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77-109 Kapiti Road and 1 Brett Ambler Way, Paraparaumu

Ecological Management Plan



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1 INTRODUCTION

1.1 Background

This Ecological Management Plan (EMP) has been prepared for New Central Park Limited to describe the ecological management actions required for the development, and supporting works including earthworks and vegetation clearance at 77-109 Kapiti Road and 1 Brett Ambler Way, Paraparaumu, hereby referred to as 'the site' / 'the Project' (**Error! Reference source not found.**).

The actions described in this report are based on management requirements advised in the Assessment of Ecological Effects report (Bioresearches, 2026a), and outlines actions to avoid, minimise, and remedy the potential ecological effects of the proposed development on native terrestrial fauna and flora.

Management plans and protocols provided in this report include:

- A Lizard Management Plan;
- Native Bird Management;
- Native Freshwater Fauna Salvage and Relocation Plan; and
- Freshwater Restoration Plan

This EMP supports both the Project's Fast-track Application and the application to the Department of Conservation (DOC) for a Wildlife Act Authority (WAA), which is required for the capture, handling and relocation of indigenous wildlife (excluding freshwater fish). For this Project, indigenous lizards may require capture and relocation to enable vegetation clearance and associated works to proceed. It is noted that the WAA will be applied for with DOC separate to the fast-track consent application.

1.2 Project Works and Management

The Project comprises the comprehensive development of the site as an extension to the Paraparaumu town centre, including residential, large format retail, specialty retail, commercial and other associated activities, together with the construction of the internal road network, pedestrian and cycle connections, open space, landscaping, stormwater infrastructure and associated servicing.

Land use consent is sought for the proposed development as a whole, including the residential and commercial activities and buildings, rather than solely for enabling earthworks and infrastructure works to facilitate future development. The Project will also involve bulk earthworks across the site to establish the proposed development platforms, road network, open spaces and associated infrastructure.

The Wharemaukū Stream will be retained in its existing alignment along the southern part of the site and enhanced through naturalisation and riparian planting. The Project also includes the creation and enhancement of large indigenous wetland habitat, together with associated flood storage and stormwater management areas within the western and southern parts of the site.

To avoid, minimise, and mitigate potential adverse ecological effects associated with the works, the Project will also include the following measures:

- 5.44 ha of wetland habitat creation;
- Additional riparian planting and stream enhancement;
- 5 years of pest plant and pest animal control;
- Native bird management and measures to avoid impacts on nesting birds;
- Lizard salvage and relocation; and
- Native fish recovery and relocation.

Figure 1. (below) Site overview showing site boundary, stream, works extent and proposed vegetation clearance

Table 1. (below) Summary of management and timings for fauna and flora as described in this EMP



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Kapiti Road, Paraparaumu

Site Overview

Legend

- Site boundary
- Works Extent
- Pedestrian Links

Terrestrial fauna and flora

- Exotic Scrub
- Native plantings
- Exotic trees
- Tī Kōuka
- Mokopirirakau "southern North Island"

Freshwater

- Artificial drain
- Culvert
- Ephemeral flow path
- Regional highly modified stream
- Watercourses
- Natural Inland Wetland

Table 2. Summary of timings and activities for fauna management, freshwater restoration works, pest animal + pest plant management, and reporting requirements.

Timing	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
During works	**Fauna Management**												
	Lizard Management – *Grassland + shrubland habitats*	Lizard Management required				Outside of the salvage season - No lizard relocation permitted					Lizard management required		
	Bird Management – *Grassland habitat*	Bird surveys required within 2 hours prior to vegetation clearance of grassland											
	Bird Management – *Tree and shrubland habitats*	Bird surveys required within 2 hours prior to vegetation clearance			No bird surveys required prior to tree/shrub clearance				Bird surveys required within 2 hours prior to vegetation clearance				
	Fish Management	Fish management activities undertaken Oct- Feb / first week of March			Fish management preferably avoided over this time due to high levels of rainfall, low temperature and sedimentation effects						Fish management activities undertaken Oct- Feb / first week of March		
	Fauna Management Completion Reports	Fauna completion reports will be submitted to GWRC, and DOC where required. The timings are summarised in Section 7.1											
Years Post Works	**Freshwater Restoration Activities**												
1	Initial weed control												
	Planting												
	Planting and weed maintenance												
	Rodent bait pulse												
	Trap checks/ bait replacement	Fortnightly checks/ bait replacement				Monthly checks/ bait replacement					Fortnightly checks/ bait replacement		
	Post-Planting Completion Report	A post-planting completion report is required to be submitted to Council by the Project ecologist no more than 1 year following planting											

Timing	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	Planting and weed maintenance, including annual plant check												
	Rodent bait pulse												
	Trap checks/ bait replacement	Fortnightly checks/ bait replacement				Monthly checks/ bait replacement					Fortnightly checks/ bait replacement		
3	Planting and weed maintenance including annual plant check												
	Rodent bait pulse												
	Trap checks/ bait replacement	Fortnightly checks/ bait replacement				Monthly checks/ bait replacement					Fortnightly checks/ bait replacement		
4	Planting and weed maintenance including annual plant check												
	Rodent bait pulse												
	Trap checks/ bait replacement	Fortnightly checks/ bait replacement				Monthly checks/ bait replacement					Fortnightly checks/ bait replacement		
5	Planting and weed maintenance including annual plant check*												
	Rodent bait pulse												
	Trap checks/ bait replacement	Fortnightly checks/ bait replacement				Monthly checks/ bait replacement					Fortnightly checks/ bait replacement		
	Completion Report	A post-planting and pest management completion report shall be submitted by the Project Ecologist within 12 months of completing the five-year maintenance period, **or once the performance targets of 90% plant survival and 90% canopy cover have been achieved**											

***n.b. years of maintenance following planting commence at the completion of planting, hence an additional maintenance visit is required in March (see Table 12)**

1.3 Cultural Values and Mana Whenua Involvement

The Wharemaukū Stream is an important freshwater feature within the wider Paraparaumu environment and forms part of the network of waterways and associated habitats that have traditionally supported indigenous biodiversity and cultural practices. The Project recognises the importance of the stream to Ātiawa ki Whakarongotai and Puketapu Hapū, including their relationship with freshwater environments and their role as kaitiaki.

The Project incorporates a range of ecological management, mitigation and restoration measures intended to manage effects on indigenous biodiversity and enhance freshwater and terrestrial habitats. These include the salvage and relocation of indigenous lizards and freshwater fish, measures to protect native birds during vegetation clearance, the creation and enhancement of wetland habitats, restoration and riparian planting along the Wharemaukū Stream, indigenous planting, pest plant and animal control, and ongoing ecological monitoring.

In addition to their primary ecological objectives, these measures provide opportunities for mana whenua involvement in the management and enhancement of indigenous biodiversity and freshwater environments. In particular, the proposed wetland restoration and enhancement of the Wharemaukū Stream provide opportunities to improve habitat quality, support indigenous freshwater fauna and strengthen ecological connections between the stream, wetlands, riparian margins and associated open spaces.

The proposed conditions of consent provide for ongoing engagement with Ātiawa ki Whakarongotai and Puketapu Hapū during the implementation of ecological management and restoration activities. Opportunities for involvement may include:

- Providing advice on the refinement of ecological management and restoration plans, including opportunities to incorporate mātauranga Māori and tikanga where appropriate;
- Involvement in indigenous fauna management activities, including lizard and freshwater fish salvage and relocation, native bird management and associated monitoring, where appropriate and subject to relevant authorisations;
- Input into indigenous planting and habitat restoration, including species selection and opportunities to incorporate plants associated with mahinga kai, rongoā and other customary uses;
- Participation in wetland and stream restoration activities, including the establishment and ongoing management of indigenous vegetation and freshwater habitats;
- Input into ecological monitoring programmes, including opportunities to identify cultural indicators relevant to freshwater health, indigenous biodiversity and restoration outcomes; and
- Participation in monitoring and reporting activities associated with the implementation of the EMP and other relevant ecological management plans.

A Kaitiaki Monitoring Strategy is also proposed to provide a framework for mana whenua involvement in monitoring activities associated with the Project. This will provide opportunities to identify relevant cultural indicators and monitoring methods, including those associated with the Wharemaukū Stream, wetlands, indigenous species and ecological restoration activities. Where appropriate, these may be integrated with the ecological monitoring and reporting requirements established through this EMP and subsequent management plans.

The detailed arrangements for mana whenua involvement will be progressed through ongoing engagement with Ātiawa ki Whakarongotai and Puketapu Hapū, consistent with the relevant conditions of consent. This will include opportunities to review and provide input into relevant management plans and restoration methodologies as these are further developed.

This EMP provides the overarching framework for managing ecological effects during construction and implementing the proposed fauna management and habitat restoration measures. It will operate alongside the more detailed wetland and stream restoration management plans and the Kaitiaki Monitoring Strategy to provide a coordinated approach to ecological management, monitoring and opportunities for mana whenua involvement throughout the Project.

