will achieve a net gain outcome within 20 years. While it is difficult to determine the specific time of impact, offset actions would be timed with those losses, and average age of those existing plantings (17 years) are not expected to be substantially different at the time of impact, from the conservative attributes of the 25-year-old plantings modelled.

Table 9: Explanation table for BOAM for SNA T13UP166 Broadleaved scrub: Rewarewa component.

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
Indigenous Canopy height **(m)**	**15 m** Height of typical VS5 canopy species more or less, based on expected heights at 50 years – the approximate age of the SNA area (generally pioneer trees and shrubs, e.g. kānuka- 18m, mahoe- 15m, mapou- 6m; kowhai- 20m). At maximum height, VS5 could be expected to be transitioning to a mature forest type.	**7.75m** Measured from RECCE plots: rewarewa dominant plots	**Revegetation 9 ha** Confidence 75-90%	**7m** Within the parameters of measured trees from four plots of 14-25-year-old restoration plantings at Waihi (heights 6-8 m)	Well-established approach to revegetation with known success over numerous projects.	**0.06**
Winter fruit and flower resources	**17** The benchmark of at least 17 species that fruit or flower during winter months, and based on seral broadleaved species that occur within the Waikato Region: *Alectryon excelsus*	**5** Species recorded throughout SNA T13UP166 (southern fragment) *Brachyglottis repanda*	**Revegetation 9 ha** Confidence >90%	**13 species (increase 8)** *Brachyglottis repanda* *Coprosma arborea* *Entelea arborescens* *Geniostoma ligustrifolium* *Hedycarya aborea*	Revegetation is well established approach to restoration (as evidenced across the landscape). Selected species on pioneer and buffer planting lists. This is a conservative count, which gives strong confidence. Species from the	**2.58**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
	Alseuosmia macrophylla *Brachyglottis repanda* *Coprosma arborea* *Coprosma autumnalis* *Entelea arborescens* *Geniostoma ligustrifolium* *Hedycarya aborea* *Hoheria sexstylosa* *Pennantia corymbosa* *Plagianthus regius* *Pseudopanax arboreus* *Pseudowintera axillaris* *Leptospermum scoparium* *Myrsine australis* *Rhabdothamnus solandri* *Veronica stricta*	*Hedycarya aborea* *Leptecophylla juniperina* *Veronica stricta* *Myrsine australis*		*Hoheria sexstylosa* *Pennantia corymbosa* *Plagianthus regius* *Pseudopanax arboreus* *Leptospermum scoparium* *Myrsine australis* *Veronica stricta* *Vitex lucens*	recommended planting list that flower or fruit during winter months (June-August) are: tītoki, rangiora, whau, hoheria, mānuka, mapou, kaikomako, whauwhaupaku, kōwhai, koromiko, māmangi, kohekohe, hangehange, porokaiwhiri, nīkau and pūriri (16 species). However, not all of these will be producing flowers/fruit within 15/20 years (eg nīkau) and not all of these produce good food sources - eg kōwhai seeds. Some species have been excluded from this list (eg kawakawa) because while they do flower during winter, their flowers are wind pollinated and are not known to provide a food resource for birds or insects.	
Indigenous canopy species richness	**15** Up to 15 native canopy species could be expected in	**3** Measured from 20m x 20m	**Revegetation 9 ha**	**8** Expected with maintenance of planted species.	Planting schedule includes 18 pioneer and 19 enrichment species, of which 14 could be expected to have	**1.47**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
(count)	VS5 scrub / forest, based on reviews (e.g. Singers et al. 2017).	RECCE plots within rewarewa-dominant vegetation.	Confidence 75-90%		a canopy presence at 20 years.	
Indigenous understorey species richness **(count)**	**25** Up to 25 native canopy species could be expected in VS5 scrub / forest, based on reviews (e.g. Singers et al. 2017).	**9** Measured from 20m x 20m RECCE plots rewarewa-dominant vegetation within SNA T13UP166	**Revegetation 9 ha** Confidence 75-90%	**20** Expected with maintenance of planted species.	Planting schedule includes 18 pioneer species as well as 19 enrichment species to be planted after 5 years. While some of these may not remain in the understory layer, a large portion are expected to be present either through mixed growth rates, or self-seeding. Some colonisation through bird and wind dispersal also expected (e.g. Sullivan et al. 2005).	**2.52**
Diversity of native avifauna **(count)**	**15 spp** Five additional native species, to those observed within the WNP area, could be expected for a VS5 scrub / forest benchmark in the Waihi area, given consideration of	**10 spp** Maximum total native species diversity recorded from site visits to SNA T13UP166 and 5 MBCs	**Revegetation 9 ha** Confidence 75-90%	**12 species (increase 2 spp)** Bellbird and kereru have been recorded in the surrounding landscape but not from SNAT13UP 166. These species will be expected within 20 years.	Korimako (bellbird) and kererū have been recorded in the surrounding landscape but not from SNA T13UP166. Food plants have been provided for in the planting schedule. It is anticipated that these species be become	**0.89**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
	species that may have potential to colonise from the Coromandel and Kaimai Ranges (e.g. tomtit, whitehead, kereru, falcon & bellbird)				regular visitors by 20 years, resident thereafter.	

Table 10: Explanation table for BOAM for SNA T13UP166 Broadleaved scrub: Treefern-dominant component.

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
Indigenous Canopy height **(m)**	**15 m** Height of typical VS5 canopy species more or less (generally pioneer trees and shrubs, e.g. kānuka- 18m, mahoe- 15m, mapou- 6m; kowhai- 20m). At maximum height, VS5 could be expected to be transitioning to a mature forest type.	**7m** Measured from recce plots: tree fern dominant plots	**Revegetation 8.5 ha** Confidence >90%	**7m** Within the parameters of measured trees from four plots of 14-25-year-old restoration plantings at Waihi (heights 6-8 m)	Well-established approach to revegetation with known success over numerous projects.	**-1.87**
Winter fruit and flower resources	**17**	**5**	**Revegetation 8 ha**	**13 species (increase 8)** *Brachyglottis repanda*	Revegetation is well established approach to restoration (as evidenced	**2.08**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
	The benchmark of at least 17 species that fruit or flower during winter months, and based on seral broadleaved species that occur within the Waikato Region: *Alectryon excelsus* *Alseuosmia macrophylla* *Brachyglottis repanda* *Coprosma arborea* *Coprosma autumnalis* *Entelea arborescens* *Geniostoma ligustrifolium* *Hedycarya aborea* *Hoheria sexstylosa* *Pennantia corymbosa* *Plagianthus regius* *Pseudopanax arboreus* *Pseudowintera axillaris* *Leptospermum scoparium*	Species recorded throughout SNA T13UP166 (southern fragment). *Brachyglottis repanda* *Hedycarya aborea* *Leptecophylla juniperina* *Veronica stricta* *Myrsine australis*	Confidence >90%	*Coprosma arborea* *Entelea arborescens* *Geniostoma ligustrifolium* *Hedycarya aborea* *Hoheria sexstylosa* *Pennantia corymbosa* *Plagianthus regius* *Pseudopanax arboreus* *Leptospermum scoparium* *Myrsine australis* *Veronica stricta* *Vitex lucens*	across the landscape). Selected species on pioneer and buffer planting lists. This is a conservative count, which gives strong confidence. Species from the recommended planting list that flower or fruit during winter months (June-August) are: tītoki, rangiora, whau, hoheria, mānuka, mapou, kaikomako, whauwhaupaku, kōwhai, koromiko, māmangi, kohekohe, hangehange, porokaiwhiri, nīkau and pūriri (16 species). However, not all of these will be producing flowers/fruit within 15/20 years (eg nīkau) and not all of these produce good food sources - eg kōwhai seeds. Some species have been excluded from this list (eg kawakawa) because while they do flower during	

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
	Myrsine australis *Rhabdothamnus solandri* *Veronica stricta*				winter, their flowers are wind pollinated and are not known to provide a food resource for birds or insects.	
Indigenous canopy species richness **(count)**	**15** Up to 15 native canopy species could be expected in VS5 scrub / forest, based on reviews (e.g. Singers et al. 2017).	**2** Measured from 20m x 20m RECCE plots within treefern-dominant vegetation.	**Revegetation 8.5 ha** Confidence >90%	**8** Expected with maintenance of planted species.	Planting schedule includes 18 pioneer and 19 enrichment species, of which 14 could be expected to have a canopy presence at 20 years.	**1.76**
Indigenous understorey species richness **(count)**	**25** Up to 25 native canopy species could be expected in VS5 scrub / forest, based on reviews (e.g. Singers et al. 2017).	**5** Measured from 20m x 20m RECCE plots tree fern-dominant vegetation within SNA T13UP166 TSF3	**Revegetation 8.5 ha** Confidence >90%	**20** Expected with maintenance of planted species.	Planting schedule includes 18 pioneer species as well as 19 enrichment species to be planted after 5 years. Some colonisation through bird and wind dispersal also expected (e.g. Sullivan et al. 2005).	**2.68**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
Diversity of native avifauna **(count)**	**15 spp** Five additional native species, to those observed within the WNP area, could be expected for a VS5 scrub / forest benchmark in the Waihi area, given consideration of species that may have potential to colonise from the Coromandel and Kaimai Ranges (e.g. tomtit, whitehead, kererū, falcon & bellbird)	**10 spp** Maximum total native species diversity recorded from site visits to SNA T13UP166 and 5 MBCs	**Revegetation 8.5 ha** Confidence 75-90%	**12 species (increase 2 spp)** Bellbird and kererū have been recorded in the surrounding landscape but not from SNA T13UP166. These species will be expected within 20 years.	Korimako (bellbird) and kererū have been recorded in the surrounding landscape but not from SNA T13UP166. Food plants have been provided for in the planting schedule. It is anticipated that these species will be regular visitors by 20 years, resident thereafter.	**0.04**

Table 11: Explanation table for BOAM for: Western fragment Broadleaved scrub.

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
Indigenous Canopy height **(m)**	**15 m** Height of typical VS5 canopy species more or less (generally pioneer trees and shrubs, e.g. kānuka- 18m, mahoe- 15m, mapou- 6m; kowhai- 20m). At maximum height, VS5 could be expected to be transitioning to a mature forest type.	**12 m** Measured onsite: mixture of pole tree fern, rewarewa and pōhutukawa	**Enhancement of SNA T13UP166: 20 ha** Confidence 75-90%	**15 m** Current indigenous spp. Heights are approximately 12 m tall, requires an additional 5 m growth over 20 years.	Tanes Tree trust: average growth 30-39 cm per year. Enhancement is within existing VS5 vegetation, which is currently around 6m tall. The existing rewarewa and tōwai making up the subcanopy under pines (which are being removed for enhancement) are expected to grow 9m in 20 years.	**0.87**
Indigenous Canopy cover (%)	**85%** The benchmark of at least 85% canopy cover considers best case scenario whereby colonising weeds will be shaded out between plantings.	**60%** Measured onsite: Canopy patchy / discontinuous	**Enhancement of SNA T13UP166: 20 ha** Confidence 75-90%	**80%** By 20 years from pine removal, rewarewa / towai expected to spread canopies and existing understorey growth (e.g. mahoe, pidgeonwood, currently >5 m) fill light gaps within 20 years.	The current canopy continuity is discontinuous due to emergent pines. By 20 years post pine removal vigorous growth from both newly planted species and the current subcanopy is expected, which will fill gaps, albeit with some variation in canopy height where younger trees replace pines.	**1.16**
Indigenous canopy species richness	**15** Up to 15 native canopy species could be expected in VS5 scrub / forest, based on	**3** Recorded onsite: mixture of pole tree	**Enhancement of SNA T13UP166: 20 ha**	**5** Expected with maintenance of planted species with	Measured diversity onsite, supported by additional plant species list for pine replacement	**0.98**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
(count)	reviews (e.g. Singers et al. 2017).	fern, rewarewa and pōhutukawa	Confidence >75-<90%	natural regeneration over some understory diversity		
Indigenous understorey species richness **(count)**	**25** Up to 25 native canopy species could be expected in VS5 scrub / forest, based on reviews (e.g. Singers et al. 2017).	**17** 17 spp recorded onsite (Bioresearches 2025a). Model provides conservative approach	**Enhancement of SNA T13UP166: 20 ha** Confidence >90%	**20** Expected with ongoing pest control and enrichment planting.	Planting schedule includes 10 additional enrichment species to be planted after 5 years. At least 12 species already present at and some colonisation through bird and wind dispersal also expected (e.g. Sullivan et al. 2005). Measure considered conservative.	**0.45**
Diversity of native avifauna **(count)**	**15 spp** Five additional species could be expected for a VS5 scrub / forest benchmark in the Waihi area, given consideration of species that may have potential to colonise from the Coromandel and Kaimai Ranges (e.g. tomtit, whitehead, kererū, falcon & bellbird)	**10 spp** Maximum total native species diversity recorded from site visits to SNA T13UP166 and 5 MBCs	**Enhancement of SNA T13UP166: 27 ha** Confidence 75-90%	**12 species (increase 2 spp)** Bellbird and kereru have been recorded in the surrounding landscape but not from SNA T13UP166. These species are expected within 20 years.	Korimako (bellbird) and kererū have been recorded in the surrounding landscape but not from SNA T13UP166. Additional food plants have been provided for in the SNA enrichment planting schedule. It is anticipated that these bird species be become regular visitors by 20 years, resident thereafter.	**0.61**

Table 12: Explanation table for BOAM for: Voluntary Plantings

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
Average height (m)	**7 m** Benchmarked against existing voluntary plantings on site that are 20 years old	**7 m**	Revegetation (28ha): Confidence >90%	**7 m** Average height of existing voluntary plantings.	Existing plantings aged 20 years have been measured at between 7-8m height. Revegetation planting will be located close by, indicating that soil and microclimate conditions will be similar, giving strong confidence in achieving the same height within the 20 year time frame.	**-1.39**
Indigenous Canopy cover (%)	**70%** Benchmarked against existing voluntary plantings of between 15 - 20 years age.	**70%** Measured onsite: Canopy patchy / discontinuous	Revegetation (28ha): Confidence >90%	**70%** Expected with maintenance of planted areas.	Revegetation is a well-established approach to restoration (as evidenced across the landscape). Evidence of strong growth and canopy formations is shown by existing voluntary plantings. Canopy density is expected to peak between 10-20 years before shorter lived pioneer species (such as manuka) begin to die off and create canopy gaps.	**3.70**
Diversity **(count)**	**22** Benchmarked against diversity surveyed in existing voluntary	**22** Recorded on site	Revegetation (28ha): Confidence >90%	**30** Expected with maintenance of planted species	Revegetation planting list has 18 pioneer and 19 enrichment species. Natural colonisation through wind and bird dispersal is also expected, based on evidence from existing voluntary	**3.70**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
	plantings (Bioresearches 2025a).				plantings. Conservative estimate.	
Winter flower/fruit resources	**4** Benchmarked against existing voluntary plantings.	**4** 4 spp recorded onsite in existing voluntary plantings (Bioresearches 2025a). Model provides conservative approach	Revegetation (28ha): Confidence >90%	**6** Expected with maintenance of planted species	Six species are calculated to be providing flower/fruit resources to birds 20 years after planting based on restoration pioneer and enhancement lists.(these are expected to be pūriri, which can flower after 15 years, hebe, whauwhaupaku, kaikomako, mapou, houhere) Others (eg nikau, kohekohe, titoki) will take longer to mature to fruiting age so were not included. As potential winter flower/fruit providing species in these lists are higher than 6 and caution was taken to exclude species that would not provide food resources before 20 years, confidence is very high that this number will be met after 20 years. Note that not all species that flower or fruit over the winter period produce food resources for birds - eg Coprosma and kawakawa flowers are wind pollinated simple structures that	**-1.39**

Biodiversity attribute	Benchmark and justification	Impact value	Action and confidence	Biodiversity value by 20 years	Justification for confidence (References / data)	Attribute Net Biodiversity Value
					are not considered food sources for birds, or insects.	
Diversity of native avifauna **(count)**	**8 spp** Benchmarked against indigenous birds detected in current voluntary planting areas using 5 minute bird counts and opportunistic encounters.	**8 spp** Maximum total native species diversity recorded from site visits to voluntary plantings and 5 MBCs	Revegetation (28ha): Confidence 75-90%	**10 species (increase 2 spp)** Expected with maintenance of planted areas and full suite of recommended species planted.	The particular provision of plant species that will provide winter food resources will help ensure year-round food is present. A greater diversity of plant species is included in pioneer and enrichment planting lists than the voluntary plantings and this is expected to provide food and habitat requirements for birds in the wider landscape, in particular kereru and bellbirds, which are present in the surrounding area, but have not yet been detected within current planting areas.	**-1.37**

4.5.3 Modelled Offsetting Actions

A minimum of 17.5 ha of offset planting and 20 ha of offset enhancement planting (via pine removal and replacement with future native canopy trees) is to be undertaken to offset the loss of protected terrestrial ecological values with respect to the TSF incursion into SNA T13UP166.

The 17.5 ha of offset planting is proposed to be undertaken within and adjacent to the existing southern SNA T13UP166 fragment. Particular focus of offset revegetation is to:

- Improve connectivity between the northern and southern fragments of SNA T13UP166; and
- Provide enrichment species that will ensure succession to a future WF11 forest type which will have historically occurred there.

4.5.4 Description of Offset

Target habitat-specific revegetation (e.g. vineland, flaxland) around known habitat for moko skink (*Oligosoma moco*) a Nationally 'At Risk' species, with densely growing and fruit producing ground cover vegetation that will facilitate population growth and expansion beyond existing, isolated areas.

The species composition for the proposed restoration planting is based on the kauri, podocarp, broadleaved forest ecosystem type (WF11, Singers & Rogers 2014) and includes 31 species, including a minimum of 15 canopy species and 25 understorey species.

All planting undertaken for the WNP (including 20ha of area for offset of mostly voluntary planting and pines, 17.5 ha offset planting and 20 ha enhancement planting) will have legal protection in perpetuity (via covenant or similar), pest and weed control.

The BOAM for offsetting SNA loss demonstrates that 17.5 ha of revegetation for the loss of 8.3 ha of SNA scrub will deliver biodiversity gains in 20 years with a high level of confidence (>90%). A further 20 ha of pine tree removal within SNA T13UP166 and replacement with future WF11 forest canopy trees for the loss of a 1.2 ha fragment of 'not protected', naturally occurring pōhutukawa / rewarewa vegetation will deliver biodiversity gains in 20 years with confidence (75-90%).

The lower level of confidence in enhancement actions (compared to >90%), despite the much larger area over which enhancement actions will be undertaken, is due in part to the habitat value that pine trees may already provide to fauna. Therefore, their initial removal will reduce the ecological uplift (amount gained by improving existing values) that could otherwise be achieved by planting an area where biodiversity attributes are nearer to zero.

However, it is important to note that, while enhancement measures may not provide as much ecological uplift within the 20-year timeframe to measure the offset outcome, pine trees will continue to gradually spread throughout the SNA beyond this time if not properly managed. The Department of Conservation estimates that wildling pines spread at an estimated rate of 5% per year, where they outcompete native vegetation and reduce habitat resources for indigenous wildlife (and hence reduce biodiversity). Therefore, it is expected that the large existing areas of pine-dominant vegetation within the southern SNA T13UP166 fragment will require ongoing management to prevent this spread, if not captured in the proposed actions. Further, the direction of resources to provide such management (removal, replant, monitoring and maintenance) may not be a priority to stakeholders, given that the existing values within the SNA are not high. Therefore, it is reasonable to expect that the large areas of pine-

dominant vegetation will continue to spread over time and continue to reduce the ecological integrity of the SNA if pines are not removed and/or managed.

The restoration planting and vegetation enhancement is proposed to be undertaken within the site adjacent to the remaining SNA to decrease the overall edge effects and increase ecological connectivity.

It is also proposed that legal protection (or vesting) and ongoing pest and weed control for all SNA vegetation and new plantings within the site is undertaken.

The offsetting sites for revegetation are located directly adjacent to SNA T13UP166 where there is space to do so, while the enhancement sites are located within the SNA. The revegetation sites are currently predominantly bare grazing land with a small number of mature specimen trees. They currently present limited value as vegetation, avifauna or lizard habitat.

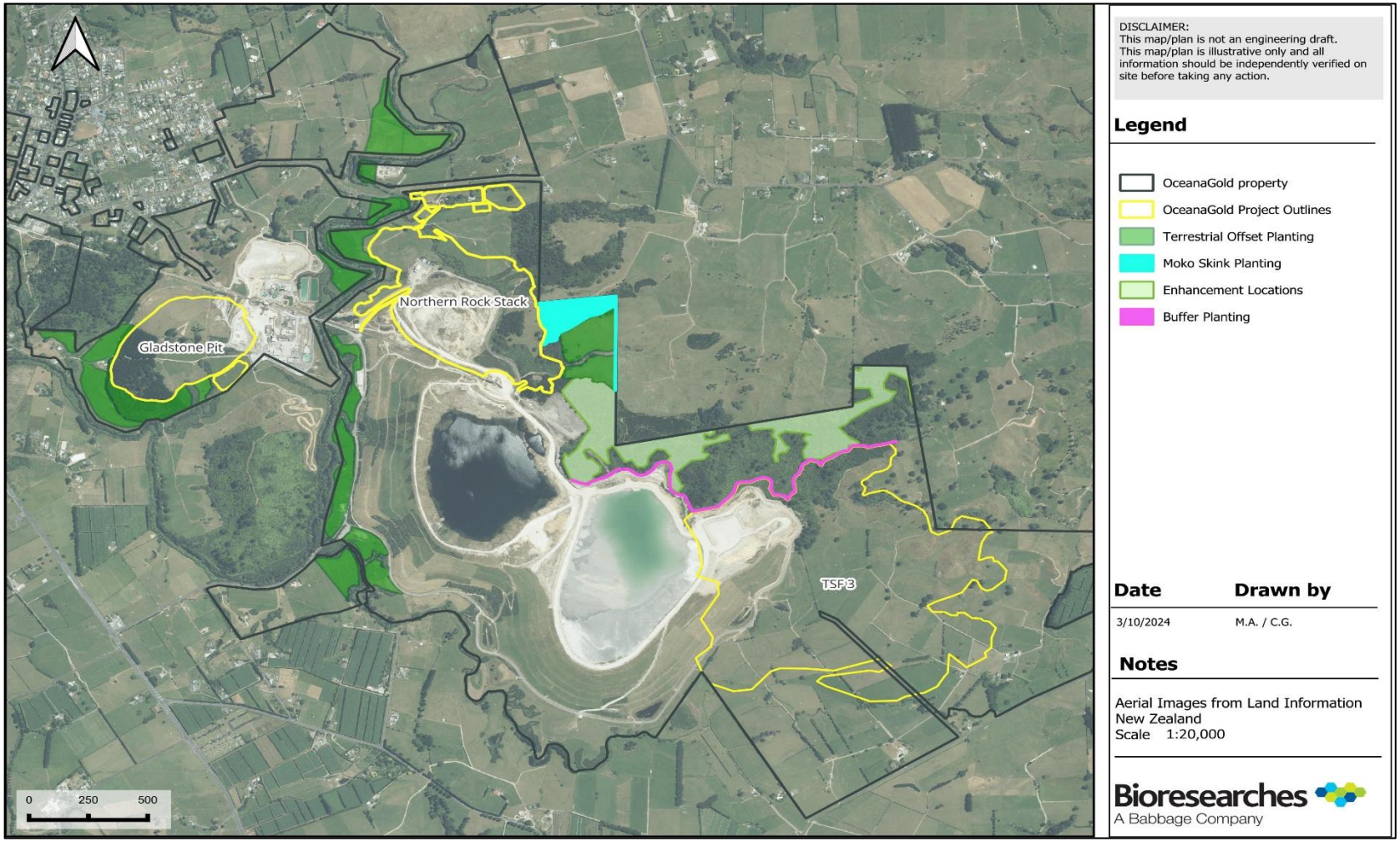

Figure 7: Site-wide offset locations of terrestrial offset planting and enhancement actions.

4.5.5 Biodiversity Compensation for Copper Skink Habitat at Gladstone Pit

Management measures for native lizards, including copper skinks, are detailed in a separate Lizard Management Plan. However, the loss of known habitat for high-value copper skinks within the proposed GOP, including 1 ha of native plantings, 5.1 ha of pine plantation and 0.4 ha of rocky outcrop would represent a high-level residual effect (high value, moderate magnitude).

Therefore, in addition to management, a biodiversity compensation model for the loss of native and exotic habitat has been developed (BCM, Baber et al. 2021).

Terrestrial revegetation and habitat enhancement, with pest control: 11.2 ha of native revegetation on OGNZL land at GOP, where it is contiguous with retained and protected habitats that are known to support copper skinks. All native plantings would be subject to 20 years of pest control (rats, possums, mustelids). In addition, rock substrate from outcrops that will be removed through GOP development will be relocated to the revegetation area prior to planting to enhance copper skink habitat. Bait stations and traps will be deployed as per Section 7 for Pest Animal management.

Pest animal control: 4.45 ha of retained and protected habitats that support copper skinks on OGNZL land at GOP, where they are contiguous with terrestrial revegetation for habitat compensation (above). Table 13 below describes the data inputs into the BCM. The BCM predicts that a 10% Net Gain outcome for effects on copper skink habitat will be exceeded through the proposed compensation actions, i.e. the compensation score is 39% higher than the impact score.

Table 13: Copper skink habitat Biodiversity Compensation input / output and weighted score table

Model Inputs			
Input descriptors	**Input data**		
Project/reference name	Waihi North		
Biodiversity type	Copper skink habitat		
Technical expert(s) input	C Wedding, D van Winkel		
Benchmark	5		
How many habitat types OR sites are impacted	3		
Number of proposed compensation actions	2		
Net gain target	10%		
Habitat/Site Impact(s)	**Plantings**	**Pine**	**Rocky outcrop**
Impact risk contingency:	3	3	3
Impact uncertainty contingency:	1	1	1
Areal extent of impact (ha):	1	5.1	0.4
Value score prior to impact:	2.5	1.5	3.5
Value score after impact:	0.001	0.001	0.001
Compensation Action(s)	**Revegetation & pest control**	**Pest control existing habitat**	
Discount rate:	3.0%	3.0%	
Finite end point (years):	10	1	
Compensation confidence contingency:	2	3	
Areal extent (ha) of compensation type:	11.2	4.45	
Value score prior to compensation:	0.001	2.5	
Value score after compensation:	2.5	3	

Model outputs				
	Total impact score	**Plantings**	**Pine**	**Rocky outcrop**
Impact score	**-2.66655**	-0.57727	-1.76597	-0.32331
	Total compensation score	**Revegetation & pest cont**	**Pest control existing habit**	
Compensation score	**3.70636**	3.43634	0.27002	
Net gain outcome	**39.0%**			

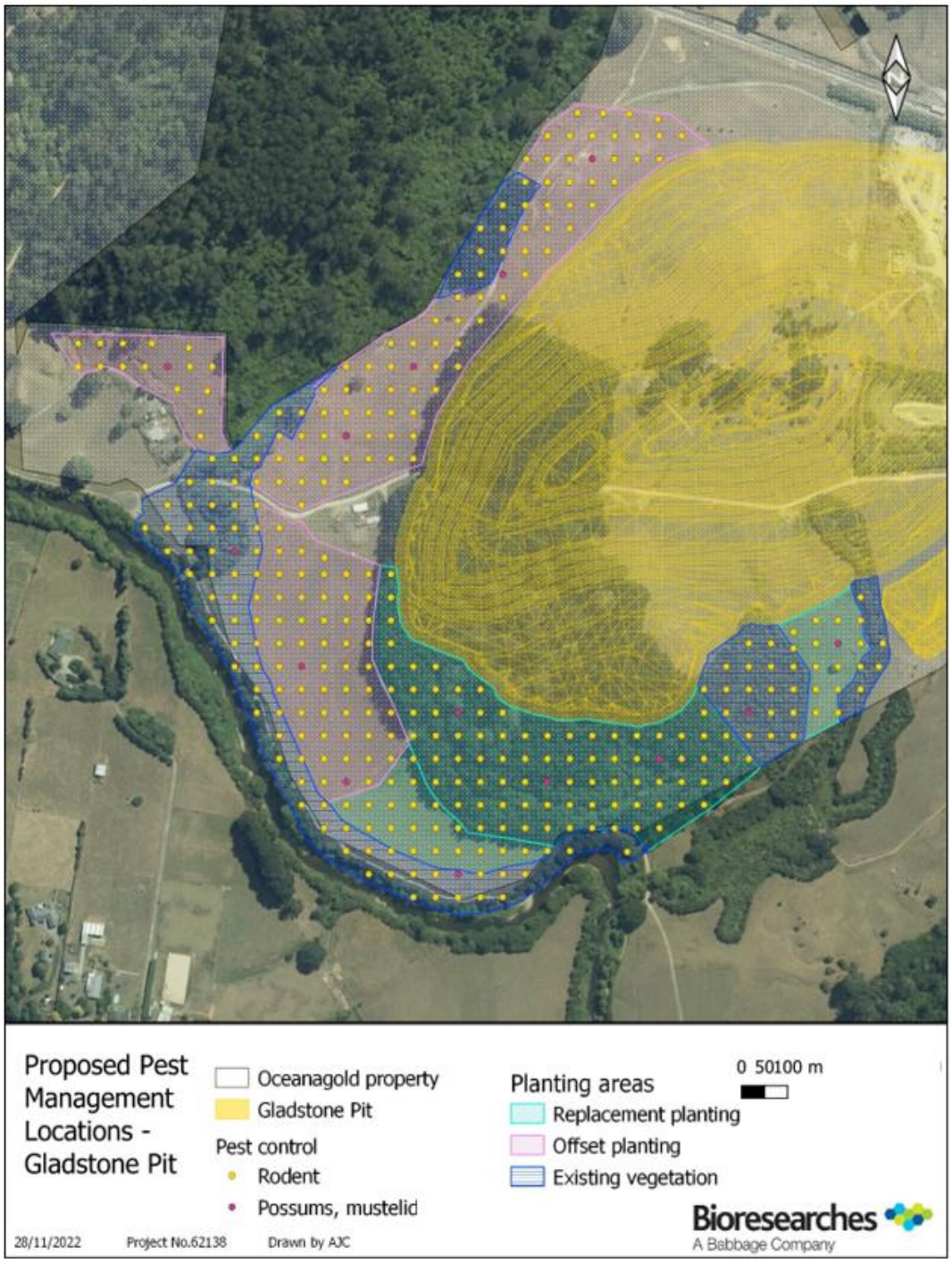

Figure 8: Restoration planting (for offsets), and pest control would compensate for copper skink habitat loss at Gladstone Open Pit. Trap locations are indicatively spaced; rodent traps will be placed 50m apart, and 100m apart for possum, mustelid traps and 100-200m apart for cats

Table 14: Copper skink habitat BCM data inputs and explanation

Model inputs	Explanation
Biodiversity type	Copper skink habitat
Technical expert inputs(s)	Chris Wedding, Dylan van Winkel
Benchmark	**A benchmark of 5 equates to high value mature native forest margin** where bordered by rank grassland wetland or riparian margins. This habitat would include high ground-habitat complexity, including refugia, and ground vegetative cover or leaf litter, be sunny or only partially shaded and have been subject to long-term pest management and at carrying capacity.
How many habitat types OR sites are impacted	3 Native plantings, pine forest, rocky outcrop
Number of proposed compensation measures	2 Revegetation (with pest control), pest control of existing contiguous habitats
Net Gain target	Ground-habitat complexity, including refugia, and ground vegetative cover or leaf litter, be sunny or only partially shaded and have been subject to long-term pest management and at carrying capacity.
Impact model inputs and descriptions	
Habitat/site impacted	**Native plantings**
Impact contingency risk (uncertainty)	3: High risk/high value (calculated impact score is multiplied by 1.1 (+10%)) Copper skinks are classified as nationally At Risk (Declining) which equates to a 'high' ecological value under EcIAG (Roper Lindsay et al. 2018).
Areal extent of impact (ha)	1 ha
Value score prior to impact	2.5 Relatively simple plantings, 10-15 years old
Value score after impact	0.001 There will be a permanent and complete loss of habitat within the footprint (noting that the formula cannot work with 0).
Habitat/site impacted	**Pine plantation**
Impact contingency risk (uncertainty)	3: High risk/high value (calculated impact score is multiplied by 1.1 (+10%))

Model inputs	Explanation
	Copper skink are classified as nationally At Risk (Declining) which equates to a 'high' ecological value under EcIAG (Roper Lindsay et al. 2018).
Areal extent of impact (ha)	5.1 ha
Value score prior to impact	1.5 Exotic pine plantation with some rough grass, relatively simple habitat heterogeneity
Value score after impact	0.001 There will be a permanent and complete loss of habitat within the footprint (noting that the formula cannot work with 0).
Habitat/site impacted	**Rocky outcrop**
Impact contingency risk (uncertainty)	3: High risk/high value (calculated impact score is multiplied by 1.1 (+10%)) Copper skink are classified as nationally At Risk (Declining) which equates to a 'high' ecological value under EcIAG (Roper Lindsay et al. 2018).
Areal extent of impact (ha)	0.4 ha
Value score prior to impact	3.5 Naturally occurring area with habitat heterogeneity
Value score after impact	0.001 There will be a permanent and complete loss of habitat within the footprint (noting that the formula cannot work with 0)
Compensation model inputs	
Compensation type 1	**Native revegetation with pest control**
Discount rate	+3 % (the default discount score as per Maseyk et al. (2015); Baber et al. (2021a). The discount rate addresses the temporal time lag between the impact occurring and the biodiversity gains being generated by the conservation action(s).
Finite end-point	10 years
Compensation contingency (confidence)	2 High confidence: copper skinks readily detectable in existing 10 year-old plantings without pest control
Areal extent (ha) of compensation type	11.2 ha

Model inputs	Explanation
Value score prior to compensation measure (relative to benchmark)	0.001 No existing habitat in planting areas
Value score after compensation measure (relative to benchmark)	2.5
Compensation model inputs	
Compensation type 1	**Pest control existing contiguous habitat**
Discount rate	+3 % (the default discount score as per Maseyk et al. (2015); Baber et al. (2021a). The discount rate addresses the temporal time lag between the impact occurring and the biodiversity gains being generated by the conservation action(s).
Finite end-point	1 year
Compensation contingency (confidence)	3 Moderate confidence: Control not targeting mice, but some benefits expected from rat, mustelid control
Areal extent (ha) of compensation type	4.45
Value score prior to compensation measure (relative to benchmark)	2.5 habitat generally consists of other similar age plantings
Value score after compensation measure (relative to benchmark)	3

4.6 Offset Monitoring

Offset monitoring is required to determine the success of the modelled offset outcomes, within the set time frame and against the targets outlined in Table 15. Monitoring will confirm if the attributes are being met and ensure a response for further planting/enhancement/management, should the attributes not be met. This section also introduces the approach to identification of threats and the regular monitoring of early planting establishment, to allow any threats to achievement of the targets to be identified and addressed at an early stage.

Formal offset monitoring does not apply to the following areas:

- Screening plantings; and
- General riparian plantings.

4.6.1 Early establishment monitoring

In addition to the formal offset monitoring programme required by consent conditions, OGNZL will undertake regular monitoring of plant establishment and plant survival, in alignment with regular contractor maintenance activities, as stipulated in plant maintenance contracts each year for the first 5-years of the planting at which point the monitoring set out in Table 15 will be implemented.

Early interventions may include;

- Direct replacement of plants that have not survived,
- Additional pest plant, pest animal management actions as required,
- Investigation into causation of unexpected levels of plant mortality;
- Review of species establishment success, and replacement of more suitable species if deemed necessary, following consultation with the project ecologist.
- Wind protection
- Application of fertiliser.

The results of this monitoring and any actions taken will be outlined in the Offset Monitoring Report following each 5-yearly monitoring programme.

4.6.2 Formal Offset monitoring

Offset outcomes will be measured every five years at each of the offset sites. The purpose of the monitoring is to:

1. Track the progress of identified biodiversity attributes.
2. Provide feedback with recommendations for any additional management required to ensure the offset meets its target on or before 20 years.
3. Identify any requirements for contingency actions early, where any shortfalls could affect offset outcomes.
4. Provide a monitoring report, following each monitoring occasion, to demonstrate that:
    a. the offset is developing as expected
    b. is being appropriately managed and maintained.

If offset maturity is short of targets, then adaptive management actions will be modelled, using a BOAM, and implemented to ensure that a net gain outcome is achieved.

4.6.2.1 Offset Monitoring Targets and Contingencies

Monitoring targets, as provided in consent conditions, are provided in Table 15. While ultimate success will be determined at 20 years, the targets provide an indication of expected values for attributes at each 5-yearly intervals with the gradual development and maturation of the offset vegetation. Failure to meet biodiversity attribute targets prior to 20 years may not necessarily result in failure of the offset, however monitoring outcomes that result in values that are short of the targets would inform adaptive management actions, such as additional planting, provision of fertilisers, or wind protection.

This section addresses monitoring targets and contingencies as modelled for each BOAM.

Table 15. Five-yearly monitoring targets for offset planting areas – Note: Offset success measured at 20 years. Targets prior to offset outcome are indicative only and should prompt management response.

Biodiversity attribute	Offset action	5 years	10 years	15 years	20 years
Indigenous Canopy height (m)	Revegetation	2 m	4 m	6 m	7 m
Winter fruit and flower resources (count)	Revegetation	2	10	13	13 spp.
Indigenous canopy species richness	Revegetation	5	6	8	8 spp.
Indigenous understorey species richness	Revegetation	2	10	15	20 spp.
Native avifauna diversity	Revegetation	4	10	12	12 spp.
Canopy height	SNA Enhancement	12	13	14	15 m
Indigenous canopy cover	SNA Enhancement	60	65	75	80%
Indigenous canopy species richness	SNA Enhancement	3	3	4	5 spp.
Indigenous understorey species richness	SNA Enhancement	17	18	19	20 spp.
Native avifauna diversity	SNA Enhancement	10	11	12	12 spp.

4.6.2.2 Monitoring Targets and Contingencies

Formal outcome monitoring for the biodiversity offset shall include:

- Monitoring to occur once every five years, commencing five years after the canopy species have been planted and continue for at least 20 years (note- separate from plant maintenance). At 20 years, if all attributes have been met, monitoring may cease.
- At five yearly monitoring, if attributes are more than 15% behind predicted targets from year 10, adaptive management requirements will be detailed in the Offset Monitoring Report (such as whether additional planting, pest control over greater area is required). These actions would be modelled, using a biodiversity offset accounting model to demonstrate that Net Gain outcomes will be achieved at 20 years.

Monitoring is to be completed by suitably experienced ecologists and include:

- Vegetation monitoring within 20m x 20m plots
- Four plots within SNA enhancement planting, three plots within each of the two offset restoration plantings, being the SNA offset and non-protected vegetation offset.). The final locations of monitoring plots will be determined during first monitoring period. GPS coordinates and/or permanent marks will be used to establish boundaries.
- Identification of all shrub and tree species at the canopy and understorey levels.
- Record percentage canopy cover.
- Determine canopy height.
- Bird monitoring at same locations as vegetation plots 5-minute bird count at each location, replicated four times.

4.6.3 Reporting of monitoring

The reporting associated with the Residual Effects Offset Plan must include:

- The results of all aspects monitored including how they are tracking against the biodiversity attributes.
- Records of any weeds encountered during monitoring.
- Records of any dead/dying plants encountered.
- Recommendations as a result of the monitoring, including any actions required to ensure the Biodiversity Attributes outlined in Table 15 are achieved.

The Report is to be provided to Hauraki District Council and Waikato Regional Council in accordance with Condition 201 of the Hauraki District Council Consent conditions.

Monitoring of lizards is addressed within the separate Ecological Management Plan (refer to Section 8.10).

4.7 Key Performance Indicators

As set out in conditions 200-205 of Appendix B2 of the WNP Decision, for the Residual Effects Offset Plan, the key performance indicators comprise:

- Five-yearly monitoring, commencing five years after initial revegetation and enhancement canopy species have been planted, is to demonstrate progress towards a net biodiversity gain between the impact sites and the offset sites. The net biodiversity gain is to be achieved with regard to canopy height, native canopy diversity, winter fruiting and flowering species, native canopy cover, native canopy diversity, native understorey diversity, and avifauna diversity in accordance with the targets set out in Table 15.
- If monitoring demonstrates that biodiversity attributes are more than 15% behind predicted targets from year 10, adaptive management requirements will be detailed in the monitoring report. These requirements would be modelled, using a biodiversity offset accounting model to demonstrate that net gain outcomes will be achieved at 20 years.
- 20 years following the commencement of the consented activities a net biodiversity gain is to be achieved, and is to include as a minimum:

- 17.5 ha of revegetation within and adjacent to the existing southern SNA T13UP166 fragment (offsetting the loss of 3.6 ha of rewarewa forest and 4.6 ha of treefern scrub within SNA T13UP166);
- 20 ha of revegetation throughout the wider Waihi North Project area (offsetting the loss of 10.1 ha of voluntary plantings which occur predominantly beyond TSF3);
- 20 ha of enhancement planting within SNA T13UP166 (offsetting the loss of 1.2 ha of the western fragment of SNA T13UP166).

If monitoring indicates that the lizard habitat compensation is not performing as expected, the Project Herpetologist will review the likely cause and recommend appropriate remedial actions. These may include additional habitat enhancement, additional refugia, infill or replacement planting, increased pest control, changes to pest control methods, or additional monitoring.

4.8 References

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Beresford, R.; Smith, G.; Ganley, B.; Campbell, R. (2019). Impacts of myrtle rust in New Zealand since its arrival in 2017. *New Zealand Garden Journal*, 22 (2): 5-10.

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Maseyk, F., Martine, M., Seaton, R., Duton, G. (2015). A Biodiversity Offsets Accounting Model for New Zealand. The Catalyst Group Contract Report No: 2014-008. Prepared For the New Zealand Department of Conservation. 73 pp.

4.9 Appendix 4B – Biodiversity Offset Models

Table 16: BOAM Output for loss of southern SNA T13UP166 fragment: Rewarewa forest. Model indicates a net biodiversity gain (1.42).