2 LIZARD MANAGEMENT PLAN

2.1 Context

The indigenous herpetofauna of the Wellington Region includes 17 terrestrial taxa, of which five no longer exist on the mainland. These species are listed in
A review of the DOC herpetofauna database and iNaturalist records indicated that five indigenous species have been recorded within 5 km of the site. One of these records; a Ngahere gecko (*Mokopirirakau* 'southern North Island' – At Risk – Declining) was found on site, however this record dates back to 1968 when indigenous forest remained. Other records include barking gecko (*Naultinus punctatus*) and copper skink (*Oligosoma aeneum*) (both 'At Risk – Declining), as well as the northern grass skink (*Oligosoma polychroma* – Not Threatened), which were identified on similar, open farmland habitats within a 5 km radius of the site. Raukawa gecko (*Woodworthia maculata* – Not Threatened) was also found ~3km north of the site. Boffa Miskell (2022) reported that they conducted a survey within the site for skinks but did not publish the results.

A survey for indigenous lizards using single-layered *Onduline* artificial cover objects was undertaken between 28 April and 1 May 2025, targeting areas of suitable habitat across the site. No indigenous lizards were detected during the survey (Bioresearches, 2025). However, the EcIA could not conclusively exclude their presence as the site contains extensive and structurally complex habitat, including rough grassland, shrubland and large piles of inorganic material overgrown with vegetation, which provide suitable refugia for native lizards, but can limit the effectiveness of conventional survey methods.

Should lizards be present on site, its likely they exist in low densities. This is due to the site's historical land use and modifications, including extensive forest clearances dating prior to 1958, predominant use as grazed pasture and further vegetation clearance in 2018 to support the construction of the MacKays to Peka Peka Expressway and stormwater pond in the northern corner. Indigenous lizards have been recorded within 5 km of the site, including the historic record from 1968 of a ngahere gecko near the present-day stormwater pond to the north. However, given the extent of historical vegetation clearance, land-use, the site's isolation by surrounding roads, and the highly urbanised nature of the wider landscape, opportunities for dispersal and recolonisation from surrounding lizard populations are limited.

All indigenous lizards are legally protected under the Wildlife Act 1953 (and subsequent amendments) and vegetation and landscape features that provide significant habitat for indigenous species are protected under the Resource Management Act 1991 (Section 6(c)). A WAA is required to capture, handle, and relocate indigenous wildlife and this LMP will be actioned under a valid DOC WAA.

Exotic reptiles and amphibians are not protected under the Wildlife Act 1953 and do not require specific fauna management under this LMP. In particular, plague skink (*Lampropholis delicata*) is classified as an Unwanted Organism under the Biosecurity Act 1993 and must not be intentionally moved or relocated if encountered during works.

2.2 Management Strategy

Complete avoidance of effects on indigenous lizards and their habitat is not practicable. Accordingly, potential effects will be managed through a combination of salvage and relocation, together with habitat enhancement at the nominated release site. These measures are intended to reduce the risk of injury and mortality during works and provide suitable habitat for relocated individuals.

2.3 Salvage and relocation

Prior to the commencement of the lizard salvage, the extent of the works footprint 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.

A DOC-authorised herpetologist would carry out a search and salvage operation that involves:

1. A pre-vegetation clearance systematic search; and
2. A machine-assisted destructive search.

These methods are discussed in more detail in the below section.

Table 3, sourced from the.

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3. A pre-vegetation clearance systematic search; and
4. A machine-assisted destructive search.

These methods are discussed in more detail in the below section.

Table 3. Terrestrial herpetofauna of the Wellington region (mainland), corresponding Wellington mainland and NZ conservation statuses, and reported occurrence within 5 km of the site. Green highlights species that are most likely to be found based on habitat availability on site.

	Common Name	Species Name	Wellington Mainland Threat Status*	NZ Threat Status**	Found ≤ 5km of site	Habitat	Liklihood of occurance on site
Indigenous	*Dactylocnemis pacificus*	Pacific gecko	Data deficient	Not Threatened		Lowland forest and scrub, using trees, loose bark and hollows as retreats; also uses rocky outcrops and debris as refuge.	Possible/less likely
	Oligosoma whitakeri	Whittaker's skink	Critical	Endangered		Restricted to islands and coastal boulder habitat in Pukerua Bay	Unlikely
	Oligosoma aff. infrapunctatum "southern North Island"	Kupe skink	Critical	Critical		Ground-dwelling under rocks, logs, or in dense vegetation.	Unlikely
	Naultinus punctatus	Moko kākāriki/ barking gecko	Vulnerable	At Risk – Declining	ü	Primarily arboreal in forest and shrubland habitats	Unlikely
	Oligosoma aeneum	Copper skink	Vulnerable	At Risk – Declining	ü	Ground-dwelling under rocks, logs, dense vegetation or inorganic materials	Possible
	Oligosoma ornatum	Ornate skink	Vulnerable	At Risk – Declining		Ground-dwelling, typically associated with deep leaf litter, dense vegetation, logs, rocks and other ground-level refuges.	Possible
	Oligosoma zelandicum	Glossy brown skink	At Risk - Declining	At Risk - Declining		Ground-dwelling within moist, well-covered habitats i.e., grassland, wetlands, scrub.	Possible
	Mokopirirakau	Ngahere gecko	At Risk - Declining	At Risk - Declining	ü	Primarily arboreal in forest and shrubland habitats.	Unlikely

	"southern North Island"						
	Woodworthia "Marlborough mini"	Minimac gecko	At Risk - Declining	At Risk – Declining		Predominantly terrestrial and associated with rocky habitats	Possible/less likely
	Oligosoma kokowai	Northern spotted skink	Endangered	At Risk - Relict		Ground-dwelling within sunny open habitats where sufficient ground cover exists	Possible/less likely
	Oligosoma polychroma	Northern grass skink	Not Threatened	Not Threatened	ü	Ground-dwelling within sunny open habitats where sufficient ground cover exists	Possible
	Woodworthia maculata	Moko pāpā/ Raukawa gecko	Not Threatened	Not Threatened	ü	Predominantly terrestrial and associated with rocky habitats	Possible/less likely
Introduced	*Lampropholis delicata*	Plague skink		Introduced & Naturalised	ü		
	Ranoidea raniformis	Southern bell frog		Introduced & Naturalised	ü		
	Litoria ewingii	Whistling tree frog		Introduced & Naturalised	ü		

* Crisp *et al.* (2023); ** Hitchmough *et al.* (2021)

2.5.1 Lizard capture

2.5.1.1 Pre-clearance searches

Diurnal active searches will be undertaken by a DOC-authorised herpetologist across the Project footprint. Searches will involve systematically inspecting suitable lizard habitat, including lifting and searching beneath logs, rocks, woody debris, rubbish and other organic or inorganic material; hand-searching vegetation and rock piles; and inspecting beneath loose or flaking bark and within accessible tree cavities. Hand tools, such as rakes, may be used where appropriate to assist with searches.

Diurnal searching is a proven technique for detecting both diurnal (e.g. *Oligosoma* spp. and *Naultinus* spp.) and nocturnal (e.g. *Mokopirirakau* and *Dactylocnemis* spp.) lizards in New Zealand (Whitaker 1994; Lettink and Hare, 2016).

Given that the site comprises only several isolated trees and windrows, the presence of arboreal lizards such as barking gecko (*Naultinus punctatus*) and ngahere gecko (*Mokopirirakau* "southern North Island") is considered unlikely. The site lacks contiguous or well-connected forest and shrubland habitat and provides limited canopy continuity and structural complexity for arboreal lizard movement, refuge and foraging. Survey efforts would therefore focus on low-growing vegetation, and suitable ground-level substrates and refugia.

Active searching would continue until the herpetologist is satisfied that all searchable features have been adequately inspected. Only then would the next phase (machine-assisted destructive search) of the salvage operation take effect.

2.5.1.2 Vegetation clearance and machine-assisted searches

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.

Areas of complex low-growing vegetation (e.g. areas of rank grass) that cannot be effectively hand-searched, should be searched with the assistance of a machine (excavator). An excavator fitted with a toothed bucket or root rake will be used to progressively lift and remove vegetation and scrape back surface material to expose the underlying topsoil (Figure 2.1).

All machine-assisted vegetation clearance shall be undertaken under the direct supervision of the herpetologist, who will instruct the machine operator on the sequence, location and rate of clearance.

Coordination and communication between the herpetologist and vegetation clearance contractors (both managers and labourers) is essential to minimise the risk of injury or mortality to lizards and to maintain safe working conditions for the herpetologist.



Figure 2. Machine-assisted searches. Herpetologist supervising the scraping of terrestrial vegetation.

2.5.1.3 Post-vegetation clearance searches

Following the clearance of vegetation and habitat features, the herpetologist will walk the extent of the clearance area to search for any lizards that may have been missed during or emerged since vegetation stripping. This will involve searching through vegetation debris piles, raking back soil mounds or scattered leaf litter. Only once the project herpetologist is satisfied that the footprint is clear of lizards, will the salvage operation be declared complete.

2.6 Lizard handling and temporary containment

Indigenous lizards would be captured and handled by a DOC-authorised herpetologist only under a valid WAA. The credentials of the project herpetologist are provided in Table 2.