OFFSET MODEL

Key

	User Input		Dropdown list
	Auto-filled		Not Required

	BIODIVERSITY TYPE	DISCOUNT RATE
1	Broadleaved scrub	0.03

READ ME:

Step 1: Biodiversity Attributes must be entered into the Impact Model prior to commencing input into the Offset Model.
Step 2: Input the Biodiversity Type identifier (e.g. 1 if it the first Biodiversity Type, 2, if it is the second etc.) into Cell B11. The same identifying number needs to be used for the same Biodiversity Type within the Impact and Offset Models. The Biodiversity Type (Cell C11) will be auto-populated.
Step 3: Input time preference Discount Rate (Cell E11)
Step 4: Biodiversity Components will be auto-populated once Cell B11 is populated.
Step 5: Biodiversity Attributes will be auto-populated once Cell B11 is populated.
Step 6: Work through accounting model for each Biodiversity Attribute entering values into light brown cells. At Column K choose method of accounting for time and follow instructions. If using a finite end point, continue on this sheet. If calculating the offset as accrued over time use the Offset Model_5 yearly worksheet.
Step 7: Repeat for additional Biodiversity Components (scrolling down the sheet)
Step 8: Use a new workbook for each Biodiversity Type

	This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model					These cells provide information about the proposed Offset Actions			Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute					This is the average Net Present Biodiversity Value for the Biodiversity Component
	Biodiversity Component	Biodiversity Attribute		Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions			Measure prior to Offset	Measure after Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value	Component Net Present Biodiversity Value
1.1	SNA Rewarewa dominant	1.1a	Native canopy height	Height (m)	15	Revegetation, weed and pest control	9	Confident 75-90%	Finite end point	Continue to Column M	0	7	20	1.92	-1.86	0.06	1.42
		1.1b	Winter fruit & flower resources	Count (#)	17	Revegetation, weed and pest control	9	Very confident >90%	Finite end point	Continue to Column M	0	13	20	3.64	-1.06	2.58	
		1.1c	Native canopy species richness	Count (#)	15	Revegetation, weed and pest control	9	Confident 75-90%	Finite end point	Continue to Column M	0	8	20	2.19	-0.72	1.47	
		1.1d	Native understorey species	Count (#)	25	Revegetation, weed and pest control	9	Confident 75-90%	Finite end point	Continue to Column M	0	20	15	3.81	-1.73	2.08	
		1.1e	Native avifauna diversity	Count (#)	15	Revegetation, weed and pest control	9	Confident 75-90%	Finite end point	Continue to Column M	0	12	20	3.29	-2.40	0.89	

Table 17: BOAM output for loss of southern SNA T13UP166 fragment: Tree fern scrub. Model indicates a net biodiversity gain (0.94).

This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model					These cells provide information about the proposed Offset Actions			Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute						This is the average Net Present Biodiversity Value for the Biodiversity Component
	Biodiversity Component	Biodiversity Attribute		Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions			Measure prior to Offset	Measure after Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value	Component Net Present Biodiversity Value
1.2	SNA treefern dominant	1.2a	Native canopy height	Height (m)	15	Revegetation, weed and pest control	8.5	Confident 75-90%	Finite end point	Continue to Column M	0	7	20	1.81	-3.68	-1.87	0.94
		1.2b	Winter fruit & flower resources	Count (#)	17	Revegetation, weed and pest control	8.5	Very confident >90%	Finite end point	Continue to Column M	0	13	20	3.44	-1.35	2.08	
		1.2c	Native canopy species richness	Count (#)	15	Revegetation, weed and pest control	8.5	Confident 75-90%	Finite end point	Continue to Column M	0	8	20	2.07	-0.31	1.76	
		1.2d	Native understorey species	Count (#)	25	Revegetation, weed and pest control	8.5	Confident 75-90%	Finite end point	Continue to Column M	0	20	15	3.60	-0.92	2.68	
		1.2e	Native avifauna diversity	Count (#)	15	Revegetation, weed and pest control	8.5	Confident 75-90%	Finite end point	Continue to Column M	0	12	20	3.11	-3.07	0.04	

Table 18: BOAM output for loss of Western (not protected) Fragment: SNA T13UP166 enhancement. Model indicates a net biodiversity gain (1.40).

	This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model				These cells provide information about the proposed Offset Actions			Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute					This is the average Net Present Biodiversity Value for the Biodiversity Component
	Biodiversity Component	Biodiversity Attribute		Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions			Measure prior to Offset	Measure after Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value	Component Net Present Biodiversity Value
1.3	Western pohutukawa fragment	1.3a	Native canopy height	Height (m)	15	Enhancement of pine areas in SNA 166 with future WF11 canopy trees within	21	Confident 75-90%	Finite end point	Continue to Column M	8	15	20	4.48	-0.96	3.52	1.40
		1.3b	Canopy cover	Percentage cover (%)	70	Enhancement of pine areas in SNA 166 with future WF11 canopy trees within	21	Confident 75-90%	Finite end point	Continue to Column M	60	80	20	1.37	-1.20	0.17	
		1.3c	Native canopy species	Count (#)	15	Enhancement of pine areas in SNA 166 with future WF11 canopy trees within	21	Confident 75-90%	Finite end point	Continue to Column M	3	5	20	1.28	-0.24	1.04	
		1.3d	Native understorey species	Count (#)	25	Enhancement of pine areas in SNA 166 with future WF11 canopy trees within	21	Very confident >90%	Finite end point	Continue to Column M	15	20	20	2.22	-0.62	1.60	
		1.3e	Native avifauna diversity	Count (#)	15	Enhancement of pine areas in SNA 166 with future WF11 canopy trees within	21	Very confident >90%	Finite end point	Continue to Column M	10	12	20	1.48	-0.80	0.68	

Table 19: BOAM Output for loss of 10.1 ha of site-wide, predominantly planted native vegetation.

	This section captures which elements of biodiversity are to be accounted for, and the benchmark value for the Attribute. The information matches that in the Impact Model					These cells provide information about the proposed Offset Actions			Calculations can be made for a finite end point, or at five yearly time-steps over 35 years. Indicate preference in Column K and Follow the instructions in Column L		This section is where the marginal change in the measure of Biodiversity Attribute due to the Offset Action is quantified. Inputs are derived from direct measure, existing data or models where available, or expert estimated predictions. Attribute Biodiversity Value at the Offset Site is compared to the Attribute Biodiversity Value at the Impact Site to calculate the Net Present Biodiversity Value for each Attribute					This is the average Net Present Biodiversity Value for the Biodiversity Component
	Biodiversity Component	Biodiversity Attribute		Measurement Unit	Benchmark	Proposed Offset Actions	Offset area (ha)	Confidence in Offset Actions			Measure prior to Offset	Measure after Offset	Time till endpoint (years)	Biodiversity Value at Offset Site	Biodiversity Value at Impact Site	Attribute Net Present Biodiversity Value	Component Net Present Biodiversity Value
0.1	voluntary plantings	0.1a	Average height	metres	7	revegetation	20	Confident 75-90%	Finite end point	Continue to Column M	0	7	20	9.14	-10.10	-0.96	1.65
		0.1b	Canopy cover	%	70	revegetation	20	Very confident >90%	Finite end point	Continue to Column M	0	70	10	14.21	-10.10	4.11	
		0.1c	Diversity	count	22	revegetation	20	Very confident >90%	Finite end point	Continue to Column M	0	30	10	14.21	-10.10	4.11	
		0.1d	Avifauna diversity	Count	12	revegetation	20	Confident 75-90%	Finite end point	Continue to Column M	0	12	15	10.59	-10.10	0.49	
		0.1e	Winter flower/fruit resources	Count	4	revegetation	20	Very confident >90%	Finite end point	Continue to Column M	0	6	20	10.58	-10.10	0.48	

4.10 Appendix 4B – Biodiversity Compensation Model

Table 20: BCM Model inputs / outputs for SNA T13UP166 and Western Fragment.

Model Inputs			
Input descriptors	**Input data**		
Project/reference name	Waihi North		
Biodiversity type	Regenerating broadleaf		
Technical expert(s) input	C Wedding		
Benchmark	5		
How many habitat types OR sites are impacted	3		
Number of proposed compensation actions	2		
Net gain target	10%		
Habitat/Site Impact(s)	**Rewarewa**	**Treefern**	**Western fragment**
Impact risk contingency:	2	1	1
Impact uncertainty contingency:	2	1	2
Areal extent of impact (ha):	3.6	4.6	1.2
Value score prior to impact:	2.5	1.5	2
Value score after impact:	0.001	0.001	0.001
Compensation Action(s)	**Revegetation & pest control**	**Enhance SNA via ine removal, pest control**	
Discount rate:	3.0%	3.0%	
Finite end point (years):	20	20	
Compensation confidence contingency:	2	2	
Areal extent (ha) of compensation type:	17.5	20	
Value score prior to compensation:	0.001	2	
Value score after compensation:	2.5	3	

Model outputs				
	Total impact score	**Rewarewa**	**Treefern**	**Western fragment**
Impact score	**-4.05394**	-2.07817	-1.44803	-0.52774
	Total compensation score	**Revegetation & pest control**	**Enhance SNA via ine removal, pest control**	
Compensation score	**5.82238**	3.99525	1.82713	
Net gain outcome	**43.6%**			

Table 21: BCM inputs/outputs explanation table for SNA T13UP166 and Western Fragment.

Model inputs	Explanation
Biodiversity type	Regenerating Broadleaved Forest (SNA T13UP166 and adjacent Western Fragment)
Technical expert inputs(s)	Chris Wedding, Dylan van Winkel
Benchmark	A benchmark of 5 equates to high value regenerating vegetation with future canopy species such as podocarps and other long-lived broadleaved tree species present beneath a pioneer species-dominant canopy
How many habitat types OR sites are impacted	3 Rewarewa, Treefern, Western Fragment

Model inputs	Explanation
Number of proposed compensation measures	2 Revegetation (with pest control), Enhancement via pine management and pest control
Net Gain target	10%
Impact model inputs and descriptions	
Habitat/site impacted	**Rewarewa forest**
Impact contingency risk (uncertainty)	2: Moderate risk/moderate value (calculated impact score is multiplied by 1.05 (+5%)) Rewarewa forest assessed as 'Moderate' ecological value under EcIAG (Roper Lindsay et al. 2018).
Areal extent of impact (ha)	3.6 ha
Value score prior to impact	2.5 Relatively simple structure, low diversity, however threshold lowered for this value as many regenerating systems in landscape strongly modified (Roper-Lindsay et al. 2018)
Value score after impact	0.001 There will be a permanent and complete loss of habitat within the footprint (noting that the formula cannot work with 0).
Habitat/site impacted	**Treefern**
Impact contingency risk (uncertainty)	1: Low risk/low value (calculated impact score is multiplied by 1.0 (0%)) Very simple structure, low diversity (Roper-Lindsay et al. 2018)
Areal extent of impact (ha)	4.6 ha
Value score prior to impact	1.5 Simple structure, low diversity
Value score after impact	0.001 There will be a permanent and complete loss of habitat within the footprint (noting that the formula cannot work with 0).
Habitat/site impacted	**Western fragment**

Model inputs	Explanation
Impact contingency risk (uncertainty)	1: Low risk/low value (calculated impact score is multiplied by 1.0 (0%))
Areal extent of impact (ha)	1.2 ha
Value score prior to impact	2 Despite low value, naturally occurring area with some large, sprawling pohutukawa. Threshold lowered for this value as many regenerating systems in landscape strongly modified (Roper-Lindsay et al. 2018)
Value score after impact	0.001 There will be a permanent and complete loss of habitat within the footprint (noting that the formula cannot work with 0)
Compensation model inputs	
Compensation type 1	**Native revegetation**
Discount rate	+3 % (the default discount score as per Maseyk et al. (2015); Baber et al. (2021a). The discount rate addresses the temporal time lag between the impact occurring and the biodiversity gains being generated by the conservation action(s).
Finite end-point	20 years
Compensation contingency (confidence)	2 High confidence: restoration well establish method and moderate value plantings undertaken through surrounding landscape
Areal extent (ha) of compensation type	17.5 ha
Value score prior to compensation measure (relative to benchmark)	0.001 No existing habitat in planting areas
Value score after	2.5

Model inputs	Explanation
compensation measure (relative to benchmark)	
Compensation model inputs	
Compensation type 1	**Enhance SNA via pine removal, pest control**
Discount rate	+3 % (the default discount score as per Maseyk et al. (2015); Baber et al. (2021a). The discount rate addresses the temporal time lag between the impact occurring and the biodiversity gains being generated by the conservation action(s).
Finite end-point	20 years
Compensation contingency (confidence)	2 High confidence: method supports natural regeneration with some added diversity (pines suppress) through planting where pines controlled
Areal extent (ha) of compensation type	20 ha
Value score prior to compensation measure (relative to benchmark)	2 Some large areas of low value where pine dominance is strong.
Value score after compensation measure (relative to benchmark)	3

PART D: PLANTING PLAN

5 PLANTING PLAN

5.1 Overview

The Planting Programme for Waihi North consists of range of different planting treatments as outlined in the Integrated Mitigation Planting stage map for Waihi (Figure 2).

The different types of planting are as follows:

- **Offset plantings** – are subject to specific plant lists and ratios; and must meet monitoring targets to ensure the desired net gain outcomes are achieved. The approach is outlined in detail in section 5.3.
- **Screen planting** – as required to manage visual impact assessments and will follow similar principles as offset planting, however, may consist of a simplified planting list, focussing on fast growing native species to achieve screening objectives.
- **Riparian planting** – targets apply to specific areas as outlined in the Stream Enhancement Riparian Planting Plan.

This planting plan outlines the general approach to planting to ensure the objectives of the Integrated Mitigation Planting stages are met, specifically for the Offset Planting.

5.2 Consent Condition Matrix

Table 22 below sets out the relevant consent conditions associated with the Planting Plan and where they are addressed within this document.

Table 22 Planting Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Waihi North Project – Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance;	C47B(2)(a): > Lead in times and Implementation timeframes - Section 5.4.1 and 5.4.10 > Maintenance – Section 5.6 C47B(2)(b): > Monitoring – Section 5.6 > Triggers and remedial actions – Section 5.6 > Reporting requirements – Section 5.9

Consent Condition Number	Consent Condition Wording	Location within this Plan
	b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following: Planting Plan – which identifies the areas where enhancement, offsetting or buffer planting is required on site to address residual effects on flora and fauna	C47B(2)(c): Performance indicators – Section 5.8.
Waihi North Project – Appendix B2 –HDC Conditions		
195	Subject to Condition 194, the Consent Holder must undertake the planting identified in **Figures A** and **B** in **Attachment 8** and Table 1 in **Attachment 9.**	Section 5.3 and 5.4.10
197	All planting required under Condition 195 must: a) Use plants which are eco-sourced from the Coromandel or Bay of Plenty Plant Regions; and b) Use seed collected locally and germinated and raised at a NZPPI-accredited nursery or from a suitable alternative community-based nursery.	Section 5.3
198	1. All planting required under Condition 195 must be subject to annual maintenance, including releasing of plants from weeds and replacement of dead plants. Any species that consistently fails must be replaced with an alternative similar species listed as suitable for that purpose in the ELMP-WA.	Section 5.6

Consent Condition Number	Consent Condition Wording	Location within this Plan
	2. Maintenance must commence following pioneer planting and continue for the later of: a. 5 years following the completion of enrichment planting in the Planting Area; or b. Until 90% of the original density and species, with an 80% canopy closure, has been achieved. 3. […]	
202	1. Except as provided for in Condition 203, within 5 years of the commencement of this consent, the Consent Holder must enter into appropriate covenants and/or encumbrances (or similar legal mechanism) to ensure that, regardless of any future ownership or tenure changes, the areas of land required for revegetation planting specified under Condition 195 are protected in perpetuity. 2. Condition 202(1) does not apply to road reserves or land under DOC or other public administration.	To be addressed in subsequent updates to the ELMP as the 5-year time period progresses.
Waihi North Project – Appendix B4 –WRC Conditions		
G21	Subject to Condition G22, the Consent Holder must undertake the planting identified in **Figures A** and **B** in **Attachment 1** and the Table in **Attachment 2.**	Section 5.4.10
G24	All planting required to be undertaken under Condition G21 must: a. Use plants which are ecosourced from the Coromandel or Bay of Plenty Ecological Region; and b. Use seed collected locally and germinated and raised at a New	Section 5.3

Consent Condition Number	Consent Condition Wording	Location within this Plan
	Zealand Plant Producers Incorporated (NZPPI)-accredited nursery or from a suitable alternative community-based nursery.	
G25	1. All planting required to be undertaken under Condition G21 must be regularly maintained, including regular releasing of plants from weeds and replacement of plants that do not survive. Any species that consistently fails must be replaced with an alternative similar species listed as suitable for that purpose in the ELMP. Maintenance must continue until at least 70 percent stream canopy shade success is achieved, except where this planting is carried out adjacent to the Ruahorehore Stream and the Ohinemuri River, in which case the required shade success requirement will be determined by an ecological assessment of canopy health to the satisfaction of the Waikato Regional Council.	Section 5.6

5.3 Offset planting

This plan covers four areas in detail, that are identified within the Residual Effects Assessment required to be enhanced, offset and/ or buffer planted on site (Figure 10) to mitigate residual effects to flora and fauna, including:

- Terrestrial offset planting;
- Moko skink planting;
- Enhancement locations; and
- Buffer planting.

All replacement planting will be for the purpose of ecological restoration or conservation planting (cf. amenity planting) and incorporate indigenous plant species found in the WF11 ecosystem type (Singers & Rogers, 2014).

WF11 - Kauri, podocarp, broadleaved forest has a Regional IUCN threat status of “Endangered” (Singers et al. 2017) and is characterised by vegetation that occurs in warm and sub-humid to humid areas with rainfall 1000–2500 mm per annum. It is found predominantly on ridge-crests and hillslopes

with acidic leached soils (e.g. usually where kauri occurs) or more fertile (granular) soils such as in gullies (e.g. where broadleaved species occur). The vegetation is comprised of podocarp trees such as rimu, tōtara, thin-barked tōtara, miro and tānekaha. Kahikatea is more common in gullies and on alluvial terraces. Broadleaved tree species are often dominant in gullies, and include taraire, tawa, tōwai, kohekohe (coastal to lowland), pūriri, northern rātā, pukatea (damp lowland areas) and rewarewa. Associated understorey shrubs include karamu, kānuka, mānuka, mingimingi, heketara, five-finger, māpou and māmāngi.

Consent conditions require plants to be ecosourced from Bay of Plenty or Coromandel “Plant Regions”. Plants should represent healthy specimens and where possible be eco sourced from the Waihi and surrounding Ecological Districts, including Waihi, Tairua Hauraki, Te Aroha, Tauranga. Ecosourcing maintains local adaptations and natural genetic relationships of plants within local populations. Ecosourced plants are more likely to tolerate local environmental conditions and to survive following planting.

Section 5.3 lists the recommended plant species, % abundance, spacing and minimum plant sizes for each of the planting areas. The species list may be adapted if an alternative species, spacing or size of plant would achieve monitoring targets, or if there are biosecurity risks associated with a species on the list. The project ecologist will be consulted prior to any changes being made.

- Plants should be a minimum size 1L or PB2. Plants of a smaller size may be used if they can be expected to meet monitoring targets in the required timeframes. The project ecologist will be consulted prior to plants smaller than 1L or PB2 being used.
- Plants must be sourced from a New Zealand Plant Producers Incorporated (NZPPI)-accredited nursery, or a community nursery with comparable systems in place.

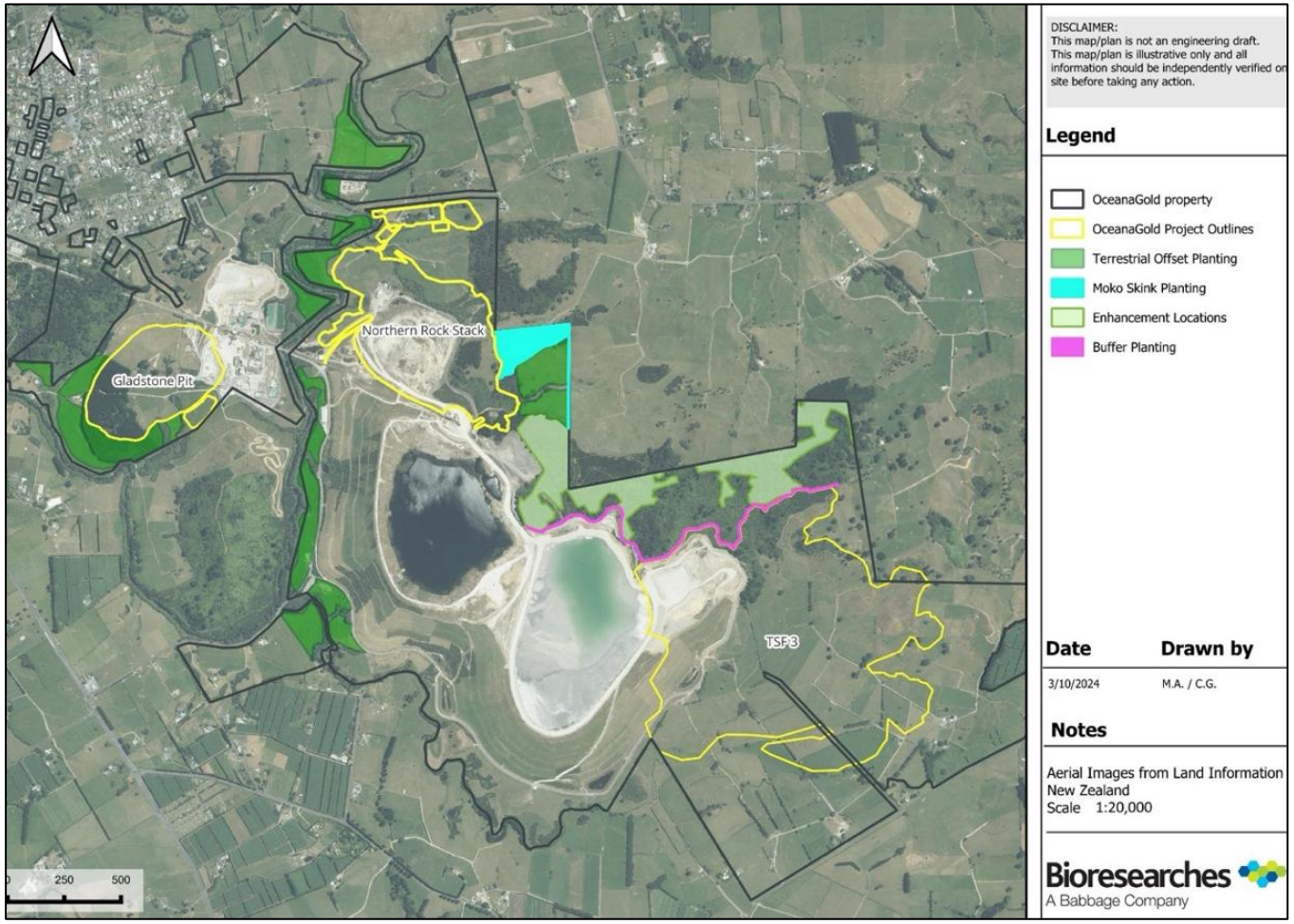


Figure 9: Waihi offset locations of terrestrial offset planting and enhancement actions

5.4 Planting Method

A multi-staged approach will be adopted to achieve successful restoration of a more diverse range of flora consistent with ecosystem WF11 (Singers & Rogers, 2014).

5.4.1 Multi-staged Planting

Stage 1 - Spring/summer: prior to the winter restoration planting, site preparation will involve removal of any major weeds.

Stage 2 – Autumn/winter: Weed removal will be undertaken and pioneer species planted.

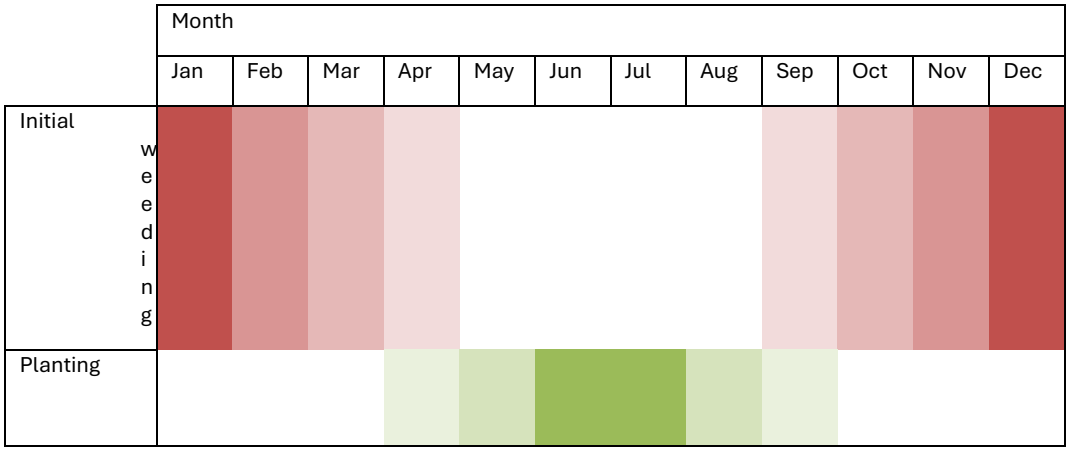
Stage 3 – Autumn/winter; after three years: Once the pioneer plantings have reached a sufficient size to shelter enrichment species (approximately 3 years with fast growing pioneer species), under-planting of canopy and enrichment species will commence. Releasing or removal of pioneer plantings may be required to make room for the new plantings.

5.4.2 Site Preparation

The site should be prepared for planting by removing weeds, including areas of pine, which will need to be mechanically removed, felled and left to rot, or poisoned and left in situ to make way for infill plants.

Planting will be undertaken over autumn and winter, so that the root systems have sufficient time to establish before the drier summer months (Table 23).

Table 23: Weed control and planting timeframes.



5.4.3 Pioneer Planting Schedule

Pioneer planting provides for fast growing trees and shrubs that provide natural protection for later successional canopy vegetation that may otherwise have difficulty thriving in exposed environments. Pioneer plants establish quickly and create a canopy cover that will reduce exposure and shade out weeds.

This plan provides for 18 species of trees and shrubs that will provide year-round foraging, roosting and nesting habitat for nectarivore, frugivore and insectivore birds. Note some of these species are also large and / or long-lived and will also form part of the canopy of a future forest (e.g. tōtara, rewarewa).

5.4.4 Future Canopy and Enrichment Planting Schedule

Five years after pioneer planting, future canopy and other enrichment species will be planted. Canopy/climax trees are late successional species, are typically larger, longer lived and slower growing. Therefore, the canopy diversity is expected to comprise all pioneer species for at least 30-40 years.

The planting locations (Figure 9) are generally low lying or gently sloping, and so the future canopy species are suited to this topography.

Nineteen enrichment species (mostly future canopy trees) are provided in Table 26. It may be necessary to first release or remove some pioneer species to create space for enrichment trees.

5.4.5 SNA T13UP166 Enhancement Schedule

SNA T13UP166 will be enhanced with a schedule of 14 species that will be planted into gaps where pine trees are removed (spacing minimum 5 m). Species recorded from SNA T13UP166 plots have been excluded from the list so as to provide increased diversity at both understorey and future canopy tiers.

5.4.6 Buffer Planting Schedule

The Project edge at the abutment of TSF3 and SNA T13UP166 is expected to be subject to new or increased edge effects, including weed incursion, light, wind exposure and desiccation effects. These edge effects would be minimised through establishing a minimum 10 m wide buffer of plantings of fast-growing native shrub species. Buffer planting provides protection for habitat edges by shading out weedy species, providing shelter from excessive light and wind and reducing the threat of desiccation. In order for the planting to provide an adequate buffer to minimise adverse effects, it will be no less than 10 m (approximately 11 plants deep at 1 m spacing), infill planted into newly created edge where there is existing open space on the forest floor would be appropriate to reduce edge effects on surrounding regenerating vegetation. All planting will only incorporate indigenous plant species found in the *WF11* ecosystem type (Singers & Rogers, 2014).

WF11 - Kauri, podocarp, broadleaved forest has a Regional International Union for Conservation of Nature (IUCN) threat status of "*Endangered*" (Singers et al. 2017) and is characterised by vegetation that occurs in warm and sub-humid to humid areas with rainfall 1000–2500 mm per annum. It is found predominantly on ridge-crests and hillslopes with acidic leached soils (e.g. usually where kauri occurs) or more fertile (granular) soils such as in gullies (e.g. where broadleaved species occur). The vegetation is comprised of podocarp trees such as rimu, tōtara, thin-barked tōtara, miro and tānekaha. Kahikatea is more common in gullies and on alluvial terraces. Broadleaved tree species are often dominant in gullies, and include taraire, tawa, tōwai, kohekohe (coastal to lowland), pūriri, northern rātā, pukatea (damp lowland areas) and rewarewa. Associated understorey shrubs include karamu, kānuka, mānuka, mingimingi, heketara, five-finger, māpou and māmāngi.

Table 28 lists the recommended plant species, % abundance, spacing and minimum plant sizes for the buffer planting area along the southern boundary of the southern fragment of SNA T13UP166, with the new interface with TSF1A and TSF3.

5.4.7 Moko Skink Habitat Enhancement Planting Schedule

A selection of low growing shrubs and vineland will be planted to enhance and expand an area of known habitat for Nationally 'At Risk' moko skinks (*Oligosoma moco*). In addition, habitat shall be enhanced through the relocations of rocky substrate from the 'Western pōhutukawa fragment', which is scheduled to be removed as part of the TSF3 works. This will provide additional environmental complexity which, along with planting, will provide enhanced habitat. Moko skinks are an open grassland, vineland habitat specialist (typically occurring near coastal edges), and the provision of targeted enhancement will improve the biodiversity outcomes for the overall management, mitigation and offset package (offset trade-up, DOC 2014). Within the Waihi area, moko skink are a unique biodiversity component, given that their presence is rare on the mainland (excluding islands) and those at Waihi represent one of the farthest inland records for the species. The proposed enhancement habitat planting (1.7 ha) will aim to extend their current habitat and provide or improve connectivity between currently disconnected components of their distribution around the WNP area.

The moko skink enhancement area is 4.04 ha and includes:

- 1.7 ha new planting
- 2.34 ha of enhancing existing habitat (pine tree management)
- Relocation of rocky substrate from the 'Western pōhutukawa fragment' into the new planting area

5.4.8 Planting Procedure

- Planting will be undertaken from May through to September inclusive.
- All plants will be set out on site according to the plant schedules.
- Planting holes should be at least 1.5 – 2 times larger than the plant root ball.
- Remove the plant carefully from the bag. If the plant is root bound, gently untangle roots and position in hole.
- Gently press soil around roots to bury in.
- Slow release fertiliser tabs are recommended to assist initial establishment of plants.
- If required, apply localised mulch and/or biodegradable weed mat squares to the base of the plant to reduce the risk of weeds overtaking the plant and to increase moisture retention in the soil. Note, blanket mulch or large areas of weed mat MUST NOT be used within lizard habitat areas.

5.4.9 Planting Strategy

To achieve a natural forest structure over time, indigenous species that align with those found in the local ecosystem have been selected and applied to the planting schedules with appropriate ratios and spacing.

This Plan follows the spacing recommendations from Waikato Regional Council, with spacing of 1.5 m between pioneer plants / small trees to achieve rapid canopy closure, and 5 m spacing between enrichment and future canopy species.

Species compositions should be set out by an experienced practitioner to ensure:

- Podocarps are generally planted on higher slopes.
- Broadleaved enrichment species are generally planted on lower or flatter topography in suitable habitat.

- Species susceptible to wind and frost damage are planted in suitable habitats with less exposure.

5.4.10 Planting Timeframes

Planting timeframes are provided in Table 24 below to ensure that plantings associated with offset and SNA edge buffer are prioritised following removal of SNA vegetation, and that replacement plantings are undertaken in such order so that the duration of the loss of planted areas is consistent with a 'temporary' effect (i.e. plantings are less than 25 years old at replacement, Roper-Lyndsay et al. 2018). This is in accordance with the schedule set out as Table 1 of HDC Condition 195.

Table 24: Timeframes for restoration planting to deliver mitigation, replacement and offset planting activities for Waihi sites.

Affected Area	Area to plant (ha)	Planting type	Timing
Lizard / moko skink habitat Enhancement	2.34	Pine tree management (remove or top, poison & delimb)	Prior to any vegetation removal at GOP, NRS, TSF3.
Lizard / moko skink habitat planting	1.7	Offset planting	Lizard habitat planting to be undertaken in first planting season following SNA vegetation removal at TSF3
Copper skink compensation at GOP	11.2	Habitat compensation planting	Prior to any vegetation removal at GOP
TSF3: SNA Offset planting	16.2	Offset	Pioneer planting complete by end of first planting season following SNA vegetation removal at TSF3
TSF3: SNA Enhancement (pine management & planting)	20	(Pine tree management (remove or top, poison & delimb) and replacement plant	Enrichment planting complete by end of first planting season following vegetation removal at Western Fragment, TSF3
TSF3: Buffer (SNA T13UP166)	1	Buffer (5 m wide)	Planting complete by end of first planting season following SNA vegetation removal at TSF3
TSF3: Replacement	0.6	Replacement	As removed: pioneer planting complete over planting season following removal
NRS: Replacement	9.1	Replacement	As removed: pioneer planting complete over planting season following removal
GOP: Replacement	6.5	Replacement	As removed: pioneer planting complete over planting season following removal

5.5 Plant Schedules

Table 25: Pioneer planting schedule for 18 revegetation and replacement species. Flowering and fruiting times are indicated on the right (Yellow = flowers; orange = fruits and flowers; pink = fruits).

Species	Common Name	Spacing (m)	Abundance (%)	Size	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Alectryon excelsus	Tītoki	5	5	PB2												
Aristotelia serrata	Makomako	1.5	5	PB2												
Brachyglottis repanda	Rangiora	1.5	5	PB2												
Coprosma robusta	Karamū	1.5	5	PB2												
Dacrycarpus dacrydioides	Kahikatea	5	7	PB2												
Entelea arborescens	Whau	1.5	5	PB2												
Hoheria populnea	Houhere	1.5	5	PB2												
Knightia excelsa	Rewarewa	1.5	5	PB2												
Kunzea robusta	Kānuka	1.5	12	PB2												
Leptospermum scoparium	Mānuka	1.5	7	PB2												
Melicytus ramiflorus	Māhoe	1.5	5	PB2												
Myrsine australis	Māpou	1.5	4	PB2												
Pennantia corymbosa	Kaikōmako	1.5	5	PB2												
Plagianthus regius	Mānātu	1.5	5	PB2												
Podocarpus totara	Tōtara	5	4	PB2												
Pseudopanax arboreus	Whauwhaupaku	1.5	5	PB2												
Sophora fulvida	Kōwhai	1.5	7	PB2												
Veronica stricta	Koromiko / hebe	1.5	4	PB2												

Table 26: Enrichment planting schedule for offset restoration. List of 19 species. Flowering and fruiting times are indicated on the right (Yellow = flowers; orange = fruits and flowers; pink = fruits).

Species	Common Name	Spacing (m)	Abundance (%)	Size	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beilschmiedia tarairi	Taraire	5	5	PB2												
Carpodetus serratus	Putaputawētā	1.5	8	PB2												
Coprosma arborea	Māmāngi	1.5	4	PB2												
Coprosma rhamnoides	Twiggy coprosma	1.5	3	PB2												
Corynocarpus laevigatus	Karaka	5	5	PB2												
Dacrydium cupressinum	Rimu	5	5	PB2												
Didymocheton spectabilis	Kohekohe	5	8	PB2												
Geniostoma ligustrifolium	Hangehange	1.5	3	PB2												
Hedycarya arborea	Porokaiwhiri	5	5	PB2												
Ixerba brexioides	Tāwari	2	5	PB2												
Laurelia novae-zelandiae	Pukatea	5	6	PB2												
Metrosideros robusta	Northern rātā	5	5	PB2												
Phyllocladus trichomanoides	Tānekaha	5	5	PB2												
Piper excelsum	Kawakawa	1.5	7	PB2												
Prumnopitys ferruginea	Miro	5	5	PB2												
Rhopalostylis sapida	Nīkau	2	8	PB2												
Schefflera digitata	Patē	3	5	PB2												
Vitex lucens	Pūriri	5	10	PB2												

Species	Common Name	Spacing (m)	Abundance (%)	Size	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Pterophylla sylvicola	Tōwai	3	8	PB2												

Table 27: Planting schedule for SNA enrichment species. Flowering and fruiting times are indicated on the right (Yellow = flowers; orange = fruits and flowers; pink = fruits).

Species	Common Name	Spacing (m)	Abundance (%)	Size	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Agathis australis	Kauri	5	20	PB5												
Alectryon excelsus	Tītoki	5	7	PB5												
Beilschmiedia tawa	Tawa	5	8	PB5												
Corynocarpus laevigatus	Karaka	5	5	PB5												
Dacrydium cupressinum	Rimu	5	8	PB5												
Didymocheton spectabilis	Kohekohe	5	7	PB5												
Hedycarya arborea	Porokaiwhiri	1.5	8	PB5												
Kunzea robusta	Kānuka	1.5	2	PB5												
Metrosideros robusta	Northern rātā	5	5	PB5												
Pectinopytis ferruginea	Miro	5	5	PB5												
Phyllocladus trichomanoides	Tanekaha	1.5	10	PB5												
Podocarpus totara	Tōtara	5	5	PB5												
Prumnopitys taxifolia	Matai	5	5	PB5												

Vitex lucens	Pūriri	5	5	PB5												

Note: Understorey planting in the enhancement area may be able to be reduced depending on the abundance of native planting remaining once pines and other weed species have been cleared/managed/felled. Should significant native vegetation remain, the project ecologist should be consulted prior to making any changes to the planting schedule. Canopy planting should occur as scheduled.

Table 28: Planting schedule for buffered area around edge of TSF3. Flowering and fruiting times are indicated on the right (Yellow = flowers; orange = fruits and flowers; pink = fruits).

Species	Common Name	Spacing (m)	Abundance (%)	Size	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Piper excelsum	Kawakawa	1.5	20	PB2												
Corokia cotoneaster	Korokio	1.5	10	PB2												
Coprosma autumnalis	Kanono	1.5	10	PB2												
Leptospermum scopariam	Mānuka	1.5	20	PB2												
Leucopogon fasciculatus	Mingimingi	1.5	15	PB2												
Phormium cookianum hookeri	Whaririki	1.5	15	PB2												
Veronica stricta	Hebe	1.5	10	PB2												

Table 29: Planting schedule for lizard enhancement and offset areas. Flowering and fruiting times are indicated on the right (Yellow = flowers; orange = fruits and flowers; pink = fruits).

Species	Common Name	Spacing (m)	Abundance (%)	Size	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Phormium tenax	Harakeke	1.4	10	PB2												
Muehlenbeckia complexa	Pōhuehue	1.4	50	PB2												
Austroderia toetoe	Toetoe	1.4	10	PB2												
Leucopogon fasciculatus	Tall Mingimingi	1.4	10	PB2												
Metrosideros excelsa	Pōhutukawa	20	5	PB25												
Cordyline australis	Tī kōuka	1.4	10	PB2												
Coprosma propinqua	Mingimingi	2	5	PB2												

5.6 Plant Maintenance & Monitoring

Plants will be maintained and monitored annually from pioneer planting for at least five years following completion of enrichment planting.

If annual monitoring demonstrates that the survival rate has not met a minimum of 90% of the original density and species, with an 80% canopy closure by the fifth year, then maintenance shall continue until these conditions have been met.

Ongoing maintenance is important to ensure plant survivorship, and native plant dominance and density. Plants will need to be released from weeds, and any that have died will be replaced.

The ideal maintenance frequency decreases over time, over a five-year period (Table 30).

Table 30: Maintenance and Monitoring schedule for all plantings

Year	1	2	3	4	5
Number of maintenance visits	4	2	1	1	1

5.7 Protection of planted areas

To ensure protection in perpetuity of offset plantings, OGNZL will enter into covenants to encompass planting areas on privately owned land, as required by Hauraki District Council condition 202 (1), within 5 years of the commencement of the consent.

This condition does not apply to road reserves, land under DOC or other public administration.

Condition 203 allows for an alternative area of planting to be sought, should the appropriate legal protection be unable to be secured for an offset planting area. OGNZL will not sell any of the land required for revegetation planting specified under condition 195 until the covenant is in place.

It should be noted that some planting may not be completed until more than five years after consent commencement. Accordingly, OGNZL does not propose to enter into covenants or other legal protection mechanisms until planting establishment has been confirmed, ensuring that land is not unnecessarily encumbered before the success of the revegetation programme has been demonstrated.The appropriate legal instrument will specify the going management requirements and responsibilities.

5.8 Key Performance Indicators

For the Planting Plan, the key performance indicators comprise:

- From the commencement of pioneer planting to the completion of enrichment planting, and for at least five years following, monitoring and maintenance will occur

in accordance with the schedule provided in Table 28 to ensure a minimum survival rate of 90% of the original density and species of plantings, with an 80% canopy closure by the fifth year; and

- If the monitoring and maintenance demonstrates that the survival rate is less than 90% of the original density and species of plantings, and / or with less than 80% canopy closure by the fifth year, maintenance will continue until such time that these requirements are met.

Restoration planting is to occur in accordance with the timeframes provided in Table 23, and in accordance with the Plant Schedules provided as Table 25 (Pioneer Planting), Table 26 (Enrichment Planting), Table 27 (SNA Enrichment Species), Table 28 (Buffered Area around TSF3), Table 29 (Lizard Enhancement and Offset Areas).

5.9 Reporting

The reporting procedures will be undertaken in accordance with the reporting set out in Section 1.5.

PART E: PLANT PATHOGEN AND WEED MANAGEMENT PLAN

6 MANAGEMENT OF PLANT PATHOGENS AND WEEDS

6.1 Consent Condition Matrix

Table 31 below sets out the relevant consent conditions associated with the Management of Plant Pathogens and Weeds and where they are addressed within this document.

Table 31 Management of Plant Pathogens and Weeds - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following: Management of Plant Pathogens and Invasive Species – which outlines the methods and protocols to be implemented to minimise risk of plant pathogens and weeds;	C47B(2)(a): > Lead in times –these protocols will be implemented for the duration of the WNP. > Implementation timeframes -the protocols set out in this section of the ELMP will be maintained for the duration of the WNP. > Duration of maintenance – No maintenance is required however the protocols will be maintained for the duration of the WNP. C47B(2)(b): > Monitoring – 6.7 > Triggers and remedial actions – Section 6.7 > Reporting requirements – Section 6.7

		C47B(2)(c): Performance indicators – Section 6.8

6.2 Kauri Dieback Protocols

6.2.1 Overview

Kauri Dieback is a soil-borne disease caused by the fungus-like organism *Phytophthora agathidicida* ("**PA**") which has led to the rapid spread and dieback of kauri trees throughout their range. There is no known cure for this disease and kauri trees have subsequently been classified as 'Threatened-Nationally Vulnerable' (de Lange et al. 2018).

- PA can be spread by movement of contaminated soil, plant (roots, trunk, bark) materials and associated by-products such as sawdust.
- Contaminated material may be as small as a pinhead.
- The complete host range for PA is not known and it is possible that other plant species may host the pathogen.

Infection of a kauri tree with PA causes damage to the vascular tissues and prevents the tree from accessing the water and nutrients that it requires. Infected trees may display the following symptoms of stress:

- Bleeding gum and lesions on trunk
- Leaf yellowing and loss
- Branch loss (as opposed to naturally loss of lower branches)
- Canopy thinning

6.3 Purpose of Kauri Protocols

The purpose of this Plan is to prevent and minimise any Project-mediated transmission of PA. It provides measures to prevent transmission of PA during the life of the Project.

PA is an unwanted organism under the Biosecurity Act 1993. In accordance with section 52 of that act, no person shall knowingly communicate, cause to be communicated, release, cause to be released, or otherwise spread the organism.

6.3.1 Kauri presence within the Waihi North Project

Kauri trees occur occasionally throughout the WNP area, where they mainly form components of selected planting mixtures. Some relict trees occur in the surrounding landscape and a small stand occurs on a northern projection of the southern fragment of SNA T13UP166. There is one naturally occurring kauri tree within the proposed footprint of TSF3 and no kauri trees within the WNP area are known to exhibit any PA symptoms.