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

Table 2. Credentials of project herpetologists.

Name	Experience	Contact details
Chris Wedding	18 years' experience	Chris.Wedding@bioresearches.co.nz 027 341 3497
Michaela Scarrott	3 years' experience	Michaela.Scarrott@bioresearches.co.nz 02108369202
Charlotte Garrett	4 years' experience	Charlotte.Garrett@bioresearches.co.nz 0273103835

2.7 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;
- 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.

2.8 Lizard salvage conditions and timeframe

The lizard salvage would only be undertaken during favourable weather conditions (i.e. temperatures above 15°C, precipitation-free, ideally wind speed < 15 km/hr).

The duration of the pre-clearance searches would continue until the herpetologist is satisfied that all searchable features have been adequately inspected. Considering the size and scale of the site and vegetation removal footprint, it is anticipated that that searches would take approximately 1 week. The *machine-assisted searches* would continue until all habitat for lizards has been removed to the satisfaction of the project herpetologist (i.e. there is no suitable habitat for indigenous lizard remaining within the footprint).

2.9 Lizard relocation

2.9.1 Relocation site selection

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.

To assist with site selection, the key principles for lizard salvage and transfer guidelines (NZLizardTAG 2019) were reviewed, from which a set of five site selection criteria were specifically used. These criteria included:

1. The site(s) must be ecologically appropriate and have long-term security;
2. The habitat at the site(s) must be suitable for the salvaged species;
3. The site(s) must provide protection from predators;
4. The site(s) must be protected from future human disturbance;

5. The distance between the receiving site(s) and the original population (i.e., capture site) should be minimised as far as practicable.

Aerial imagery and a desktop review was used to scope potential release sites within the Property, and within the wider landscape. Consideration was given to size, topography, variety of lizards habitat present, protection of land, lizard records, and existing pest control. The suitability of each site assessed against the list of site selection criteria is discussed below.

2.9.1.1 Relocation Site Assessment

Kapiti Road (the Site)

The retention of lizards within a project area would be preferred as it maintains local biodiversity and reduces the potential effects associated with longer distance relocations (e.g. stress during transfer periods, homing phenomena). However, the retention of lizards within the site relies on the availability or provision of habitat, of sufficient quantity and quality, to support displaced individuals.

The extent and complexity of lizard habitat across the property would be substantially reduced following construction of housing, roads, pedestrian footpaths and wetland remediation works, as shown in **Error! Reference source not found.**. Areas of vegetation retained following the initial development would be further reduced by future works associated with connecting roads and urban facilities, including a playground and indoor court facility.

The stormwater pond vegetation margin in the north-eastern corner of the Site would provide the most suitable potential relocation area within the property. However, its limited extent, habitat complexity and connectivity with the wider landscape would constrain its capacity to support viable and expanding native lizard populations. Increased human activity associated with the proposed development may also increase predation pressure, particularly from domestic cats and other introduced predators.

Accordingly, the Site is **not considered suitable** as a release location for native lizards salvaged from the development area.

Release Site - TBC

New Park Limited is currently liaising with Kāpiti Coast District Council to identify suitable alternative release sites for salvaged lizards. This section will be completed once potential release sites have been identified, landowner permissions obtained, and further assessments undertaken to confirm their suitability.

2.9.2 Lizard release strategy

All lizards would be directly released into the approved relocation site within 24 hours of capture. It is expected that all relocated lizards would have high rates of survival and persistence given the short relocation distance (i.e., lizards would be released within or close to their natural home range areas considering the small size of the site). In addition, habitat enhancement (see section 2.8 below) would provide additional refuge sites and generally improve habitat quality for lizards.

Each individual lizard would be measured, weighed, and photographed prior to release. Photographs of the dorsal, lateral, and ventral sides of the animal would provide a reference for individual identification during post-release monitoring sessions (where required).

2.10 Lizard habitat enhancement

The habitat at the proposed relocation site is considered suitable for a variety of indigenous lizards in its current state. However, the relocation of additional individuals into an already occupied environment may increase competition for key resources, including refuges, food and suitable territories, and may result in displacement into lower-quality habitat. Where the carrying capacity of the relocation site and adjacent habitat is already constrained, increased competition for limited resources may reduce the likelihood of survival and successful establishment of relocated lizards. To mitigate these potential risks, management provisions would 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) Provision of supplementary refuges;
2) Native revegetation planting; and
3) Implementation of mammalian pest control.

Management provisions required for salvage and relocation activities are presented in Table 3.

2.10.1 Supplementary Refuges

For the first lizard released and every five lizards thereafter, at least one supplementary refuge comprising of at least 0.5m x 0.5m area of small, stacked logs, brush or rocks shall be created within the lizard release area.

For skinks the refugia should comprise woody debris comprising either stacked logs or brush and for saxicolous geckos (i.e., *Woodworthia sp.)* rocky substrates such as pebbles, stones and flat rocks should be used, where available on site (Figure 2). Should rocky substrates not be available, artificial refugia should be created using two-layered stack with 400 × 280-mm sheets separated by 10-mm diameter wooden spacers or stones (Figure 2).

The following materials and methods should be used when creating woody refuges:

- The woody material shall be from native species, or non-weedy exotic species that are not likely to root or grow (e.g., no material should be used from poplar or willow trees);
- Amenity trees can be sectioned or cut into log discs that can then be used as a base layer, for habitat complexity and invertebrate food source provision.
- It is recommended that the material used to create these piles is sourced from elsewhere on site, where it is not currently providing habitat to native lizards.

To ensure that captured and relocated lizards immediately have habitat available, at least two stacks must be created prior to any lizard management activities commencing, in a suitable location decided by the herpetologist. If ten lizards are caught and released, it is recommended another two ecostacks are installed before any additional lizards are caught and released. **Error! Reference source not found.** provides examples of completed ecostacks.



Figure 2. Examples of supplementary refuges for native skinks. Left: stack built with woody debris; right logs cut into slim discs which can be stacked and used to build supplementary refuges at the release site



Figure 3. Examples of supplementary refugia for relocated ground-dwelling native geckos. Left: rocky substrates; right: two-layered stack artificial covers.

2.10.2 Mammalian pest control

To enhance the probability of survival and establishment of relocated lizards it is recommended that mammalian pest control targeting rodents, hedgehogs, mustelids, and possums be implemented across the release Site. Table 2 outlines the recommended triggers for post-release management (including pest control) and details of the pest control programme (where required) are provided in Section 7.

2.11 Salvage completion reporting

Upon completion of the lizard salvage and relocation programme, all findings will be submitted as an Amphibian and Reptile Distribution Scheme (ARDS) card to the DOC.

2.12 Post-release monitoring

Post-release monitoring is a requirement of all DOC WAA's issued for the purpose relocating protected wildlife. Thus, population monitoring is recommended where lizards are salvaged and relocated as part of the Project. Table 2 outlines the recommended triggers for post-release monitoring provisions at the relocation site depending on the results of the salvage operation.

It is recommended post-release monitoring be carried out at the release site to verify or otherwise the presence of lizards, determine the presence of gravid female lizards, potentially identify relocated individuals, and determine the performance of enacted management.

The monitoring sessions would employ standard survey techniques such as the use of artificial refuges (Lettink & Cree, 2007; Lettink, *et al.*, 2011; Lettink, 2012), live traps (Hare, 2012), and active searches, in accordance with DOC SOPs (*DOC Biodiversity inventory and monitoring toolbox – Herpetofauna*).

The results of each monitoring session and any recommendations emerging from the results would be reported to GWRC and DOC. In addition, all records of lizards would be submitted to the DOC and GWRCfor inclusion in their respective herpetofauna databases.

Table 2 Triggers for management and post-release monitoring provisions.

	Trigger	Management provision	Duration of pest management	Post-release monitoring provision
	• < 5 Not Threatened lizards;	• Supplementary refuges	N/A	N/A
A	• < 10 Not Threatened lizards; and/ or • ≥ 1 'At Risk' lizards	• Supplementary refuges • Pest management required	3 years	N/A
B	• ≥ 10 Not Threatened lizards; and/ or • ≥ 5 'At Risk' lizards;	• Supplementary refuges • Pest management required	3 years	Monitoring at years 1 and 3.
C	• ≥ 20 Not Threatened lizards; and/ or • ≥ 10 'At Risk' lizards;	• Supplementary refuges • Pest management required	5 years	Annual monitoring (at years 1, 2, 3, 4, 5 and 6).

2.13 Post vegetation clearance

Following vegetation clearance, the cleared area should be managed to prevent the re-establishment of suitable lizard habitat and subsequent re-immigration from adjoining retained vegetation. Where practicable, cleared areas should be promptly earth-worked or otherwise maintained in a condition that prevents vegetation regrowth and the development of refugia suitable for lizards. Where earthworks will not immediately follow clearance, or where suitable vegetation is retained in direct connection with the works area, temporary lizard-exclusion fencing should be installed and maintained to prevent recolonisation (e.g. silt fencing. This is particularly relevant where retained habitat remains around the stormwater pond and along the northern perimeter adjoining the Kāpiti Expressway. These measures will reduce the risk of lizards re-entering the works area after salvage and clearance have been completed.