Overall, the risk of presence of PA within the WNP area is low, and the risk of spread beyond it is low. However, precautionary testing should be undertaken. If testing confirms PA presence, the area will be designated a PA Management Area and kauri hygiene protocols will be followed.

Although testing completed to date has not detected PA, if future surveillance and testing confirm its presence within a WNP work area, the protocols set out in sections 6.3.2 to 6.3.7 will apply

Identification of PA Infection

PA is currently not known within the WNP area. However, the following precautionary actions have been undertaken within areas proposed for planting or where earthworks are proposed to occur that support kauri trees:

Prior to any works occurring, four soil samples (1-1.5kg) were collected from the base of a kauri tree within the area, at 100 cm distance from around the base of the tree.

- At GOP: one tree
- At NRS: three trees.
- At TSF3: one tree.

Soil samples were collected using the following method (4 samples per tree):

- *Remove leaves and other plant material that has not broken down from a small area of ground. Using a trowel or planting spade (cleaned between site samples) take a volume of soil (about 1-2 cups) from each of four points around the base of the selected tree, approximately 10 – 100 cm from the base and another four further out towards the drip line of the crown. Penetrate to about 100 mm deep. Put all 8 soil samples into one zip lock bag. The total amount should be 1-1.5 kg. Clearly label the bag with location / plot number / sample number. A duplicate second label, written on waterproof paper is to be inserted into the bag (in case ink runs off bag in transit).*
- *Important: ALWAYS Clean trowel before sampling another tree: ensure all soil is removed and spray with 2% SteriGENE solution.*
- *Bags of soil will be placed into a chilly bin and all soil samples stored in a refrigerator until dispatch to the assigned laboratory.*

Samples were sent to Scion for analysis of soil samples. All samples collected returned negative results.

6.3.2 Kauri Hygiene Protocols for contaminated Zones (PA Management Areas)

The protocols set out in Sections 6.2 must be complied with during all vegetation removal and earthworks within PA-contaminated areas **where PA is detected from testing** (PA Management Areas, being contaminated vegetation and associated surface soils at GOP, NRS or TSF3).

6.3.3 Planning Considerations

The PA Management Area shall be clearly demarcated on the ground by the Project Manager with the Project arborist or ecologist. Demarcation shall provide signage alerting all visitors and workers that the area is a PA Management area.

Signage instructing all visitors and workers entering the Management Area to sanitise footwear and equipment that has or may come into contact with soil or vegetation should be visible at all times.

A kauri dieback phytosanitary kit, consisting of a solution of 2% SteriGENE in clean water, a scrub brush and a kauri dieback hygiene procedure information sheet shall be held at the Management Area, periodically maintained and clearly visible to all personnel who enter the site. This kit must be used anytime persons enter and exit the Management area.

A metal parking area shall be provided at the Management Area to prevent vehicles tracking on soil.

Vehicle wash-down zones (wheels, truck/trailer) shall be provided at all access ways into the Management Area.

Vehicle wash-down zones shall be provided and positioned on a concrete or gravel area with good drainage to a sediment retention pond. After mud, soil, and vegetation has been removed by brush and/or rod, the vehicle should be sterilised with a 2% SteriGENE solution.

The vehicle should be as clean as possible before the SteriGENE is applied to allow thorough decontamination.

After the vehicle is cleaned, allow to dry for 1 – 10 minutes, and wash and sterilise tools (brushes and rods) used for vehicle cleaning.

For smaller vehicles, it is sufficient to dry brush off all visible mud, and then take the vehicle through a commercial car wash.

Always undertake a final visual inspection of the vehicles and machinery to ensure there is no remaining soil, mud, or plant material before the vehicle is moved.

6.3.4 Vehicles and Heavy Equipment

All vehicles (where possible) and heavy machinery should remain on-site for the duration of all vegetation removal, and earthworks to 2 m deep beneath surface vegetation at the site.

All light vehicles shall remain on metal tracks (not track on to farmland). Operators are responsible for ensuring machinery and vehicles are free of mud and soil on tyres, mud flaps, body, and underbody when entering an area containing kauri and when moving from one area of kauri to another. Interior mats can also be a point of transfer and should be cleaned regularly.

6.3.5 Footwear and Equipment

Upon entering and exiting the Management Area, each person must scrub the soles of their footwear with a dry brush to loosen and remove soil, and then spray with a 2% solution of SteriGENE. In addition, footwear should be re-brushed and sprayed when moving between areas of kauri, within the site.

All equipment that may come into contact with plant material or soil must be sanitised upon entry to and exit from the site using the brush and SteriGENE spray method. Equipment should be allowed to dry for at least 2 minutes, but preferably until completely dry, before transportation.

To assist with this, all on-site vehicles in the Management Area must hold a personal phytosanitary kit, including a 500 ml spray bottle of 2% SteriGENE solution and a scrubbing brush in a sealed plastic bag.

At all site entries / sign in points, a scrubbing bush, 4 L jerry can of 2% SteriGENE solution and a 1 L spray bottle of the SteriGENE solution shall be kept and maintained in a suitable container.

6.3.6 Disposal of Contaminated Organic Material

Where PA is identified from soil tests, felled kauri trees and soil within 3 x canopy drip line must be disposed of at a facility approved by the National Kauri Dieback Programme. Currently, the closest facility approved for receiving PA-infected organic material is the Tirohia landfill in Paeroa, operated by Waste Management (6332 State Highway 26).

There may also be opportunities for contaminated soil material to also be disposed of within the tailings facility prior to the last tailings deposition. This will ensure that any such soil will become buried under subsequent tailings.

Soil for disposal shall be dampened with water and covered prior to transportation at all times.

Soil or organic material from this location must not be transported beyond the PA Management Area unless it is taken to an approved KDP landfill for disposal (see the guidelines for Landfill disposal guidelines below).

All soil and vegetation lifted from the Management Area must be loaded into a tip-truck / tip-trailer fitted with a sealed liner that is robust enough to contain the material without leaking during loading and transporting.

Waste Management should be provided with at least 24 hours' notice to accept site waste, which can be done by calling 0800 113 340. Vehicles used for transporting organic matter need to be securely covered as to prevent the release of potentially infected material en route. The vehicle should be thoroughly sanitised as per the methods outlined above.

6.4 Myrtle Rust Protocols

6.4.1 Overview

Myrtle rust is a serious fungal disease of plants in the myrtle (Myrtaceae) family and is caused by the fungus Austropuccinia psidii. It affects several native plants including ramarama, pōhutukawa, rātā, kānuka and mānuka, as well as several exotic species. Myrtle rust is known to be present throughout most of the North Island (including Waihi), and across the top and on the west coast of the South Island (Beresford et al., 2019). In May 2018, the Ministry for Primary Industry's ("**MPI**") response was closed, and the focus moved to science to find ways to manage the disease in the longer term.

Myrtle rust can be identified by the following symptoms (myrtlerust.org.nz):

- Bright yellow powdery eruptions appearing on the leaf
- Brown/grey rust pustules on older lesions
- Grey 'fuzzy spore growth on underside of leaf
- Some leaves may become buckled or twisted and will die off.

Figure 10: Myrtle rust on ramarama (left), rata (right). Images courtesy of myrtlerust.org.nz

6.4.2 Purpose of Myrtle protocols

Myrtle Rust is now widespread and is wind-borne. Therefore, its transmission into the WNP area cannot be prevented. However, Project-mediated transmission can be minimised through recommendations provided in this Plan.

Currently, if Myrtle Rust is found, the MPI website recommends:

- Don't touch it.
- Take a clear in-focus photograph.
- Submit the photograph to iNaturalist.

The following recommendations will ensure the appropriate management of myrtle rust risk within the WNP area.

6.4.3 Myrtle rust risk management during Plant Maintenance and Offset Monitoring

If personnel believe they have seen the symptoms of myrtle rust, refer MPI recommendations above and notify the relevant plant nursery (if the infected plants are less than 5 years old).

If personnel wish to remove infected myrtle plant material:

- Bury infected material onsite (at 50 cm depth), or
- Take the Myrtle rust infected material to a landfill or transfer station provided that is it securely enclosed in a sealed bag and disposed of as general waste (**not green waste**).

6.4.4 Myrtle rust risk management during revegetation planting

Prior to replanting, a signed Myrtle Rust Nursery Management Declaration certifying that the plant supplier has implemented the New Zealand Plant Producers Incorporated Myrtle Rust Nursery Management Protocol should be provided to OceanaGold.

6.5 Didymo Protocols

6.5.1 Overview

Didymo (Didymosphenia geminata), also known as "rock snot", is an invasive freshwater algae found in New Zealand, primarily in the South Island.

Didymosphenia has large sarcophagus-shaped cells that are mounted on long mucilaginous stalks. Masses of this alga (commonly referred to as "didymo") primarily consisting of the stalks, can smother streambeds, and pile up along stream and river margins. Dried-up wads of this alga look like paper pulp dumped on the stream/river banks as shown in Figure 11 and Figure 12.

Figure 11: Didymo on stream rocks. Image courtesy of Landcare Research.

Figure 12: Didymo on rocks in stream bed. Image courtesy of Landcare Research.

6.5.2 Purpose of Didymo Protocols

Didymo is not yet detected in the North Island of New Zealand, therefore following the “Check – Clean -Dry” method outlined by MPI is of high importance (further details on cleaning methods is available on the MPI website[1]) in preventing the spread through north island water ways.

6.5.3 Didymo Risk Management During Surface Activities

All gear and equipment being used in or near waterways should be washed using the “Check - Clean - Dry” method outlined by MPI. If personnel believe they have seen didymo, refer to the MPI recommendations at the website link above. Sightings should be reported to MPI or the local regional council.

6.6 Weed Management

The control of weed plants will be implemented throughout all revegetation and enhancement areas to promote native forest regeneration.

Weed control will be maintained for a minimum of 5 years during which any competitive weeds will be removed. Guidance on the control of priority weeds is provided in Table 32; and an adaptive management approach may be required for additional weed species encountered.

[1] https://www.mpi.govt.nz/outdoor-activities/boating-and-water-activities-preventing-the-spread-of-pests-weeds-and-diseases/check-clean-dry-help-protect-new-zealands-waterways#movingbetweenwaterways

Table 32: Weed plants within the WNP area and recommended control methods. Information adapted from weedbusters.co.nz. Photographs retrieved from NZPCN.org.nz and remain the property of their photographers. For more information regarding weed control methods, see weedbusters.org.nz

Species	Common name	Weed control method	Photograph
Asparagus scandens	Climbing asparagus	Spray lightly spring-early summer, avoid runoff, total coverage not required (200ml glyphosate/10L. Do not add penetrant when spraying against tree trunks). Spray autumn- winter only in frost-free areas on healthy growth, (increase rate to 300ml glyphosate/ 10L).	
Cortaderia selloana	pampas	Remove plants by hand as they appear or sizeable plants by bulldozer/ excavator. Compost or leave on site to rot down. Burn or bury any flower heads. Weed wipe (year-round): glyphosate (200ml/L + penetrant).	
Hedychium gardnerianum	wild ginger	Cut above pink collar at base and paint with glyphosate (250ml/L). Repeat annually or if plants re-sprout. Hand-pulling is suitable for small plants, but the debris should not be composted.	

Species	Common name	Weed control method	Photograph
Ligustrum sinense	Chinese privet	Cut and stump swap with glyphosate (250ml/L)	
Ulex europaeus	gorse	Spray (spring-summer): triclopyr 600 EC (20ml/10L) or triclopyr 300 EC (40ml/10L). Spray (autumn-winter): metsulfuron-methyl 600g/kg (5g/10L+ penetrant - knapsack) or (20g/100L + penetrant - spraygun) or a product containing 100g picloram+300g triclopyr/L (250ml/100L spraygun).	
Lonicera japonica	Japanese honeysuckle	Vial method for ground infestations. Pull up all stems possible and dispose. Treat and move vials monthly until plant eradicated. Treat remainder by placing cut vine ends in vials 5-10 m apart containing 1 g metsulfuron/ 20 ml. 5 g metsulfuron/ L or 200 ml Tordon Brush Killer/ L or Vigilant Gel. Glyphosate (10 ml/ L) or metsulfuron-methyl 600 g/ kg (5 g/ 10L + penetrant) or clopyralid (50 ml/10 L) or Tordon Brush Killer (60 ml/10 L).	
Pinus radiata	Radiata pine	Removal of pines from within the SNA De-limb and top to no more than 5 m. Remove branches and leave standing poles to break down naturally. Trunk drilling and poisoning (refer methods contained within Marlborough District Council Factsheet 174 “Poisoning wilding radiata pine”)	

Species	Common name	Weed control method	Photograph
		Felled and/or poisoned trees to be left in situ to decompose naturally. Trunks may be drilled or cut to facilitate decomposition.	

6.7 Reporting requirements and triggers for remedial action

Any sightings or signs of infections related to kauri dieback, myrtle rust and didymo will be reported internally and the appropriate mitigation and notifications measures implemented. Where a PA+ result is detected, the steps outlined in Figure 13 will be undertaken. Noting that for Step 6, this management can be updated, and a new management is not required to be prepared.

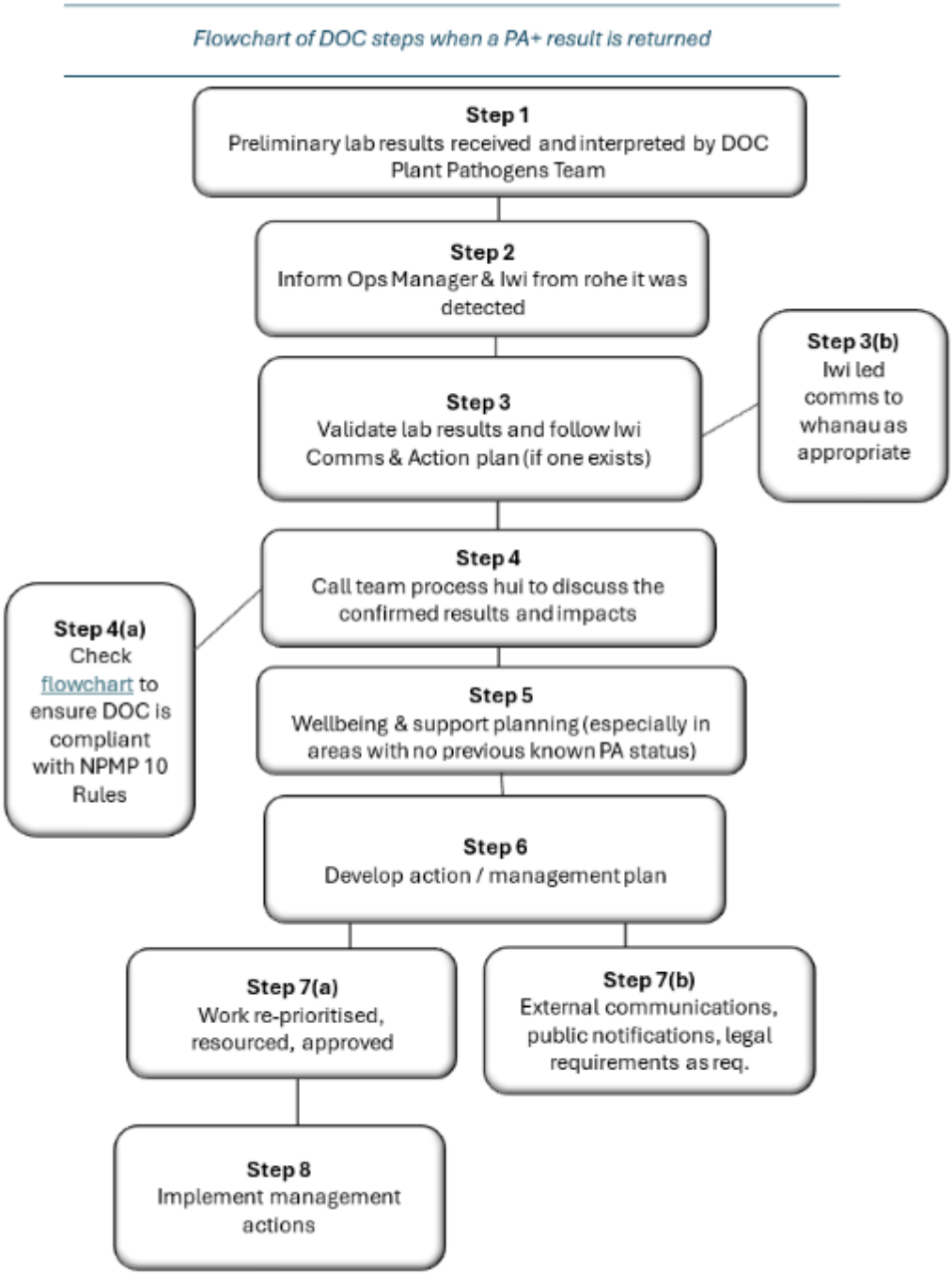


Figure 13 DOC PA+ Requirements

6.8 Key Performance Indicators

Any sightings or confirmed infections of plant pathogens, weeds, or invasive species are reported internally and managed in accordance with best practice standards and requirements and further spread is not facilitated by the WNP.

PART F: PEST ANIMAL MANAGEMENT PLAN

7 PEST ANIMAL MANAGEMENT

7.1 Overview

7.2 Consent Condition Matrix

Table 33 below sets out the relevant consent conditions associated with the Pest Animal Management and where they are addressed within this document.

Table 33 Pest Animal Management Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following: Pest Animal Management Plan – which outlines the methods to be implemented to control pest animals throughout mitigation areas	C47B(2)(a): > Lead in times –Section 7.8 > Implementation timeframes -Section 7.8 > Duration of maintenance – 7.7 C47B(2)(b): > Monitoring – 7.9 > Triggers and remedial actions – Section 7.11 > Reporting requirements – Section 7.12 C47B(2)(c): Performance indicators – Section 7.10

7.3 Purpose and Objectives

Pest animal management forms an integral component of the Waihi North Project (WNP) biodiversity offset, compensation, enhancement and restoration programme. Its purpose is to reduce the effects of introduced mammalian pests on indigenous vegetation and fauna so that the ecological outcomes required by this Ecology and Landscape Management Plan (ELMP) can be achieved and sustained over the life of the Project.

Pest management is therefore not treated as a stand-alone operational activity. It is an ecological treatment that supports the successful establishment and development of restoration planting, protects resident and translocated lizard populations, reduces predation pressure on indigenous fauna, and improves the condition and resilience of indigenous habitats. The programme is intended to contribute directly to the Project's biodiversity offset and compensation outcomes and to the delivery of long-term net ecological gain.

The pest management commitments set out in this ELMP define the management areas, target pest species, minimum control network, operational timeframes, monitoring requirements, performance targets, trigger thresholds, remedial responses, reporting obligations and review process that will apply to the Project. A separate Pest Animal Management Plan (PAMP) provides the supporting operational methodology for contractors and field personnel, including device selection, installation procedures, servicing requirements, data recording and detailed monitoring protocols. The PAMP may be updated to reflect improved technology or operational practice, provided that the ecological outcomes, minimum performance standards and consent commitments established by this ELMP are maintained or improved.

7.3.1 Ecological outcomes supported by pest management

The pest animal management programme will support the following WNP ecological outcomes:

- Successful establishment of all biodiversity offset, compensation, enhancement and replacement planting areas;
- Increased survival, growth and structural development of planted indigenous vegetation;
- Increased indigenous understorey species richness and canopy development;
- Increased availability of indigenous fruit, flowers and other seasonal food resources for native fauna;
- Increased abundance and diversity of indigenous birds and invertebrates;
- Protection and enhancement of existing and created lizard habitat, including habitat supporting resident and translocated lizard populations;
- Reduced browsing, grazing and predation pressure within management areas; and
- Improved ecological connectivity and habitat resilience across the wider Waihi landscape.

7.3.2 Pest management objectives

To achieve these outcomes, pest animal management will be implemented in accordance with the following objectives:

Objective 1 - Protect restoration establishment: Maintain browsing and grazing pests at levels that do not compromise the survival, growth or structural development of restoration planting.

Objective 2 - Reduce predation pressure: Suppress introduced mammalian predators to reduce risks to indigenous lizards, birds, eggs, nestlings and large invertebrates.

Objective 3 - Protect lizard management areas: Apply the highest intensity of predator control and surveillance within areas supporting resident or translocated lizard populations, including a minimum three-month control lead-in before any lizard translocation.

Objective 4 - Achieve measurable performance standards: Monitor pest activity using repeatable methods and maintain pest indices below the targets and trigger thresholds specified in this ELMP.

Objective 5 - Apply adaptive management: Increase or modify control effort where monitoring identifies threshold exceedance, persistent pest activity, reinvasion pathways, unacceptable browse damage or a material risk to ecological outcomes.

Objective 6 - Maintain long-term implementation: Continue pest control, monitoring, reporting and review over the 20 year planting timeframe, unless an alternative duration or management approach is approved through the ELMP review process.

Objective 7 - Integrate with wider management: Where practicable, coordinate Project pest management with existing OGNZL control networks and wider landscape-scale biodiversity initiatives in the Waihi area.

The programme will be outcome-focused. The control methods and device types used may change over time as new humane and effective technologies become available; however, any change must continue to meet the spatial coverage, monitoring, target, threshold and response requirements specified in this ELMP.

7.4 Pest Management Areas

For the purposes of pest animal management, the biodiversity offset, compensation, enhancement and restoration sites associated with the WNP have been consolidated into two management areas (Figure 14). The sites vary in size, configuration, habitat type and ecological objective, but broadly fall into two categories requiring different levels of control intensity. This two-tier approach provides a clear and practical framework for implementation while ensuring that pest management effort is proportionate to ecological sensitivity and the outcomes sought.

Figure 14 Waihi North Project Pest Management Areas (Area A being the Lizard Habitat Enhancement Area and Area B being all other identified areas).

7.4.1 Management Area A - Lizard Habitat Management Areas

Management Area A comprises the lizard release area, lizard enhancement area and GOP copper skink compensation area. These sites support, or are intended to support, resident and translocated lizard populations and represent the highest ecological priority for pest animal management within the Project.

Small lizard management sites are particularly vulnerable to reinvasion because their perimeter-to-area ratio is high and surrounding habitats may continue to support mammalian predators. Control within Area A will therefore be intensive, continuous and supported by a comparatively dense control and surveillance network. The programme will be designed to suppress both larger predators and small rodents, including mice, which may continue to affect lizards and large invertebrates even where rats and mustelids are maintained at low levels.

The principal management requirements for Area A are:

- Predator control will commence no less than three months before any lizard translocation;
- Control will continue throughout the operational life of the Project and for the 20-year planting timeframes, unless otherwise approved through the ELMP review process;
- Target species will include rats, mice, mustelids, hedgehogs, possums and feral cats;
- Rodent bait stations will generally be deployed at approximately 50 m spacing;
- Multi-species predator traps capable of controlling rats, mustelids and hedgehogs will generally be deployed at approximately 100 m spacing;
- Possum traps will generally be deployed at approximately 200 m spacing, supplemented by bait stations and additional devices where monitoring identifies elevated activity;
- Feral cat control will be undertaken where camera monitoring, field observations or other evidence confirms activity;
- Modified chew-card monitoring will be established at approximately 40 m spacing; and
- Permanent or repeatedly deployed trail cameras will provide surveillance for mustelids, hedgehogs, feral cats and other larger predators.

Device locations shown on maps will be indicative. Final micro-siting will be undertaken in the field to maximise encounter rates and will prioritise habitat edges, tracks, fence lines, stream margins, vegetation linkages, culverts, fallen logs and other likely movement or reinvasion pathways. Minor adjustments to mapped locations will not constitute a change to the ELMP where the required network density, coverage and ecological function are retained.

7.4.2 Management Area B - Vegetation Restoration and Biodiversity Enhancement Areas

Management Area B comprises the remaining biodiversity offset, enhancement, compensation and restoration planting areas associated with the WNP. These include the Waihi Biodiversity Offset Enhancement Area, SNA enhancement areas, offset planting areas, replacement planting areas, TSF buffer planting, riparian planting areas and other restoration planting undertaken on land owned or managed by OGNZL.

The primary purpose of pest management in Area B is to improve vegetation establishment and long-term ecological condition by reducing browse pressure and suppressing mammalian predators. Predator control will also provide wider benefits for indigenous birds, lizards and invertebrates using these sites and adjoining habitat. Because many of the restoration areas are narrow, fragmented or strongly influenced by surrounding edge habitat, the network will place particular emphasis on site perimeters and likely reinvasion pathways rather than relying solely on a conventional square grid.

The principal management requirements for Area B are:

- Target species will include rats, possums, mustelids, hedgehogs, rabbits and hares, together with other browsing mammals where detected or where browse effects become unacceptable;
- Active mouse suppression is required within Area A only; any reduction in mice within Area B will be incidental to the wider rodent control programme;
- Combined rodent and possum bait stations will generally be deployed using an indicative 50 m by 100 m network, including approximately 50 m spacing around site perimeters and additional stations at likely reinvasion pathways;
- Multi-species predator traps will generally be deployed at approximately 100 m spacing;
- Supplementary possum traps will be installed where monitoring identifies elevated possum activity or where additional protection of restoration planting is required;
- Rabbit, hare and other browsing mammal control will be undertaken where field observations, monitoring or vegetation damage indicate that restoration outcomes may be compromised;
- Modified chew-card monitoring will be undertaken along transects through each management area at approximately 40 m spacing; and
- Trail cameras will be placed at representative sites and likely reinvasion points, with the number and location determined by site size, shape, habitat linkages and predator movement patterns.

7.5 Existing pest control infrastructure

An existing trap and bait station network is present across parts of the WNP area. That network has historically been serviced on a discretionary basis and has not operated against formal pest targets or trigger thresholds. Existing devices may be retained, relocated, upgraded or incorporated into the ELMP network where they are suitable, humane, serviceable and contribute to the required spatial coverage. Once incorporated, those devices will be uniquely identified, mapped, serviced, monitored and reported as part of the consented pest management programme.

The final network maps will distinguish between existing infrastructure retained for use, new devices required to meet the ELMP commitments, and monitoring locations. Where an existing device is not appropriately located or does not meet current animal welfare or operational requirements, it will not be relied upon to satisfy the minimum network specified in this ELMP.

7.6 Target Pest Species

The mammalian pest species targeted by the programme have overlapping and cumulative effects on indigenous biodiversity. These effects include predation of lizards, birds, eggs, nestlings and large invertebrates; consumption of seeds and seedlings; browsing of planted and naturally regenerating vegetation; competition for food resources; and modification of habitat structure. Management priorities

differ between Areas A and B according to the ecological values present and the mechanism by which each pest species may affect Project outcomes.

The target species, principal biodiversity effects and management emphasis are summarised in Table 34. The detailed control methods, operational timing, monitoring protocols, performance standards and threshold responses are set out in the subsequent sections of this ELMP and in the supporting standalone PAMP.

Table 34 Target pest species, principal ecological effects and management emphasis for the Waihi North Project.

Target species	Principal ecological effects	Management area and focus
Ship rat and Norway rat (Rattus rattus and R. norvegicus)	Predation of lizards, birds, eggs, nestlings and large invertebrates; consumption of seeds and fruit; potential reduction in recruitment and habitat quality. Ship rats are a principal threat to lizard populations and restoration outcomes.	Areas A and B. Continuous bait-station control supported by trapping. Higher suppression standard within Area A. Activity monitored using modified chew cards and, where useful, cameras and trap-catch records.
House mouse *(Mus musculus)*	Predation of native invertebrates, lizard eggs and small lizards, together with consumption of seeds. Mice may remain abundant after larger predators are reduced and may therefore continue to affect sensitive lizard habitat.	Area A is the focus of active management. Bait stations and suitable traps will be used to suppress mice alongside rats. Outside Area A, mouse reduction may occur incidentally but is not a primary management objective.
Brushtail possum *(Trichosurus vulpecula)*	Browsing of planted and naturally regenerating vegetation; suppression of canopy and understorey development; consumption of fruit, flowers and foliage; opportunistic predation of native fauna.	Areas A and B. Controlled primarily through combined rodent/possum bait stations, supplemented by possum traps where required. Monitoring will use chew cards, camera detections and operational observations.
Mustelids - stoats, ferrets and weasels *(Mustela spp.)*	Predation of lizards, birds, eggs, nestlings and large invertebrates. Mustelids can reinvade small restoration sites rapidly and an individual animal may cause substantial localised losses.	Areas A and B, with highest priority in Area A. Multi-species predator traps at approximately 100 m spacing, supplemented by strategically placed cameras and targeted response to confirmed detections.
Hedgehog *(Erinaceus europaeus)*	Predation of lizards, eggs, ground-nesting birds and a wide range of indigenous invertebrates. Hedgehogs may be common in pasture-restoration interfaces and other edge habitats.	Areas A and B. Controlled using multi-species predator traps. Cameras, trap records and field observations will be used to identify persistent or increasing activity requiring intensified control.
Feral cat *(Felis catus)*	Predation of lizards, birds and other vertebrate fauna. Individual cats may range over large areas and repeatedly enter small lizard management sites.	Primary management focus is Area A, with control elsewhere where monitoring identifies ecological risk. Camera surveillance will be used to identify activity and guide targeted trapping or other lawful control.
Rabbits and hares	Browsing and clipping of planted seedlings and regenerating	Area B, and Area A where relevant. Management is triggered by animal

Target species	Principal ecological effects	Management area and focus
(Oryctolagus cuniculus* and *Lepus europaeus)	vegetation, potentially reducing plant survival and delaying restoration establishment.	presence, field sign or browse damage likely to compromise restoration outcomes. Control may include targeted night shooting, trapping or an authorised toxin where appropriate.
Ungulates and other browsing mammals, including deer, goats and pigs where present	Browsing, trampling, rooting and disturbance of restoration planting and indigenous vegetation. Repeated use may cause substantial localised plant losses and inhibit regeneration.	Primarily Area B. Targeted ground control will be initiated where animals or repeated browse impacts are detected. Control intensity will be proportionate to the ecological risk and observed damage.

7.7 Pest control implementation

Pest animal management will be delivered through an integrated programme of toxic baiting, kill trapping, targeted control and surveillance. The programme has been designed for the small, narrow and fragmented configuration of many WNP restoration sites, where pest reinvasion can occur rapidly from adjoining farmland, exotic vegetation and indigenous habitat. Control infrastructure will therefore provide both internal coverage and increased protection along site boundaries, habitat linkages and likely reinvasion pathways.

The device spacings and minimum management requirements specified in this ELMP constitute the core Project commitments. The precise device models, lures, bait products and field micro-sites may be refined through the contractor-focused Pest Animal Management Plan (PAMP), provided that any alternative approach maintains or improves the required spatial coverage, animal-welfare performance, target-species capability and ecological outcomes.

7.7.1 Spatial deployment and minimum device spacing

Control networks will be established throughout each management area before the relevant ecological activity begins. Device locations shown on Project maps will be indicative. Final locations will be confirmed during field installation to account for access, topography, vegetation, watercourses, public safety and animal movement patterns. Micro-siting will prioritise habitat edges, tracks, fence lines, stream margins, culverts, ridgelines, fallen logs, vegetation linkages and other locations likely to concentrate pest movement.

Minor relocation of an individual device from its mapped position will be permissible where required for safety or to improve effectiveness. Such relocation must not result in a material reduction in network coverage or create an unprotected gap within a management area. Confirmed device locations will be recorded spatially within the Project pest management database and shown in annual reporting.

Table 35 Minimum pest control network and spatial deployment requirements.

Management area	Control component	Minimum / indicative spacing	Deployment requirements
Area A - Lizard Habitat Management Areas	Rodent bait stations	Approximately 50 m	Deployed throughout the management area to provide intensive suppression of rats and mice, with additional attention to boundaries and likely reinvasion pathways.

Management area	Control component	Minimum / indicative spacing	Deployment requirements
Area A - Lizard Habitat Management Areas	Multi-species predator traps	Approximately 100 m	Devices capable of controlling rats, mustelids and hedgehogs, distributed across the site and micro-sited on likely movement routes.
Area A - Lizard Habitat Management Areas	Possum traps	Approximately 200 m	Used with the bait station network and supplemented where monitoring identifies elevated possum activity or localised browse risk.
Area A - Lizard Habitat Management Areas	Feral cat control	Targeted; no fixed grid	Trap placement directed by trail-camera detections, field signs, observations and likely access routes.
Area B - Vegetation Restoration and Biodiversity Enhancement Areas	Combined rodent and possum bait stations	Indicative 50 m x 100 m network	Approximately 50 m spacing around site perimeters, with internal control lines approximately 100 m apart where site dimensions permit. Additional stations at habitat links and reinvasion points.
Area B - Vegetation Restoration and Biodiversity Enhancement Areas	Multi-species predator traps	Approximately 100 m	Distributed through restoration areas and placed preferentially along edges, tracks, riparian corridors and vegetation linkages.
Area B - Vegetation Restoration and Biodiversity Enhancement Areas	Supplementary possum traps	As required	Installed where monitoring or vegetation condition indicates that the bait station network is not providing adequate local suppression.
Area B - Vegetation Restoration and Biodiversity Enhancement Areas	Rabbit, hare and other browsing-mammal control	Targeted; no fixed grid	Control directed to areas where animals, field sign or browse damage are detected and restoration outcomes are at risk.

7.7.2 Kill trapping

Kill trapping will operate continuously and will be used as a primary control method for mustelids and hedgehogs and as a complementary method for rats and possums. Deployment will be as per the recommended spacing in Table 36 and Figures 15-Figure 17. Only traps that have demonstrated acceptable animal-welfare performance for the relevant target species will be used. Devices must have passed the applicable National Animal Welfare Advisory Committee humane trap standard, or an equivalent standard that supersedes it, unless a different legally authorised method is required for a species for which no suitable kill trap is available.

The trapping network may comprise conventional single-set traps, double-set units, self-resetting traps or species-selective automated systems. Device selection will account for the target species, non-target risk, servicing requirements, site access and the technology available at the time of deployment.

Substitution of a device model will not require amendment of this ELMP where the replacement is legally authorised, suitable for the target species, provides equivalent or improved animal-welfare performance and does not reduce the required network coverage.

Table 36 Indicative trapping approaches by target species.

Target species	Examples of suitable device types	Primary management approach
Rats	NAWAC-approved single-set, double-set, self-resetting or multi-species traps	Integrated with the permanent rodent bait station network, with increased trapping intensity in Area A and where monitoring identifies elevated rat activity.
Mice	Mouse-capable traps and multi-species automated devices	Active mouse suppression within Area A only; elsewhere any mouse reduction is incidental to the wider rodent programme.
Possums	NAWAC-approved possum kill traps and self-resetting devices	Bait stations provide the principal control method, supplemented by trapping in Area A and where monitoring or browse effects identify additional need.
Mustelids	NAWAC-approved mustelid traps, including single-set, double-set, self-resetting or multi-species devices	Permanent multi-species predator network throughout Areas A and B, with additional targeted devices following detections.
Hedgehogs	NAWAC-approved predator traps capable of reliably killing hedgehogs	Controlled through the multi-species predator network; trapping intensity increased where persistent or increasing camera detections occur.
Feral cats	Live-capture cage traps, approved kill traps or species-selective devices	Targeted control initiated following confirmed activity, with trap placement directed by cameras and field observations.

Live-capture traps, where used, will be checked at the frequency required by legislation, animal-welfare standards and site-specific operating procedures. Any captured companion animal or non-target species will be managed in accordance with the approved operating procedure. Carcasses and other trap waste will be handled and disposed of safely and in accordance with legal requirements.

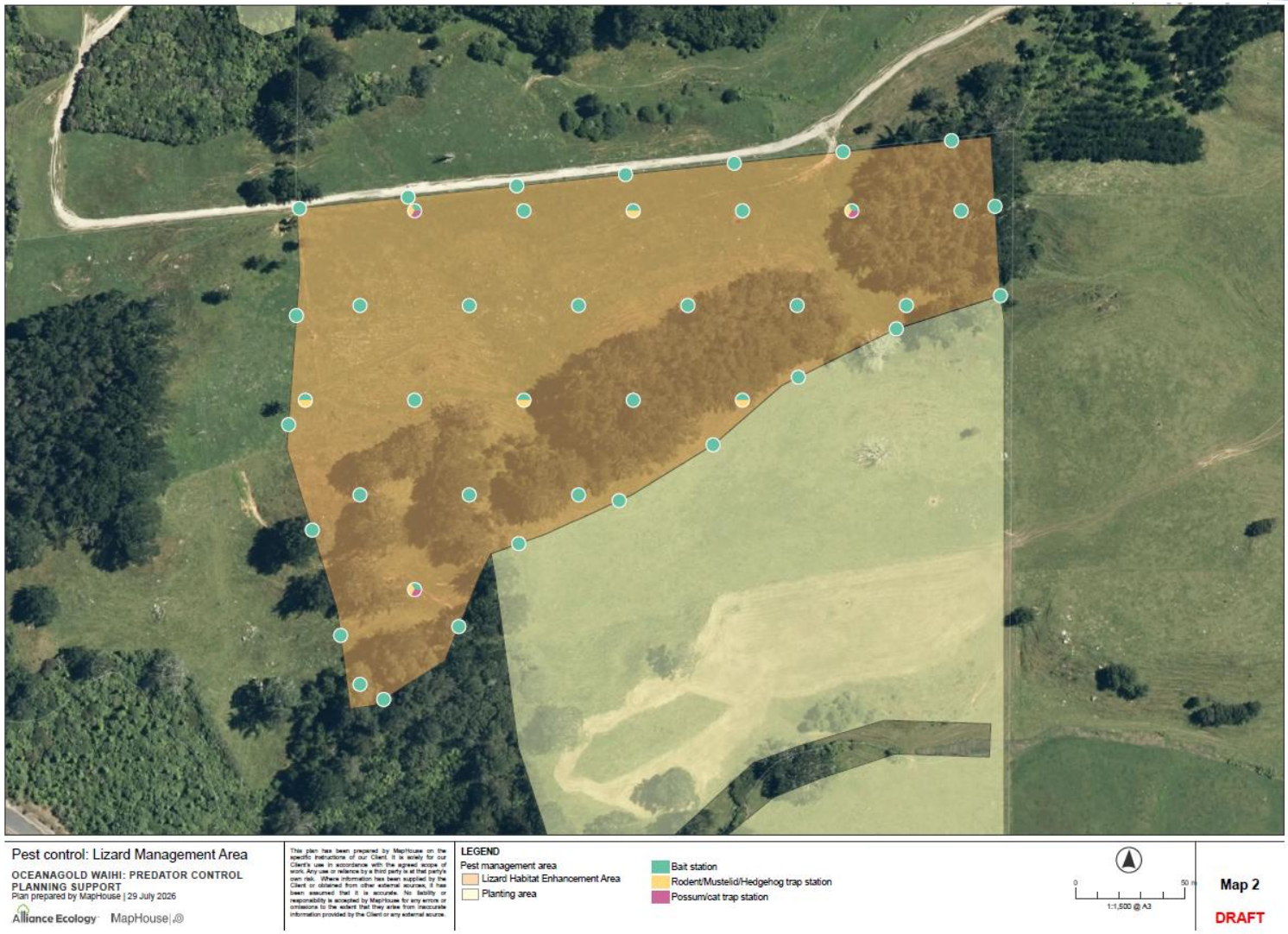


Figure 15 Bait Trap Area in the Lizard Management Area

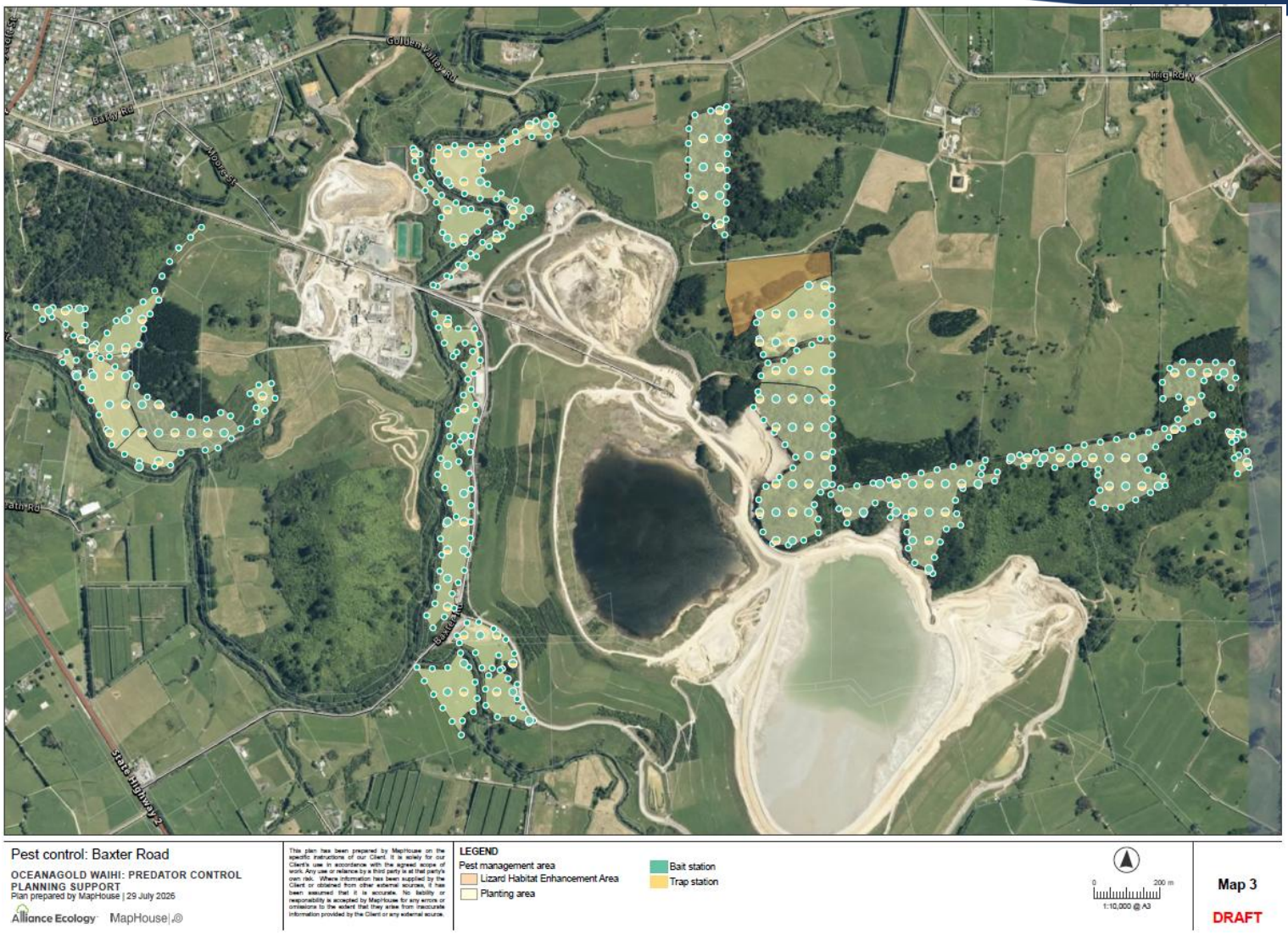


Figure 16 Bait Trap Area at Baxter Road

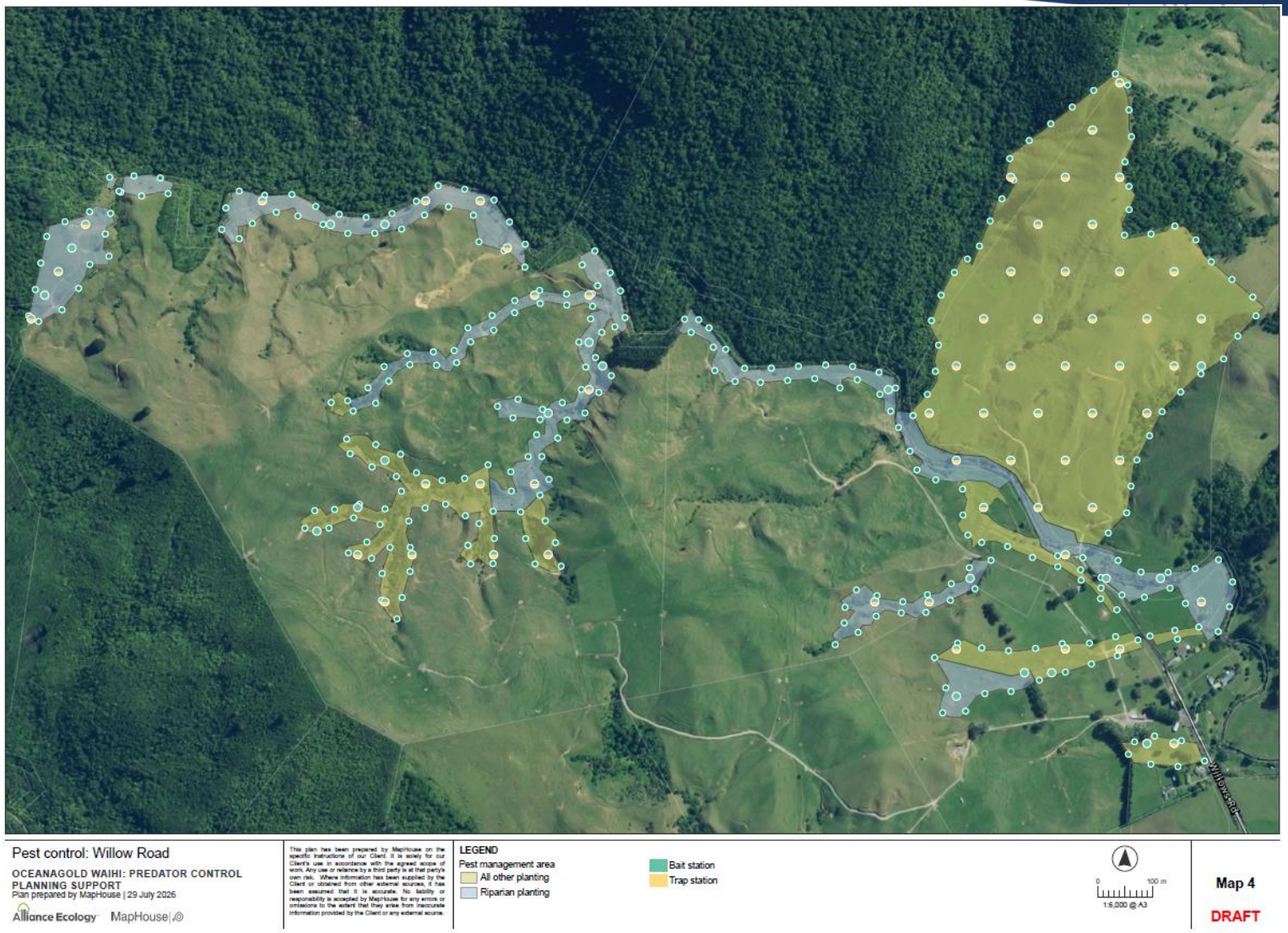


Figure 17 Bait Trap Area at Willow Road

7.7.3 Toxic control

Permanent bait station networks will provide the primary method of rat and possum control throughout the management areas (see Figure 15 – Figure 17) and will also provide targeted mouse suppression within Area A. Toxic bait will be deployed only within fit-for-purpose bait stations designed to restrict access by children, domestic animals and non-target wildlife. Bait stations will be secured, individually identified and recorded within the Project pest management database.

DoubleTap® (diphacinone and cholecalciferol) or cholecalciferol are the preferred vertebrate toxic agents for routine maintenance control. Alternative vertebrate toxic agents may be used where operational circumstances warrant, provided that the product is registered for the intended use in New Zealand, is applied in accordance with the label and all statutory requirements, and has been assessed as appropriate for the ecological values and non-target risks at the site.

Toxic baiting will be undertaken as discrete control pulses. Bait stations will be serviced and replenished in accordance with product requirements while uptake remains active, and residual bait will be removed at the completion of a pulse where appropriate to minimise non-target exposure and environmental contamination. Warning signs, public notification, access restrictions and controlled-substance requirements will be implemented wherever required by the product, legislation or site context.

7.7.4 Targeted browsing-mammal control

Rabbits, hares, deer, goats, pigs and other browsing or grazing mammals will be controlled where animals are detected or where browse, trampling or rooting threatens restoration establishment or ecological condition. The control method will be selected according to species, site access, public safety, legal requirements and the scale of the problem. Methods may include targeted night shooting, ground hunting, trapping or an authorised vertebrate toxic agent where appropriate. Control will focus on the affected area and likely source or access route, followed by inspection of vegetation condition to confirm whether the response has been effective.

7.7.5 Health, safety and non-target risk management

All pest animal control will be undertaken by suitably trained and, where required, certified personnel in accordance with relevant legislation, product labels, landowner requirements and OGNZL health and safety procedures. Site-specific risks will be assessed before devices or toxins are deployed. Control equipment will be positioned and secured to minimise risks to workers, the public, domestic animals and indigenous wildlife.

Where practicable, devices will incorporate restricted entrances, raised sets, species-selective triggers or other safeguards appropriate to the site. Non-target captures, interference, damage, theft and other incidents will be recorded and reviewed. Where a material non-target risk is identified, the relevant device, bait or placement will be modified, suspended or replaced while maintaining effective pest suppression through an alternative method.

7.8 Operational Timeframes

Pest animal management will be established in advance of the ecological values it is intended to protect and will continue throughout the life of the Project. Trapping networks will operate year-round. Toxic control, monitoring and servicing intensity will vary in response to pest activity, seasonal conditions, restoration stage, accessibility and monitoring results; however, control will not be routinely deactivated solely because of the time of year.

The annual programme described below represents the minimum routine operating regime. Where a management threshold is exceeded, a new reinvasion pathway is identified, significant browse damage occurs or an important ecological value is at immediate risk, additional control and monitoring will be implemented outside the routine schedule.

7.8.1 Establishment and lead-in requirements

The pest management network for each management area will be planned, installed and operational before the relevant planting, habitat enhancement or fauna translocation activity commences. The programme will be implemented progressively as management areas become available, but each area must meet the applicable lead-in requirements set out in Table 37.

Table 37 Pest management establishment and implementation phases

Phase / timing	Required actions	Purpose and completion requirement
Planning and baseline phase	Confirm management-area boundaries, target species, access, existing devices and likely reinvasion pathways; undertake baseline monitoring where practicable; finalise network design and procurement.	Completed sufficiently early to allow the control network to be installed and operational before planting, habitat works or translocation.
Network installation	Install, identify and map traps, bait stations and monitoring devices; establish the data-management system; undertake commissioning and safety checks.	All minimum network components for the relevant area are operational before the commencement of the ecological activity they support.
Area A lead-in	Commence the full predator-control programme, including rodent baiting and predator trapping, no less than three months before any lizard translocation.	Control remains continuously operational through the translocation period and afterwards. Monitoring is used to confirm pest activity and guide any required intensification.
Initial knockdown / Year 1	Apply an intensive initial control phase, potentially including additional toxic bait pulses, more frequent servicing or supplementary devices.	Reduce established pest populations to below the relevant trigger thresholds and identify local reinvasion pathways before transition to routine maintenance.
Routine maintenance	Maintain continuous trapping, seasonal toxic control, quarterly monitoring, database recording and annual reporting.	Continue for the 20-year planting period unless an alternative duration or approach is approved through the ELMP review process.
Triggered response	Implement additional control whenever numerical thresholds, qualitative triggers or unacceptable ecological effects are identified.	Continue intensified management and undertake follow-up monitoring until the relevant target or management objective is restored.

7.8.2 Routine annual operating schedule

Single-set traps require relatively frequent servicing because each device becomes unavailable after activation. These traps will generally be checked approximately fortnightly during spring and summer, when pest activity and ecological vulnerability are typically greatest, and approximately monthly during autumn and winter. A more frequent interval will be adopted where required by the device, animal-welfare obligations, high capture rates, remote alerts or threshold exceedance.

Self-resetting and remotely monitored traps will generally be inspected at least every two months, or sooner where remote reporting, bait or lure condition, capture information or manufacturer requirements indicate that servicing is needed. The use of self-resetting devices does not remove the requirement for routine physical inspection and maintenance.

Routine toxic control will generally comprise two seasonal maintenance pulses each year, normally during spring and late summer or autumn. Timing may be adjusted to account for local pest activity, weather, bait uptake and operational access. Additional baiting pulses may be undertaken during the initial knockdown phase or where monitoring indicates that the relevant trigger threshold has been exceeded.

Chew-card and trail-camera monitoring will generally be undertaken quarterly, representing one survey in each season. Additional surveys will be undertaken following significant control operations, where a threshold is exceeded, where persistent predator activity is detected or where increased surveillance is required to protect lizard habitat or newly established restoration planting.

Table 38 Minimum routine frequency of pest animal control and monitoring activities

Activity	Minimum routine frequency	Indicative timing	Additional requirements
Single-set kill-trap servicing	Approximately fortnightly in spring/summer; monthly in autumn/winter	Year-round	Increase frequency where capture rates, alerts, ecological risk or threshold exceedance indicate a need.
Self-resetting / remotely monitored trap inspection	At least every two months	Year-round	Service sooner in response to alerts, manufacturer requirements, lure depletion, faults or elevated pest activity.
Maintenance toxic baiting	Normally two control pulses per year	Spring and late summer/autumn	Timing may be adjusted; undertake additional pulses in Year 1 or following threshold exceedance or reinvasion.
Chew-card monitoring	Quarterly	One survey per season	Repeat after major control or approximately four weeks after additional control undertaken in response to an exceedance.
Trail-camera monitoring	Quarterly	One survey per season	Additional surveillance at lizard sites, reinvasion pathways or locations with persistent predator detections.
Infrastructure inspection and database update	During every servicing or monitoring visit	Year-round	Record device status, captures, bait/lure condition, maintenance

Activity	Minimum routine frequency	Indicative timing	Additional requirements
			needs and confirmed GPS location.
Annual programme review and reporting	Annually	Report submitted by the date specified in the consent or ELMP reporting framework	Assess performance against targets, document exceedances and responses, and confirm the following year's programme.

7.8.3 Adjustment of timing through adaptive management

The routine frequencies in Table 38 may be increased whenever monitoring or operational information indicates that greater effort is required. Relevant factors include an exceedance of a numerical pest threshold, a confirmed mustelid or feral cat detection, increasing hedgehog activity, repeated bait depletion, high trap catch rates, equipment failure, a newly identified reinvasion pathway, unacceptable browse damage, or an imminent ecological activity such as lizard translocation.

Where additional control is initiated following a numerical threshold exceedance, follow-up monitoring will generally be undertaken approximately four weeks after the additional control commences. Intensified control and monitoring will continue until results demonstrate that the applicable target has been achieved or the qualitative management trigger has been satisfactorily addressed. The reason for any material adjustment to the routine programme, the actions undertaken and the outcome will be documented in the annual pest management report.

7.9 Monitoring Programme

Monitoring shall be undertaken to assess the effectiveness of pest management, determine whether performance targets are being achieved and support adaptive management. Monitoring will focus on repeatable indices of pest activity rather than absolute population estimates.

Monitoring will comprise:

- Modified chew card surveys for rodents and possums (Figure 18 – Figure 20).
- Strategically located trail cameras targeting mustelids, feral cats and hedgehogs at permanent monitoring locations where practicable (Figure 18 – Figure 20).
- Quarterly monitoring, with additional surveys following major control operations or threshold exceedances.
- Modified chew cards will generally be deployed at approximately 40 m spacing along representative transects to maximise spatial coverage across the fragmented restoration sites. Trail cameras will be placed along likely predator travel routes including riparian margins, tracks, habitat edges and other reinvasion pathways. Monitoring results will be compared against the performance targets below and used to guide adaptive management.

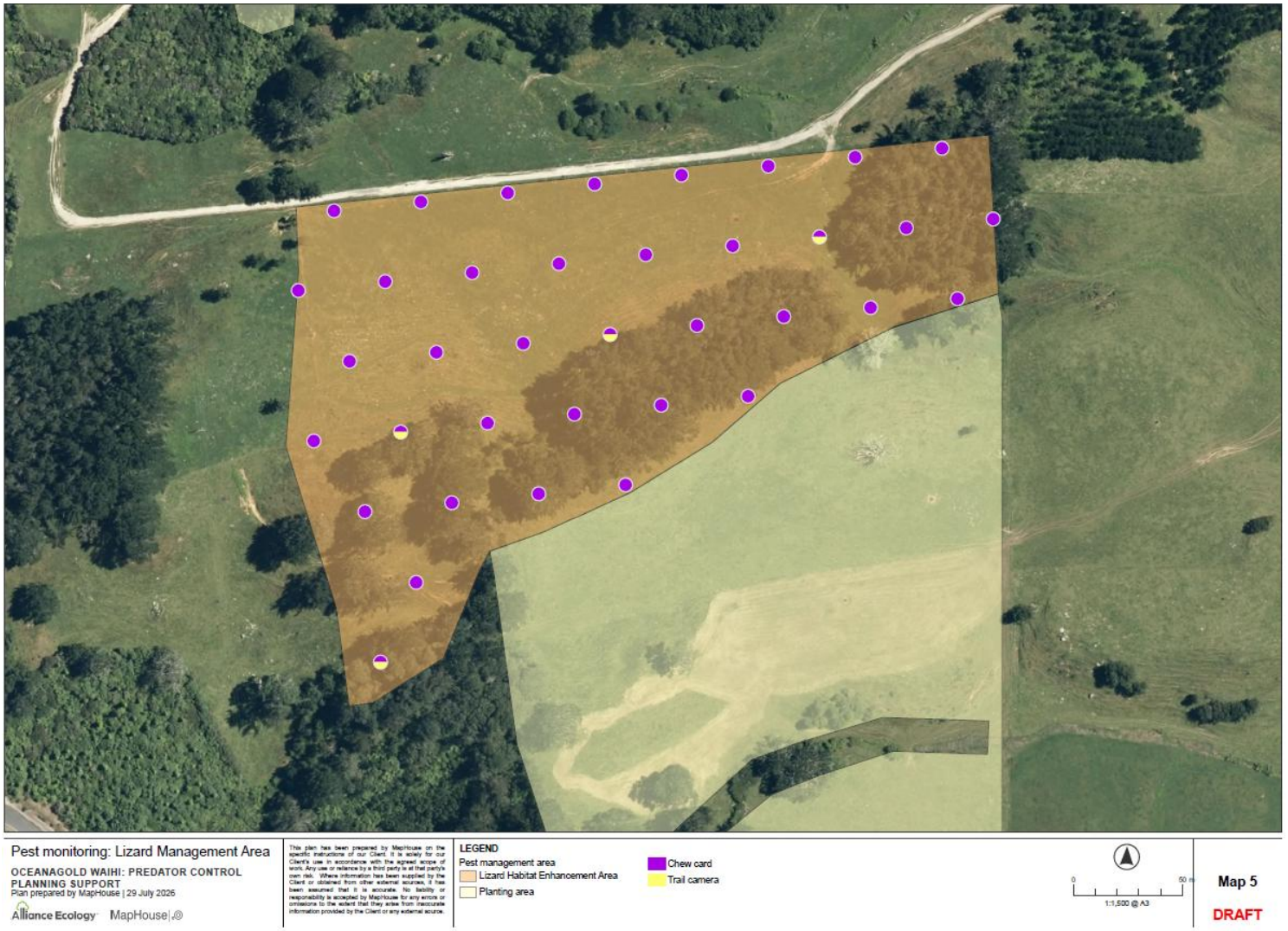


Figure 18 Chew Card and Trail Cameras in the Lizard Management Area

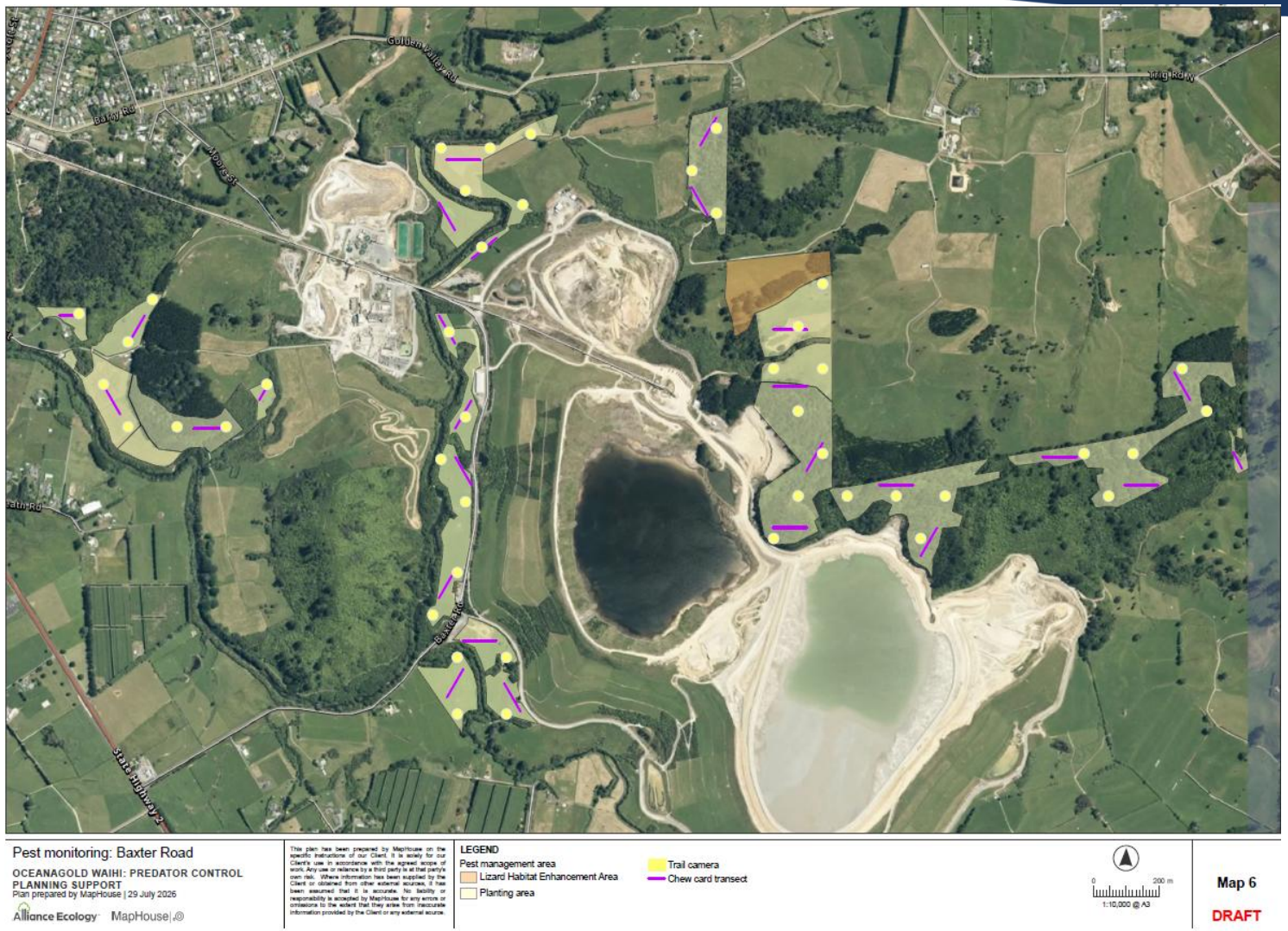


Figure 19 Chew Card and Trail Cameras at Baxter Road

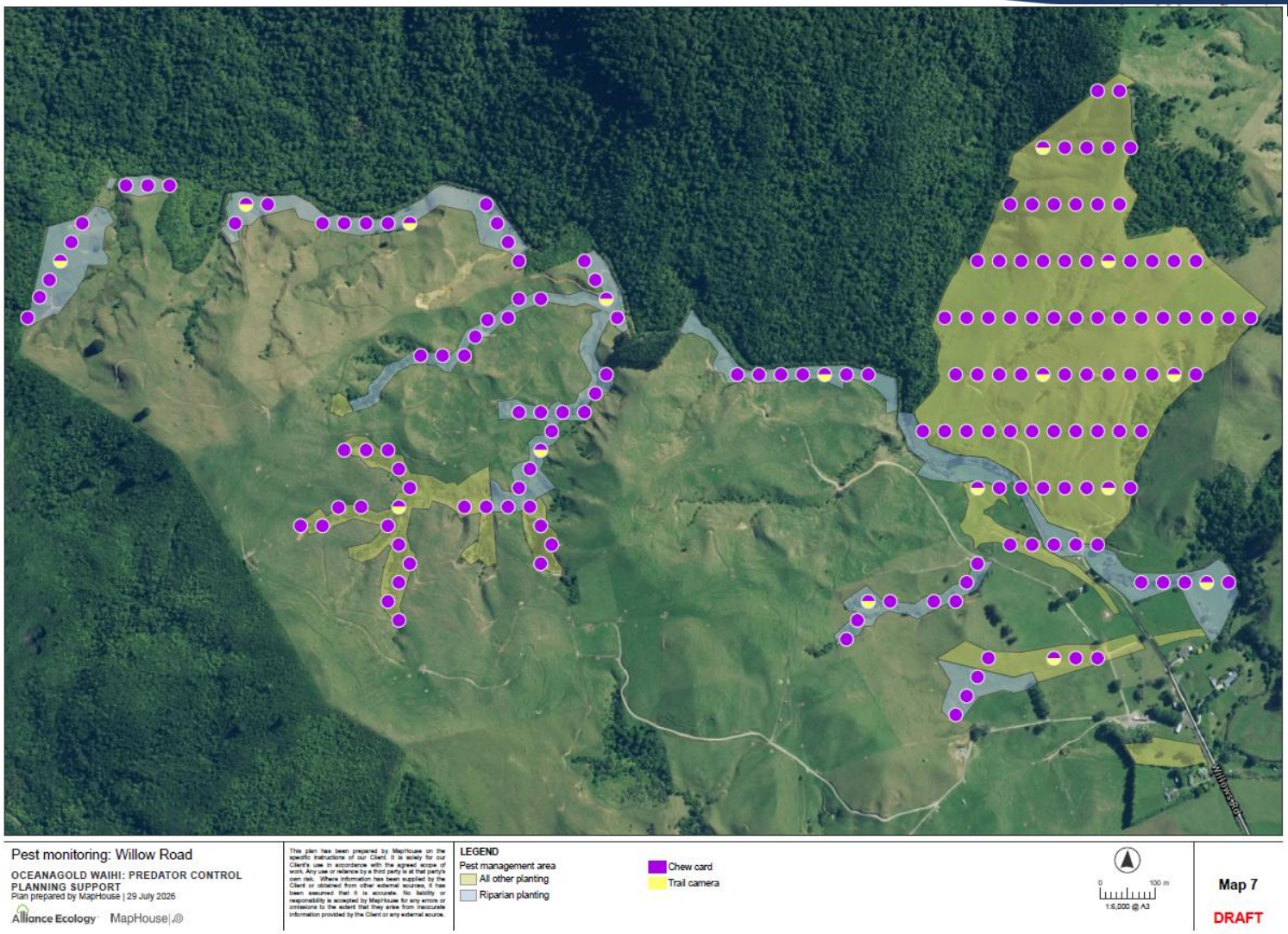


Figure 20 Chew Card and Trail Cameras at Willows Road

7.10 Performance Targets

Performance targets provide measurable criteria for evaluating programme success. Quantitative thresholds are used where robust monitoring indices exist, while qualitative objectives are applied to species monitored primarily through occupancy or detections.

7.10.1 Quantitative targets

Species	Target	Trigger	Monitoring
Mice (Area A)	<5% CCI	≥10% CCI	Quarterly chew cards
Rats (Area A)	<5% CCI	≥10% CCI	Quarterly chew cards
Rats (Area B)	<10% CCI	≥15% CCI	Quarterly chew cards
Possums	<5% CCI	≥10% CCI	Quarterly chew cards

7.10.2 Qualitative targets

Species	Objective	Management Trigger
Mustelids	Maintain very low occupancy	Any confirmed detection
Feral cats	Maintain very low activity	Any confirmed detection
Hedgehogs	Maintain very low activity	Persistent/increasing detections
Rabbits & hares	Minimise browse damage	Unacceptable browse
Ungulates	Prevent browse impacts	Repeated presence/browse

7.11 Adaptive Management Response

Adaptive management shall be used to ensure pest management remains effective throughout the life of the Project. Following each monitoring event, results shall be reviewed against the performance targets. Where trigger thresholds are exceeded, the contractor or relevant staff shall investigate the likely cause, implement additional control, and undertake follow-up monitoring to confirm that target pest populations have returned below the relevant thresholds.

The adaptive management process (outlined in further details in the PAMP) will generally comprise a review of monitoring data, diagnosis of likely causes, implementation of species-specific remedial control, follow-up monitoring and return to the routine maintenance programme once targets have again been achieved.

Species	Minimum response
Mice (Area A)	Review data, increase baiting if required, inspect all devices and repeat monitoring.
Rats	Increase trap servicing and supplementary toxic control where required.
Possums	Targeted trapping and/or toxic control followed by repeat monitoring.
Mustelids, cats, hedgehogs	Immediate targeted trapping and increased surveillance following confirmed detections.
Rabbits, hares, ungulates	Targeted ground control where browse impacts become unacceptable.

7.12 Data Management and Reporting

All pest management and monitoring data shall be recorded in a centralised data management system such as Trap.NZ, or an equivalent platform. Information shall include device locations, servicing

records, monitoring results, captures, bait and lure replacement, maintenance requirements and relevant field observations. The ELMR shall summarise pest management undertaken, monitoring results, performance against targets, threshold exceedances, adaptive management responses and recommendations for continual improvement.

7.13 Review and updates

OGNZL shall periodically review the pest management programme to ensure it remains effective, reflects current best practice, and continues to achieve the biodiversity outcomes identified in this ELMP.

The review process shall consider, as appropriate:

- Progress towards the pest management objectives and performance targets;
- Monitoring results and long-term trends in pest activity;
- The effectiveness of existing control methods, devices and operational practices;
- Emerging pest management technologies, including new trapping systems, surveillance tools, lures and approved toxins;
- Advances in scientific knowledge and industry best practice;
- Relevant guidance published by the Department of Conservation, regional councils or other recognised technical authorities; and
- Opportunities to improve operational efficiency while maintaining or enhancing biodiversity outcomes.

Where reviews identify opportunities to improve programme performance, management approaches may be modified, provided that any changes remain consistent with the objectives of this ELMP and any relevant consent conditions. Significant changes to monitoring methodologies or performance targets should be supported by appropriate scientific justification and documented through the annual reporting process.

The pest management programme shall also be reviewed following any significant ecological event that may influence pest populations or management effectiveness, including wildfire, severe storm events, major vegetation disturbance, or the establishment of new pest incursions.

The adaptive management framework described in this chapter is intended to ensure that pest management remains responsive to changing environmental conditions and evolving best practice throughout the life of the WNP.

PART G: LIZARD MANAGEMENT PLAN

8 LIZARD MANAGEMENT PLAN

8.1 Context

Herpetofauna (reptiles and amphibians) comprise a significant component of New Zealand's terrestrial fauna, and the majority of the herpetofauna (~124 taxa) are represented by lizards (Hitchmough et al. 2021). All indigenous lizards are legally protected under the Wildlife Act 1953, and its subsequent amendments, and vegetation and landscape features that provide significant habitat for indigenous lizards are protected by the Resource Management Act ("**RMA**") 1991.

8.2 Objectives of the Lizard Management Plan

The objectives of this Lizard Management Plan ("**LMP**") are to minimise potential adverse effects on native lizards within the proposed footprints (GOP, NRS, TSF3) by way of capturing and relocating any indigenous lizards prior to and during vegetation removal, and providing habitat enhancement and pest control, where appropriate. Further, this LMP aims to achieve the following:

- The population of each species of native lizard present on the site at which vegetation clearance is to occur shall be maintained or enhanced, either on the same site of at an appropriate alternative site; and
- The habitat(s) that lizards are transferred to (either on site or at an alternative site) will support viable populations for all species present.

These objectives will be achieved by:

(a) Using current best practice to capture native lizards from vegetation in the footprint prior to and during vegetation clearance and relocate any captured individuals to safe and suitable habitats (avoid and minimise mortality of wildlife protected by the Wildlife Act);

(b) Applying recognised surveying and monitoring protocols that are to be followed, using the 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;

(c) Meeting requirements of the Wildlife Act (WA 1953) and RMA

This LMP addresses the following:

- A summary of the affected habitat and species covered by the plan;
- Capture and relocation procedures;
- A summary of the proposed release (and enhancement) sites; and
- Post works management and monitoring (where required).

This LMP must be actioned under a valid Department of Conservation Wildlife Act Authority ('permit').

8.3 Consent Condition Matrix

Table 39 below sets out the relevant consent conditions associated with the Lizard Management Plan and where they are addressed within this document.

Table 39 Lizard Management Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following: Lizard Management Plan – which outlines the ways in which to capture and relocated any indigenous lizards prior to and during vegetation removal activities	C47B(2)(a): > Lead in times –Section 15 > Implementation timeframes -Section 8.5.2 and 8.7.3 > Duration of maintenance – Section 15 C47B(2)(b): > Monitoring – 8.10 > Triggers and remedial actions – Section 15 > Reporting requirements – Section 15 C47B(2)(c): Performance indicators – Section 8.11
Appendix B2 –HDC Conditions		
194	1. Prior to undertaking vegetation clearance in any of Areas 5, 6 or 7, the Consent Holder must establish the Lizard Habitat Enhancement Area in accordance with the requirements of the ELMP-WA. 2. The Lizard Habitat Enhancement Area must include, as a minimum: a. Site protection (e.g. permanent stock-proof fencing and legal protection);	Section 8.9

Consent Condition Number	Consent Condition Wording	Location within this Plan
	b. Removal of pine trees; c. Provision of supplementary refuge structures; d. Implementation of mammalian pest control for the duration of the consents; and e. Native revegetation planting.	

8.4 Summary of the Affected Area and Existing Lizard Populations

8.4.1 Desktop Assessment

A review of the DOC Amphibian and Reptile Distribution Scheme (ARDS) database (*accessed December 2024*) for historic records of herpetofauna in the Waihi Ecological District revealed that five species of indigenous lizards have been reported within 10 km of the WNP area. These include copper skink (*Oligosoma aeneum*), shore skink (*Oligosoma smithi*), moko skin (*Oligosoma moco),* forest gecko (*Mokopirirakau granulatus*) and elegant gecko (*Naultinus elegans*). The closest records to the WNP area were represented by two copper skinks (occurring ≤ 650 m north of Martha Pit) and two elegant geckos (occurring ≤ 3 km away) although, it should be noted that the elegant gecko records represent individuals sighted in the mid-1960s.

Shore skinks are restricted to coastal environments (e.g. beaches and sand dune systems) and are not considered to be present within the WNP area.

8.4.2 Previous Survey Effort

The lizard fauna of the WNP area was identified through several independent surveys carried out between the months of December and May, during 2011-2012, 2017- 2020 and 2022. The surveys resulted in the detection of two indigenous lizard species, copper skink (*Oligosoma aeneum*) and moko skink (*Oligosoma moco*) (Bioresearches, 2025a).

Copper skinks were recorded from the proposed GOP and were recorded in the surrounding landscape at Union Hill, and Favona wetland.

Moko skinks were recorded in dense vegetation at the northern extent of the southern SNA T13UP166 fragment and in boulder jumbles among pasture and rank grass on the northern side of a pine stand, west of the NRS.

8.4.3 Species Covered by Plan

Lizard species managed under this plan (40) have been identified from desktop analyses, habitat suitability and their ecological range (van Winkel et al, 2018). Rough grasses, native plantings, pine and

rocky outcrops and stony areas within the WNP have been identified as either potential or confirmed habitats for protected skinks (copper skink and moko skink). While survey coverage and effort has been extensive, the presence of other species (including geckos), or occurrence of species at other locations within the WNP footprint, remains possible.

Table 40: Lizard species covered under the WNP Lizard Management Plan: Threat status and potential habitats within the WNP.

Common name	Species name	Threat status	Potential habitat
Copper skink	*Oligosoma aeneum*	At Risk- declining	Rough grass, ground cover, native plantings, pine, rock outcrops
Ornate skink	*Oligosoma ornatum*	At Risk- declining	Rough grass, ground cover, native plantings, pine, rock outcrops
Moko skink	*Oligosoma moco*	At Risk- Relict	Rough grass, ground cover, native plantings, pine, rock outcrops
Forest gecko	*Mokopirirakau granulatus*	At Risk- declining	Naturally occurring native vegetation (foliage and ground cover), pine, rock outcrops
Green gecko	*Naultinus elegans*	At Risk- declining	Naturally occurring native vegetation (foliage)
Pacific gecko	*Dactylocnemis pacificus*	Not Threatened	Scrubland, mature forests, rocky islets, and rock outcrops

Figure 21: Moko skink (left); copper skink (right)

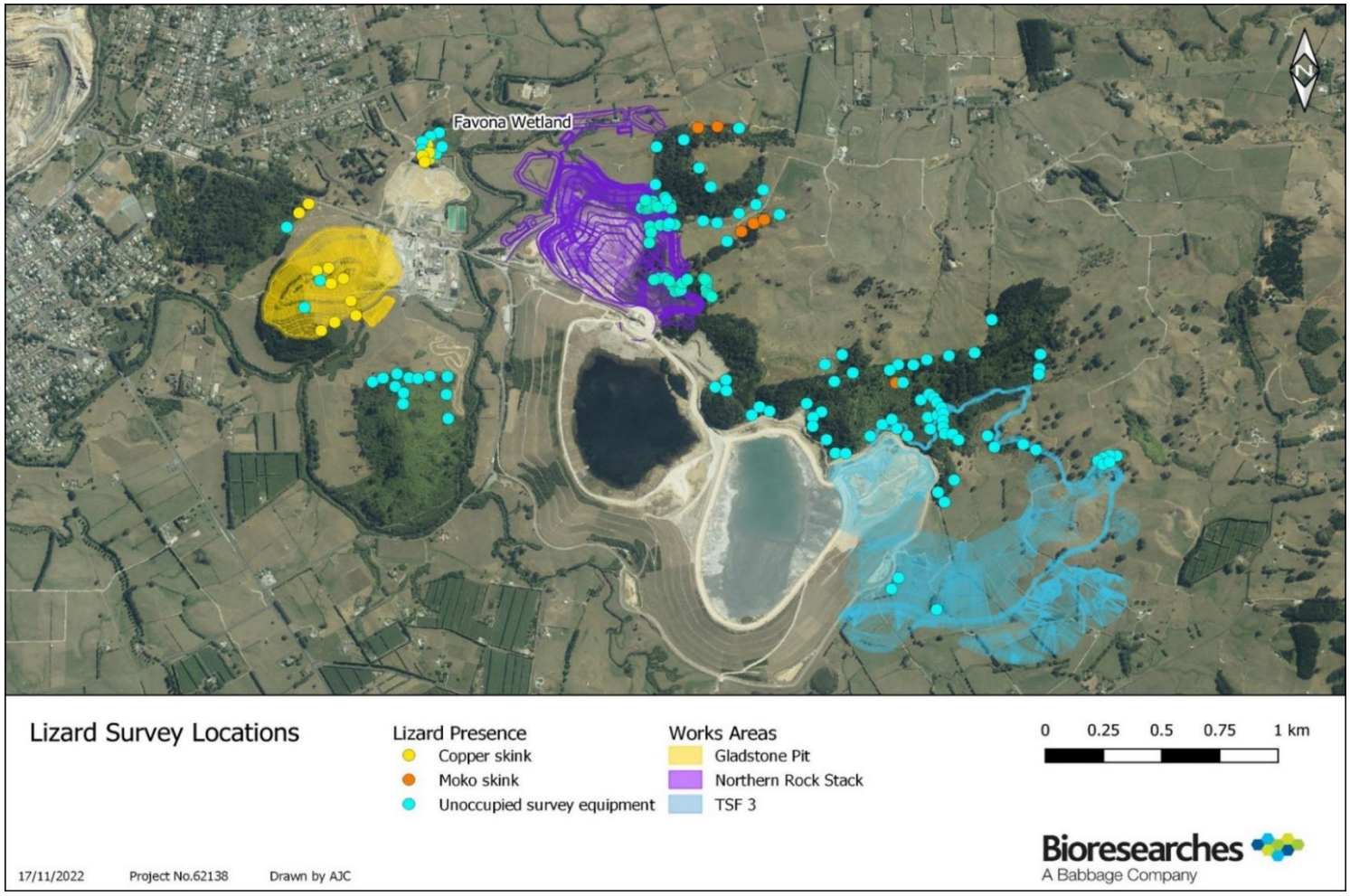


Figure 22: Lizard survey locations and identified indigenous lizards recorded during the surveys (2012 & 2017, 2018, 2020, 2022)

8.4.4 Summary of Potential Adverse Effects on Resident Lizards

Areas that support indigenous lizards will be directly affected by the activities proposed as part of the WNP. Activities such as vegetation removal, blasting, and significant earthworks could result in a range of direct and indirect adverse effects on the local lizard populations. Potential effects include, but are not limited to:

- Direct mortality or injury during vegetation clearance;
- Habitat loss, fragmentation, and isolation through the removal of vegetation and associated refuge structures (e.g. rocks);
- Displacement of lizards that could result in reductions in individual fitness or heightened risk of predation by exotic mammalian predators; and
- Construction related disturbances (e.g. noise, vibrations, or dust effects).

Notwithstanding these effects, the technical assessments supporting the resource consent application demonstrated a Low level of effect on indigenous lizards due to the low magnitude of known habitat removal (at GOP only). The moko skink, while found to be present in habitats contiguous with the NRS and TSF3 footprints, are avoided.

8.4.5 Managing Potential Adverse Effects on Indigenous Lizards

The complete avoidance of potential effects on indigenous lizards and their habitats cannot be achieved due to the current extent of the project design. Therefore, managing the effects will be achieved through mitigation that will involve the implementation of a salvage-relocation operation and release site habitat enhancement and in accordance with a Wildlife Act Authority. In addition, habitat augmentation will be provided for to contribute additional resources for resident indigenous lizards with the objective of maintaining indigenous lizard populations within the wider WNP area.

Notwithstanding the detection of only terrestrial skinks within the WNP area, the salvage methods described in this LMP are best practice and designed to detect and capture both terrestrial and arboreal lizards (e.g. skinks and geckos). That is, the methods are applicable across the range of lizard taxa that may potentially be encountered within the WNP footprint.

8.4.6 Securing Biodiversity Gains

Habitat creation / planting (1.7 ha) and enhancement actions (2.34 ha) for native lizards within the WNP are designed to maximise opportunities to protect and enhance existing moko skink values in perpetuity. Moko skink are a nationally ‘At Risk’ species that is often sympatric (share same habitats) with copper skinks. However, unlike copper skinks, moko skinks are now extinct through most of their natural range on the New Zealand mainland, now persisting in potentially fewer than five populations along the north-east of the North Island, excluding offshore islands. Therefore, the localised presence of this species in the surrounding Waihi North landscape offers a significant opportunity to preserve and enhance this biodiversity value. Habitat enhancement measures for this species, and copper skinks, are addressed in a separate Residual Effects Offset Plan.

In addition to gains expected for moko skinks, a minimum 11.2 ha of habitat compensation planting will be undertaken at GOP, where it would be contiguous with existing habitats that will be retained and protected within OGNZL landholdings.

8.5 Lizard Salvage and Relocation

8.5.1 Site Demarcation

Prior to the commencement of the lizard salvage, the extent of the works footprint(s) should be clearly demarcated by contractors (e.g. pegged out, dazzled, taped) to ensure the Project herpetologist understands the full extent of the affected area.

Lizard capture is required at the following sites:

- GOP- all vegetation removal (plantings, pine, rock outcrop).
- NRS- all vegetation removal (plantings).
- TSF3- all vegetation removal (SNA T13UP166, Western Fragment, Eastern Fragment, Southern Planted Fragment).

8.5.2 Lizard Capture

A DOC authorised herpetologist, and assistant ecologist(s), will carry out a search and salvage operation from October to April inclusive, during two phases, including:

Phase 1: A pre-vegetation clearance systematic search and live trapping programme; and

Phase 2: A machine-assisted destructive search (focused areas).

The specific salvage methods for each of the phases are detailed below.

8.6 Phase 1: Pre-vegetation clearance live trapping programme and systematic searches

The following sections provide detail of trap types that will be used prior to vegetation removal at GOP, NRS and TSF3. Refer Table 2 for trapping and search effort per location. Traps will consist of:

- Artificial Retreats (ARs, Figure 23), refer Lettink (2012)
- Pitfall Trap (Figure 23), refer Hare et al. (2012a)
- Funnel Trap (Figure 24), refer Hare et al. (2012b)

8.6.1 Live trapping:

- 60 - 200 baited (banana) traps (funnel or pitfall) and / or Artificial Retreats (ARs) shall be installed through ground cover scrub.
- All traps shall be embedded in and furnished with vegetation to protect any captured lizards from heat and exposure during confinement.
- Pitfall traps and ARs shall be installed at least one month prior to a minimum 4-day trapping period.
- When not in use, all pitfall traps shall be sealed closed (so that no lizards can be captured) or furnished to the upper rim so that lizards may escape.
- All traps shall be checked no more than 24 hourly while active.
- All native lizards shall be released at the designated release site immediately upon capture.

During trap checks, the Project herpetologist shall hand search all vegetation, logs and debris to capture lizards and to identify important areas that should be targeted for machine searching.

Figure 23: Artificial retreat (L); Pitfall trap with AR cover (R)

Figure 24: Funnel trap (L); gecko in funnel trap (R)

8.6.2 Active Searches:

Both diurnal (day) and nocturnal (night) searches will be undertaken by a DOC-authorised herpetologist, assisted by other ecologists where required. Refer Table 34 for search effort per location.

1. During the day, searchers will walk the extent of the project footprint systematically lifting debris (e.g. logs, rocks, and organic and inorganic material), searching through vegetation foliage, thickets and rock piles by hand or with the assistance of tools (e.g. rakes), searching the crowns and skirts of tree ferns, and searching beneath flaking tree bark or within tree cavities to reveal lizards.
2. At night, spotlight searching using headtorches and binoculars will be used to target arboreal geckos occupying the trunks, branches, and foliage of trees. In instances where the foliage of tall trees cannot be effectively searched using this technique (e.g. canopy is too high or foliage too dense), the herpetologist will mark (e.g. dazzle paint) the trunk(s) and these trees(s) will be re-inspected during Phase 2 of the salvage operation.