3 NATIVE BIRD / AVIFAUNA MANAGEMENT PLAN

3.1 Context

Native birds are legally protected under the Wildlife Act 1953 (and subsequent amendments) and vegetation and landscape features that provide significant habitat for indigenous species are protected under the Resource Management Act 1991 (Section 6(c)).

The proposed Project works requires the clearance of vegetation during bird breeding and egg laying seasons and since vegetation removal during this time may threaten disturbance or harm to native nesting birds or mortality of eggs/ chicks, a bird nesting survey by a qualified ecologist will be necessary prior to the removal of vegetation to ensure harm to native avifauna is avoided, and disturbance is minimised.

Two species recorded previously on site (as discussed in the EcIA, Bioresearches 2026); pukeko (*Porphyrio melanotus*) and New Zealand pipit (*Anthus novaeseelandiae*- 'At-Risk Declining') can potentially lay nests within areas of grassland habitat on site. Whilst New Zealand pipit breed seasonally, pukeko are capable of laying eggs all year round (Table 4). Its therefore recommended to precede all grassland clearance activities year-round with a nest check by a suitably qualified ecologist. The specific methodologies for bird nest surveys and subsequent management measures if native birds are found nesting on site is provided in the below sections.

Other species likely to breed on site include fantail (*Rhipidura fuliginosa*), grey warbler (*Gerygone igata*), sacred kingfisher (*Todiramphus sanctus*), silvereye (*Zosterops lateralis*) and welcome swallow (*Hirundo neoxena*). Where present, these species may nest within trees, shrubs and other suitable vegetation. Pre-clearance nest surveys should therefore be undertaken during their respective breeding seasons, generally between August and March, as summarised in Table 4.

3.2 Pre-clearance nest surveys

Immediately prior to (i.e., no more than two hours before) the removal of vegetation, a suitably experienced ecologist will walk through the vegetation clearance footprint and search for active birds' nests. An active nest is defined as a nest that contains eggs and/ or chicks (of any development age).

When undertaking nest checks for ground nesting birds such as New Zealand pipit and pukeko, its critical to survey the site ahead whilst walking through the site to avoid trampling the nest, or disturbing nesting parents. Pukeko are likely to alarm call when approached, indicating a nest is present, however New Zealand pipit if incubating are likely to be inconspicuously encased in a woven grass nest and harder to detect (Figure 4). The below methods should therefore be implemented whilst undertaking nest surveys, to ensure adverse effects are avoided and/or minimised to potentially nesting birds on site:

All habitats:

- Undertake a broadcast survey: the surveyor stands at a predetermined point for 5 minutes, scanning the Site within range with binoculars looking for movement and listening for calls. This should be repeated to cover the extent of grassland habitat, shrubs, and trees on Site, no more than two hours before the vegetation clearance activities begin.

- Where a tree cannot be fully and confidently inspected due to structural complexity or obscured features, the surveyor should undertake an additional 10-minute observation period, listening and scanning for signs of nesting activity, such as adult birds returning to or departing from a nest.

Grassland habitats:

- Following the broadcast survey in Step 1, playback should be undertaken within areas of long grassland that provide potential nesting habitat for New Zealand pipit.
- A high-quality recording of the species' territorial song or contact calls (e.g. *"tjwsee"* or *"tjwsit"*) should be broadcast using a portable speaker. The calls can be obtained from NZBirdsOnline and played for short bursts (less than 30 seconds) at natural levels (roughly 60–65 dB), followed by 30 seconds of observation (listening and looking within ~100m from point of playback).
- Playback and listening should be repeated when entering areas out of hearing range whilst walking through the site.



Figure 4. Examples of native bird nests: (top) pukeko nests laid on-top of areas of grassland; (below) New Zealand pipit nests, woven into grassland areas.

3.3 Nest detected on site

The detection of any active nest of native bird(s) would trigger a management response, involving the establishment of an exclusion perimeter to be formed around the nest. The exclusion area would be measured as a 15 m diameter around the vegetation hosting the nest and would be demarcated by ways of fencing, tape or non-toxic spray-paint to clearly show the exclusion area. All works within this exclusion zone would cease until the nestlings have fledged, which would be confirmed by the project ecologist.

Table 4. Breeding and egg laying season for native birds most likely to utilise the site, based on suitable habitat

Common name	National Threat Status*	Breeding Season											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fantail	Not Threatened	0									0	0	0
Grey warbler	Not Threatened								0	0	0	0	0
Kingfisher	Not Threatened										0	0	0
New Zealand Pipit	At Risk - Declining	0							0	0	0	0	0
Pūkeko	Not Threatened	0	0	0	0	0	0	0	0	0	0	0	0
Silvereye	Not Threatened	0	0							0	0	0	0
Welcome swallow	Not Threatened	0	0	0					0	0	0	0	0

Key: 0= egg laying season, blue = breeding season. **Note**: Several species found on site are partially protected under the Wildlife Act 1953, listed as game-birds[1] or 'partially protected wildlife'[2]. These species are italicised in column A. Species in bold have a conservation status of Threatened or At-Risk. *Robertson et al, 2021.

4 NATIVE FRESHWATER FAUNA SALVAGE AND RELOCATION PLAN

4.1 Overview

The project will result in the removal or modification of aquatic habitat across the site, including Watercourse 1, artificial drains and several wetlands, as part of the bulk earthworks. Two culverts will also be constructed within the Wharemaukū Stream, including the culvert for the Iver Trask extension. The purpose of this Native Freshwater Fauna Salvage and Relocation Plan (NFFSRP) is to minimise the risk of injury or mortality to indigenous freshwater fish and other aquatic fauna such as kōura (freshwater crayfish) and kākahi (freshwater mussels) during these works by capturing and relocating freshwater fauna from affected aquatic habitat.

A diverse range of indigenous fish have been recorded within the Wharemaukū catchment, as per the New Zealand Freshwater Fish Database (Table 5). Targeted surveys were additionally undertaken by Bioresearches (Bioresearches, 2026) using overnight trapping and eDNA sampling within Watercourse 1 and the adjoining Wharemaukū Stream. These surveys confirmed the presence of several indigenous fish within and adjacent to the site, most of which have a "Threatened" or "At Risk" status.

Brown mudfish (*Neochanna apoda*; At Risk - Declining) were not detected during targeted surveys and have not been recorded within the Wharemaukū Stream catchment; however, they have been recorded within similar dune wetlands within 2.5 km from site. Its presence is therefore considered possible, although unlikely, and brown mudfish are addressed within this NFFSRP as a precaution.

Table 5: New Zealand freshwater fish database records for the Wharemaukū Stream catchment, and their detection during targeted surveys undertaken by Bioresearches (2026) within and adjacent to the site.

Common Name	Scientific Name	Threat Classification*	Detection during Bioresearches (2026) survey
Shortfin eel	*Anguilla australis*	Not threatened	✓
Longfin eel	*Anguilla dieffenbachii*	At risk - Declining	✓
Kōaro	*Galaxias brevipinnis*	At risk - Declining	
Banded kōkopu	*Galaxias fasciatus*	At risk - Naturally uncommon	
Īnanga	*Galaxias maculatus*	Threatened – Nationally vulnerable	✓
Shortjaw kokopu	*Galaxias postvectis*	Threatened – Nationally vulnerable	
Common bully	*Gobiomorphus cotidianus*	Not threatened	✓
Redfin bully	*Gobiomorphus huttoni*	At risk - Naturally uncommon	✓
Kōura	*Paranephrops planifrons*	Not threatened	
Freshwater shrimp	*Paratya curvirostris*	Not threatened	✓

* = Freshwater fish threat classifications from Dunn et al. (2025); freshwater invertebrate threat classifications from Grainger et al. (2018).

4.2 Methodology

4.2.1 Capture and relocation site

The aquatic habitat present within the site footprint is depicted in Figure 5, and include Watercourse 1, further artificial drains and wetlands that will be reclaimed as part of the proposed works. Two culverts will also be installed within the Wharemaukū Stream; however, this stream will be otherwise retained. These works will require the recovery and relocation of native fish, and kōura and kākahi (not recorded but possibly present) within impacted areas.

Fish, kōura, kākahi will be relocated within the same catchment to habitat that is suitable for the species captured and consistent with the habitat from which they were recovered. Fish captured from Watercourse 1 and other drain habitats will generally be relocated downstream of the works within suitable habitat in the Wharemaukū Stream. Fish recovered from wetland habitats will be relocated to riparian wetland habitats immediately downstream of the site adjacent to the Wharemaukū. Given the close proximity and hydrological connectivity of the proposed release areas to the capture locations, the relocation sites are considered to provide suitable receiving habitat.

If brown mudfish are captured, a suitable relocation site within the same catchment will be identified by the Project Ecologist in collaboration with mana whenua, taking into account the specific habitat requirements of the species and the characteristics of the capture location.