8.7 Phase 2. Vegetation clearance and machine-assisted searches

Phase 2 of the lizard salvage operation acts as a contingency, recognising that not every lizard may be detected and captured during the Phase 1 activities.

- Destructive searches will involve searching through potential habitat during vegetation removal, and with the assistance of an excavator fitted with a toothed bucket or rake (Figure 25).
- Searches would cover all potential habitat within the site and continue until the supervising ecologist is satisfied that the potential habitats are sufficiently removed or degraded that lizards or katipo spiders are unlikely to be present.
- Only taller trees that have been marked for re-inspection during the nocturnal searches, will be felled using a chainsaw under the supervision of the Project herpetologist. Once the tree has been felled, the foliage, bark, and any holes or crevices in the branches/trunks will be inspected for lizards to the satisfaction of the herpetologist.
- At no stage should areas identified by the herpetologist as potential lizard habitat be mulched in situ by lowering a mulch-head directly onto standing vegetation. Mulching standing vegetation is highly destructive and eliminates all opportunities

for the herpetologist to recover individuals or for the lizards to vacate the vegetation of their own accord before the vegetation is destroyed.

- Coordination and communication between the herpetologist and vegetation clearance contractors (both managers and labourers) is crucial to ensure injury to lizards, and the herpetologist, is avoided.

Figure 25: Machine-assisted searches. Herpetologist supervising the scraping of terrestrial vegetation

8.7.1 Lizard Handling and Temporary Containment

Indigenous lizards will be captured and handled by a DOC-authorised herpetologist only.

All lizards will be placed in a temporary containment box(es), which will be filled with vegetation matter and leaf litter and misted with water. Lizards will only be held temporarily for the period of the active searches or trap inspections (i.e. < 2 hr), after which the lizards will be released at the approved relocation site.

It is not anticipated that any lizard taxa with threat classifications higher than 'At Risk' will be encountered on-site. However, if this were to occur, the individual(s) will be captured and held temporarily in a containment box while the Department of Conservation (Hauraki District Office) is notified, and further advice and instruction is given to the herpetologist.

8.7.2 Inadvertent Lizard Injury or Death

The following steps will be implemented if any injured or dead lizards are found during salvage:

- The Project herpetologist will notify DOC at the earliest opportunity within 24 hours after an injured or dead lizard is found;
- Any lizard death of 'Threatened', 'At Risk' species shall be sent to Massey University Wildlife Post-mortem Service for necropsy:
- The body will to be chilled if it can be delivered within 24 hours, frozen if longer than 24 hours to deliver;
- Appropriate measures shall be undertaken to minimise further lizard deaths;

- Injured lizards found during salvage will be taken to a suitably qualified vet as soon as possible for assessment and treatment. Injured lizards 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 lizard(s) can be assessed and treated;
- Lizards assessed by the vet or alternative specialist as uninjured, or otherwise in suitable condition for release, will be transported to the relocation site in the portable enclosure and released; and
- Euthanasia of an injured lizard shall only be undertaken under direction from DOC.

8.7.3 Lizard Salvage Timeframe

The duration of the pre-clearance live trapping and searches will continue for a period of 5 days of suitable weather (i.e. temperatures above 15°C, precipitation-free). However, the following contingency plan has been proposed to ensure that all efforts is made to salvage every lizard. If:

(a) No lizards have been caught over the 5-day search/ trapping period or the herpetologist has determined that the habitat is no longer suitable to support lizards, the salvage operation will cease, OR

(b) Lizards are still being caught on day 5, searching and trapping will continue until no lizards are captured within a 24-hour period thereafter employing the same search effort.

Phase 2 will then follow Phase 1 and will continue until all habitat for lizards has been removed to the satisfaction of the Project herpetologist.

8.7.4 Summary of salvage operation and minimum effort

Trapping effort would consist of a minimum 4-day period within a working week (traps activated on Monday- closed Friday). Artificial Retreats, where used, will be checked a minimum five times (Monday to Friday) Table 41 provides a minimum site-specific search and trap effort.

Table 41: Minimum search / salvage effort to be applied per area

Site	Effect	Salvage method(s)	Minimum effort
Gladstone Open Pit	Loss of 1.4 ha of planted and remnant (rocky hilltop) vegetation and habitat, and 5.1 ha of pine plantation	Active searches (diurnal & nocturnal)	10 hours (plantation logs)
		Live trapping / Artificial refuges	60 traps
		Machine-assisted searches	Until herpetologist has determined that the habitat is no longer suitable to support lizards
	Loss of 8.1 ha of planted native vegetation and	Active searches (diurnal & nocturnal)	None- little to no searchable material

Site	Effect	Salvage method(s)	Minimum effort
Northern Rock Stack	approximately 1 ha of pine-dominant vegetation		(plantings in grassland)
		Live trapping / Artificial refuges	180 traps
		Machine-assisted searches	Until herpetologist has determined that the habitat is no longer suitable to support lizards
TSF3	Loss of 8.3 ha of SNA vegetation, 1.5 ha of non-SNA naturally occurring vegetation and 0.3 ha planted vegetation	Active searches (diurnal & nocturnal)	20 hours
		Live trapping / Artificial refuges	200 traps
		Machine-assisted searches	Until herpetologist has determined that the habitat is no longer suitable to support lizards

8.7.5 Lizard Relocation

8.7.5.1 Relocation Site Criteria

The re-establishment, persistence and long-term protection of the displaced lizards relies on the appropriate selection of a suitable relocation site. A relocation site should offer equal or ideally better prospects for survival and long-term persistence of lizards when directly compared to the original capture site.

A suitable relocation site is one that provides all the necessary attributes required by lizards for survival and reproduction (e.g. shelter, food resources, reproductive access to mates, etc). It is necessary to understand the existing lizard community structure at a relocation site before introducing new individuals into the environment (this is particularly important where high numbers of lizards [i.e. > 20] are expected to be released). The following set of criteria have been applied to assist in determining a suitable relocation site.

1. Habitat size and complexity – ensure the relocation habitat is representative (equal quality) or of better quality, than the original capture site(s).

2. Vicinity to original population – limit the distance that lizards are relocated from their original capture site(s). Distances < 500 m will meet this criterion.

3. Security of estate – ensure legal protection of habitats at the relocation site (all offset locations are required to be protected (covenant, stock fence) in perpetuity).

4. Resident species composition and density – confirm the presence of indigenous lizards and limit the potential adverse effects of intra- and inter-species competition at the relocation site.

8.7.5.2 Selected Relocation Site

This Plan will increase (1.7 ha lizard habitat planting) habitat availability and enhance (2.34 ha pine canopy removal, provision of additional refuges) identified habitats (Figure 26 and Figure 27) that would be contiguous with SNA T13UP166, following offset planting (17.5 ha) that will be undertaken in accordance with this Plan. The identified habitats currently support At Risk moko skinks, a species now rare on the New Zealand mainland, and which is typically sympatric (naturally occurs in the same areas) with copper skinks. Table 42 reviews the suitability of this location against release site assessment criteria.

Table 42: Assessment criteria as applied to the proposed SNA T13UP166 lizard relocation site

Criterion	SNA T13UP166	Meets criterion
1. Habitat size & complexity Ensure the relocation habitat is representative or of better quality than the original capture site(s)	> The total current area available to receive salvaged lizards is 1.3 ha, comprising naturally regenerating native scrub beneath a pine block. This block of vegetation supports moko skink at low density, and is inclusive of 4.04 ha of restoration and enhancement as per Figure 9. The entire area will receive long-term pest predator control and revegetation will provide connectivity with SNA T13UP166, where another moko skink record occurs. > Enhancement of SNA (i.e. planting, provision of supplementary refuges, fencing, weed management, and pest control) will significantly increase the quantity and quality of habitat for lizards.	Yes, where habitat enhancement is implemented.
2. Vicinity to original population Limit the distance that lizards are relocated from their original capture site(s) (i.e. preferably < 500 m)	> Considering the area extent over which the WNP covers, some salvaged lizards may be relocated more than 500 m (up to 5 km) from their original capture site. However, all lizards will remain within the wider WNP area, preserving the local diversity of lizards. > This plan provides a single dedicated area to create, protect and enhance habitat for a significant lizard community in perpetuity, and with connectivity to SNA T13UP166. This approach will have greater overall benefits to indigenous lizard values than several smaller areas of management.	No
3. Security of estate Ensure protection and maintenance of habitats at relocation sites over the long-term, preferably in perpetuity.	> SNA T13UP166 is a scheduled protected area under the Hauraki District Plan. > Mitigation measures, including revegetation and enhancement, will be protected in perpetuity, including protection of pest mammal control and fencing from livestock.	Yes, where habitat enhancement is implemented and maintained long-term.
4. Resident species composition & density Reduce as far as practicable the potential adverse effects of intra- and inter-specific competition at the relocation site.	> SNA T13UP166 is known to support one species of indigenous lizard (moko skink). It is likely that at least one other species (copper skink) also occurs given the presence of suitable habitat for this species and its occurrence in the wider landscape. > Survey effort to date suggests that moko skink is localised and occurs at relatively low abundance within SNA T13UP166. It is unclear why this might be though it could be inferred that pest mammal pressure are influencing the conspicuousness and/ or abundance of this species and currently, moko	Yes, where habitat enhancement is provided.

Criterion	SNA T13UP166	Meets criterion
	skink probably exist either below natural carrying capacity or at carrying capacity relative to the habitat quality within the SNA. > With habitat enhancement measures, the quantity and quality of existing lizard habitat within SNA T13UP166 could be improved, leading to an increase in overall lizard carrying capacity to a level that will allow salvaged-relocated lizards to persist and thrive.	

Figure 26: Moko skink habitat, within boulder deposits and low scrub under pine canopy- east of the NRS area

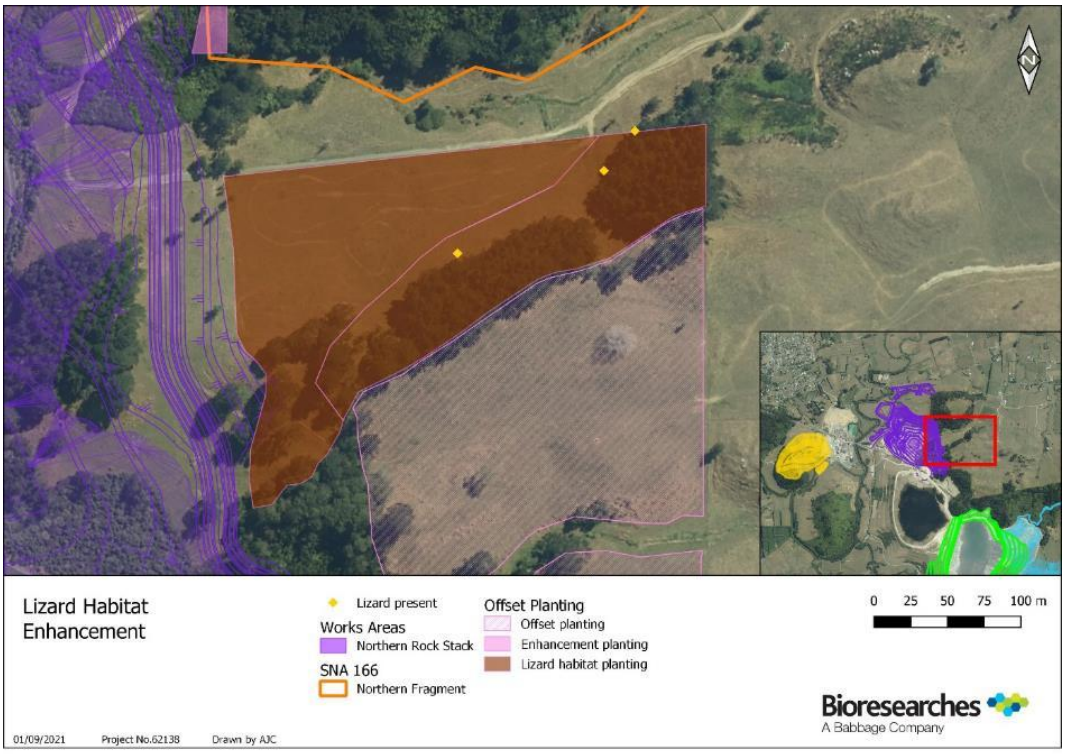


Figure 27: Plan of the proposed lizard relocation area within the wider landscape surrounding the WNP

8.8 Lizard Release Strategy

All lizards will be hard-released (i.e. no soft-release pens) into appropriately enhanced habitat at the approved relocation site. It is expected that habitat enhancement will assist in achieving high survival and persistence of relocated lizards at the release site.

All relocated lizards will be recorded and basic demographic (sex, morphometric) measurements, and where possible, identification (ventral or dorsal identification photographs) information will be recorded.

8.9 Lizard Habitat Enhancement and Augmentation

8.9.1 Overview

A combination of lizard habitat enhancement (enhancing existing habitat) and habitat augmentation (recreating habitat) will be required to ensure that highest probability of survival of relocated lizards and maintain indigenous lizard populations within the wider WNP area over the long-term.

In its current state, the habitat at the proposed relocation site is considered suitable for a variety of indigenous lizards. However, the relocation of additional individuals into an already occupied environment raises concerns about potential intra- and inter-specific interactions such as direct competition (e.g. aggressive interactions, competitive exclusion) and resource availability/ competition (e.g. refuges, food supply, access to new territories). To mitigate these potential risks, management provisions will be required to enhance the relocation site, and its surrounds, to ensure that important resources are adequately provided for and the overall carrying capacity of the site is raised.

To enhance this area sufficiently to receive salvaged lizards, it is recommended that the following actions are implemented:

1 Site protection (e.g. stock-proof fencing);

2 Removal of pine trees;

3 Provision of supplementary refuge structures;

4 Implementation of mammalian pest control; and

5 Native revegetation planting.

Each of these elements are briefly discussed below.

8.9.2 Lizard Habitat Protection (Stock-proof Fencing)

Long-term security of the lizard release site is important to ensure relocated lizards successfully establish and persist into the future. To ensure that lizard habitat remains as undisturbed as possible, permanent stock-proof fencing will be provided around the full extent of the relocation site (SNA T13UP166). Fences will exclude both livestock access and encroachment of other agricultural practices into lizard sensitive areas and ensure that the enhancement plantings establish without disturbance or interferences (e.g. wandering livestock).

Fencing must be erected prior to the release of any lizards to avoid habitat disturbance.

8.9.3 Pine Tree Management

Pine trees currently form a canopy over regenerating native vegetation at the proposed lizard relocation site. These pines will be removed, or topped to no more than 5 m tall, poisoned and delimbed. The remaining pole will be left to break down naturally within the site. The removal of the top and limbs will stimulate growth in existing indigenous vegetation while providing habitat for fauna as both standing poles or log fall.

Pine tree management shall be undertaken prior to lizard habitat planting and the release of any lizards to avoid habitat disturbance after lizard release.

8.9.4 Supplementary Lizard Refuges

The provision of permanent refuge structures, including but not limited to log piles (including from some topped pine trees), natural debris (e.g. decaying vegetation), and rocks collected during the vegetation clearance activities will be required to supplement the natural refuges already present at the lizard relocation site.

Refuge structures will be relocated as directed or by the Project herpetologist(s) into the lizard enhancement areas prior to lizard salvage operation. Salvaged lizards will then be released beneath these refuge structures to provide immediate shelter.

8.9.5 Mammalian Pest Control

Mammalian pest control will target rodents, hedgehogs, mustelids, possums, and feral cats within the lizard relocation and enhancement area. The pest control operation will be established prior to (no less than 3 months before) any lizard release and be maintained (e.g. rebaiting of bait stations and re-setting of traps) for the 20-year plant monitoring period.

The pest control provider/operator should submit annual progress reports to the Project herpetologist for review. The data contained within the progress reports will assist analyses alongside the post-release lizard monitoring results to determine whether the level pest suppression is achieving the desired benefits for lizards. Data will ultimately be reported in the annual Ecology and Landscape Management Report, provided to WRC, DOC, and HDC.

The site-wide pest animal control programme is detailed in the Residual Effects Offset Plan and Pest Animal Management Plan (Section 7).

8.9.6 Native Vegetation Planting

Creation of new lizard habitat and the enhancement of existing habitat will occur through an extensive revegetation planting programme. A specific planting schedule for provision of ground cover habitat is provided in the separate Residual Effects Offset Plan.

This ‘lizard-friendly’ native vegetation (e.g. densely growing and fruit producing plants) will provide cover and food resources for lizards. The plantings will be undertaken over 1.7 ha of currently grazed pasture and be contiguous with existing pine canopy habitat (2.34) and future offset planting that will be contiguous with SNA T13UP166.

8.10 Post-Release Monitoring

8.10.1 Overview

Lizard monitoring will be undertaken within the lizard enhancement and the lizard habitat planting area. The purpose of the monitoring is to determine the following success parameters:

1. Population increase (rough scale): Lizard encounters (copper skink, moko skink) increase over time (including recaptures);

2. Evidence of breeding: That captured animals include evidence of breeding (gravid females, juveniles); and

3. Habitat expansion: that lizard (copper skink, moko skink) habitat occupation extends into lizard habitat plantings;

4. Population expansion into planted habitats: That there is evidence of breeding within planted habitats.

Lizard monitoring will also assist monitoring of the performance of other actions, including pest control and plant maintenance.

8.10.2 Method and Frequency of monitoring

Lizard monitoring will be undertaken annually for the first five years following implementation of the Lizard Management Plan, and then five-yearly until the end of the 20-year plant monitoring period. Lizard monitoring will be conducted regardless of the number of lizards released.

Monitoring will:

- Use standard survey techniques (DOC Biodiversity inventory and monitoring toolbox – Herpetofauna): artificial refuges (Lettink & Cree, 2007; Lettink, et al., 2011; Lettink, 2012), live traps (Hare, 2012a, b), and active searches (Hare 2012c),
- Trap location and trap types will be consistent each monitor following the initial five years, except where new potential habitats are investigated.

The results of each monitoring session and any emerging recommendations will be reported to WRC and DOC. In addition, all records of lizards will be submitted to DOC for inclusion in their herpetofauna database.

8.11 Key Performance Indicators

Lizard management will be implemented in accordance with best practice standards and requirements and reviewed annually by the Project herpetologist to ensure lizard management is achieving anticipated targets.

Monitoring of population increase, evidence of breeding, habitat expansion, and population expansion into planted habitats will be undertaken annually for the first five years following implementation of the Lizard Management Plan, and then five-yearly until the end of the 20-year plant monitoring period.

Annual progress reports of lizard management will be provided to WRC, HDC, and DOC detailing the level to which pest suppression is achieving the desired benefits for lizards. This detail will be reported in the Ecology and Landscape Management Report.

Further details of any measures and methods implemented can be provided on request.

8.12 Reporting

A Suitably Qualified Experience Practitioner(s) (“**SQEP**”) must prepare a report annually, identifying the extent of vegetation and removal and a summary of all relevant lizard management and monitoring undertaken preceding vegetation removal activities undertaken during the previous 12 months.

The report must detail:

a) Extent of vegetation removal undertaken.
b) All preclearance lizard surveys and protocols, and results,
c) Any injuries or mortalities during vegetation removal.

This information will be provided in the ELMR and may be combined with information regarding bats and avifauna.

PART H: AVIFAUNA MANAGEMENT PLAN

9 AVIFAUNA MANAGEMENT PLAN

9.1 Overview

This Avifauna Management Plan outlines the methods that will be used to avoid, remedy, or mitigate any potential adverse effects on avifauna (birds) occurring within or temporarily utilising the WNP area.

Native forest birds are legally protected by the Wildlife Act 1953 and significant habitats[2] for indigenous fauna are protected under the Resource Management Act 1991. No direct habitat loss for birds of conservation concern (i.e. those listed as 'Threatened' or 'At Risk' by the New Zealand Threat Classification System; Robertson *et al.,* 2017) is expected within the WNP area. Though, it is anticipated that New Zealand dotterel, New Zealand pipit, New Zealand dabchick and other species associated with habitats at the existing tailings facility could benefit from activities associated with WNP (Waihi area).

9.2 Summary of Avifauna Values and Effects

The WNP will require the removal of approximately 25.7 ha of vegetation, including native, exotic and plantations. These areas provide roosting, nesting and foraging habitat for local avifauna communities and the potential adverse effects of the proposed works on avifauna may include:

- Loss of habitat and associated resources from the local landscape;
- Noise-, dust-, or light-associated disturbance to nesting behaviour and nesting success or to sensitive birds; and
- Injury or mortality of eggs, chicks, and brooding females during the breeding season, as a result of vegetation clearance.

Notwithstanding these potential effects, the largely exotic assemblage of bird species within the WNP area has led to the magnitude of effects of the vegetation loss being considered Low. Acknowledging that native birds are protected under the Wildlife Act 1953, protocols to avoid or manage adverse effects are proposed.

Native bird species considered to be 'Threatened' or 'At risk' that have the potential to inhabit the area include the following:

- NZ Dotterel
- Dabchick
- NZ Pipit

9.3 Consent Condition Matrix

Table 43 below sets out the relevant consent conditions associated with the Avifauna Management Plan and where they are addressed within this document.

[2] Significant habitats for avifauna include those that provide breeding and food resources and/ or important roosting sites.

Table 43 Avifauna Management Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following: Avifauna Management Plan – which outlines the methods that will be used to minimise the effects of the vegetation clearance and land disturbance activities on avifauna.	C47B(2)(a): > Lead in times –Section 9.4.2 > Implementation timeframes - Section 9.4.2 > Duration of Maintenance – No maintenance is required however the protocols will be maintained for the duration of the WNP. C47B(2)(b): > Monitoring – Section 15 > Triggers and remedial actions – Section 9.4.4 > Reporting requirements – Section 9.6 C47B(2)(c): Performance indicators – Section 9.5

9.4 Protocols for Avoiding or Managing Effects on Avifauna

9.4.1 Overview

The potential effects on avifauna can be avoided or minimised through the following management measures:

- Constraints on vegetation clearance or with pre-clearance nest survey
- Constraints on noise, dust, or light-associated disturbances
- Procedures to manage accidental injury or mortality to native avifauna.

9.4.2 Vegetation Clearance and Pre-clearance Nest Survey

Vegetation clearance should be avoided during the peak bird breeding season (September to December inclusive) as far as practicable, to prevent harm or injury to eggs, chicks, and brooding females. While adult birds could be expected to fly away during vegetation clearance activities, brooding females could be at risk of injury if they remain on the nest until the vegetation begins to fall.

Where removal of such vegetation during the peak bird breeding season is unavoidable, a native bird nesting survey must be completed prior to clearance to avoid injury or loss of eggs, chicks, or active nests. The following protocols are to be adopted:

- Nest surveys will be undertaken by a qualified ecologist.
- Nest surveys will include inspections for tree cavities (including pine), tree nests and ground nesting species such as New Zealand dotterel, New Zealand pipit and harrier.
- Arborists may be required to assist with nest surveys where trees are too tall or the foliage too dense to accurately determine the presence/ absence of active nests.
- Where no active native bird nest(s) are found, the vegetation may be felled within three days of the nest survey. If clearance within this timeframe is not possible, the nesting survey should be repeated to verify the absence of active nests prior to clearance.
- Where an active native bird nest(s) is located, an exclusion perimeter (30 metres diameter for a non-threatened native bird species, 50m for an ‘At Risk’ or ‘Threatened’ species) will be demarcated around the tree or nest, and works shall not breach this cordon until all nestlings have fledged. Vegetation may be removed once the ecologist has confirmed that nesting is complete.

9.4.3 Constraints on Noise, Dust or Light-associated Disturbances

Avifauna may be disturbed by loud or persistent construction related noise, increased dust and/ or bright and persistent lighting during construction. These disturbances could result in birds vacating the area temporarily but will be most harmful during the breeding season if important nesting habitat is degraded (e.g. dust falling on nests), breeding call activity is affected, or nest failure is induced.

To manage these effects the following protocols will be implemented:

- Limit construction noise to commence at least one hour after sunrise and cease at least one hour before sunset.
- Limit or avoid the use of lighting during the night, or where lighting is deemed necessary, avoid directing light spill onto nearby vegetation or direct light downwards using lighting hoods.
- Ensure dust management protocols are in place and are adhered to throughout the life of the WNP.

Compliance with the limits specified in the relevant consent conditions for each effect will ensure these protocols are met.

9.4.4 Accidental Injury or Mortality to Native Avifauna

In the event accidental or mortality to native avifauna during vegetation clearance or construction, the following procedures will be implemented:

- Injured native birds will be placed in an appropriate carrying box/ bag (e.g. one that is cool, dark, and material-lined and may include cardboard boxes) and immediately transported to a DOC-approved veterinarian for assessment and treatment.
- If the species is 'At Risk or 'Threatened', the local DOC office will be contacted within two hours of the event or, if after hours, DOC will be informed through the DOC hotline (0800 362 468). Species that fit this category that may be present in the area are:

  > NZ Dotterel

  > Dabchick

  > NZ Pipit

- DOC and veterinary advice will be sought in conjunction with the Project Ecologist to make a decision for rehabilitation of the bird if required. Rehabilitation would be undertaken by an appropriately qualified and permitted rehabilitation provider.
- All injuries or mortalities will be accurately recorded in INX as an environmental event and reported to DOC within 24 hours of being identified with a full investigation undertaken. Refer Table 44 for the DOC contact details.
- Any native bird that is dead or has been euthanised will be taken to the local DOC office as soon as possible.

Table 44 DOC Contact Details

	When to contact	Contact details
Hauraki DOC Office	Within two hours, if 'At Risk or Threatened species injured.	0800 275 362
DOC Hotline	If At Risk or Threatened species discovered after hours	0800 362 468

9.5 Key Performance Indicators

Avifauna management will be implemented in accordance with best practice standards and requirements, with all injuries or mortalities to be accurately recorded and reported to DOC. Other key performance indicators include:

- Vegetation clearance undertaken in accordance with the approach prescribed by the Avifauna management plan, outside of peak bird nesting season where possible and overseen by appropriately trained ecologists.
- Any bird injuries or mortalities reported to DOC within required timeframes.
- Exclusion zones demarcated for any native bird nests identified.
- Ecologist to confirm when native bird nest has fledged, prior to vegetation clearance commencing within the exclusion zone.
- All injuries or mortalities will be accurately recorded and reported to DOC within the appropriate timeframes.
- Consent conditions limits related to noise, air quality, and light are met.
- Actions taken with regard to avifauna management during vegetation clearance activities will be reported annually in the ELMP annual report.

9.6 Reporting

A SQEP must prepare a report annually, identifying the extent of vegetation and removal and a summary of all relevant fauna management and monitoring undertaken preceding vegetation removal activities undertaken during the previous 12 months.

The report must detail:

a) Extent of vegetation removal undertaken.
b) All preclearance bird surveys and protocols, and results.
c) Any injuries or mortalities during vegetation removal.

This information will be provided in the ELMR and may be combined with information regarding bats and lizards.

PART I: BAT MANAGEMENT PLAN

10 BAT MANAGEMENT PLAN

10.1 Overview

All native bats are protected under the Wildlife Act 1953 (s3) and areas of significant indigenous vegetation and significant habitats of indigenous fauna (including native bats) are matters of national importance under the Resource Management Act 1991 (s6(c)). The habitats within and surrounding the WNP area could potentially support long-tailed bats (*Chalinolobus tuberculatus*), a 'Nationally Critical' species that is threatened by habitat loss, fragmentation, and introduced predators (O'Donnell et al., 2018).

The purpose of this Bat Management Plan (BMP) is to identify how the WNP will address potential adverse effects on native bats within the WNP area, especially in areas where vegetation removal (including exotic pine trees) is proposed (e.g. GOP, NRS and TSF3). Specifically, the BMP sets out procedures for how the potential adverse effects will be avoided or remedied or mitigated.

10.2 Consent Condition Matrix

Table 45 below sets out the relevant consent conditions associated with the Bat Management Plan and where they are addressed within this document.

Table 45 Bat Management Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and	C47B(2)(a): > Lead in times and implementation timeframes –Section 10.5.2 > Duration of maintenance - No maintenance is required however the protocols will be maintained for the duration of the WNP. C47B(2)(b): > Monitoring – 10.7.1

Consent Condition Number	Consent Condition Wording	Location within this Plan
	c. Detailed contents and performance indicators in relation to the following: Bat Management Plan – which outlines how the Waihi North Project will address potential adverse effects on native bats within the Waihi North Project area, with emphasis on areas where vegetation clearance is proposed.	> Triggers and remedial actions – Section 10.6.11 > Reporting requirements – Section 10.9 C47B(2)(c): Performance indicators – Section 10.8

10.3 Summary of Bat Values and Potential Effects

Bat surveys (2011-2024) at Gladstone Open Pit recorded long-tailed bats at low levels, at the eastern edge of the block, at the edge of the pine plantation. As the pine trees on site have some capacity to support roosting habitat for native bats, removal of these pine trees could lead to the death or injury of native bats. The 'Protocols for minimising the risk of felling bat roosts' (the 'Bat Roost Protocols', or BRP) should therefore be followed to minimise this risk.

10.4 Long-tailed Bat Ecology

Long-tailed bats are found throughout the North Island and are classified as a 'Nationally Critical' threatened species under the New Zealand Threat Classification System (O'Donnell et al, 2023). LTBs typically use forest edges and riparian areas for foraging and commuting (O'Donnell, 2000). They are highly mobile and have extensive home ranges that have been recorded to stretch 19km and cover over 50km2, with individuals capable of moving tens of kilometres in one night (O'Donnell, 2001a).

Roosts are often in tree cavities, epiphytes, or under loose bark (Borkin and Parsons 2009; Griffiths 1996) and change frequently, often on a nightly basis (O'Donnell, 2000). However, roost fidelity can be high on a year-to-year basis (Sedgeley & O'Donnell, 1999).

Roosts require habitat features that are mostly supported by larger trees and are carefully selected for thermal properties that are still not well understood (Sedgeley 2001; DOC, 2021b) and thus challenging to artificially replicate. Roost trees, particularly those that are used for communal roosting, are therefore considered a valuable and limited resource for LTBs.

A summary of the New Zealand bat reproductive cycle is included below (Figure 28), to provide context to the requirements and procedures outlined in this document.

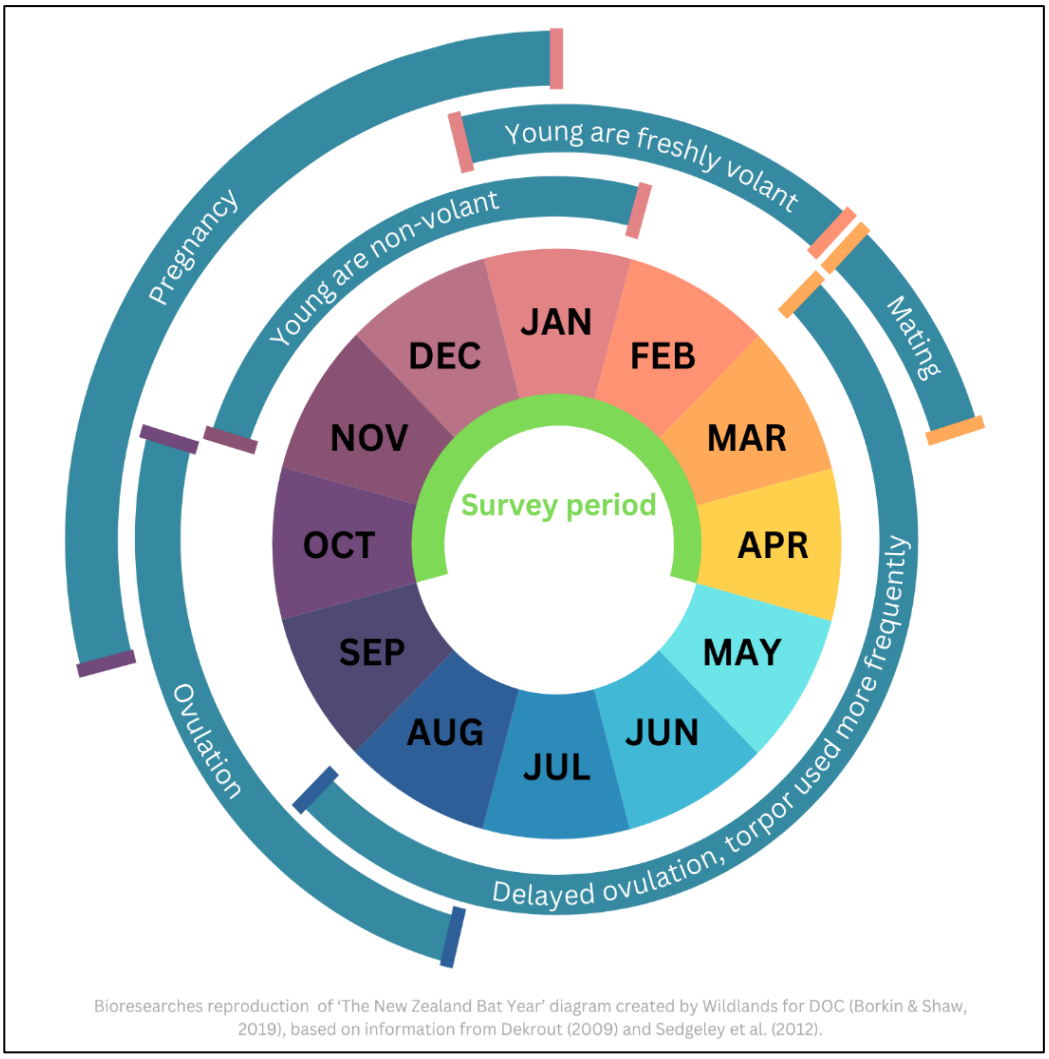


Figure 28: Visual representation of the key stages of the reproductive cycle of bats (long-tailed & short-tailed bats) in Aotearoa New Zealand

10.5 Purpose of Plan

10.5.1 Overview

The purpose of this Bat Management Plan is to set out procedures to avoid impacts on native long-tailed bats ('Threatened–Nationally Critical) that may be adversely affected by potential roost tree felling within the WNP area.

1. This Plan adopts the requirements of current standard protocol as in accordance with the DOC advice including: DOC (2024) Protocols for minimising the risk of felling bat roosts (Bat Roost Protocols (BRP)) Version 4, 2024 approved by the New Zealand DOCs Bat Recovery Group and must be as required to meet any subsequent versions of the Protocols.

2. DOC (2021) Artificial bat roost advisory note – DOC-6734995. New Zealand Bat Recovery Group Advice Note- The Use of Artificial Bat Roosts.

Vegetation removal for the Project requires the removal trees that support potential bat roost characteristics. Such trees are > 15 cm diameter at breast height (dbh), and support features including cracks, knot holes, flaking bark epiphytes.

10.5.2 Plan Implementation and Competencies

DOC requires that only personnel who are certified to be competent at high-risk activities for bats, such as 'roost felling', may undertake them. This is particularly relevant whereby a Wildlife Act Authority would be required prior to any felling of a bat roost tree. Such a Wildlife Authority requires the understanding of what to do when bats are found during tree felling as per Appendix 6 of 'Initial veterinary care for New Zealand Bats'.

Therefore, prior to vegetation removal, this plan requires that:

- All trees that are >=15 cm dbh (diameter at breast height) shall be demarcated spray / marker paint and numbered on a map.
- For all identified trees, the DOC Tree Removal Protocol shall be adhered to.
- A bat survey (October 1 – April 30) is to be undertaken within the area of vegetation clearance, prior to tree felling. This will involve ABMs / acoustic bat monitors to be placed throughout the affected area (targeting trees with bat roost characteristics) one week prior to proposed clearance.
- The data must be analysed for bat activity on the morning immediately prior to proposed tree felling.
- Tree felling must be stopped if bat activity is detected at any time within two consecutive valid survey nights preceding tree felling.
- Where identified bat roosts require felling, those trees shall be replaced with a minimum six artificial bat roost boxes (see below).

To ensure that bat roosts are identified appropriately and surveys provide valid data, the surveys are to be undertaken only when environmental conditions are also within established parameters:

- <5mm rain in first 4 hours after official sunset, and <2.5mm rain for each 2-hour period overnight; and
- temperature >10ºC at sunset.

10.6 Department of Conservation Bat Tree Removal Protocols

10.6.1 Overview

This section details procedures to be followed to give effect to the DOC protocols for removing trees that have the potential to support bat roosts. The intention of the tree removal protocol is, in the first instance, to avoid felling bat roost trees, secondarily to move roost trees, and only if unavoidable, fell roost trees (but only once vacated by bats).

10.6.2 Certified Bat Ecologist

DOC requires that only certified personnel (certified bat ecologist) may undertake high-risk activities, such as identifying bat roosts within a tree where bats have been recorded, and that tree requires removal. Bat ecologists must be approved to the relevant competency level (CL) for the activity they are undertaking:

Table 46: Certification requirements for high-risk activities

Activity	Certification required
Identifying roost characteristics	Any individual confident with identifying high-risk features, with support of a bat ecologist approved at CL 3.3 where further investigation is required
Physical checking of potential roost features	CL 3.3, or a certified arborist under the direction of a bat ecologist approved at C.L 3.3
Assessing bat activity around potential roost trees with ABMs	CL 3.1
Assessing use of tree by roost watches	CL 3.2, or under direct supervision of such during counts requiring multiple watchers
Overseeing tree felling	**Any individual capable of physically inspecting trees for signs of bats once felled, and who is familiar with 'Initial Veterinary Care for New Zealand Bats' (Borkin and Shaw, 2019/2023)**

Note: *Certification and experience required for each activity in the Tree Removal Protocols, as per DOC BRP, v2 (2021)*

A Wildlife Act Authority would be required prior to any felling of a bat roost tree. Such a Wildlife Authority requires the understanding of what to do if bats are found during the tree felling as per Appendix 6 of 'Initial Veterinary Care for New Zealand Bats' (Borkin and Shaw, 2023).

10.6.3 Overview of Bat Roost Protocol

Aspects of potential bat roost tree management are required to be undertaken by an ecologist or arborist who is certified as competent for specific skill sets by DOC. Figure 29 (DOC, 2024) details the decision-making process required for implementing bat roost protocol.

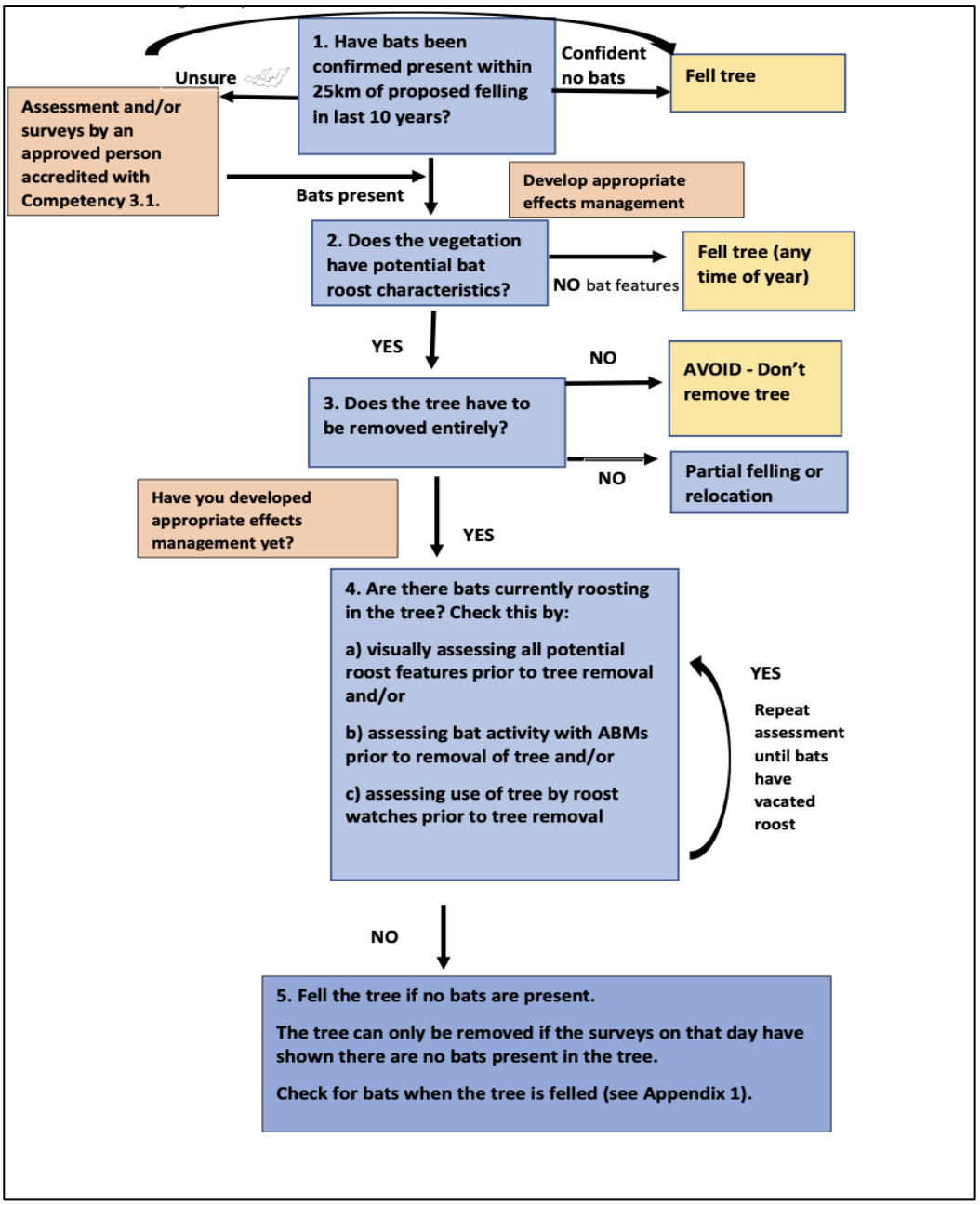


Figure 29: Decision tree for Bat Roost Protocol (based on DOC BRP, Version 4, October 2024).

10.6.4 Identifying Roost Characteristics

Where bats are recorded, vegetation supporting bat roost characteristics will be identified by the Certified Bat Ecologist, to inform sufficient coverage for pre-felling surveys required immediately prior to removal. High Risk Trees will be qualified as any trees that are ≥15 cm DBH (diameter at breast height) and support any of the following bat roost characteristics:

1. Hollows
2. Cavities
3. Knot holes
4. Cracks
5. Flaking, peeling, or decorticating bark
6. Epiphytes
7. Broken or dead branches/ trunk
8. Shelter, cavities, or hollows formed by multiple trunks/ double leaders
9. Dense tree-fern skirts

Where the vegetation does not support bat roost characteristics as above, the vegetation may be removed (any time of year) without bat roost protocols.

10.6.5 Bat Activity Assessment (High Risk Trees)

Where bats are detected at the site and affected vegetation supports bat roost characteristics (High Risk Trees), those trees will be assessed (between 1 October and 30 April) to determine any current activity by a certified bat ecologist, to ensure no bats are occupying potential roosts at the time of removal. This assessment must be undertaken immediately prior to tree removal by way of at least one of the following methods:

1. Tree climbing for visual inspection of potential roosts, if possible
2. Pre-felling surveys: minimum two consecutive valid survey nights immediately prior to removal
3. Roost watches: minimum two consecutive valid nights of roost entry/ exit watches immediately prior to removal

Where bats are confirmed present, the tree must not be felled. This process must be repeated on subsequent days until the bat ecologist confirms absence.

Confirmation of roost activity will trigger Section 10.6.9 - Procedure and Section 10.7 - Artificial Roost Provision.

10.6.6 Tree Climbing and Inspection

Roost features may be able to be accessed by an experienced tree climber or certified bat ecologist (approved at CL 3.3). A non-certified arborist must provide information along with photographs or video footage to the bat ecologist to inform the decision on whether the tree may be felled.

- An endoscopic camera should be available for this step and every possible corner of each potential roosting feature inspected, i.e., cavity/crack etc. Cracks, holes, and splits may lead to cavities or may be superficial. A cavity may be wet indicating no/low potential as a bat roost.
- Search of tree features should be accompanied by use of a hand-held bat detector. If bats are present and not in torpor, then detection of presence listening at 25 kHz (for social calls) and 40 kHz (for echolocation calls) may help to determine if long-tailed bats are present.
- The presence of guano or urine staining should be noted.

Care must be taken while climbing trees to avoid disturbing, removing or destroying tree features with bat roost potential such as sections of loose bark or cavities in dead wood. Using mobile elevated platforms can be a good option. Bats are less likely to be active over colder periods, so climbing to check whether bats are present in potential roost features must take place between October 1st to April 30th when the temperature is 10°C or greater at official sunset on the night previous to inspection.

10.6.7 Pre-felling Surveys

Bat activity is to be recorded using ABMs. Location of ABMs must provide sufficient coverage to be able to determine if bat roosts are present in one or more of the trees. A minimum two consecutive valid survey nights immediately prior to felling will be undertaken by the certified bat ecologist (approved at CL 3.1). At least two nights are required as it is possible for bats to enter or leave a roost without echolocating, or to not leave the roost for a night.

Prior to the commencement of surveys, ABMs must be checked for correct operation at a site where bat activity is known to be regular, or by using the DOC – Bat Recorder Tester (Tussock Innovation Ltd) phone app made for this and available from Google Play Store. Faulty or suspect ABMs must not be deployed, and ABMs must be redeployed if faults occur.

10.6.8 Roost Watches

This must only be undertaken in combination with pre-felling surveys and can be carried out by a certified bat ecologist approved at CL 3.2. Where multiple personnel are required to cover a potential roost tree, at least one must have the appropriate certification and be present for the entire duration of the watch. Watches must confirm no bat activity for two consecutive nights immediately prior to felling. The following weather conditions define a valid night for roost watches:

- Be undertaken between October 1- April 30 (inclusive)
- Temperature greater than 10°C all night between official sunset and sunrise.
- Precipitation < 2.5 mm for each two-hour period between official sunset and sunrise, and < 5 mm in the first 4 hours after official sunset.
- Roost watches should include the deployment of ABMs and analysis of data for the night of the roost watch.

10.6.9 Emergence watches

Each tree must be watched initially from sunset until it becomes too dark to see by sufficient people to observe all potential exit points.

This must be supported by the use of handheld detectors. The aim of emergence watches is to identify potential roost locations within the vegetation. Infra-red and thermal imaging cameras may be useful in this process.

10.6.10 Roost re-entry watches

The time when bats return to roosts can vary based on temperature and time of year.

- Observers must then return the next morning and watch the tree to determine whether bats return to the vegetation.
- Roost re-entry watch timing should be based on patterns of activity recorded onsite with acoustic recorders. Watches should begin two hours prior to when the last passes were recorded on the ABMs on previous nights and finish one hour after official sunrise time. Where this information is not available and at minimum, watches shall begin two hours prior to official sunrise until one hour after sunrise. Infra-red and/or thermal imaging cameras may be useful as a supplementary tool in this process.

If bats are sighted, or sign detected, or a roost (active/inactive) is confirmed, the approved bat ecologist, as soon as possible, shall:

- Call the tree felling supervisor to inform them which affected tree(s) cannot be felled due to detection of bat sign.
- Send an email to the site manager, and a bat ecologist representing the council and DOC detailing the results of the survey and outlining the measures for protection or relocating the roost tree.
- A record (including photos) of any vegetation containing bat roosts shall be kept detailing the date; size, location and species of tree or other vegetation; roost type, e.g., cavity, peeling bark, broken branch; detail outlining how presence of bats was confirmed; the number of bats present; and species present, if known.

10.6.11 Bats Detected

Vegetation removal must take place on the day of tree inspection, or the day roost watches or two consecutive nights of ABM data have confirmed that there are no bats present. If practical, trees are to be inspected for signs of bats once felled and before removing from site. People inspecting trees should be familiar with the Bat Care Advice document and able to check/inspect tree for signs of bats once felled.

If during the felling of a tree bats are detected, felling of that tree must stop immediately if safe to do so, and DOC and an approved bat ecologist at Competency Level 2.1 must be consulted.

If bats do not fly away or are potentially injured/found on the ground, felling can only re-start once permission has been obtained from DOC after consultation with an approved bat ecologist at Competency Level 2.1.

If bats are detected once the tree has **been felled**, all further work must stop, and DOC and an approved bat ecologist at Competency Level 2.1 must be contacted. The felled tree must be thoroughly inspected by the approved bat ecologist for further bats.

If any bats are found on the ground or in the tree once felled, place the bat in a cloth bag in a dark, quiet place at ambient (or slightly warmer) temperature and take to a veterinarian for assessment as soon as possible. A maximum of two bats should be kept in one bag. After delivering the bat to the vet, contact an approved bat ecologist at Competency Level 2.1 in consultation with the vet and DOC (0800 DOC HOT, 0800 362 468).

Bats must be kept for three days under observation and must be kept out of torpor for this time. Vets must euthanise bats whose injuries are causing suffering and are not likely to heal sufficiently to allow rehabilitation and return to the wild. The approved bat ecologist at Competency Level 2.1 and vet must consult with DOC to consider appropriate rehabilitation options where suffering is minimal and chances of return to the wild are high.

10.7 Artificial Roost Provision

Vegetation clearance has potential to remove communal roost trees which are a limited resource to long-tailed bats. Therefore, any loss of such habitat is a very high-level effect on the basis of the species threat status and the probable low availability of large suitable trees in the surrounding landscape.

Therefore, in accordance with the DOCs advisory note for the use of Artificial Roost Box ("**ARB**"), a minimum of six ARBs for each identified roost removed, will be installed in habitat suitable for bat roosting, as directed by the bat ecologist.

The total number of ARBs to be installed will be a minimum of six per identified roost tree lost.

ARBs will be installed within a nearby area of protected vegetation where bats have been detected (by survey, records or other knowledge).

All ARBs will (as per DOC advisory note on artificial bat roost provision):

- Be deployed at a minimum height of four metres from the ground
- attached securely to an appropriate tree, with no clutter within 2 m of the roost opening
- Be 'predator proofed' with 'tree bands' to prevent access by rats, cats and possums. Bands will be wrapped around the trunk above and below each roost box
- Be of multiple designs, of variable orientation and exposure to light
- Be installed near to the lost roost tree to facilitate discovery, where practicable and where location won't be subject to excessive disturbance (e.g. from artificial lighting, noise, vibration, or human curiosity).

10.7.1 ARB Monitoring

Where any ARBs are installed, they will be checked annually and maintained for a minimum of 10 years. At each inspection, any cobwebs, bird nesting material or invertebrates will be removed. Each ARB will be inspected for signs of bat roosting, such as guano. Anti-predator tree bands will be checked at 6-monthly intervals for a minimum of five years and maintained to ensure they remain securely attached to the tree. Close inspection and maintenance should occur between May-September (inclusive) to avoid sensitive months for juveniles and breeding females (Figure 28). If bats are determined to be

present in the ARB then maintenance must be postponed for a short time until the ARB is vacant (e.g. to the following day). While information on the effectiveness of ARB designs and optimal installation for long-tailed bats in New Zealand is limited, Hamilton City now has well over 100 ARBs installed throughout urban parks, with a study tracking use of 74 ‘Kent’ style ARBs for 12 months (2021-2022) observing 32% of them used at some point by LTBs (Robinson et al., 2024). It should be noted that initial screening excluded ARBs that appeared unlikely to be used, however AECOM (2022) reported 41% of 80 ARBs installed in association with the Southern Links Project were being used within two years. This was likely facilitated by the Hamilton LTB population having ever-increasing exposure to ARBs beginning over a decade ago. Uptake in other regions or effects on individual fitness and population have not been well studied

Various roost box designs have been used in New Zealand. Models utilised by long-tailed bats include:

- Various timber ‘Kent’ bat box designs and similar bespoke inspired designs (e.g. Waikato Regional Council)
- Schwegler ‘woodcrete’ designs (models 2F, 2FN, 1FF and 1FD; DOC, South Canterbury)

Long-tailed bats have been recorded roosting in the bespoke WRC ‘Kent’ design (Hamilton) and all four of the Schwegler designs (South Canterbury).

Figure 30: Examples of artificial bat roost designs; Left: timber 'Kent' design (source: Treelands); Centre: Schwegler 2FN design and Right: Common Noctule bats inside 2FN bat roost (Source: Schwegler)

10.8 Key Performance Indicators

Bat management will be implemented in accordance with best practice standards and requirements. This is to include the installation of a minimum of six ARBs per identified roost tree lost. The ARBs are to be checked and maintained for a minimum of 10 years. Anti-predator tree bands are to be checked and maintained at 6 monthly intervals for a minimum of 10 years.

10.9 Reporting

A SQEP(s) must prepare a report annually, identifying the extent of vegetation and removal and a summary of all relevant bat management and monitoring undertaken preceding vegetation removal activities undertaken during the previous 12 months.

The report must detail:

a) Extent of vegetation removal undertaken.
b) All preclearance bat surveys and protocols, and results.
c) Any injuries or mortalities during vegetation removal.

This information will be provided in the ELMR and may be combined with information regarding avifauna and lizards.

10.10 Conclusion

Upon completion of works, all findings resulting from the implementation of the Bat Management Plan will be recorded (processed csv files and GPS locations) and sent to batdatabase@doc.govt.nz on a standard spreadsheet available by emailing this address.

10.11 References

The following list is the references applicable to the Planting Plan, Plant Pathogen and Weed Management Plan, Pest Animal Management Plan, Lizard Management Plan, Avifauna Management Plan and Bat Management Plan

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PART J: STREAM DIVERSION AND DEVELOPMENT PLAN

11 STREAM DIVERSION AND DEVELOPMENT PLAN

11.1 Overview

The new tailings storage facility (TSF3), and two new rock stacks (the Northern Rock Stack, NRS and Willows Rock Stack) are proposed over existing watercourses within the footprint of the WNP. To offset a portion of this unavoidable impact, two ecological functional stream diversions are required totaling 2,765 m which will contribute to loss of stream habitat on the unnamed 'TB1' stream within the NRS due to the NRS Diversion, and the Ruahorehore Stream and tributaries within the TSF3 due to the TSF3 Diversion. The Stream Diversion and Development Plan ("**SDDP**") sets out the principals of the stream diversions and development and only applies to stream diversion channels not clean water diversion channels.

The NRS Diversion will be 965 m and will discharge through a short section of an unnamed tributary and then into the Ohinemuri River. The TSF3 Diversion will be 1,800 m and will channel flows into the Ruahorehore Stream and into the Ohinemuri River.

11.2 Consent Condition Matrix

Table 47 below sets out the relevant consent conditions associated with the Stream Diversion and Development Plan and where they are addressed within this document.

Table 47 Stream Diversion and Development Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and	C47B(2)(a): > Lead in and implementation timeframes –Section 11.5.1 > Duration of maintenance – Section 11.8 C47B(2)(b): > Monitoring – 11.8 > Triggers and remedial actions – Section 11.8.2 > Reporting requirements – Section 11.9

Consent Condition Number	Consent Condition Wording	Location within this Plan
	c. Detailed contents and performance indicators in relation to the following: Stream Diversion and Development Plan – which identifies how stream ecological functions will be maintained or improved following the diversion of two streams.	C47B(2)(c): Performance indicators – Section 11.10
Appendix B4 – WRC Conditions		
G19	The Consent Holder must undertake the following ecological offset works: […] c. Developing 2,765 metres of new stream channel with the ecological functionality shown in Appendix 1: Indicative Stream Channel Diversion Design of the Freshwater Fisheries Dispensation for the areas shown in the ELMP-WA referred to in Condition C5	Section 11.1
G20	Stream diversion and enhancement measures must be consistent with Type 1, Type 2 or Type 3 diversions shown in the Stream Diversion and Development Plan provided within the ELMP-WA referred to in Condition C5 and incorporate the following design elements: a. Stream diversions are to convey clean water, or surface water treated to remove silt (i.e., uncontaminated by construction or operational activities); b. The design of the diversion channels must create a range of stable microhabitats for fish and invertebrates, including stable pool habitats and gravel and cobble habitat, sufficient to achieve a level of stream function equivalent to that predicted through the mitigation calculations set out in the Boffa Miskell Freshwater Ecological Assessment;	Section 11.4 and Appendix 12A

Consent Condition Number	Consent Condition Wording	Location within this Plan
	c. The diversion channel around TSF3 and the NRS must allow the passage of migrating eels and other native fish with climbing abilities; d. Riparian vegetation should extend to at least 10 m either side (where this occurs on land owned by the Consent Holder) of the channel and must include low-growing species with overhanging cover in accordance with the Stream Enhancement Riparian Planting Plan provided within the ELMP-WA; e. Diversions should be constructed prior to the reclamation of the original channel; f. Where a diversion is required but it is not possible to replicate the existing habitat value (such as the upper reaches of the Ruahorehore Stream Tributary diversion channel) or where construction is taking place, then a clean water cut off drain must be created; g. The diversion around TSF3 must include provision for a 1.2 ha wetland to the east of the TSF3.	
SC6.F.4	Diversion drains and associated works must: […] (a) For sections of the diversion drains that are to be permanent, be constructed and operated to convey the run-off resulting from a 1% Annual Exceedance Probability.	These consent condtions will be worked towards over the timeframe of the project and any updates made to the ELMP as required.
SC6.F.7	Within 20 working days following completion of each diversion, the Consent Holder must provide Waikato Regional Council with as-built plans of the completed works.	
SC7.F.4	Diversion drains and associated works must be constructed and operated to convey the run-off	

Consent Condition Number	Consent Condition Wording	Location within this Plan
	resulting from a 1% Annual Exceedance Probability.	
SC7.F.6	The Consent Holder must advise Waikato Regional Council in writing in advance of the proposed construction of each of the diversion drains, and must provide plans of the proposed works, and advise proposed start times for construction.	
SC7.F.7	Within 20 working days following completion of each diversion, the Consent Holder must provide Waikato Regional Council with as-built plans of the completed works.	

11.3 Existing Ecological Values

11.3.1 TB1 Stream / NRS Diversion

TB1 Stream is an existing formed diversion that was created from an earlier expansion of mining operations. The TB1 stream is located to the north of the Processing Plant and drains directly into the Ohinemuri River (Figure 31). There are several small tributaries to the east that flow in the TB1 stream that will also be reclaimed either in their entirety or within their lower reaches. The upstream source of water for TB1 will be unchanged for the NRS diversion, flowing from tributaries to the south-east and south.

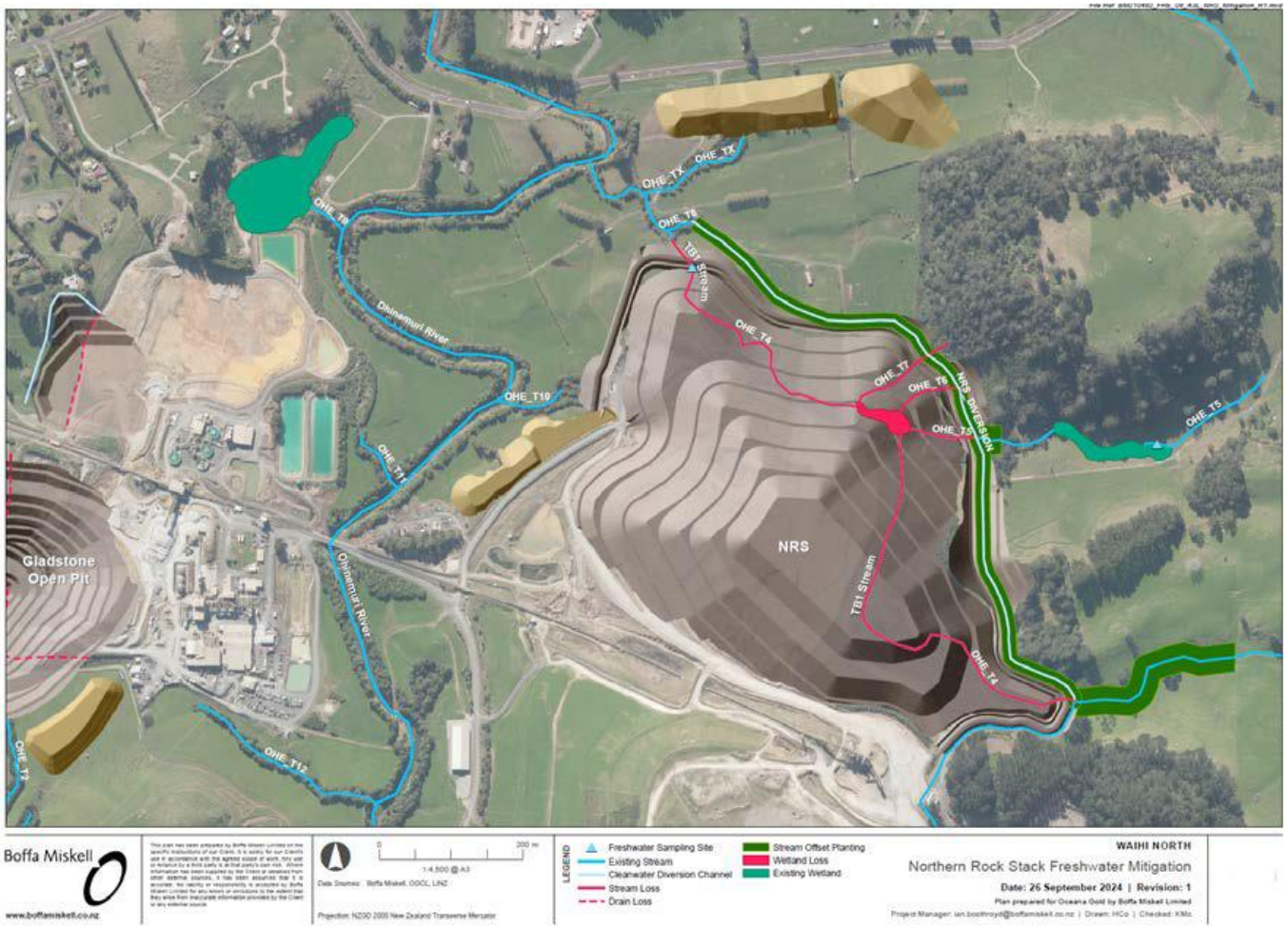

Figure 31 Map of existing TB1 Stream and proposed NRS Diversion

TB1 Stream has a reasonably wide (1.7 – 3.4 m) channel with a silt / sand substrate with the occasional small gravel present. Water flow was slow, with large and deep pools (up to 1.26 m deep) present along the reach and some areas of anoxic sediment. Riparian vegetation had been planted to approximately 10 m either side and fenced off from the surrounding grazed pasture. Native species such as flax, lemonwood, cabbage tree and mapou have been planted, amongst others. Giant umbrella sedge is abundant along the stream edge on both banks, with it extending out to several meters towards the downstream end of the reach. Small areas of active erosion were present with bank slumping more apparent at the downstream end of the reach. Macrophytes were rare along the survey reach, with small areas of *Nitella sp*. observed. Towards the lower reaches the stream channel shallowed and concentrated patches of watercress and water purslane (*Ludwigia palustris*) were present.

Macroinvertebrate communities were dominated by taxa pollution tolerant. However, a number of pollution sensitive EPT taxa were observed. The MCI-sb was indicative of 'fair' biotic function, with probable moderate pollution.

Fish taxa was poor, with only shortfin eel recorded (*Anguilla australis*).

TB1 Stream had an SEV score of 0.501, which is indicative of 'moderate' ecological functionality.

A wetland feature occurs within the TB1 stream corridor. This wetland has been formed from a former silt pond that was developed as part of the construction of the TSF2. This is not a 'natural inland wetland'[3] because it is a deliberately constructed wetland as part of a re-routed watercourse and arising from a former created silt pond. It will not be recreated as part of the NRS Diversion.

11.3.2 TSF3 Diversion / Ruahorehore Stream

The Ruahorehore Stream, associated tributaries and drainage canals are located to the east of the existing tailing storage facilities, south of the Processing Plant. The proposed TSF3 footprint will result in the loss of a section of the Ruahorehore Stream and associated tributaries, and a number of connected drainage canals (Figure 32). The headwaters of the Ruahorehore Tributary are located within a forested area and neighbouring grazing areas to the north. The flow from these headwaters will be maintained through the TSF3 diversion channel. A small area of the main stem of the Ruahorehore will be realigned at the downstream extent of the TSF3 diversion channel.

[3] NPS-FM Subpart 3, 3.21 Definitions relating to wetlands and rivers: natural inland wetland (b) a deliberately constructed wetland.

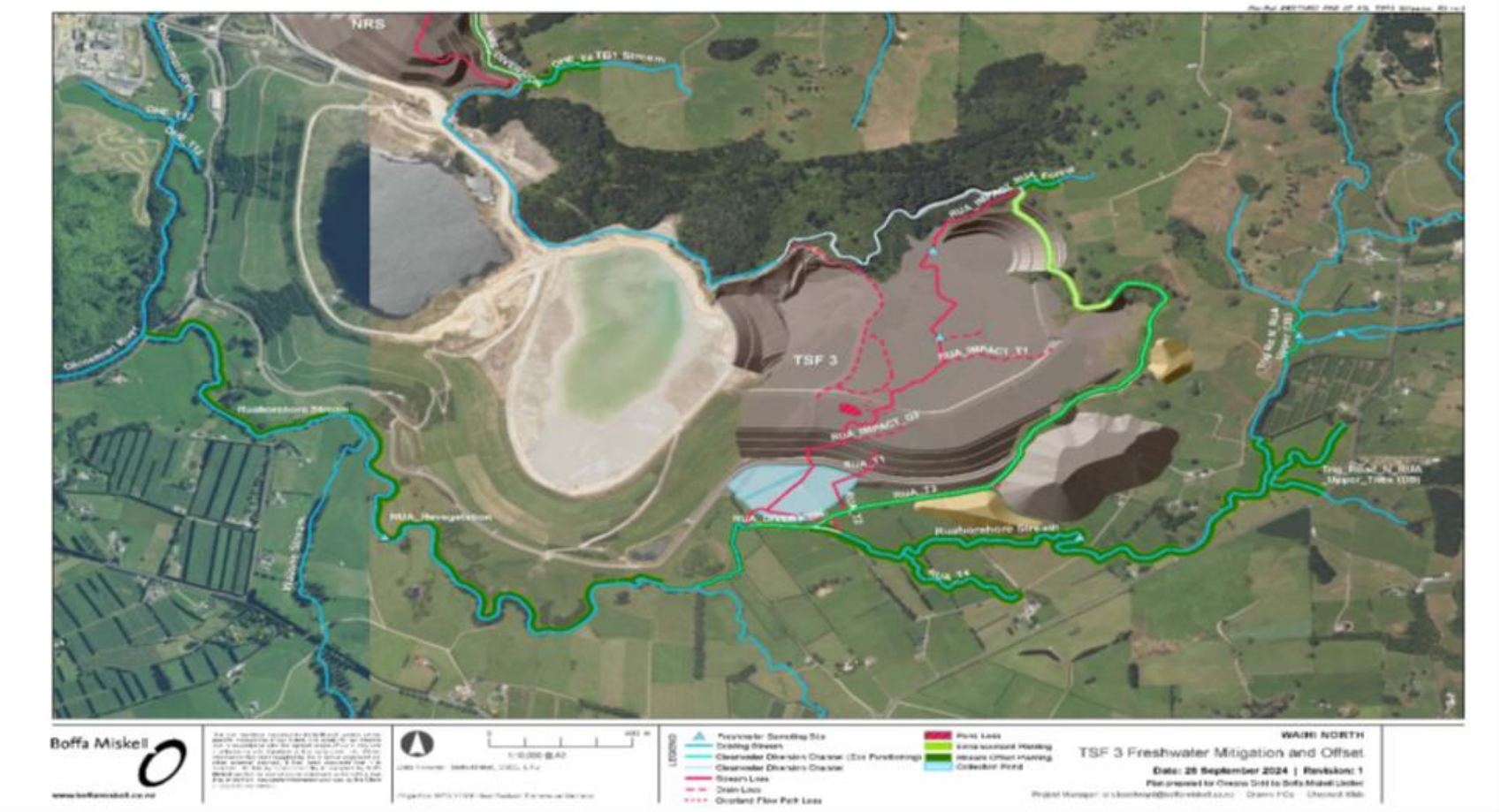

Figure 32: Map of the existing Ruahorehore Stream and Tributaries, and proposed TSF3 Diversion.

The watercourses within the TSF3 footprint are generally characterised by an incised channel of varying width (0.17 - 3.3 m) and depth (0.2 - >1 m), and substrate comprised largely of silt / sand with occasional small gravels and bedrock present. Riparian vegetation is largely absent, with the occasional weedy shrub or hedging present. Bank slumping is evident along much of the stream length, with areas of pugging from stock also present. Macrophytes were often abundant, particularly along the stream edges including the emerged species willow weed and mercer grass (*Paspalum distichum*) and the submerged species *Elodea canadensis* and *Nitella sp*.

Macroinvertebrate communities were dominated by pollution tolerant species such as *Oxyethira* and the snail *Potamopyrgus antipodarum*. MCI-sb scores had a range of 74.1 – 110, with high scores seen at the upstream survey site.

Fish communities were comprised mainly of shortfin eel, with kōura, a common bully and a rainbow trout (*Oncorhynchus mykiss*) also recorded.

SEV-scores had a range of 0.435-0.532, which is indicative of 'moderate' ecological functionality.

11.4 Diversion Design Objectives

The proposed stream diversions, NRS and TSF3, are to be ecologically functioning diversions that replicate the habitat and ecological functioning of a stream. These two diversions have been included within stream offset calculations and have minimum ecological functionality (via a predicted SEV score) to achieve.

The design of the stream diversions must be fit for purpose and ensure that stream ecological functions are maintained or improved on from the stream to be lost. The new diversion channels must provide appropriate aquatic habitat for fish, macroinvertebrates and plants, while conveying water. The below are a guideline for the design and construction of the diversion. Final detailed design has not been undertaken but is to be consistent with the principals of this Plan and the indicative Stream Channel Design examples located in Appendix 12A.

11.4.1 Stream Channel

11.4.1.1 Channel Meander

The two diversion channels should mimic and improve upon, as much as practicable, the natural meanders of the section of stream being reclaimed.[4] The addition of boulders, submerged logs, etc. will be used to aid meander development and increase flow heterogeneity.

11.4.1.2 Habitat Diversity and Channel Complexity

Hydrologic heterogeneity and instream habitat complexity can be improved upon through the creation of natural features such as runs, riffles and small and large pools. These features can be created utilising natural substrates such as rocks, logs and large boulders (See Figure 29 below). Both of the diversion channels are within catchments with a high loading of fine sediment, and these may become smothered with time. However, their presence increases stream heterogeneity and stability.

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[4] Stream TB1 and Rurahorehore Stream; the diversion mimicking the stream in the catchment it is within.

The extent of created habitat should be at a minimum consistent with the habitat present in the stream to be reclaimed and similar to neighbouring natural tributaries, with the final substrate present mimicking that naturally occurring in similar sized tributaries in the wider catchment.

A visual survey of the existing stream should be undertaken prior to the design of the diversion channel by the Project Freshwater Ecologist and the relevant designer/engineer to ascertain the correct ratios for channel complexity and bed material.[5] The channel complexity and availability will 'naturalise' over time as the new diversion channel becomes established.

The channel design must create a low-flow, or baseflow, channel, a bank full channel and a floodplain area (Figure 33). A low flow channel aims to maintain flowing water as much as practicable during dry conditions. This provides a refuge for fish and for fish movement, at least to extend a period of habitat availability should dry conditions persist.

11.4.1.3 Stream depth, wetted width and velocity

Stream depth and wetted width affect the total area of habitat that can be utilised by aquatic biota, and the volume of water conveyed during normal flows. Stream width and depth should mimic that of the channel to be reclaimed. A survey of the existing stream should be undertaken prior to the design of the diversion channel by the Project Hydrologist to ascertain the stream depths, widths, velocities and capacity. The final design should mimic, where possible, these with some localised variation for the creation of large and small pools and meanders.

5 This includes the ratios of riffe/run/pool/chute, and silt/sand/gravels/cobbles/boulders.

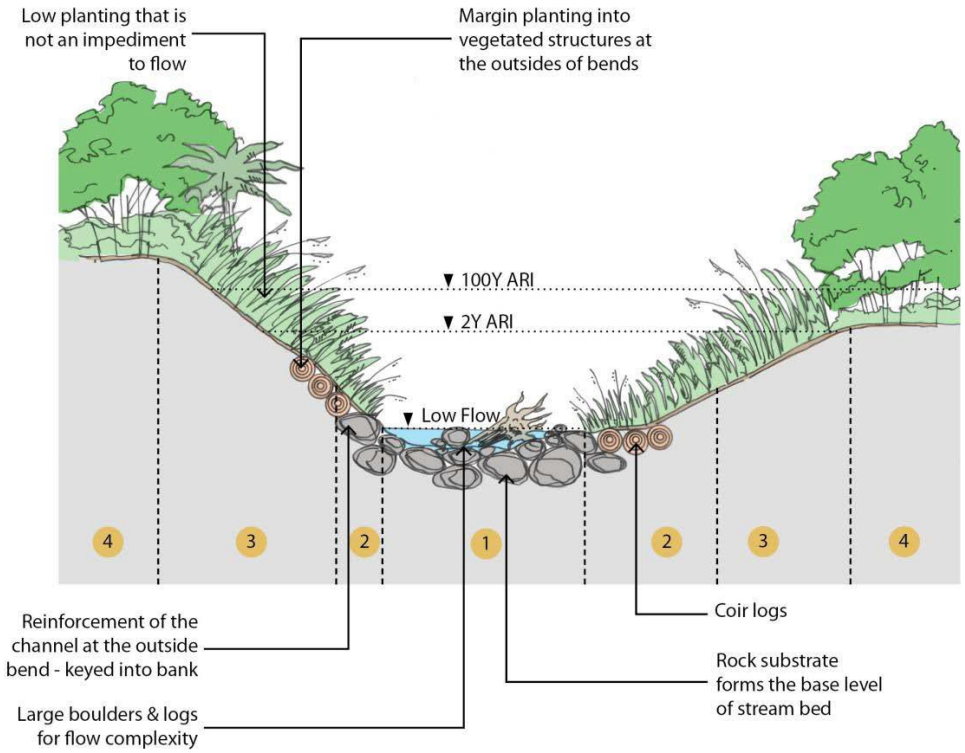


Figure 33: Example of a channel design, illustrating a low flow channel and the use of rocky substrates and woody debris.

Water velocities can affect macroinvertebrates, fish and macrophyte establishment as individual species have different flow preferences. The diversion channel should initially seek to replicate base flow velocities present in the existing channels. The use of channel features such as cascades can be created to help maintain desired flow rates. These features must maintain the relevant fish passage.

11.4.2 Riparian Vegetation

Riparian vegetation is integral to the ecological success of the stream channel diversions. The stream profile must allow the planting of riparian vegetation close to and extending over the water surface to create ample stream edge habitat. This will provide shading to the water surface, detritus in the form of fallen leaves and potential habitat for fish and macroinvertebrate species.

All stream diversions are to be planted with a minimum of 10 m of riparian planting either side of the stream channel, with 20 m where surrounding land use allows. Exceptions to this occur where mine operation infrastructure or land ownership issues arise. Riparian planting for diversion channels is detailed in the Stream Enhancement and Riparian Planting Plan.[6]

11.4.3 Assumed SEV Scores

The management of freshwater effects for the site is conceived as a wholly integrated ‘package’ that encompasses all aspects of mitigation. As part of this package the Stream Ecological Valuation (SEV)

6 Boffa Miskell, 2024. In preparation.

and associated Environmental Compensation Ratio (ECR) assessments were used to inform the mitigation package. Therefore, stream diversions have an 'assumed'[7] SEV score that informs the overall quantum of stream mitigation (both diversion and riparian restoration) that is required. The SEV score incorporates a set of attributes that, overall, need to be met in order to achieve the predicted SEV score, and consequently the overall mitigation quantum. Further details of the SEV are given in Appendix 12B.

Each site has an assumed SEV score, that should be met by 7 years post-livening. Other key attributes for the mitigation are the assumed wetted widths and proposed lengths of the diversions.

11.4.3.1 NRS Diversion

The assumed SEV score the NRS diversion is 0.673. Some other key scores used within the SEV ECR and overall quantum calculations, that must be met by the design include:

- Average wetted width of 1.5 m.
- Total diversion channel length of 965 m.
- Riparian planting to a minimum average of 10m width both sides.
- Shade from riparian planting to average of 71-90%.

The NRS diversion channel will have the same water source as it does currently and will continue to discharge into the lower reaches of TB1 Stream and out into the Ohinemuri River.

Existing tributaries to the east of the NRS diversion channel will discharge into the diversion channel. However, many will be significantly shorter in length.

11.4.3.2 TSF3 Diversion

The assumed SEV score of the TSF3 diversion is 0.673. Some other key scores used within the SEV ECR and overall quantum calculations, that must be met by the design include:

- Average wetted width of 1.8 m.
- Total ecologically functional diversion channel length of 1,800 m.
- Riparian planting to a minimum average of 10m width both sides.
- Shade from riparian planting to average of 71-90%.

The TSF3 diversion channel will have the same water source as it does currently, originating from a neighbouring paddock and flowing through an area of regenerating native bush, maintain connection between the lower Ruahorehore Stream and the forested headwaters of its tributary.

The diversion channel is not anticipated to be 'ecologically functional' in the upper reaches but will still enable fish passage for Anguilliforms and some climbers up into the upper reaches of the Ruahorehore Tributary.

7 SEVm-P score. As outlined in Storey et al (2011).

11.5 Construction Methodology

11.5.1 Construction Principles

The final construction method will be subject to the final design of the diversion channels. Below are some general principles for construction.

- The stream diversion channel should be constructed offline and prior to any instream works within the channel to be reclaimed.
- Silt fences will be installed to prevent disturbed sediment entering the stream.
- Once the construction of the diversion channel is complete, it should be inspected by the Project Freshwater Ecologist to ensure ecological principals have been integrated.
- Prior to livening of the channel, a fish salvage shall be undertaken within the existing channel to be reclaimed. The details of the salvage are detailed in the Freshwater Fauna Salvage and Relocation Plan. Implementation will reduce any incidental mortality of native fish species.

11.6 Fish Passage

11.6.1 Objectives

The National Policy Statement for Freshwater Management (MfE, 2024; NPS-FM) sets out fish passage objectives, in particular specifying that *"The passage of fish is maintained, or is improved, by instream structures, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats."*

The stream diversion channels that are created must enable fish passage for native climbing and swimming species, where appropriate (Table 48). Fish communities were surveyed and were generally depauperate across all sites, with the below species identified:

- TB1 diversion: at a minimum it should enable passage of Anguilliforms along its length, with passage for climbers and swimmers within the lower reaches.
- TSF3 diversion: at a minimum the lower, ecologically functional, reaches need to enable the passage of swimming fish. The upper, steeper, reaches of the diversion should enable the passage of climbers and Anguilliforms.

Table 48: Swimming ability classification of some New Zealand Freshwater fish species (Boubée et al.,1999).

Swimming ability classification	Species
Anguilliforms: These fish are able to worm their way through interstices in stones or vegetation either in or out of water. They can respire atmospheric oxygen if their skin remains damp.	Shortfinned and longfinned eels, and to some extent juvenile kokopu and koaro. Torrentfish may also fit into this category, but they need to remain submerged at all times.
Climbers: These species climb the wetted margins of waterfalls, rapids and spillways. They adhere to the substrate using the surface tension and can have roughened "sucker like" pectoral and pelvic fins or even a sucking mouth (lamprey). The freshwater shrimp, a diadromous native crustacean, is an excellent climber.	Lamprey, elvers, juvenile kokopu, koaro and shrimp. To a limited extent juvenile common and redfinned bullies.
Jumpers: Able to leap using the waves at waterfalls and rapids. As water velocity increases it becomes energy saving for these fish to jump over the obstacle.	Trout, salmon, and possibly (on a scale of 20–50 mm) smelt and inanga.
Swimmers: Fish that usually swim around obstacles. They rely on areas of low velocity to rest and reduce lactic acid build-up with intermittent "burst" type anaerobic activity to get past high velocity areas.	Inanga, smelt, and grey mullet.

11.6.2 Trout Fishery

The Ohinemuri River is classified as a significant trout fishery and there are important trout spawning tributary streams (including the Mataura Stream) as well as streams providing habitat for juvenile trout populations (including the Ruahorehore Stream).

As stipulated above, the design of the TSF3 diversion must allow the passage of trout within the lower reaches. Trout are a swimming species and have no ability to climb, unlike many native species. The upper reaches of the Ruahorehore Stream naturally impeded the passage upstream of trout and the diversion channel should replicate this, with the passage of trout into the upper reaches considered undesirable.

11.7 Ecological Colonisation

The diversion channel is a new stream channel and as such, upon livening will be devoid of any aquatic life. Both the NRS and the TSF3 diversions have source populations of macroinvertebrate and fish species both upstream (within the forested reaches) and downstream. Colonisation of the diversion channels may occur at different rates, and it make take several weeks for aquatic communities to establish. Studies on recolonisation of New Zealand streams following flood events generally show that it takes some 4-8 weeks for macroinvertebrate communities to establish. The fauna and flora that establish in the diversion channels are expected to be similar to these source populations.

The exception being that juvenile trout have previously been captured in the lower reaches of the Ruahorehore, but these are not expected to populate the upper reaches of the TSF3 Diversion.

11.8 Monitoring

11.8.1 Pre-Livening Monitoring

Prior to the livening of the diversion channel an inspection should be undertaken by the Project Freshwater Ecologist and the relevant designer/engineer. The inspection must ensure that the stream and channel design meet the ecological objectives of this Plan.

11.8.2 Post-Livening Monitoring

Immediately following the livening of the diversion channel an inspection should be undertaken by the Project Freshwater Ecologist and the relevant designer/engineer. The inspection must ensure that the stream and channel design meet the ecological objectives of this Plan. In particular, fish passage along the length of the channel should be inspected. Any issues identified must be brought to the attention of the stream design and construction team, and a remedy found.

The diversion channels should undergo routine monitoring in the first year following construction to ensure stability of the channel.

11.8.3 Riparian Vegetation Monitoring

Riparian vegetation monitoring is to be undertaken to ensure the health and success of the riparian planting. The success of the planting directly impacts the success of the stream diversion. The details of the riparian planting monitoring are outlined in the Stream Enhancement and Riparian Planting Plan.

11.8.4 Stream Ecological Valuation Monitoring

Following completion of the stream diversion and associated riparian planting, the channel is to be monitored for ecological functionality to ensure it is meeting it's offset mitigation objectives. A Stream Ecological Valuation (SEV) survey must be undertaken at each of the diversion channels. The SEV is to be carried out in approximately the middle of the diversion, with the same location surveyed each monitoring round.

The SEV surveys should be undertaken at the diversion sites at 1, 3 and 5 years following the completion of riparian planting. SEV scores should be no less than 80% of the predicted SEV Score by year 5 (SEVm-P). Monitoring shall continue until the target SEV score has been achieved, or until a maximum of 5 years. Regular monitoring prior to the 7-year target will allow any major issues to be identified and remedied earlier. If the SEV score has not been achieved by 5 years, then a Stream Enhancement and Riparian Remedial Plan shall be prepared outlining ways in which to achieve the predicted score. This should be submitted to WRC for approval.

- NRS Diversion Target SEV: 0.673
- TSF3 Diversion Target SEV: 0.673

The monitoring should be undertaken by a suitably qualified and experienced freshwater ecologist who is experienced at undertaking SEV surveys.

11.9 Reporting

The consent holder must submit a report to the Consent Authority annually by 30 June each year, detailing the following:

- The extent and location, if any, of stream diversion channel construction in the previous 12 months. This should include the final construction drawings of the diversion channel.
- The extent and location, if any, of stream reclamation in the previous 12 months. This should include the outcomes of any Freshwater Fauna Salvage undertaken.
- The results of the post-livening monitoring SEV surveys. This should include any management actions that may have been identified following the surveys.

This information will be provided in the ELMR.

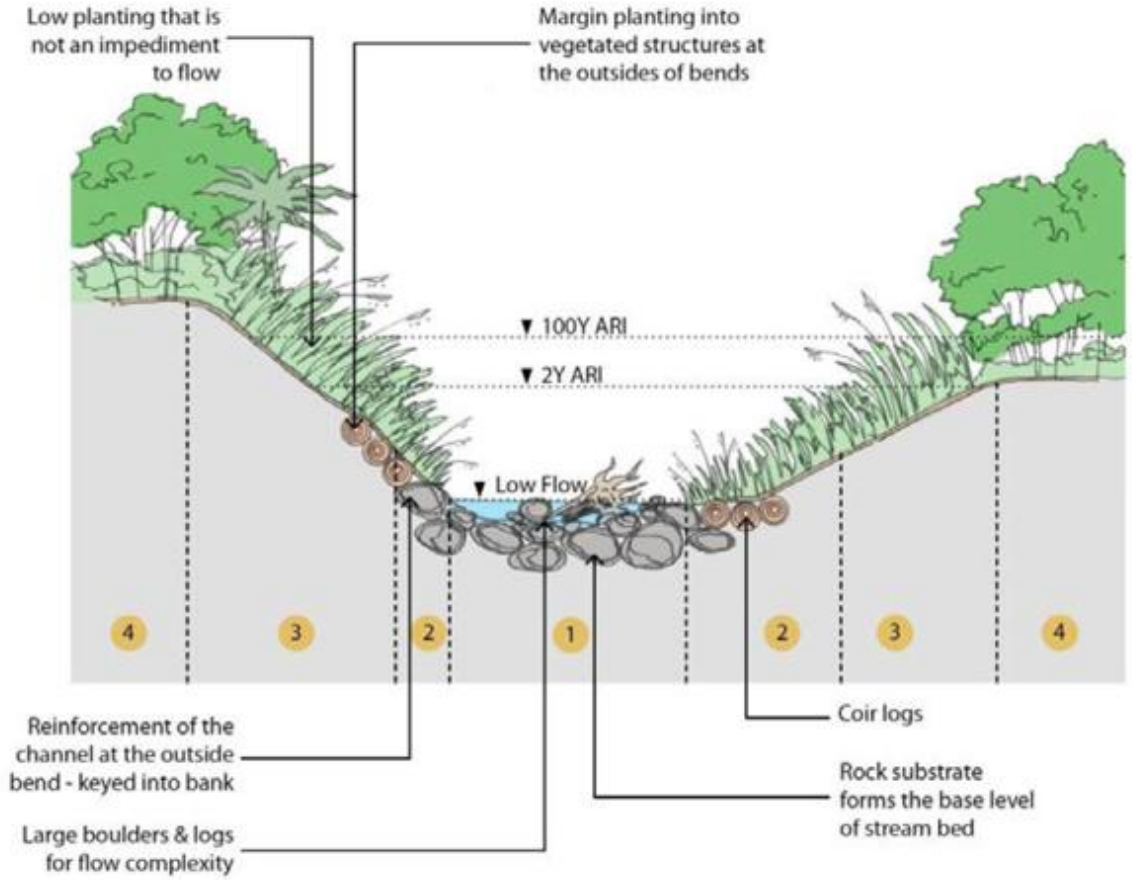
11.10 Key Performance Indicators

The key performance indicators relating to stream diversion and development are set out in Section 11.4.1 and 11.8 of this Ecology and Landscape Management Plan comprising a mixture of visual surveys, inspections, and monitoring methods.