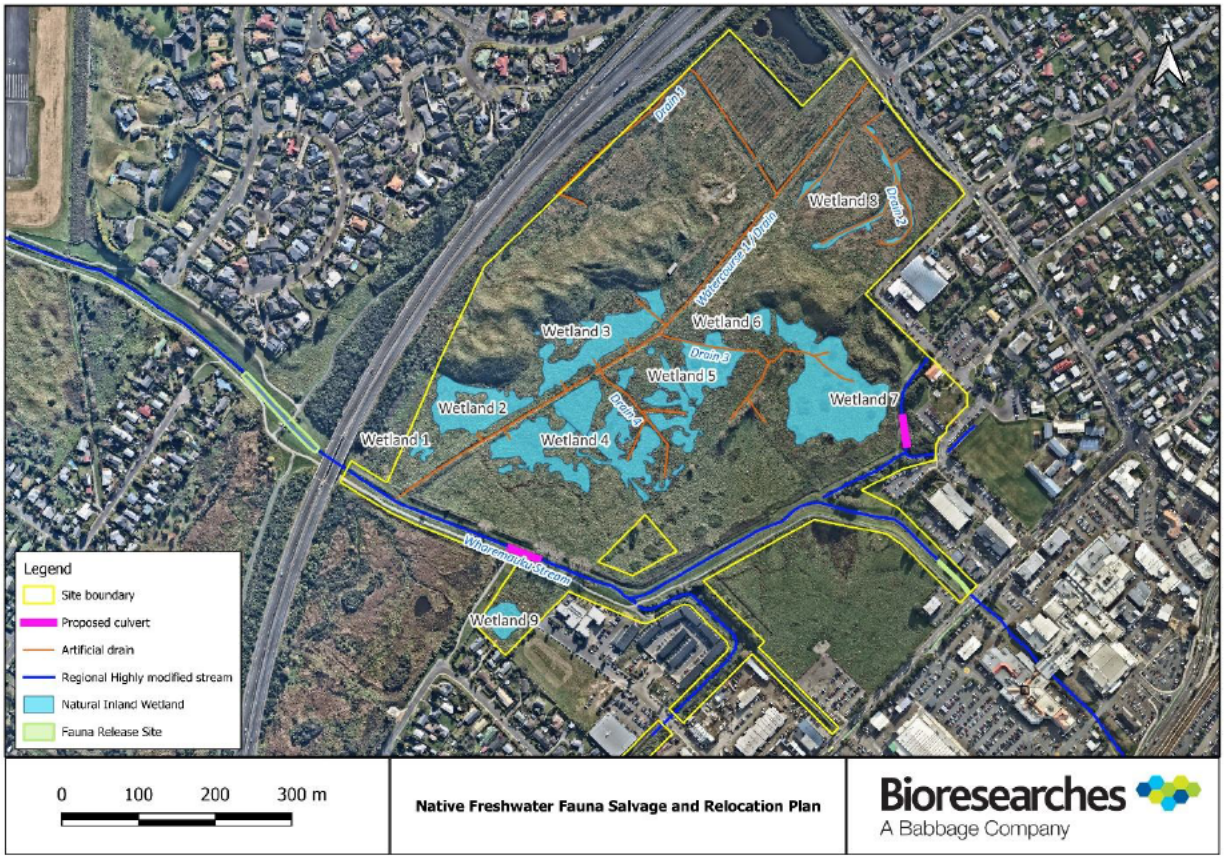


Figure 5: Aquatic habitats within the site that will be subject to freshwater fauna recovery prior to reclamation (i.e. those within the yellow polygon), together with the proposed relocation areas for native freshwater fauna.

4.2.2 Commencement of recovery plan

Fish and aquatic fauna recovery and relocation will be undertaken within one week prior to the commencement of works within affected aquatic habitats. Recovery should avoid periods of high rainfall levels to prevent the incidental infiltration of fish.

Surface water within some of the artificial drains and wetlands is expected to reduce during the drier summer months. Where works are undertaken during this period, a suitably qualified ecologist will inspect the affected habitat prior to works commencing to determine whether sufficient surface water remains to support freshwater fish.

Where suitable habitat is present, freshwater fauna recovery will be undertaken in accordance with this NFFSRP. Where an artificial drain is dry, the project ecologist will assess whether residual wetted areas, saturated substrates or other habitat features capable of supporting brown mudfish remain before determining whether active fish recovery is required.

4.2.3 Exclusion screens

Where practicable, fish exclusion barriers will be installed at the upstream and downstream extents of affected aquatic work areas prior to fish recovery, to prevent fish from recolonising areas that have been cleared. Exclusion barriers will primarily be used within Watercourse 1, artificial drains and the Wharemaukū Stream culvert work areas where discrete upstream and downstream boundaries can be established.

Within wetland habitats, barriers will be used where local site conditions and hydrological connectivity make their installation practicable. Where wetland works are undertaken in stages, exclusion barriers may be used to isolate individual work areas from adjoining wetted habitat, allowing fish recovery and works to progress progressively through the wetland while reducing the potential for fish to move back into cleared areas.

The exclusion screens will be constructed from steel warratahs and shade cloth. The shade cloth allows water to continue to flow downstream while preventing fish infiltration into the works area. The exclusion screen will extend 1 m past the wetted widths of the aquatic habitat and will be embedded into the dry ground or the banks (Figure 6).

Warratahs will be securely hammered into the ground and evenly spaced across the aquatic habitat to effectively support the shade cloth. Where extra support is considered necessary, wire will be threaded horizontally across through the warratahs to further support the shade cloth. Shade cloth will then be fastened to the warratahs and wire supports (where applicable) using zip ties. The shade cloth will extend above the water level to an approximate height of 0.5 m. Along the stream bed the shade cloth will either be embedded and pinned, or an apron of the shade cloth will be formed and pinned, with no gaps that would allow for fish passage. These exclusion screens will be checked for integrity by the supervising freshwater ecologist.

Ongoing maintenance of the exclusion barriers is the responsibility of the contractor, and the fish recovery may be repeated in case of their failure if deemed necessary by the Project Ecologist.



Figure 6: Example photographs of fish exclusion screens.

4.3 Fauna capture methodology

The fish and fauna recovery process will be conducted and supervised by a suitably qualified freshwater ecologist, as described in Section 4.6.

Native fish and kōura capture methodology will be dependent on the specific characteristics of the impacted area. Where site conditions are deemed suitable, a combination of electric fishing and netting/trapping will be utilised within the aquatic habitat to reduce the number of fish present within the area of works before proceeding with the final stages of dewatering and excavation.

The relevant methodologies within the *New Zealand Freshwater Fish Sampling Protocols* (Joy *et al.* 2013) will be followed unless otherwise specified within this plan. Setting of Gee-minnow traps will also be in general accordance with *A Revised Methodology to Survey and Monitor New Zealand Mudfish Species* (Ling *et al.* 2013).

4.3.1 Electric fishing

Provided water levels and stream conditions are suitable (i.e. clear water; no thick layer of mud and/or macrophytes; sufficient flow) a minimum of two electric fishing runs will be carried out over the fishing period. Electric fishing will generally not be undertaken within wetland habitats due to the shallow water, soft substrates and dense emergent vegetation characteristic of these areas, which are likely to reduce capture efficiency.

One electric fishing run will be undertaken prior to setting any traps or nets, and another following the last occasion of retrieving the traps or nets. Electric fishing shall be performed using an electric fishing machine (EFM 300), alongside a hand net. When used correctly, the EFM 300 temporarily stuns the fish, allowing them to be caught without damage.

If the conditions are deemed unsuitable for electric fishing, hand-netting will be undertaken before and after netting/trapping efforts by a suitably qualified ecologist. Visual and tactile searches will be undertaken, and the hand nets utilised to perform a sweeping search, with a particular focus on fish habitat (undercut banks, pools, overhanging vegetation).

4.3.2 Netting/trapping

Where depth is sufficient, baited Gee's minnow traps (GMTs) and fyke nets will be placed at intervals over the works areas and left in place overnight. Due to the potential presence of brown mudfish, the traps will include some unbaited GMTs preferentially positioned within shallow water and adjacent to suitable cover such as emergent vegetation, woody debris or other refuge habitat (Ling et al., 2013).

Fine meshed fykes with a separator grill will be used. All nets and traps will be set with an airspace to provide trapped fish access to atmospheric oxygen and will be set in general accordance with the *New Zealand Freshwater Fish Sampling Protocols* (Joy *et al.* 2013), with small buoys placed in the fyke nets if required. Where practical, trap densities will be set with one fyke net and two GMTs per 5 m^2 of suitable aquatic habitat. The traps will be checked the following morning, prior to 9 am, with any captured fish recovered.

As a minimum performance for trapping, if more than ten native fish are caught during a single trapping effort within the works area, then trapping will continue until numbers are depleted to the satisfaction of the project ecologist (using an 80% removal rate as a target, based on the Hayne's (1949) regression method).

If any "Threatened" or "At Risk" fish species are captured, the trapping effort will continue until a 100% removal rate is achieved. A single trapping effort is considered to be one night of trapping.

4.3.3 Dewatering and excavation

Dewatering will commence once the minimum performance standards have been met. The pumps utilised during this phase are required to have a 3 mm mesh screen around the water intake to prevent fish from entering the pump. To prevent any remaining fish from being entrained to the pump head, this screened intake should then be placed inside a submerged bucket.