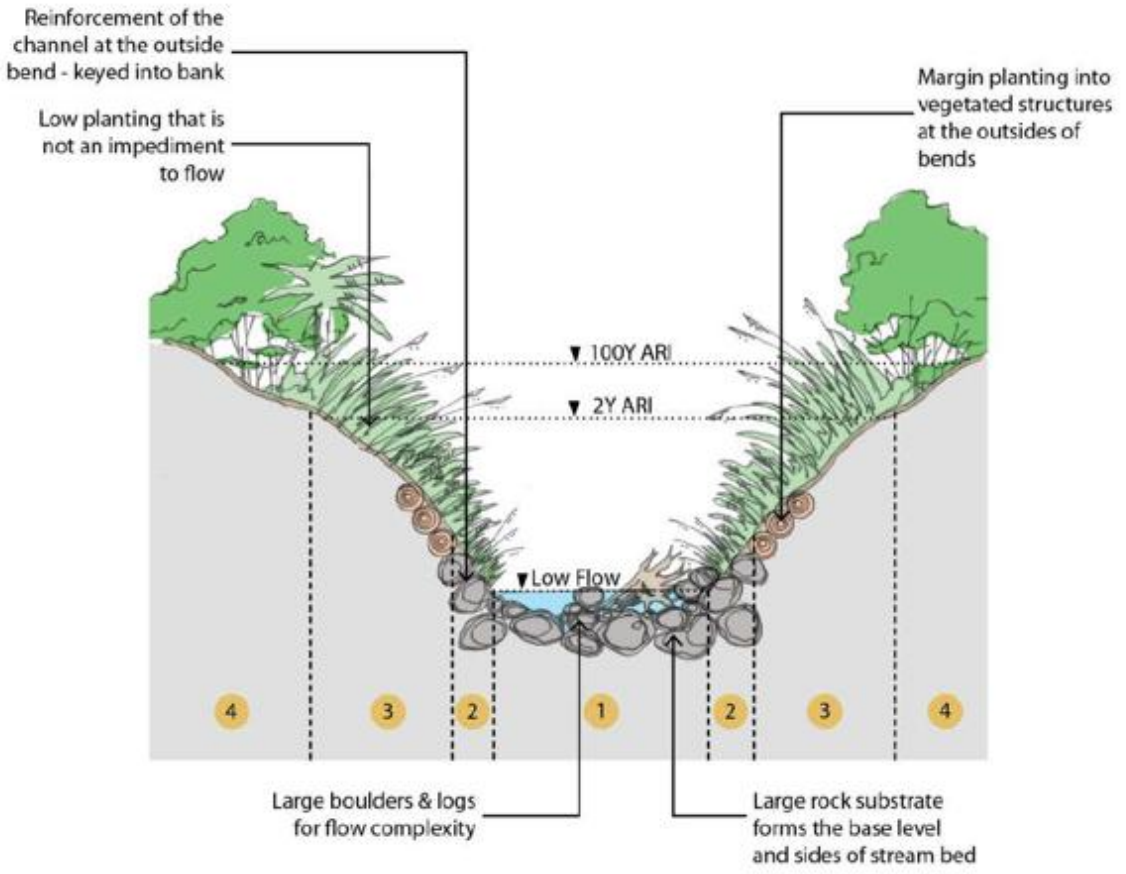
11.11 References

Boubée, J., Jowett, I., Nichols, S., and Williams, E (1999). Fish Passage at Culverts: A review, with possible solutions for New Zealand indigenous species. NIWA, Department of Conservation.

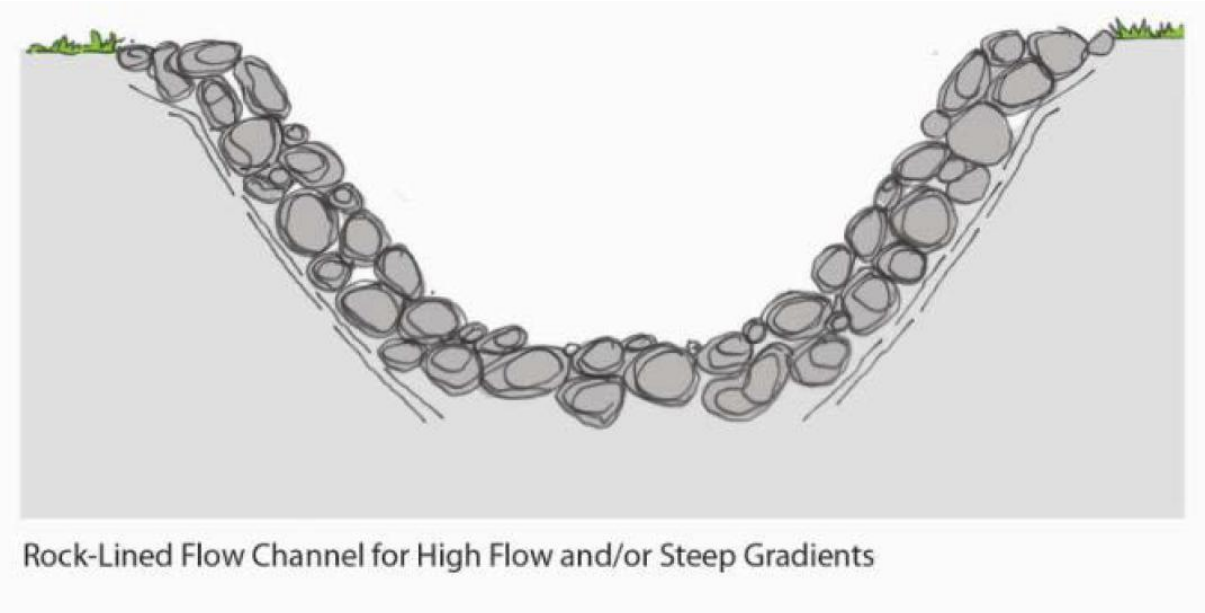
11.12 Appendix 12A: Indicative Stream Chanel Design Examples

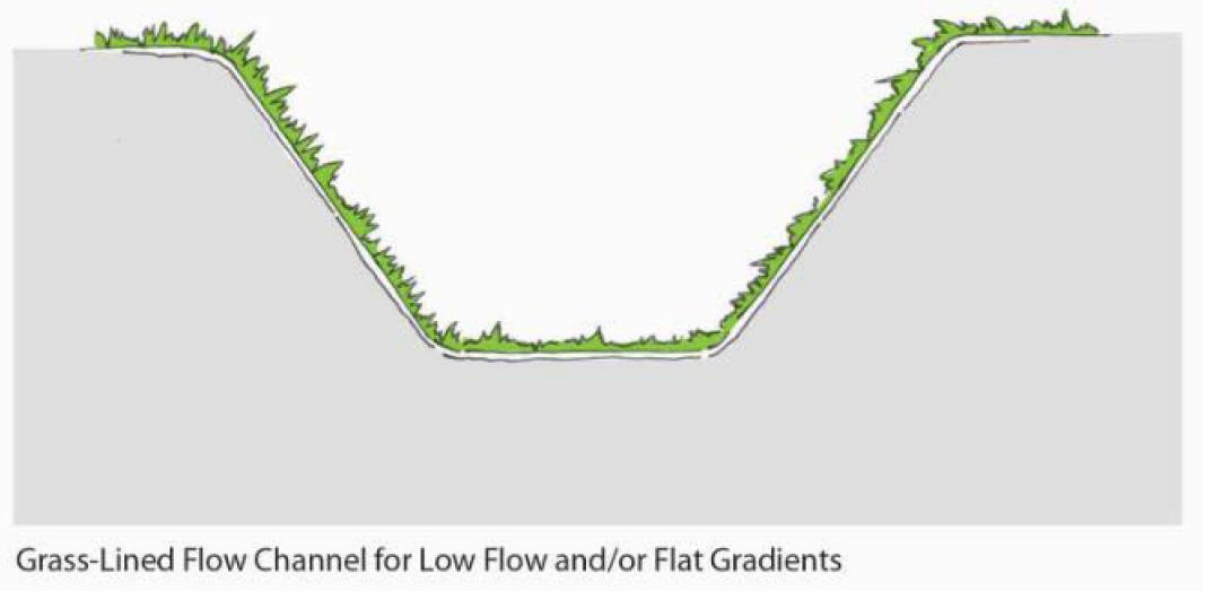


Stream Diversion Type 1 – Lowland stream cross section



Stream Diversion Type 2 – Steep stream cross section





Stream Diversion Type 3 – Flow channel cross section

11.13 Appendix 12B: SEV Method

11.13.1 Stream Ecological Valuation

The SEV is recommended by Auckland Council for providing an ecological valuation of streams and is increasingly being used outside of Auckland. The SEV uses a set of fourteen qualitative and quantitative variables to assess the integrity of stream ecological functions (Table 38).

Field work consists of a comprehensive assessment of the in-stream and riparian environment. This includes a fish survey, aquatic macroinvertebrate sampling and cross-sections of the stream to measure width, depth and substrate, as well as using qualitative parameters for reach-scale attributes.

Table 49: Summary of the 14 ecological functions used to calculate the SEV score.

Hydraulic functions:	Biogeochemical functions:
Processes associated with water storage, movement and transport. • Natural flow regime • Floodplain effectiveness • Connectivity for species migrations • Natural connectivity to groundwater	Relates to the processing of minerals, particulates and water chemistry. • Water temperature control • Dissolved oxygen levels maintained • Organic matter input • In-stream particle retention • Decontamination of pollutants
Habitat provision:	**Biotic functions:**
The types, amount and quality of habitats that the stream reach provides for flora and fauna. • Fish spawning habitat • Habitat for aquatic fauna	The occurrences of diverse populations of native plants and animals that would normally be associated with the stream reach. • Fish fauna intact • Invertebrate fauna intact • Riparian vegetation intact

This data is analysed using a series of formulae in order to produce an SEV score of between 0-1, where a 0 is a stream with no ecological value and 1 is a pristine stream with maximum ecological value. Interpretation of SEV scores is given in Table 39 below.

Table 50:Interpretation of SEV scores (Adopted from Golder Associates, 2009).

Score	Category
0 - 0.40	Poor
0.41 – 0.60	Moderate
0.61 – 0.80	Good
0.81+	Excellent

11.13.2 Ecological Compensation Ratio

To calculate the amount of enhancement required to mitigate the impacts of streamworks An environmental compensation ratio (ECR) was calculated.

The environmental compensation ratio utilises the SEV score to calculate a ratio for the minimum area to be restored as mitigation for unavoidable stream loss. The ECR has the underlying principal of 'not net loss' and is based upon 'no net loss of area-weight stream function'. A minimum ratio of compensation of 1:1 is required.

The formula for calculating the ECR is as below:

- ECR = [(SEVi-P – SEVi-I)/(SEVm-P – SEVm-C)] x 1.5

- SEVi-C & SEVi-P are the current and potential SEV values respectively for the site to be impacted.
- SEVm-C & SEVm-P are the current and potential SEV values respectively for the site where environmental compensation is to be applied.
- SEVi-I is the predicted SEV value of the stream to be impacted, after impact.
- 1.5 is a multiplier.

The ECR calculation requires the prediction of a 'potential' and 'impact' SEV scores. The potential scores for impact sites assume that best practice enhancement works have been undertaken. The prediction of the impact scores assume that the proposed streamworks have been undertaken. The generally accepted SEV score for culverts is 0.2. The predicted potential and impact scores do not include biotic functions (invertebrate fauna intact and fish fauna intact) as they are too difficult to predict.

The ECR considers that environmental compensation ratios greater than 1 are valid because of:

- The ecological risk factors associated with the cumulative loss of streams and the steady change in areal distribution of high-quality stream reaches;
- The long time-lag before full benefits of environment compensation (i.e. from riparian planting) accrue to the mitigated sites; and
- The overall difference between the expected and actual success of stream restoration methods.

PART K: STREAM ENHANCEMENT RIPARIAN PLANTING PLAN

12 STREAM ENHANCEMENT RIPARIAN PLANTING PLAN

12.1 Overview

The new tailings storage facility (TSF3), and two new rock stacks (the Northern Rock Stack, NRS and Willows Rock Stack) are proposed over existing watercourses within the footprint of the WNP. To mitigate the impacts on, and loss of watercourses, stream restoration by riparian planting is proposed along some 10,285 m of stream.

This purpose of this Plan is to outline the principals for riparian planting.

12.2 Consent Condition Matrix

Table 51 below sets out the relevant consent conditions associated with the Stream Enhancement Riparian Planting Plan and where they are addressed within this document.

Table 51 Stream Enhancement Riparian Planting Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: a. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; b. Monitoring, reporting, and review procedures, including triggers for remedial action if performance standards are not met; and c. Detailed contents and performance indicators in relation to the following:	C47B(2)(a): > Lead in and implementation timeframes -Section 12.4 > Duration of maintenance – Section 12.6 C47B(2)(b): > Monitoring – Section 12.8 > Triggers and remedial actions – Section 12.6.3 > Reporting requirements – Section 12.9 C47B(2)(c): Performance indicators – Section 12.10

Consent Condition Number	Consent Condition Wording	Location within this Plan
	Stream Enhancement Riparian Planting Plan – which details restoration riparian planting that will occur along stream edges	
C67	(h) Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 as shown in Attachment 2 to these conditions.	Section 12.3
C68	(d) Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 annexed as shown in **Attachment 2** to these conditions.	Section 12.3
C69	(f) Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 as shown in **Attachment 2** to these conditions.	Section 12.3

12.3 Quantum Required

The impact on some watercourses within the footprint of works is unavoidable. Across the footprints of works, there is an overall expected loss of some 4,122 m of low to high value stream loss as well as some 9 m^2 of warm spring. This is to be offset with the creation of 10,285 m of stream diversion channels[1] and stream restoration. With the exception of the warm spring, the offset has been informed by an Ecological Compensation Ratio (ECR) and the outcome equates to an approximate 3:1 offset ratio (gain:loss).

The total quantum of stream enhancement and riparian planting includes a 'whole of project' assessment. Where possible, riparian planting has been proposed as close to the stream loss as possible, but this has not always been feasible. The loss of the warm spring within the Wharekirauponga Stream catchment and the headwater stream within the GOP, are not able to be mitigated within their respective catchments. Therefore, stream and enhancement and riparian planting are presented as a project total, not broken down into individual areas of stream loss. Further details of the stream loss are presented in the Freshwater Ecological Assessment (Boffa Miskell, 2025).

The areas of stream enhancement and riparian planting are shown in Figure 34, Figure 35 and Figure 36 below.

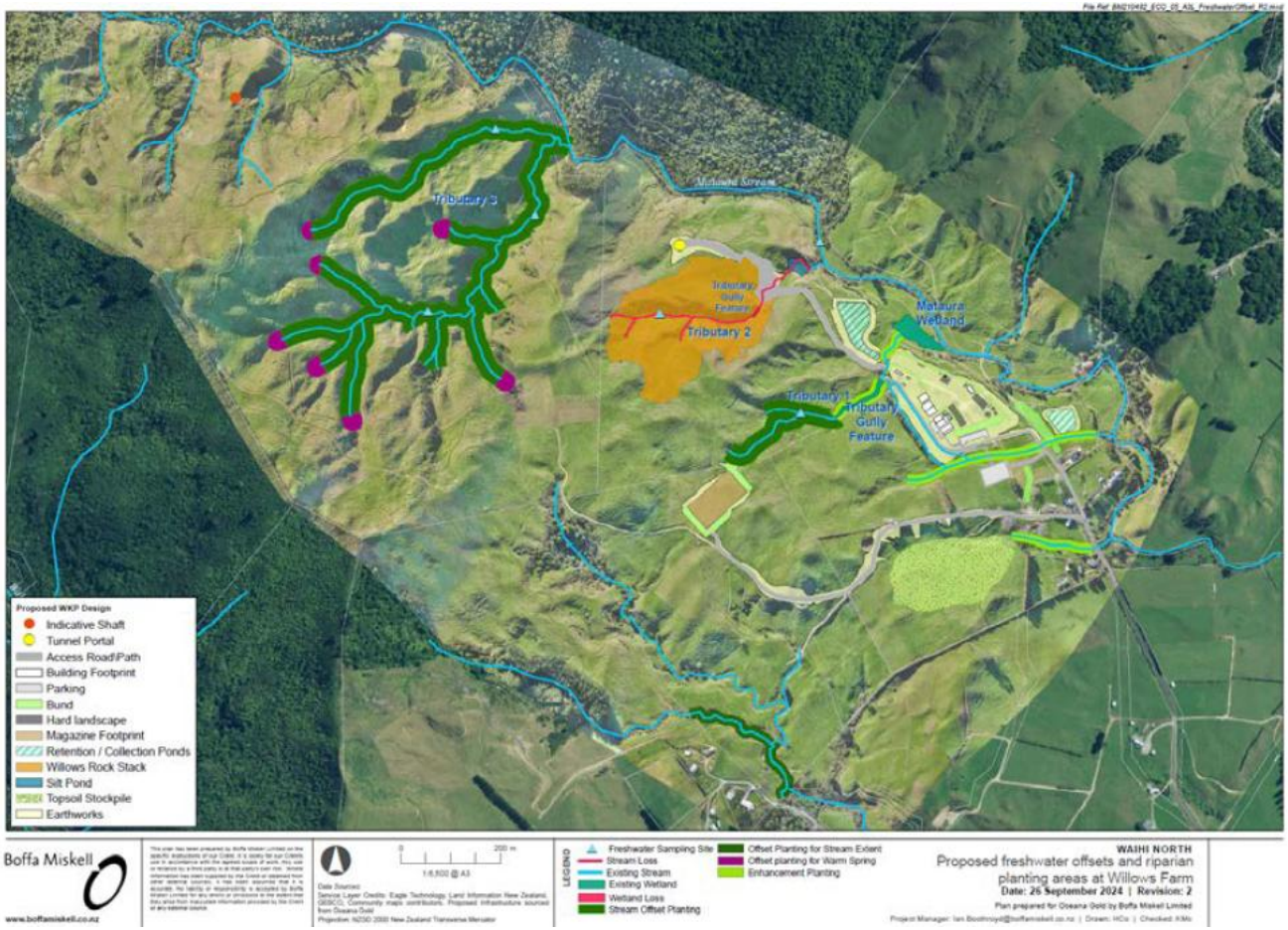


Figure 34: Map of Willows SFA showing areas of Riparian Planting

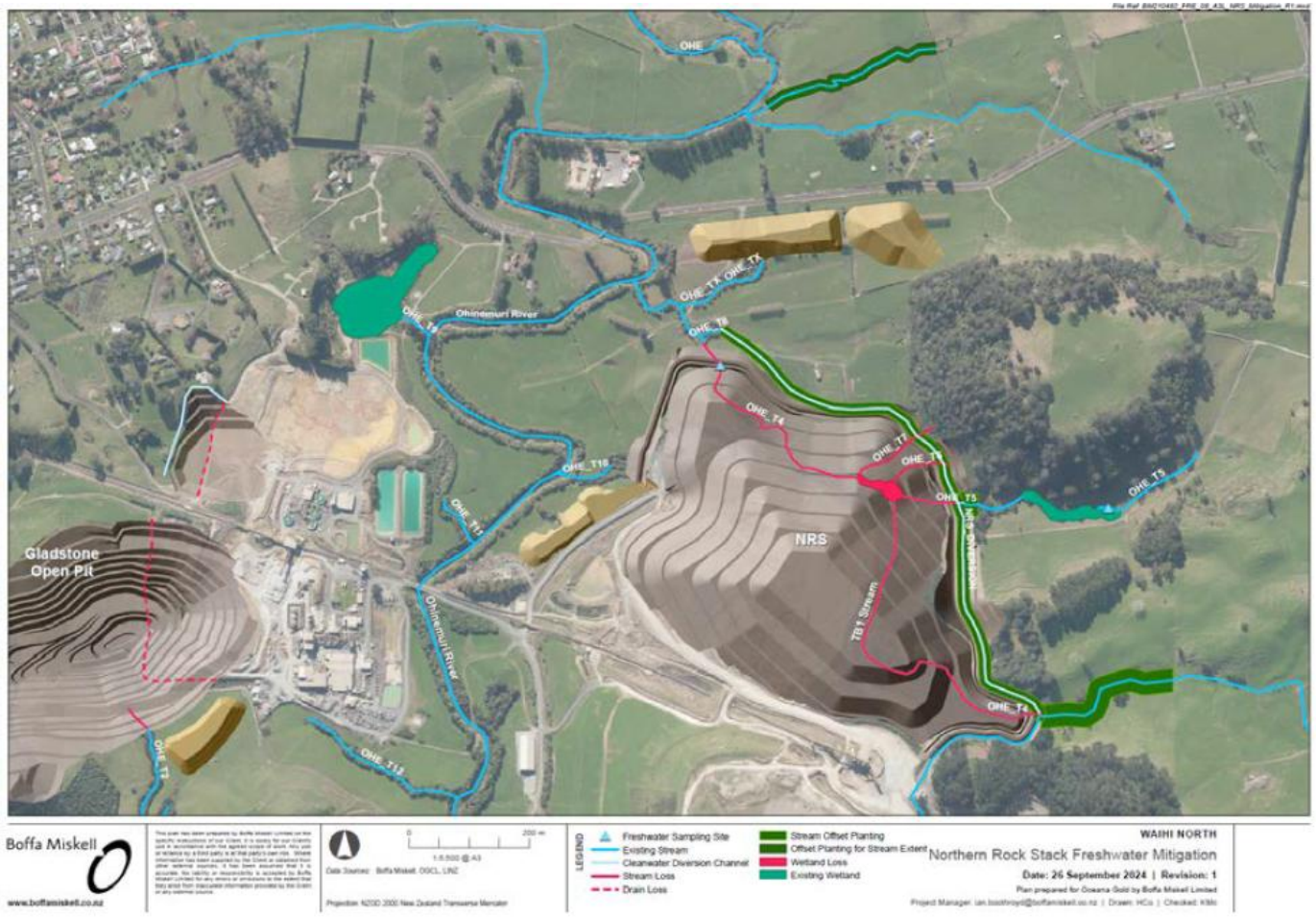


Figure 35: Map of the Northern Rock Stock area, showing areas of Riparian Planting (Offset Planting).

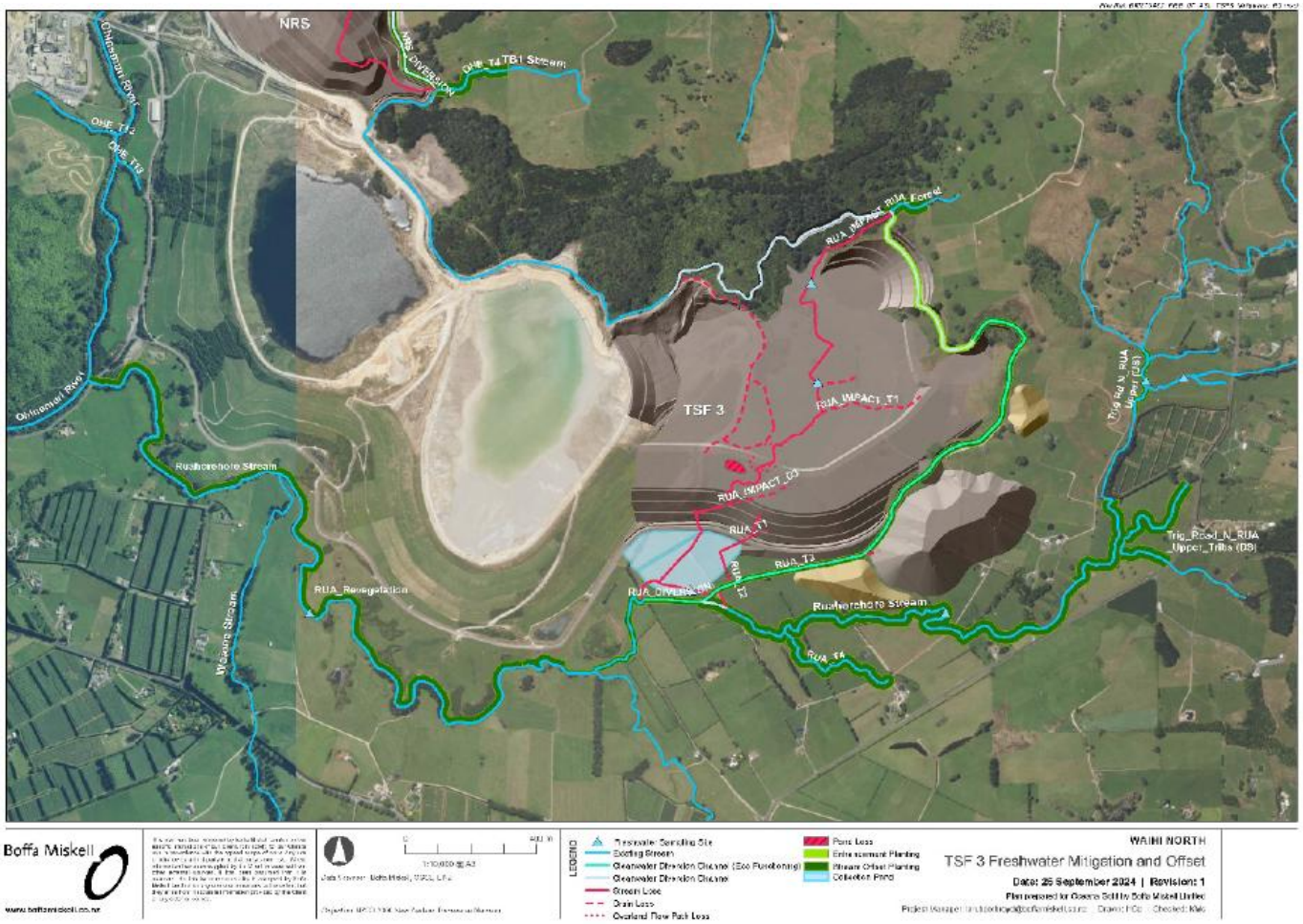


Figure 36: Map of the Tailings Storage Facility 3 area, showing areas of Riparian Planting (Offset and Enhancement)

12.4 Timing

12.4.1 Project Timing

The WNP is a large project that will be undertaken in stages across many years. Similarly riparian planting will be undertaken within planting seasons across many years. Where practicable existing stream channels undergoing enhancement planting can be planted as soon as the wider project is consented, as there is no streamworks or earthworks required. Owing to the large amount of riparian planting required across the project, it is not practical to undertake it all prior to any stream reclamation.

The specific timing around the NRS and TSF3 diversion construction is yet to be determined, however the construction of the TSF3 diversion channel is likely to occur in summer 2026/2027.

12.4.2 Seasonal Timings

All planting should be undertaken during the planting season of April to September, inclusive. Planting should commence no later than one month following the completion of weed control. This will minimise the risk of weed re-infestations competing with native planting.

The planting of diversion channels is subject to the project staging and earthworks schedule and is further described in the Stream Diversion and Development Plan (Boffa Miskell 2025).

12.5 Riparian Planting Objectives

The enhancement of streams through the use of riparian planting has a myriad of benefits for the ecological health of the stream (Figure 37), including:

- Improved water quality through the filtration of overland flow.
- Increased shade leading to reduced water temperatures and increased oxygen levels.
- Improved bank erosion control through stabilisation from plant roots.
- Improved woody debris and plant detritus within the stream channel for instream fauna.
- Increased instream habitat complexity through overhanging vegetation and inputs of woody debris.

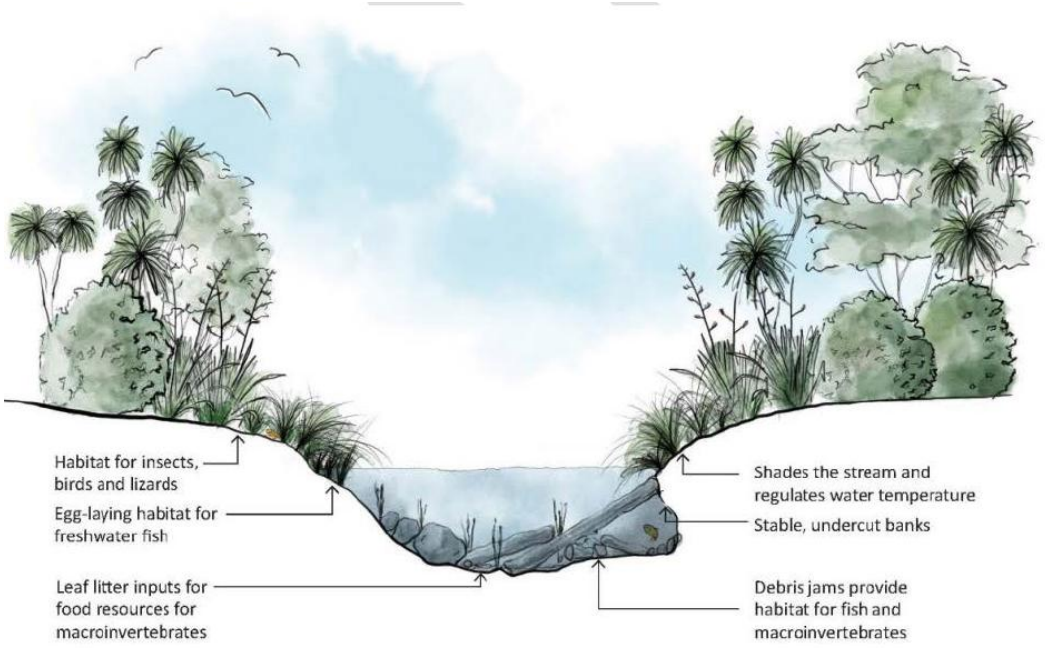


Figure 37: Example of benefits of riparian planting to stream ecology (Boffa Miskell, 2021).

12.5.1 Planting Plans

Planting Plans will be prepared for each Riparian area in Figure 30, Figure 31 and Figure 32 in accordance with this SERPP. The planting plans must be specific to each stream reach and its unique hydrological features and ecological function objectives, and will include a planting schedule and specification, site preparation and maintenance requirements.

The planting plans shall prioritise the use of pioneer species to allow successful competition with potential weed species while providing shade to streams. Detailed planting plans should consider species that provide suitable food sources for bird species and habitat for lizards and bird species; the lessons learnt during establishment of other riparian plantings completed by the company around the site.

A 10 metre riparian width, from the edge of the stream channel, is considered to be the minimum width to ensure self-maintenance of the riparian margin from invasive plant species. This 10m is to be the minimum width across riparian margins, with most margins to be planted to an average of 20 m with (See Figure 30-32).

All plants used should be eco-sourced from the Waihi ED, or an adjoining ED, to ensure they are well suited to the conditions, and sourced from an NZPPI accredited or community nursery with comparable systems in place. All plant specimens from the Myrtaceae family must be free of myrtle rust.

The riparian planting must be designed to achieve 70-90% shading of the stream channel, 7 years after the completion of planting of the stream reach. Therefore, the Planting Plan must include appropriate overhanging stream-edge and canopy species.

12.5.2 Site Preparation

The planting plan and associated specification will detail all required site preparations. Some general preparation steps are outlined below that the aforementioned must be consistent with.

12.5.2.1 Soil Conditions

The contractor should assess the ground and soil conditions prior to any planting, and where they consider that the existing topsoil is deficient, they shall tell the Project representative and ascertain if any remedial action is required.

12.5.2.2 Clearing

Areas to be planted shall be cleared of any weed species and inorganic debris. Native species are to be retained where possible.

12.5.2.3 Herbicide

All areas are to be planted with established weeds shall be sprayed with a minimum of 2 applications of approved herbicide, commencing at least 6 weeks prior to planting. Each application shall be at least one week apart. The last application should be applied at least two weeks prior to clearing the ground.

If weeds are well-established then existing weed growth may require manual trimming/removal prior to the herbicide application. Vegetation over 0.2m should be removed or mown/mulched prior to herbicide application.

Spraying with herbicide will only be undertaken by certified handlers.

12.5.2.4 Manual Removal

The cutting of large trees may be required, particularly if willow species are present. All stumps within 5m of streams shall remain in the ground, with the bole of the tree to be cut down to just above the ground level.

12.5.3 Planting

Prior to any planting, the contractor shall set out the plants according to the planting schedule. The Project Landscape Architect should then confirm the set out of the plants, prior to planting. As much notice as possible should be given of any upcoming inspections.

12.5.4 Fencing

All stream enhancement and riparian planting that is located within rural areas shall be fenced to prevent livestock access. It is preferable to install a higher quality fence as it is likely to have fewer maintenance issues.

12.6 On-going Maintenance

12.6.1 Weed Control

Pest plants and weeds should be controlled regularly for the year following planting. All planted areas shall be kept weed free to the extent that perennial weed species are eradicated, and annual weed species are well controlled. Additional weed control may be required in spring.

Spraying should be undertaken using an approved herbicide and should be spot sprayed using a protective spray nozzle/cone to avoid overspray. The maintenance schedule for weed control may differ for each area and will be confirmed in the planting plan.

12.6.2 Plant Health

For the year following planting, maintenance of plant health is to be undertaken and may include watering, insect and disease control, pruning, mulching and other accepted horticultural operations to ensure normal and healthy plant establishment and growth. The maintenance schedule may differ for each area and will be confirmed in the Planting Specification.

In addition to routine maintenance, monitoring should be undertaken following significant storm events or during periods of prolonged high or low rainfall.

12.6.3 Planting Success

The monitoring and maintenance of success of planted species is key to ensuring success of the riparian planting. All plants shall be monitored and maintained in accordance with the provisions in Section 4.6 of this ELMP.

Maintenance will include the replacement of any dead or dying planted plants and weed control if required. At the end of the five-year monitoring period a plant survival rate of 90% must be achieved. If this has not occurred, then further replacement planting, and weed control must be undertaken until the 90% survival rate is achieved.

12.7 Pest Animal Control

Pest animal control should be implemented following the completion of planting to ensure the success of the planting. Where there is a risk of the plants being pulled out, by species such as pukekos, then wire staples should be installed around the root balls of plants.

The Pest Animal Management Plan (section 7) outlines the general approach to pest management for all offset plantings, which will also apply to the identified riparian plantings.

12.8 Monitoring of Planting success

Monitoring of the successful establishment of the riparian planting should be undertaken following the five-year maintenance and monitoring plan by a suitably qualified freshwater ecologist.

Riparian planting should achieve at least 70% canopy cover or 70% stream surface shading. An exception to this is any planting on the Ohinemuri River, as the large width of the river prevents this being achieved. Planting alongside the Ohinemuri River should achieve the 90% plant survival rate with obvious overhanging vegetation and visible stream surface shading. If the planting does not achieve the 70% canopy cover, then a Stream Enhancement and Riparian Remedial Plan shall be prepared outlining methods to in which to achieve the 70% canopy cover.

In addition to the ongoing monitoring of planting success a suitably qualified freshwater ecologist should undertake a Stream Ecological Valuation (Storey et al, 2011) at the following key locations:

- Ruahorehore Stream: Just below stream diversion (location of SEV RUA_Lower).
- Ruahorehore Stream Tributary: (location of SEV RUA_Trig)

- Willows Stream Tributary 3: South Arm (location of SEV Willows 3: South Arm downstream)

The SEV surveys should be undertaken at the mitigation sites at Years 3 and 5 following the completion of riparian planting. SEV scores should be no less than 80% of the predicted SEV Score (SEVm-P). Monitoring shall continue until the SEV score has been achieved, or until a maximum of 5 years. If the SEV score has not been achieved by Year 5, then a Stream Enhancement and Riparian Remedial Plan shall be prepared outlining ways in which to achieve the predicted score.

12.9 Reporting

Management actions and monitoring data for the previous 12 months will be submitted in the ELMR by 30 June detailing the following:

- The location and extent of stream restoration and/or riparian planting undertaken in the preceding planting season.
- The number, mix, size and spacings of planting carried out at each location.
- Records of any dead/dying plants encountered.
- Details of any replacement planting undertaken.
- Any recommendations of additional planting, enhancement or management actions that should be undertaken to ensure successful planting.

12.10 Key Performance Indicators

The key performance indicators relating to stream enhancement riparian planting are set out in Section 12.8 and 12.9 of this Ecology and Landscape Management Plan comprising a mixture of monitoring, valuation, adaptive management, and reporting measures.

12.11 References

Boffa Miskell 2025. Waihi North Project: Freshwater Ecological Assessment. Report prepared for Oceana Gold (NZ) Limited.

Storey, R.G., Neale, M.W., Rowe, D.K., Collier, K.J., Hatton, C., Joy, M.K., Maxted, J.R., Moore, S., Parkyn, S.M., Phillips, N. and Quinn, J.M. 2011. Stream Ecological Valuations (SEV): a method for assessing the ecological functions of Auckland Streams. Auckland Council technical report 2011/09.

PART L: LANDSCAPE AND VISUAL MITIGATION PLAN

13 LANDSCAPE AND VISUAL MITIGATION PLAN

13.1 Overview

The objective of the Landscape and Visual Mitigation Plan is to deliver an integrated management approach that works in tandem with ecological measures to ensure the landscape and visual impacts of the Waihi North Project (WNP) are comprehensively addressed. This approach guides how change is introduced, managed during operations, and carried through to closure, ensuring that adverse effects on the WNP area and its surrounds are avoided where possible, and otherwise remedied or mitigated. While the plan's purpose is to guide the management of visible change in the landscape, it does so by considering the interconnected physical, perceptual, and associative attributes of the landscape—ensuring outcomes that protect and enhance ecological values, natural character, and overall landscape integrity.

13.2 Consent Condition Matrix

Table 52 below sets out the relevant consent conditions associated with the Landscape and Visual Mitigation Plan and where they are addressed within this document.

Table 52 Landscape and Visual Mitigation Plan - Consent Condition Matrix

Consent Condition Number	Consent Condition Wording	Location within this Plan
Appendix B1 – Combined HDC and WRC Conditions		
C47B	1. The objective of the certified ELMP-WA is to identify how the potential adverse effects of the Waihi North Project on the ecological, landscape and biodiversity values within the Waihi Area and its surrounds will be appropriately managed. 2. To achieve this objective, the ELMP-WA must include: d. Details of the location, extent, and type of mitigation works, including lead-in times, implementation timeframes, and duration of maintenance; e. Monitoring, reporting, and review procedures, including triggers for remedial action if	C47B(2)(a): > Lead in times –Section 15 > Implementation timeframes - Section 15 C47B(2)(b): > Monitoring – 13.6 > Triggers and remedial actions – Section 5.6 > Reporting requirements – Section 13.6 C47B(2)(c): Performance indicators – Section 15

Consent Condition Number	Consent Condition Wording	Location within this Plan
	performance standards are not met; and f. Detailed contents and performance indicators in relation to the following: Landscape and Visual Mitigation Plan – which guides management of visible change in the landscape, including visual amenity.	
C65	The Consent Holder must rehabilitate all areas within Area 2 that have been subject to mining activities authorised as part of this consent by: […] g. Restoration and riparian planting in general accordance with Figure A – Proposed Closure – WUG Surface Facilities Area as shown in **Attachment 2** to these conditions; […]	Section 13.4.8
C66	The Consent Holder must rehabilitate all areas within Area 3 that have been subject to mining activities authorised by this consent by: a. Backfilling all tunnel entrances from each portal for a distance of 100 metres; and b. Re contouring boxcuts to ensure their long term stability.	
C67	The Consent Holder must rehabilitate all areas within Area 5 that have been subject to mining activities authorised as part of this consent by: (h) Restoration, riparian and wetland edge planting, and provision of recreational trails, in general	

Consent Condition Number	Consent Condition Wording	Location within this Plan
	accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 as shown in **Attachment 2** to these conditions.	
C68	The Consent Holder must rehabilitate all areas within Area 6 that have been subject to mining activities authorised as part of this consent by: (d) Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 annexed as shown in **Attachment 2** to these conditions.	Figure 39
C69	The Consent Holder must rehabilitate all areas within Area 7 that have been subject to mining activities authorised as part of this consent by: (f) Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 as shown in **Attachment 2** to these conditions.	Figure 39
Appendix B2 – HDC Conditions		
55	b. In Area 2: iii. Cuts and batters for access roads must be contoured to visually integrate within the adjoining natural landform and all exposed soil must be scarified and seeded with pasture and/or native vegetation to assimilate within the surrounding land cover; and	Section 13.4

Consent Condition Number	Consent Condition Wording	Location within this Plan
	iv. All buildings and fixed structures must be finished in recessive, natural colours and/or cladding materials that minimise their visual prominence and enable them to blend with the surrounding landscape. Colour from Groups A and B of BS 5252 Colour Range, that do not exceed a Light Reflectance Value (LRV) of 32 are suitable.	
195	Subject to Condition 194, the Consent Holder must undertake the planting identified in **Figures A** and **B** in **Attachment 8** and Table 1 in **Attachment 9.**	Section 13.4.5-13.4.8

13.3 Summary of Landscape and Visual Values and Effects

The landscape surrounding Waihi is primarily influenced by working and established mining operations with some rural lifestyle use typically set against the broader natural backdrop of the Coromandel Ranges. While the area accommodates significant mining activity, including the Martha Mine and associated infrastructure, the enclosing landforms and vegetation which will remain, help limit visual exposure and maintain a sense of coherence within the local landscape.

The Coromandel Ranges are identified as an outstanding natural landscape at both district and regional levels and provide a dramatic and memorable backdrop with their steep, forested volcanic landforms. Nearby rivers and their margins further contribute to the area's natural character, albeit currently more typically modified in the context of ongoing rural land use and some more substantial riparian planting adjoining the established Process Plant. Landscape values in this setting are therefore defined by the juxtaposition of industrial and natural elements, where visual containment, legibility of landform, and broader amenity values form important considerations.

The WNP will result in incremental but contained modifications to rural and mining landscape characteristics, as well as beneficial effects to natural character. While components will alter local landform patterns and require vegetation clearance, they are largely confined within the existing operational footprint or areas already influenced by mining. Visual containment is supported by surrounding landforms such as Union and Winner Hills, and proposed mitigation includes native revegetation, riparian planting, and recontouring to support rural land use and broader biodiversity benefits which endure post-closure. Overall, adverse landscape effects will remain localised during construction and operation and are expected to remain well managed and visually integrated over time through ongoing rehabilitation and containment.