Ecologists will be on-site with hand nets to recover fish once the water levels are sufficiently low in the dewatered channel. Visual and tactile searches will be undertaken, and hand nets utilised to perform a sweeping search, with a particular focus on fish habitat (undercut banks, pools, overhanging vegetation).

Once dewatering is completed, an excavator will be used to carefully scrape out the top layer of sediment. The top layer of surface sediment removed from aquatic habitat will be hand checked by the freshwater ecologist, with native fish, such as eels (*Anguilla* spp.), known to burrow into silt substrates when they are disturbed or as water levels decrease. The excavator should be fitted with a toothed bucket (e.g., a hard pan bucket or rock bucket) for these works.

4.3.1 Kākahi

Whilst kākahi have not been recorded within the catchment, including through physical searches or eDNA, they have been conservatively considered within the NFFSRP. Kākahi may be present within the soft substrates of the reclamation areas and shall be salvaged by hand searching soft sediments, within

either wadeable or dewatered freshwater habitats. A benthic viewer may be used to assist the searches or within deeper waters. These hand searches should target recognised kākahi habitats such as soft sediments under logs, undercut banks and the edges of large pools.

4.4 Fish handling and relocation

Fish handling will be in accordance with Section 3.9 of the New Zealand Freshwater Fish Sampling Protocols (Joy et al. 2013) and the Bioresearches MPI Special Permit 872 (refer to Appendix II).

All native fish captured will be handled with wet hands or soft, wetted nets, with handling time minimised as far as practicable. Fish will be relocated within two hours of capture to the suitable release habitat. Following capture, fish will be transferred into lidded containers of an appropriate volume for the number of fish caught and kept cool. Battery powered oxygen bubblers will be placed within each of the transfer bins to provide high dissolved oxygen into the water. To reduce further stress, a water conditioner (such as API Stress Coat) will be added at a concentration of 2.5 mL per 19 L of water, or per the manufacturer's instructions.

Whilst contained, fish will be monitored and water will be changed every hour. If any individual captured fish shows signs of stress (loss of righting response, exuding excessive mucus, gulping air, and or mouth gaping) the water will be changed to provide more oxygen, or the fish will be moved to the relocation site immediately.

Large eels (> 500 mm) will be contained individually to avoid injury to other smaller captured fish. Small fish such as bullies and kōkopu will be transported in separate containers. Kōura, if present, will also be separated into their own containers. If brown mudfish are captured, they will be relocated to suitable brown mudfish habitat identified by the Project Ecologist in collaboration with mana whenua.

Kākahi will be transported within separate lidded buckets containing stream water with aeration bubblers, with kākahi crowded together at the bottom of the bucket. Kākahi will be hand-placed in suitable stream habitats (such as middy or sandy substrates) at the relocation site, anteriorly planted, approximately 25% off their length, into the substrate to allow kākahi to bury themselves (McEwan *et al.*, 2020).

If large numbers of fish are captured, they will be distributed across multiple release points within the catchment to avoid short term overstocking and predation risks. Small fish such as īnanga and bullies may be relocated to separate sections of streams to larger fish, as deemed appropriate by the lead ecologist, to prevent predation pressures.

4.4.1 Biosecurity and animal welfare

All equipment will be thoroughly cleaned and dried prior to their use. Equipment includes, but is not limited to, electric fishing machine, waders, fyke nets, gee minnow traps and transfer buckets.

Fish will be visually examined for general health (visual skin lesions or heavy fungal burdens) and if considered unhealthy by an appropriately qualified freshwater ecologist, they will be humanely

euthanised in accordance with Section 29 of the MPI Special Permit (872), by submerging fish within a high dosage of clove oil followed by blunt force trauma.

Any pest fish caught will be humanely euthanised and all euthanised pest fish will be disposed of in a bio secure manner to land, in accordance with MPI Special Permit 872

4.5 Project Management

4.5.1 Adaptive Management

Due to the high level of intrinsic variability in any fish recovery and relocation, this plan may be slightly modified by an appropriately qualified freshwater ecologist to ensure fish are recovered in a safe and professional manner, as well as in accordance with the New Zealand Freshwater Fish Sampling Protocols (Joy et al., 2013).

4.5.2 Reporting

Following the relocation, a short report will be prepared detailing the fish captured (species and number of fish) during the recovery, their status (i.e. recovered, accidentally injured or killed) as well as details on the relocation site. Greater Wellington Regional Council (GWRC) shall be provided with a copy of the report within five days of completion of dewatering.

Fish records will also be sent to NIWA to be included in the New Zealand Freshwater Fish Database.

4.5.3 Incidental Discovery of Fish

If native fish are incidentally encountered during works whereby no ecologist is present, an ecologist is to be immediately contacted and works within the aquatic habitat are to cease. The ecologist will provide advice and attend site where required to supervise the recovery and relocation of any fish from the affected area if deemed appropriate. Recovery and relocation efforts may include a combination of electric fishing, netting/trapping, hand-netting, dewatering and excavation, with appropriate methodology determined by the ecologist based on the site conditions at the time.

Relocation sites will be within the same catchment, and within a waterbody containing habitat consistent with that of the capture site. The attending ecologist will notify the appropriate personnel when the incidental fish recovery is complete, and the works can recommence.

4.6 Personnel and Permits

Suitably qualified freshwater ecologists shall conduct the fish relocation. The ecologists listed have conducted multiple successful freshwater fish relocations and surveys and have extensive experience in freshwater fish handling and ecology. At least one of them will be present on site during the relocation and will be responsible for overseeing the implementation NFFSRP.
The freshwater ecologists will include at least one of:

- Treffery Barnett, M.Sc. (Hons), Senior Freshwater and Coastal Ecologist
- Christel du Preez, M.Sc. (Hons), Senior Freshwater Ecologist
- Laura Dooley, M.Sc. (Hons), Senior Aquatic Ecologist

- Emma Baker, M.Sc. (Hons), Freshwater Ecologist

To assist in the fish recovery, the field team may include the following ecologists:

- Michaela Scarrott, B.Sc., Ecologist
- Bella Burgess, B.Sc., Ecologist
- Liam Ireland, M.Sc., Ecologist
- Dr Jess Patino Perez, PhD, Ecologist
- Levi Murdoch-Tighe, M.Sc. (Hons), Ecologist
- Lucia Duder, PG.Dip.Sci., Ecologist

4.7 Roles and Responsibilities

The details pertaining to the roles and responsibilities are outlined below.

Consent holder:

- Providing the contractor with ecologist contact details.
- Informing of any site constraints or access requirements.
- Ensuring contractor understands the requirements of the fish management.
- Ensuring the NFFSRP is implemented, and the completion report is provided to council.

Contractor/foreman:

- Installation, maintenance and monitoring of the exclusion barriers. In the event fish barriers fail prior to the completion of streamworks, the main contractor must contact lead ecologist.
- Provision of pump screen.
- Pump installation, operation and maintenance.
- Communication of any constraints or limitations in undergoing works.
- Notification of any delays in implementing streamworks and therefore timing of the NFFSRP.

Ecologist:

- Implementation and overseeing of NFFSRP as per the requirements of this plan.
- Communication of any constraints or limitations in undergoing works.
- Confirmation of fish barrier suitability.
- Reporting of results.

4.8 Permits

Bioresearches hold a MPI Special Permit (SP872) that to allow persons or agencies to take aquatic life and relocate it to a suitable habitat where this is necessary or required to mitigate adverse effects of habitat modification on the aquatic life. This is provided in Appendix II.

Since the capture and relocation sites are not within a conservation area and the fact that any fish captured will be relocated within the same catchment, no other permits are considered necessary.

5 FRESHWATER RESTORATION PLAN

5.1 Overview

The development of 77-109 Kapiti Road and 1 Brett Amber Way will result in both stream modification, as well as the loss of wetland habitat. The development site offers significant opportunities for wetland restoration, both in terms of degree of uplift and extent of area, as well as opportunities to enhance the existing Wharemaukū Stream. The wetland restoration site is currently mostly pasture with some degraded wetland habitat (predominantly wetted pasture) and drains.

To offset the loss of 5.33 ha of wetland habitat, it is proposed to create 5.44 ha of new wetland habitat adjacent to the existing Wharemaukū Stream. The creation of wetland habitat will allow for significant biodiversity gains, including in plant diversity, provision of fauna habitat, and an increase in hydrological function throughout the Site. The wetland restoration site will be earth worked to create areas of varying depths, peat from the site will be relocated into the wetland, and the area will be planted with a range of wetland vegetation in varying zones, including:

1. **Obligate (OBL)** wetland plant zone – wet most of the time, with connectivity to the stream, and inundation frequent.
2. **Facultative wetland (FACW)** vegetation zone – damp most of the time, inundation common in high rainfall events, usual storm events. Some areas would be associated with the stream (marshes), and some would be separate forming in shallow depressions (swamps).
3. **Facultative vegetation (FAC)** wetland zone – damp periodically, inundation from the stream only occasionally in a year or two, and then usually only short term. Flood zone rather than usually storm flow zone. Plus, additional zones associated with lower points in the landform, and providing a transition zone between Zone 2 vegetation and terrestrial vegetation.

The existing Wharemaukū Stream adjacent to the proposed offset wetland will be subject to enhancements and a subsequent uplift in ecological value. Enhancements include riparian planting, as well as in-stream modifications such as boulders, creating of pools and riffles, and other mechanisms to provide hydrological variation and increase fauna habitat. The in-stream modifications, combined with the riparian margin planting and wetland planting, will provide quality ecosystem services (shading, temperature control, filtration, macroinvertebrate habitat). The enhancement of the degraded aquatic habitats will provide for a positive aquatic ecological benefit, habitat creation, biodiversity gains, and create connectivity between the aquatic habitats.

5.1.1 Staging Approach

A multistage approach is required to fully create, restore and enhance the vegetation within the proposed compensation wetland and the riparian areas. Enrichment species require more protection from the elements and are best planted 3-5 years after pioneer planting. The multistage approach is outlined below:

Stage 1: **A. Construction**	Completion of any works required on channels or levels within the wetland for restoration, including the addition of the peat.

B. Weed management	Although all weeds should be eradicated with the earthworks, maintain the weed control and manage all weeds present and dispose at a transfer station.
C. Animal pest control	Begin baiting and trapping programmes to reduce animal pest indices.
Stage 2: Planting Programme	Prepare enhancement area and plant pioneer species according to the planting schedule.
Stage 3: Ongoing Maintenance	Replace any unsuccessful plantings and release seedlings from any persistent invasives or new incursions. Assess which plantings have been successful and consider alternatives where unsuccessful. Weed maintenance should continue for a minimum of five years. Enrichment species should be planted after 3-5 years.

5.2 Site Preparation: Habitat Creation

5.2.1 Wetland Creation

The wetland offset area will be located in the generally flat, low lying land adjacent to the restored Wharemaukū Steam and will form part of the river floodplain, as well as low-lying seepage areas.

Prior to planting, the wetland offset site will be earth worked to create contours allowing the designation of differing wetland zones. As such, the site will be relatively pest plant free prior to planting.

The wetland will provide a link to the existing Wharemaukū Stream channel. Linking the stream and the wetland throughout the low-lying area restoration area (**Error! Reference source not found.**) will ensure that the hydrology of the wetland is sustained, and the transition between constantly wetted areas, usually wetted areas, occasionally wetted areas and rarely wetted areas is changing with the seasons and weather events as is currently occurring on the site.

5.2.2 Stream Channel Enhancements

This Plan proposes to enhance the existing Wharemaukū Stream channel in its current position. At present, the channel is straightened, averages 2.5 m wide on the south-eastern boundary, and up to 3 m wide on the southern boundary. The depth is variable, ranging from uniform shallow gravels beds 0.15 m deep to deeper areas (0.4 m) adjacent to the bank. The substrate within the stream was comprised of small gravels and silt. Hydraulic heterogeneity was low near the site, with the reach consisting of a slow run for almost all of its extent, with one small riffle section observed where gravels were nearly blocking the stream channel. Shading was very low, with the riparian margins consisting almost entirely of managed grass and sections of gorse and other pest plants.

Fish and macroinvertebrate habitat was limited to overhanging long grass and macrophytes. The latter were present as both emergent macrophytes in dense swards on the banks of the stream, and as submerged macrophytes within the channel. Species included the invasive pest plant oxygen weed (*Lagarosiphon major*), water celery (*Helosciadium nodiflorum*), parrots feather (*Myriophyllum aquaticum*), pond weed (*Potamogeton* sp.), starwort (*Callitriche stagnalis*) and watercress (*Nasturtium* sp.).

Additional biodiversity gains will be achieved through enhancing the existing stream channel. Proposed enhancements include:

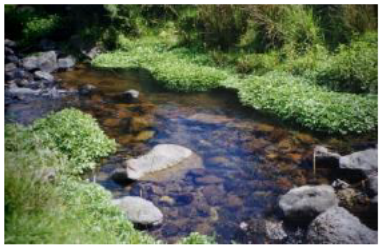
- Boulders to create variability in the hydrology and habitat;
- Slight widening of the channel to create shallow cobble to create habitat for macroinvertebrate and for fish spawning;
- Root wads or large wood for habitat creation;
- Shallow pools to create variation in depths and hydrology;
- Patches of trees and shrubs with strong fibrous roots planted very close to the water's edge, increasing connection between the stream and the land, and resulting in in-stream roots and protected bank habitat for fish and macroinvertebrates.

Most of the enhancements will be concentrated on the true right bank, adjacent to the new wetland, but with clear patches of enhancements on the true left bank, that can be worked around when channel maintenance by Kapiti Coast District Council is required. The flood maintenance requirement should include provision for ensuring an uneven profile is left in the stream channel, with emphasis on leaving small pools and riffles prior to departure.

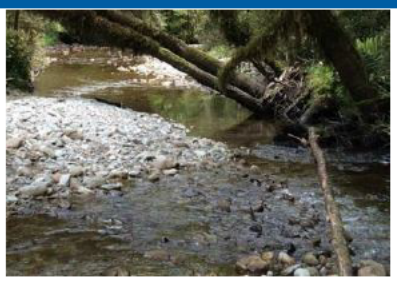
Figure 7 below indicates the approximate locations of the various stream enhancement and restoration measures. However, the precise selection, combination and positioning of measures from the 'toolbox' is best determined on site at the time the naturalisation works are undertaken, having regard to the channel conditions, substrate, flow characteristics and habitat opportunities encountered at that time. This approach provides for the detailed naturalisation response to be tailored to the stream rather than prescribing a fixed engineered solution in advance. Mana whenua representatives must be invited to have significant involvement in this on-site process, alongside the project ecologist and contractor, including in determining the appropriate selection and placement of toolbox measures and opportunities to reflect mātauranga Māori and mana whenua values in the restoration of the stream.

The following images demonstrate the use of in-stream enhancements within the Wharemaukū Stream channel.

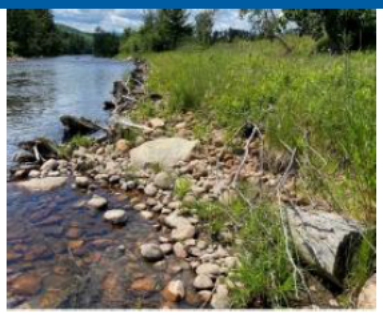
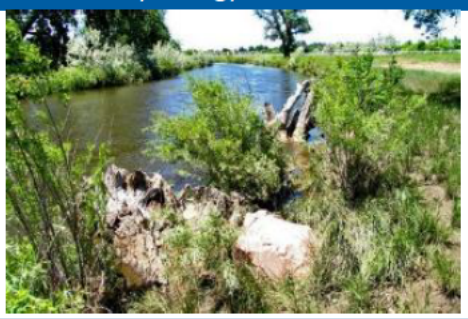
Boulders on the edge of the stream near the banks, creating eddies and pools. Positioned near the banks to allow for stream maintenance.



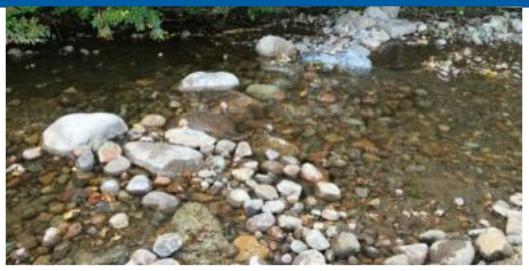

Shallow areas near the bank suitable for bully spawning habitat & macroinvertebrates




Root wads provide habitat and variation in hydrology

Shallow pools form in around boulders and root wads, and after stream maintenance (also refer to photos above)