13.4 Methods for Avoiding or Managing Effects

The Landscape, Natural Character and Visual Effects Assessment ("Assessment", Boffa Miskell, 2025) has been prepared concurrently with the project and has therefore influenced the anticipated project outcomes. Methods for avoiding or managing effects have been developed in two ways:

- Measures that intrinsically comprise part of the development design through an iterative process;
- Specific additional mitigation measures designed to reduce adverse effects of the final development proposals including areas of buffer planting included on *Figure 21b*: Proposed Mitigation – GOP, NRS and TSF3, reproduced as Figure 26 below.

In accordance with the above, areas of planting as indicated in *Figure 21b* of the Graphic Supplement supporting the Assessment accords with Figure 2: Proposed Integrated Mitigation Planting Stage. Through proposed integrated mitigation, planting will commence concurrently with proposed mining activity and supports closure.

The specific landscape mitigation methods which have been development for each component of the project seek to avoid or manage adverse effects during operation. The components and specific methods development to manage landscape effects are shown within a comprehensive Landscape Mitigation Plan which includes the following areas of planting which occurs during operation encompassing the following proposed planting areas (reproduced as Figure 38):

13.4.1 Riparian Planting

- Within OGNZL owned land = 22.9 ha.
- Owned by others = 12.9 ha.
- For treatment measures and associated implementation, maintenance and monitoring and remedial procedures refer to Part K Stream Enhancement and Riparian Planting Plan.

13.4.2 Native Terrestrial Planting

- Within OGNZL owned land = 35.9 ha.
- Owned by others = 3.1 ha.
- Planted buffer = 5.6 ha.
- SNA Enhancement = 27.1 ha.
- Screen Planting Area = 0.75 ha: This Native Terrestrial Planting includes a landscape-specific Screen Planting Area identified in Figure 2 to screen temporary stockpiles and the Northern Rock Stack from Golden Valley Road. Associated planting measures are described in section 14.4.4 below.
- For treatment measures and associated implementation, maintenance and monitoring and remedial procedures associated with all other native terrestrial planting refer to Part D Planting Plan.

13.4.3 Wetland Planting

- Within OGNZL owned land = 1.3 ha.
- The Wetland Planting Area is identified in Figure 2 and Figure 31 below to manage landscape and natural character effects associated with TSF3. Planting measures are described in section 14.4.7 below.

For each component of the WNP within the Waihi area the following methods have been identified to manage the potential for adverse landscape and visual effects.

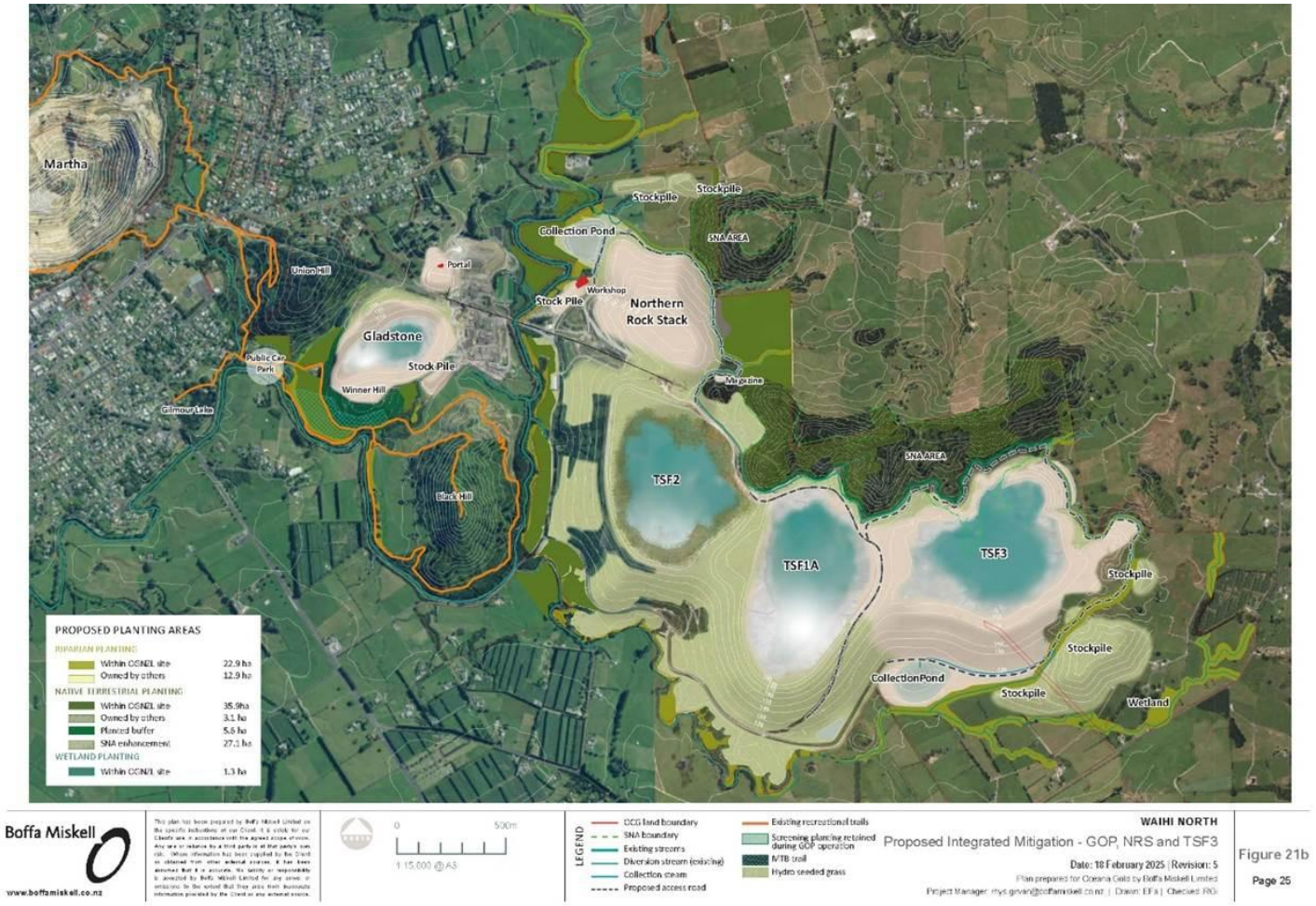


Figure 38: Landscape Mitigation Plan

13.4.4 GOP

The potential for adverse landscape effects associated with the GOP and the subsequent accommodation of tailings within the resulting open pit occur within a mining and productive landscape context including its association with established mining activity and plantation pine which remains enclosed through a combination of intervening landforms and vegetation. In addition, the mining activity will generally occur from east to west to ensure any activity associated with the removal of landform typically remains concealed from wider views to the south-east of Waihi.

To further mitigate the potential visual effects associated with the GOP during mining operation, established pine trees on Winner Hill outside the footprint of the mine will be retained whilst Gladstone Pit is in operation, referred to as Replacement Planting Zone 3 as set out in Section 3: Integrated Landscape and Ecological Response Plan above. Following mining and during implementation of the tailing's storage facility, existing pine trees will be progressively removed and re-established with native vegetation in accordance with native terrestrial planting on OGNZL land (see Part D of this Plan for planting measures). The final landform surrounding the pit will be re-established in pasture and native shrubs therefore offering further opportunities to assimilate the modified landform within a working rural landscape to further reduce the level of any longer-term adverse effects.

13.4.5 NRS

The proposed NRS will remain contained within the Martha Mineral Zone and resemble part of the larger sequence of rounded landforms to the east of Waihi along the foothills of the Coromandel Ranges. Impacts of mining activity have already been established in this context and will continue to influence the character of this landscape in a manner which remains relatively well contained. During operation, the following additional measures are proposed to provide project benefits and remedy or mitigate natural character, landscape and visual effects:

- Establishment of Screen Planting to consist of fast-growing native planting such as pittosporum and kanuka along the periphery and margins of Golden Valley Road (see Figure 2 in this Plan and Table 2: Planting Referred to in Condition 195 of the Hauraki District Council Conditions).
- Planting is to be completed within the first planting season following commencement of the consent and five years of annual monitoring, maintenance and reporting will be undertaken through the annual ELMP-WA Monitoring Report. Screen Planting shall be regarded as successfully established where:
- Infill planting and replacement of failed plants to occur as required during the next appropriate planting season;
- Planting forms a substantially continuous vegetated edge without significant gaps that compromise the intended screening function; and
- Vegetation achieves a height of approximately 3m in 5 years to achieve the visual screening outcomes relied upon in the Landscape and Visual Effects Assessment.
- Maintaining temporary stockpiles in pasture to reduce views of the ongoing raw worked appearance of the NRS;
- Reinstatement of riparian and terrestrial vegetation along the margins of diverted streams and reinforcing existing vegetation along the Ohinemuri River (refer to Parts J and K in this Plan for planting measures); and
- Removing and rehabilitating areas accommodating temporary stockpiles and round off the final contour of the NRS and reinstate with pasture at project closure.

13.4.6 Process Plant

Containing all processing and water treatment activity within the existing footprint and structures ensures there is very limited potential landscape, natural character and visual effects associated with this aspect of the project. Where possible, all new and replacement infrastructure installed onsite should be coloured the same as the existing infrastructure and therefore remain visually recessive in this established and contained industrial context.

13.4.7 TSF3

The proposed TSF3 extends east of and adjoins the existing tailings storage facilities along the toe of a more elevated backdrop to the north and east. During operation, the following measures are proposed to mitigate natural character, landscape and visual effects:

- Ensure stockpiles are hydroseeded with pasture to resemble adjoining rural areas during operation.
- Replace vegetation proposed to be removed in SNA T13UP166 and along existing watercourses to offset vegetation loss and improve connectivity along Ruahorehore Stream (see Table 2: Planting Referred to in Condition 195 of the Hauraki District Council Conditions). Refer to Parts J and K in this Plan for planting measures.
- Undertake wetland planting in area adjacent to Ruahorehore Stream (see Figure 2 in this Plan and Table 2: Planting Referred to in Condition 195 of the Hauraki District Council Conditions).
- Stock exclusion and weed and pest plant management are to be completed as soon as practicable within the identified area. Pioneer planting with indigenous wetland species is to be completed by the end of the first planting season following commencement of construction works at TSF3. Five years of annual monitoring, maintenance and reporting will be undertaken through the annual ELMP-WA Monitoring Report. Wetland planting shall be regarded as successful where:
- Pioneer plantings have reached sufficient size to provide shelter and enrichment planting of future canopy species can be undertaken (within 3 – 5 years); and
- A minimum 70% plant survival rate is achieved during the establishment period.
- Re-establish the final embankment and stockpile in pasture and facilitate reestablishment with native wetland plants within stored tailings areas at completion.

13.4.8 Closure Plan

In accordance with Conditions C65, C66 and C67 of Waihi North Project - Schedule 1: Proposed Conditions Common to the Hauraki District Council and Waikato Regional Council Resource Consents, the Consent Holder must rehabilitate all areas within Areas 5, 6 and 7 that have been subject to mining activities authorised as part of this consent by:

> *i. Restoration, riparian and wetland edge planting, and provision of recreational trails, in general accordance with Figure B – Proposed Closure – GOP, NRS and TSF3 annexed as **Attachment 2** to these conditions.*

The closure plan directed via this condition is reproduced in Figure 39 below.

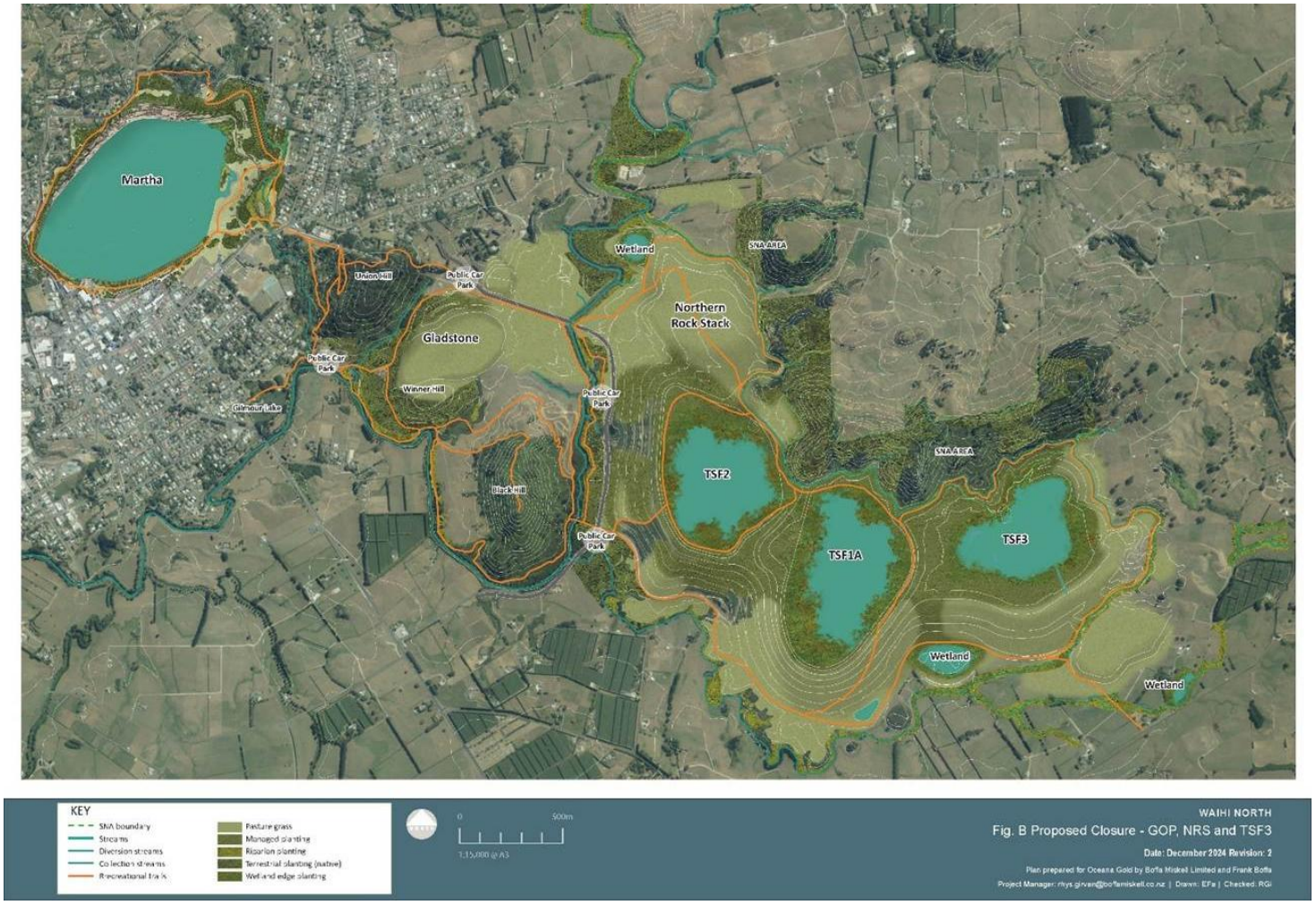


Figure 39: Landscape Closure Plan

13.5 Suitability of Mitigation Measures

The proposed landscape and visual mitigation measures are well suited to the existing and evolving character of the Waihi area, where established mining activity is already a defining feature of the landscape. The measures respond to both the physical and perceptual context of each component of the project, using a combination of landform recontouring, native revegetation, wetland enhancement, and targeted buffer planting to integrate new development with the surrounding environment.

Proposed mitigation measures build on the iterative design of the project and are consistent with best practice landscape management. Visual effects are further reduced through containment by landforms, retention of screening vegetation during active phases, and the timing of planting to align with operational sequencing. The approach set out in the Ecology and Landscape Management Plan also ensures that visible change is actively managed throughout the life of the project and contributes to longer-term rehabilitation and landscape coherence at closure.

13.6 Monitoring and Reporting

As an integrated landscape and ecological response, areas of planting included in *Figure 21b* of the Assessment (reproduced as Figure 39 above) provides the total aggregated areas for each planting type. This overfall quantum of planting aligns with planting included in Figure 2: Proposed Integrated Mitigation Planting Plan and Table 2: Planting included in Section 3 for the purpose of integrated monitoring and reporting.

PART M: GENERAL INCIDENTAL DISCOVERY PROTOCOL

14 GENERAL INCIDENTAL DISCOVERY PROTOCOL — PROTECTED OR AT RISK FAUNA

This protocol applies where Threatened, At Risk, or otherwise protected fauna are unexpectedly discovered during works and are not already addressed by a species-specific management plan within the ELMP-WA. Thes species may include highly mobile species such as birds and Raukawa Gecko.

If Threatened, At Risk, or otherwise protected fauna are unexpectedly discovered during works, the following procedure will apply:

Stop works

Works must stop immediately within the immediate area of the discovery, where it is safe to do so. Plant, machinery and personnel must avoid the fauna and any immediately associated habitat.

Notify the appropriate personnel

The discovery must be reported as soon as practicable to the OGNZL Environment team and the Project Ecologist.

Do not handle fauna unless necessary

Fauna must not be handled, moved or disturbed unless this is required to prevent immediate harm. Any handling must be undertaken only by a suitably qualified and, where required, authorised person.

Ecologist assessment

The Project Ecologist, or another suitably qualified fauna specialist, will assess the discovery and confirm the appropriate management response. This may include:

- Maintaining or adjusting the exclusion area;
- Delaying or modifying works;
- Obtaining specialist species advice (project ecologist);
- Notifying doc;
- Confirming whether a wildlife act authority or other authorisation is required;
- Relocating the fauna, if appropriate and authorised;
- Undertaking additional surveys; and/or
- Implementing additional avoidance, mitigation or monitoring measures.

Works recommencement

Works must not recommence in the affected area until the Project Ecologist or relevant fauna specialist confirms that works can proceed and any required management measures have been implemented.

Recording and reporting

All incidental discoveries must be recorded, including the date, location, species or suspected species, circumstances of discovery, actions taken, specialist advice received, and any notifications made. Relevant discoveries and management responses will be summarised in the annual ELMP-WA Monitoring Report 'Annual Vegetation Clearance and Fauna Management Report'.

This protocol sits alongside, and does not replace, the species-specific procedures in the Lizard Management Plan, Avifauna Management Plan and Bat Management Plan. Where a species-specific plan applies, that plan will take precedence.

Functions, will be confirmed by the LVMP / landscape, engineering or closure leads as relevant.

PART N: SUMMARY INTEGRATED LANDSCAPE AND ECOLOGY MEASURES AND REPORTING REQUIREMENTS

15 SUMMARY INTEGRATED LANDSCAPE AND ECOLOGY MEASURES AND REPORTING REQUIREMENTS

15.1 Monitoring and Mitigation Measures

This section of the ELMP summarises the terrestrial and landscape matters associated with the ELMP-WA. This includes:

- The monitoring and reporting requirements;
- The 5-yearly monitoring targets and contingency response;
- A consolidated planting quantum and implementation summary; and
- Area based implementation schedules.

Table 53 Monitoring and reporting requirements associated with the ELMP

ELMP-WA component	Monitoring requirement	Frequency / timing	Reporting requirement	Trigger for remedial action
Plant Establishment / Planting Plan	Walk-through plant establishment and species survival monitoring, including photopoints and rapid plot assessments. Monitoring to identify plant mortality, poor establishment, weed pressure, browsing, pest animal damage, wind exposure, or other establishment risks.	Annually for the first five years following planting, or until canopy closure is achieved.	Findings and remedial actions to be included in the annual ELMR.	Failure to achieve required survival or canopy closure targets, or evidence that plant establishment is not tracking as expected. Remedial actions may include replacement planting, infill planting, additional weed or pest animal control, fertiliser, wind protection, or review of species suitability.
Residual Effects Offset Plan	Formal offset monitoring against BOAM biodiversity attributes, including canopy height, native canopy diversity, winter fruiting and flowering species, native canopy cover, native understorey diversity, and avifauna diversity.	Five-yearly, commencing five years after initial revegetation and enhancement canopy species have been planted, and continuing for at least 20 years.	Results to be reported following each monitoring event and summarised in the annual ELMR where relevant.	If biodiversity attributes are more than 15% behind predicted targets from Year 10, adaptive management actions are to be recommended and, where required, modelled using the BOAM to demonstrate that net gain outcomes can still be achieved.
Plant Pathogen and Weed Management	Monitoring for plant pathogens, invasive plant species, and weed incursions during routine site inspections, maintenance activities, and ecological monitoring.	Ongoing during works and maintenance activities.	Any suspected or confirmed pathogen infection, significant weed issue, or invasive species issue to be reported internally and summarised in the annual ELMR where relevant.	Suspected or confirmed pathogen infection, new weed incursion, invasive species observation, or failure of existing controls. Remedial actions may include hygiene controls, access restrictions, treatment, removal or containment of infected material, additional weed control, and specialist review.
Pest Animal Management Plan	Pest animal monitoring for target species, including rodents, mustelids, cats and possums, using appropriate tools such as	Frequency to be specified in the PAMP and adjusted in response to monitoring results and pest thresholds. Control is	Pest monitoring results, control effort, target exceedances, and remedial	Exceedance of pest thresholds or evidence that pest control is not achieving the required protection for offset planting, lizard habitat,

ELMP-WA component	Monitoring requirement	Frequency / timing	Reporting requirement	Trigger for remedial action
	tracking devices, cameras, chew cards, wax tags, trap catch records, or other methods specified in the PAMP.	to occur year-round unless site-specific constraints require otherwise.	actions to be reported in the annual ELMR.	avifauna or bat outcomes. Remedial actions may include increased trap density, increased servicing frequency, changes to bait/lure, additional control methods, or expansion of control areas.
Lizard Management Plan	Monitoring of lizard release, enhancement and habitat planting areas to assess lizard occupation, breeding, habitat expansion and population response.	Annually for the first five years following implementation of the Lizard Management Plan, then five-yearly until the end of the 20-year planting period.	Annual progress reports to be provided to WRC, HDC and DOC. Lizard records to be provided to DOC for inclusion in the herpetofauna database. Summary to be included in the annual ELMR.	No evidence of habitat occupation over repeated monitoring events, poor habitat establishment, or pest monitoring results indicating inadequate pest suppression. Remedial actions to be recommended by the Project Herpetologist.
Avifauna Management Plan	Monitoring and supervision of vegetation clearance where required, including checks for active native bird nests where clearance during peak bird nesting season cannot practicably be avoided.	Prior to and during relevant vegetation clearance activities, particularly where clearance is proposed during the bird breeding season.	Any avifauna management actions, active nest exclusions, injuries or mortalities to be recorded. Injuries or mortalities to be reported to DOC within required timeframes. Summary to be included in the annual ELMR.	Discovery of an active native bird nest, bird injury or mortality, or non-compliance with the Avifauna Management Plan. Remedial actions may include establishment of exclusion zones, delay of clearance, ecologist review, and DOC notification.
Bat Management Plan	Implementation monitoring during bat-related vegetation clearance, including application of DOC Bat Roost Protocols, valid survey conditions, stop-work procedures, post-clearance records, and monitoring of artificial roost boxes and anti-predator bands.	Prior to, during and following relevant vegetation clearance. Artificial roost boxes to be checked annually and maintained for a minimum of 10 years. Anti-predator bands to be checked six-monthly and maintained for a minimum of 10 years.	Bat survey results, bat detections, stop-work events, post-clearance records, artificial roost box checks, and any bat injury or mortality to be reported to DOC where required and summarised in the annual ELMR.	Detection of bats, occupied roosts, bat injury or mortality, or failure of artificial roost boxes or predator exclusion measures. Triggers include immediate stop-work, DOC notification, review by an approved bat ecologist, and implementation of additional management measures.

Table 54 5-yearly monitoring targets and contingency response for offset planting areas

Note: Offset success is measured at 20 years. Targets prior to the offset outcome are indicative only and should prompt management response where monitoring indicates that the offset is not tracking as expected.

Biodiversity attribute	Offset action	5 years	10 years	15 years	20 years	Potential contingency / adaptive management response if targets are not met
Indigenous canopy height	Revegetation	2 m	4 m	6 m	7 m	Review species performance and site conditions. Consider infill planting, replacement with more suitable species, fertiliser application, wind protection, improved plant releasing, and/or additional weed or pest animal control.
Winter fruit and flower resources	Revegetation	2 spp.	10 spp.	13 spp.	13 spp.	Review species mix and survival of winter fruiting/flowering species. Undertake supplementary planting or enrichment planting with appropriate winter fruiting/flowering species where required.
Indigenous canopy species richness	Revegetation	5 spp.	6 spp.	8 spp.	8 spp.	Review survival and establishment of planted canopy species. Undertake replacement or supplementary planting with suitable canopy species if diversity is tracking below target.
Indigenous understorey species richness	Revegetation	2 spp.	10 spp.	15 spp.	20 spp.	Review understorey establishment and weed competition. Undertake supplementary understorey/enrichment planting, additional weed control, or canopy management where required to support understorey development.
Native avifauna diversity	Revegetation	4 spp.	10 spp.	12 spp.	12 spp.	Review habitat structure, food resources and pest animal control outcomes. Consider additional planting of food/resource species, expansion or intensification of pest control, and/or further monitoring to confirm whether low counts reflect habitat performance or survey variability.
Canopy height	SNA Enhancement	12 m	13 m	14 m	15 m	Review effectiveness of pine management and enhancement planting. Consider additional release of native canopy trees, replacement planting, supplementary planting in gaps, and/or additional weed or pest animal control.
Indigenous canopy cover	SNA Enhancement	60%	65%	75%	80%	Review canopy gaps, weed competition and browsing/pest pressure. Consider infill planting, replacement planting, additional weed control, pest animal control, or other measures recommended by the Project Ecologist.

Biodiversity attribute	Offset action	5 years	10 years	15 years	20 years	Potential contingency / adaptive management response if targets are not met
Indigenous canopy species richness	SNA Enhancement	3 spp.	3 spp.	4 spp.	5 spp.	Review survival and recruitment of planted canopy species. Undertake supplementary planting with suitable future canopy species where required.
Indigenous understorey species richness	SNA Enhancement	17 spp.	18 spp.	19 spp.	20 spp.	Review understorey condition, weed competition, browsing and light conditions. Consider supplementary understorey planting, weed control, pest animal control, or targeted management of canopy gaps.
Native avifauna diversity	SNA Enhancement	10 spp.	11 spp.	12 spp.	12 spp.	Review habitat quality, food resources and pest animal control outcomes. Consider additional food/resource planting, increased or expanded pest control, and/or additional bird monitoring to confirm trends.

Table 55 Consolidated planting quantum and implementation summary

Planting / management category	Area / minimum quantum	Trigger	Location	Purpose	Implementation timing
Lizard / moko skink habitat enhancement	2.34 ha	Prior to vegetation removal at GOP, NRS or TSF3	Lizard / moko skink enhancement area adjacent to SNA T13UP166	Enhance existing moko skink habitat through pine tree management and improve habitat quality and connectivity.	Pine tree management, including removal or top, poison and delimb, to occur prior to any vegetation removal at GOP, NRS or TSF3.
Lizard / moko skink habitat planting	1.7 ha	SNA vegetation removal at TSF3	Lizard habitat planting area associated with SNA T13UP166	Provide additional targeted lizard habitat planting and improve connectivity for moko skinks and other indigenous lizards.	To be undertaken in the first planting season following SNA vegetation removal at TSF3.
Copper skink compensation planting	11.2 ha	Prior to vegetation removal at GOP	Gladstone Open Pit / retained contiguous copper skink habitat area	Compensate for the loss of copper skink habitat through native revegetation and habitat	To be completed prior to any vegetation removal at GOP.

Planting / management category	Area / minimum quantum	Trigger	Location	Purpose	Implementation timing
				enhancement, supported by pest control.	
Copper skink retained habitat pest control	4.45 ha	Prior to / during GOP vegetation removal and ongoing management	Retained copper skink habitat contiguous with compensation planting at GOP	Improve and protect retained copper skink habitat contiguous with compensation planting.	Pest control to be implemented in accordance with the PAMP and Lizard Management Plan.
TSF3 SNA offset planting	16.2 ha shown in Table 22; check against 17.5 ha SNA offset quantum elsewhere in ELMP-WA	SNA vegetation removal at TSF3	Within and adjacent to the southern SNA T13UP166 fragment / wider offset planting area	Offset the loss of SNA vegetation and contribute to net biodiversity gain.	Pioneer planting to be completed by the end of the first planting season following SNA vegetation removal at TSF3.
TSF3 SNA enhancement	20 ha	Vegetation removal at Western Fragment / TSF3	Pine-dominant areas within SNA T13UP166	Enhance SNA T13UP166 through pine management and replacement/enrichment planting with native species.	Pine management and enrichment planting to be completed by the end of the first planting season following vegetation removal at the Western Fragment, TSF3.
TSF3 SNA buffer planting	1 ha	SNA vegetation removal at TSF3	Buffer along SNA T13UP166 interface	Buffer newly created SNA edges and reduce edge effects such as weed invasion, light, wind exposure and desiccation.	Planting to be completed by the end of the first planting season following SNA vegetation removal at TSF3.

Planting / management category	Area / minimum quantum	Trigger	Location	Purpose	Implementation timing
TSF3 replacement planting	0.6 ha	Removal of existing vegetation at TSF3	TSF3 replacement planting area	Replace vegetation removed as part of TSF3 works and contribute to ecological restoration / connectivity outcomes.	As removed: pioneer planting to be completed over the planting season following removal.
NRS replacement planting	9.1 ha	Removal of existing vegetation at NRS	Northern Rock Stack replacement planting areas	Replace vegetation removed as part of NRS works and contribute to ecological restoration / connectivity outcomes.	As removed: pioneer planting to be completed over the planting season following removal.
GOP replacement planting	6.5 ha	Removal of existing vegetation at GOP	Gladstone Open Pit replacement planting areas	Replace vegetation removed as part of GOP works and contribute to ecological restoration / connectivity outcomes.	As removed: pioneer planting to be completed over the planting season following removal.
Screen planting	0.75 ha	Commencement / Visibility of construction of stockpiles from Golden Valley Road	Alongside Golden Valley Road as identified in Figure 2 of the ELMP-WA	Establishment of fast-growing native planting (e.g. pittosporum and kanuka) to screen temporary stockpiles and Northern Rock Stack from Golden Valley Road.	Planting to be completed within the first planting season following commencement of the consent
Riparian planting	35.8 ha	Commencement of construction in Areas 5, 6 and 7	All Riparian Planting Areas identified in Figure 2 of the ELMP-WA	To manage landscape and natural character effects associated with NRS and TSF3	Refer to planting measures above and set out in Part J and K of the ELMP-WA
Wetland planting / closure planting	1.3 ha	Commencement of construction at TSF3	Wetland area adjacent to Ruahorehore Stream shown in Figure 2 in ELMP-WA	To manage landscape and natural character effects associated with TSF3	Pioneer planting to be completed over the planting season following commencement of construction works at TSF3

Table 56 Area based implementation schedules

Mitigation measure	Area relevance	Purpose	Trigger / lead-in period	Location / extent	Implementation timeframe	Maintenance / retention duration	Performance standard	Monitoring / reporting	Corrective action
Offset planting	Areas 5, 6 and/or 7, where required by the offset package	Offset residual vegetation and habitat effects and demonstrate net biodiversity gain.	Triggered by relevant vegetation clearance / offset requirements. Lead-in to align with consent and planting season requirements.	Offset planting areas identified in the ELMP-WA. Extent to be confirmed in the consolidated planting quantum table.	Pioneer planting to occur in the planting season following the trigger event, unless otherwise specified in the ELMP-WA.	Five years establishment monitoring, 20 years pest control. Maintained until establishment targets are achieved; formal offset monitoring continues in accordance with the BOAM monitoring framework.	Progress toward BOAM biodiversity attribute targets and relevant plant establishment targets.	Annual establishment monitoring and five-yearly offset monitoring, with reporting through the annual ELMP-WA Monitoring Report and offset monitoring reports.	Replacement planting, supplementary planting, species substitution, additional weed control, additional pest animal control, fertiliser, wind protection, or other actions recommended by the Project Ecologist as determined by

Mitigation measure	Area relevance	Purpose	Trigger / lead-in period	Location / extent	Implementation timeframe	Maintenance / retention duration	Performance standard	Monitoring / reporting	Corrective action
									remodelling (BOAM).
Replacement planting	Areas 5, 6 and/or 7 where existing vegetation is removed and replacement planting is required	Replace removed vegetation and contribute to ecological restoration, habitat connectivity and landscape integration where relevant.	Triggered by vegetation removal in the relevant area.	Replacement planting areas identified in the ELMP-WA. Extent mapped at Gladstone Pit.	To be undertaken in the planting season specified in the ELMP-WA following vegetation removal.	Maintained until survival and canopy closure targets are achieved.	Minimum plant survival and canopy closure targets as specified in the Planting Plan.	Annual plant establishment monitoring, with results and remedial actions reported in the annual ELMR.	Infill or replacement planting, additional weed control, pest control, review of species suitability, fertiliser or wind protection where required.
Compensation planting / lizard habitat planting at Gladstone Pit	Relevant where fauna habitat compensation is required, including	Provide habitat compensation and support protected fauna outcomes.	Triggered by vegetation removal at Gladstone Pit.	Fauna habitat planting / compensation areas identified in the ELMP-WA.	Timing of restoration planting to occur during first planting season following	Five years establishment monitoring, 20 years pest control.	Habitat establishment and fauna performance indicators specified in the relevant	Monitoring by the Project Ecologist / Project Herpetologist as relevant, with reporting to councils and	Additional habitat enhancement, refugia, infill planting, increased pest control,

Mitigation measure	Area relevance	Purpose	Trigger / lead-in period	Location / extent	Implementation timeframe	Maintenance / retention duration	Performance standard	Monitoring / reporting	Corrective action
	lizard habitat areas				vegetation removal		management plan.	DOC where required.	modified pest control methods or additional monitoring.
Enhancement planting	Areas 5, 6 and/or 7 where ecological enhancement is required	Improve existing ecological values, habitat quality, vegetation structure and biodiversity outcomes.	Triggered by relevant vegetation clearance, offset/enhancement requirement or staged implementation requirement.	Enhancement areas identified in the ELMP-WA.	To be undertaken in accordance with the staging and planting timing specified in the ELMP-WA.	Five years establishment monitoring (for infill planting), 20 years pest control. Maintained until establishment and enhancement objectives are achieved.	Relevant vegetation, habitat or biodiversity attribute targets.	Monitoring through plant establishment monitoring, offset/enhancement monitoring and annual ELMR.	Supplementary planting, weed control, pest animal control, replacement planting or other actions recommended by the Project Ecologist.
Buffer planting	Areas where new vegetation edges or sensitive ecological	Reduce edge effects, buffer retained vegetation,	Triggered by vegetation clearance or creation of new edges requiring buffering.	Buffer planting areas identified in the ELMP-WA.	To be planted in the relevant planting season	Maintained until planting is established and buffer function is achieved.	Survival, canopy closure and buffer establishment	Annual establishment monitoring and reporting through the annual ELMR.	Infill planting, replacement planting, additional weed

Mitigation measure	Area relevance	Purpose	Trigger / lead-in period	Location / extent	Implementation timeframe	Maintenance / retention duration	Performance standard	Monitoring / reporting	Corrective action
	interfaces are created	protect SNA margins and improve habitat connectivity.			following the trigger event.		outcomes specified in the Planting Plan.		control, pest control or review of planting design.
Weed control and plant establishment maintenance	All ecological planting and enhancement areas	Support successful establishment and prevent weed competition or reinvasion.	Commences before planting and continues through establishment and maintenance periods.	All relevant ecological planting and enhancement areas.	Pre-planting weed control, followed by ongoing maintenance after planting.	Maintained until establishment targets are met, and longer where required for offset/enhancement outcomes.	Weed control sufficient to support plant survival, canopy closure and habitat establishment.	Routine inspections and annual reporting of maintenance and remedial actions.	Additional weed control, change in control method, increased maintenance frequency or specialist review.
Pest animal control	Ecological planting, enhancement and fauna habitat	Support planting success and improve fauna	Commences in accordance with the PAMP and relevant fauna/offset requirements.	Pest management areas identified in the	Implemented in accordance with the PAMP, with control	Duration to be specified in the PAMP and relevant offset/fauna requirements.	Pest targets and thresholds specified in the PAMP.	Pest monitoring, control records and annual reporting	Increased trap density, increased servicing frequency, changes to

Mitigation measure	Area relevance	Purpose	Trigger / lead-in period	Location / extent	Implementation timeframe	Maintenance / retention duration	Performance standard	Monitoring / reporting	Corrective action
	areas where pest control is required	habitat outcomes.		ELMP-WA / PAMP.	intensity informed by monitoring results.			through the ELMR.	bait/lure, additional control methods, or expanded control area.
Landscape effects: Native Terrestrial planting	All areas of proposed terrestrial native planting shown in Figure 2 in ELMP-WA	To manage landscape effects associated with GOP, NRS and TSF3	Refer to planting measures above and set out in Part D of the ELMP-WA	-	-	-	-	-	-
Landscape-specific: native terrestrial Screen planting	Screen Planting area alongside Golden Valley Road	Establishment of fast-growing native planting (e.g. pittosporum and kanuka) to screen temporary stockpiles	Triggered by commencement / visibility of construction of stockpiles from Golden Valley Road	Screen planting area identified in Figure 2 in the ELMP-WA	Planting to be completed within the first planting season following commencement of the consent	Five years monitoring and maintenance until planting is established and screening function is achieved	90% plant survival rate and 3m height in 5 years to achieve screening function	Annual establishment monitoring and reporting through the annual ELMR	Undertake infill planting and/or replacement planting with additional weed control/pest control if required

Mitigation measure	Area relevance	Purpose	Trigger / lead-in period	Location / extent	Implementation timeframe	Maintenance / retention duration	Performance standard	Monitoring / reporting	Corrective action
		and Northern Rock Stack from Golden Valley Road.							
Landscape-effects: Riparian planting	All riparian planting areas	To manage landscape and natural character effects associated with NRS and TSF3	Refer to planting measures above and set out in Parts J and K of the ELMP-WA	-	-	-	-	-	-
Landscape specific: Wetland planting	Wetland creation shown in Figure 2 in ELMP-WA	To manage landscape and natural character effects associated with TSF3	Triggered by commencement of construction works at TSF3	Wetland area adjacent to Ruahorehore Stream shown in Figure 2 in ELMP-WA	Pioneer planting to be completed over the planting season following commencement of construction works at TSF3	Five years monitoring and maintenance until planting is established and screening function is achieved	70% plant survival rate and 70% indigenous wetland plant cover	Annual establishment monitoring and reporting through the annual ELMR	Supplementary planting, replacement planting, additional weed control/pest control if required

15.2 Reporting Requirements

The reporting requirements associated with this Plan are summarised in Table 53 and Table 56 above and Table 57 below.

Table 57 Summary of the Reporting Requirements

Section of the ELMP	Relevant Reporting Requirement	Relevant Consent Condition
Section 1.5	The Waihi North Ecological and Landscape Monitoring Report by 30th June covering activities addressed in the ELMP-WA for the previous 12 months. This report will be provided to Hauraki District Council, the Department of Conservation, and the Iwi Advisory Group.	Condition 205 of the HDC Conditions.
Section 1.5 Residual Effects Offset - Plan Section 4.6.3	Offset Monitoring Report including the following measures as set out in Section 4.6.3: • The results of all aspects monitored including how they are tracking against the biodiversity attributes. • Records of any weeds encountered during monitoring. • Records of any dead/dying plants encountered. • Recommendations as a result of the monitoring, including any actions required to ensure the Biodiversity Attributes outlined in Table 14 are achieved.	Condition 201 of the HDC Conditions. Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Planting Plan – Section 1.5.	As above.	As above.
Management of Plant Pathogens and Weeds – Section 6.7.	Any sightings or signs of infections related to kauri dieback, myrtle rust and didymo will be reported internally and the appropriate mitigation and notifications measures implemented.	Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Pest Animal Management – Section 7.12	Reporting is to be included within the ELMR required in Section 1.5 and set out: • Any sightings or signs of infections related to kauri dieback, myrtle rust and didymo will be reported internally and the appropriate mitigation and notifications measures implemented.	Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Lizard Management Plan - Section 8.12	A SQEP(s) must prepare a report annually, identifying the extent of vegetation and removal and a summary of all relevant lizard management and	Condition 201 of the HDC Conditions.

Section of the ELMP	Relevant Reporting Requirement	Relevant Consent Condition
	monitoring undertaken preceding vegetation removal activities undertaken during the previous 12 months. The report must detail: a) Extent of vegetation removal undertaken. b) All preclearance lizard surveys and protocols, and results, c) Any injuries or mortalities during vegetation removal. This information will be provided in the ELMR and may be combined with information regarding bats and avifauna.	Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Avifauna Management Plan – Section 9.6	A SQEP(s) must prepare a report annually, identifying the extent of vegetation and removal and a summary of all relevant fauna management and monitoring undertaken preceding vegetation removal activities undertaken during the previous 12 months. The report must detail: a) Extent of vegetation removal undertaken. b) All preclearance bird surveys and protocols, and results. c) Any injuries or mortalities during vegetation removal. This information will be provided in the ELMR and may be combined with information regarding bats and lizards.	Condition 201 of the HDC Conditions. Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Bat Management Plan – Section 10.9	A SQEP(s) must prepare a report annually, identifying the extent of vegetation and removal and a summary of all relevant bat management and monitoring undertaken preceding vegetation removal activities undertaken during the previous 12 months. The report must detail: a) Extent of vegetation removal undertaken. b) All preclearance bat surveys and protocols, and results.	Condition 201 of the HDC Conditions. Condition C47B(2)(b) of the Combined HDC and WRC Conditions.

Section of the ELMP	Relevant Reporting Requirement	Relevant Consent Condition
	c) Any injuries or mortalities during vegetation removal. This information will be provided in the Ecology and Landscape Management Report and may be combined with information regarding avifauna and lizards.	
Stream Diversion and Development Plan - Section 11.9	Reporting is to be included within the ELMR required in Section 1.5 and set out: • The extent and location, if any, of stream diversion channel construction in the previous 12 months. This should include the final construction drawings of the diversion channel. • The extent and location, if any, of stream reclamation in the previous 12 months. This should include the outcomes of any Freshwater Fauna Salvage undertaken. • The results of the post-livening monitoring SEV surveys. This should include any management actions that may have been identified following the surveys.	Condition 201 of the HDC Conditions. Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Stream Enhancement and Riparian Planting Plan – Section 12.9	Reporting is to be included within the ELMR required in Section 1.5 and set out: • The location and extent of stream restoration and/or riparian planting undertaken in the preceding planting season. • The number, mix, size and spacings of planting carried out at each location. • Records of any dead/dying plants encountered. • Details of any replacement planting undertaken. • Any recommendations of additional planting, enhancement or management actions that should be undertaken to ensure successful planting.	Condition 201 of the HDC Conditions. Condition C47B(2)(b) of the Combined HDC and WRC Conditions.
Landscape and Visual Mitigation	As an integrated landscape and ecological response, areas of planting included in *Figure 21b* of the	Condition 201 of the HDC Conditions.

Section of the ELMP	Relevant Reporting Requirement	Relevant Consent Condition
Plan – Section 13.6	Assessment (reproduced as Figure 39 above) provides the total aggregated areas for each planting type. This overfall quantum of planting aligns with planting included in Figure 2: Proposed Integrated Mitigation Planting Plan and Table 2: Planting included in Section 3 for the purpose of integrated monitoring and reporting.	Condition C47B(2)(b) of the Combined HDC and WRC Conditions.