Riparian planting with root mats - providing filtration and habitat



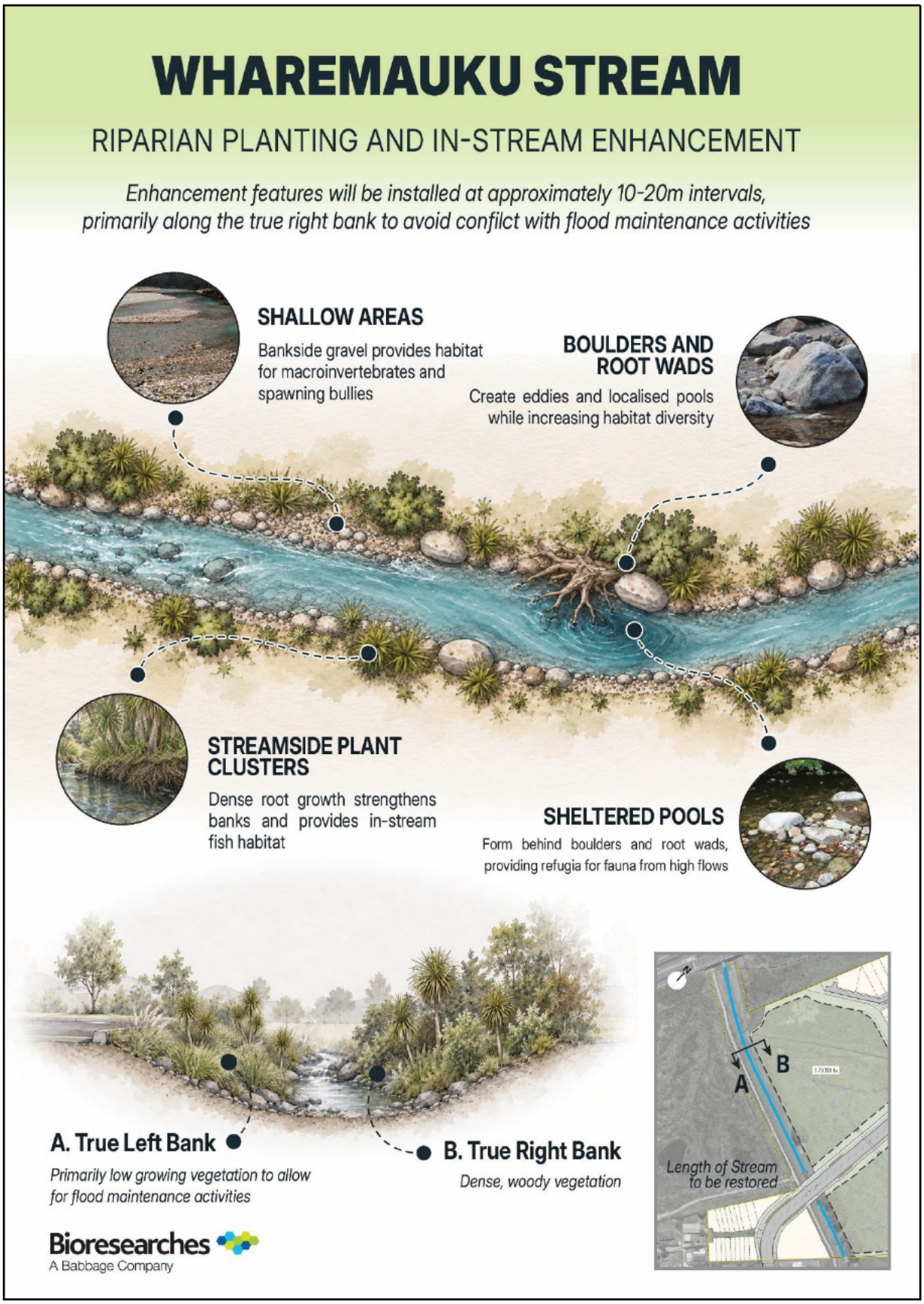


Figure 7: Diagram showing in-stream enhancements along the Wharemaukū Stream

5.3 Site Preparation - Pest Plant Management

Weed removal is necessary before any planting can begin. Plant weeds (pest plants) can smother the existing indigenous flora and inhibit growth of any new plantings. Some weed species will need continued maintenance as their seeds or rhizomes can persist in the ground.

Weed removal success is improved when carried out in the warmer months (October to March) and should be completed in the summer prior to planting activities commencing.

5.3.1 Plant Species On-Site

Several exotic species have been identified on-site within the Assessment of Ecological Effects (Bioresearches, 2026a). Not all of the exotic species identified on-site at present will require complete control, as they are likely to be shaded out once planting establishes.

The wetland will be earth-worked and as such, is expected to be clear of pest plants prior to planting. The riparian margins were generally grassed, but contained section of gorse (*Ulex europaeus*) and blackberry (*Rubus fruticosus*). The stream channel contained exotic hydrophytes which will require varying degrees of control. Non pest plant species may be removed by hand where stream flow is hindered. Pest plant species such as oxygen weed (*Lagarosiphon major*) must be completely removed with care, as this species can regrow from fragments.

The table below therefore provides a list of exotic species identified on-site at present, and control methods recommended.

Table 6: List of exotic species identified on-site and their recommended control methods

Latin Name	Common Name	Control Method
Lolium perenne	ryegrass	Hand clear around base of new plantings
Trifolium repens	white clover	Hand clear around base of new plantings
Rumex sp.	dock	Hand clear around base of new plantings
Achillea millefolium	yarrow	Hand clear around base of new plantings
Dactylis glomerata	cocksfoot	Hand clear around base of new plantings
Rubus fruticosus	blackberry	• Dig out small patches and dispose at transfer station. • Cut and paint stumps with glyphosate (200ml/L). • Foliar spray with glyphosate (20ml/L) + penetrant or triclopyr (6ml/L) + penetrant.
Ulex europaeus	gorse	• Cut stumps and paste with metsulfuron-methyl (10g/L). • Foliar spray with glyphosate (20ml/L) + penetrant or metsulfuron-methyl (0.5g/L) + penetrant or triclopyr (6ml/L) + penetrant.
Phytolacca octandra	inkweed	• Hand pull small seedlings • Cut and paste stumps immediately with glyphosate gel
Cenchrus clandestinus	Kikuyu	Spray with glyphosate 200 mL /10 L during extended dry periods and with a minimum 3 m distance from water bodies.
Paraserianthes lopthana	brush wattle	• Hand pull small seedlings • Cut and paste stumps immediately with metsulfuron gel
Helosciadium nodiflorum	water celery	Hand removal where choking waterways

Lagarosiphon major	oxygen weed	Hand removal from waterways. Ensure removal of all fragments as can spread from broken pieces
Myriophyllum aquaticum	parrots feather	Hand removal where choking waterways
Potamogeton sp.	pond weed	Hand removal where choking waterways
Callitriche stagnalis	starwort	Hand removal where choking waterways
Nasturtium sp.	watercress	Hand removal where choking waterways
Paspalum distichum	mercer grass	Hand clear around base of new plantings
Agrostis stolonifera	creeping bent	Hand clear around base of new plantings
Salix spp.*	willow	• Hand pull small plants or dig out. Dispose of all parts (can regrow from broken fragments). • Foliar spray seedlings with glyphosate (150ml/10L) + penetrant. • Drill and fill with glyphosate (500ml/10L) + penetrant.

*Not identified on-site but with potential to occur in wetlands and riparian margins

5.3.2 Timing of Pest Plant Management

A sample schedule of the pest plant control required at the revegetation area is presented in Table 7. Pest plant control should occur for a minimum period of 5 years and will include manually removing pest plant species should they re-establish.

As pest plant eradication success is improved when carried out in the warmer months; November-February, the initial pest plant control should be implemented over this period. Pest plant management should then follow the plant maintenance frequency.

Table 7. Pest Plant management schedule

Tasks - Year 1	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	Jun
Site preparation - initial pest plant control												
Planting												
Tasks - Year 2	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**Jun**
Planting												
Plant monitoring and maintenance												
Infill Planting (if required)												
Tasks - Year 3-4	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**Jun**
Infill Planting (if required)												
Plant monitoring and maintenance												
Tasks - Year 5	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**Jun**
Plant monitoring and maintenance												

5.3.3 Herbicide use

Manual pest plant control is recommended in the first instance (as described in the above section), however where this is not possible, targeted herbicide can be applied to individual plants. Where planting into long grass is required, small 'spots' of spraying to kill off circles of grass may be appropriate in some areas, although hand-releasing is preferred. Important key notes for use of herbicide are as follows:

Always follow the manufacturer's instructions carefully and use the recommended safety precautions to protect the user and water health. The user should be suitably qualified in applying chemicals, such as holding a GrowSafe certificate.

Maintaining up-to-date records of agrichemical usage is a legal requirement for the management of agrichemicals as set under the Hazardous Substances and New Organisms (HSNO) Act and specified in the New Zealand Standard for Management of Agrichemicals (NZS 8409:2021). Risks associated with the use of agrichemicals are required to be managed as indicated on the Safety Data Sheet and product label so that adverse environmental effects are avoided.

A diary should be kept of all weed control, planting, and pest control work carried out.

5.1 Planting Procedure – Planting Zones, Lists and Methodologies

5.1.1 Planting Composition

The lower-lying portions of the site, prior to anthropogenic vegetation clearance, would have been vegetated with kahikatea, pukatea forest (WF8). These forests are generally dominated by kahikatea, with pukatea, swamp maire, rimu, tawa, kiekie and supplejack also present (Singers & Rogers, 2014). Fens were likely present in the wetter areas with lower nutrient inputs, which would have been vegetated with mānuka associations (Boffa Miskell, 2022); grading into wetland carr[1] type habitats including toe toe, flax and cabbage trees, particularly in wetter areas or near open water (Ravine, 1992).

The following plant lists have been selected based on review of the Kapiti Whituna Swamp and Marsh Type Wetland planting lists (see **Error! Reference source not found.** Appendix III and **Error! Reference source not found.** Appendix IV). In addition, the Kāpiti District Endemic Flora Species List (Ward, 2024) has also been utilised.

A map showing the overall planting zones, which correspond to the planting tables, can be found in Figure 8.

[1] 'carr' is a term used to describe wetlans which contain woody vegetation, and most often occur as a mid-successional stage between a herbaceous-dominated wetland and wetland forest.

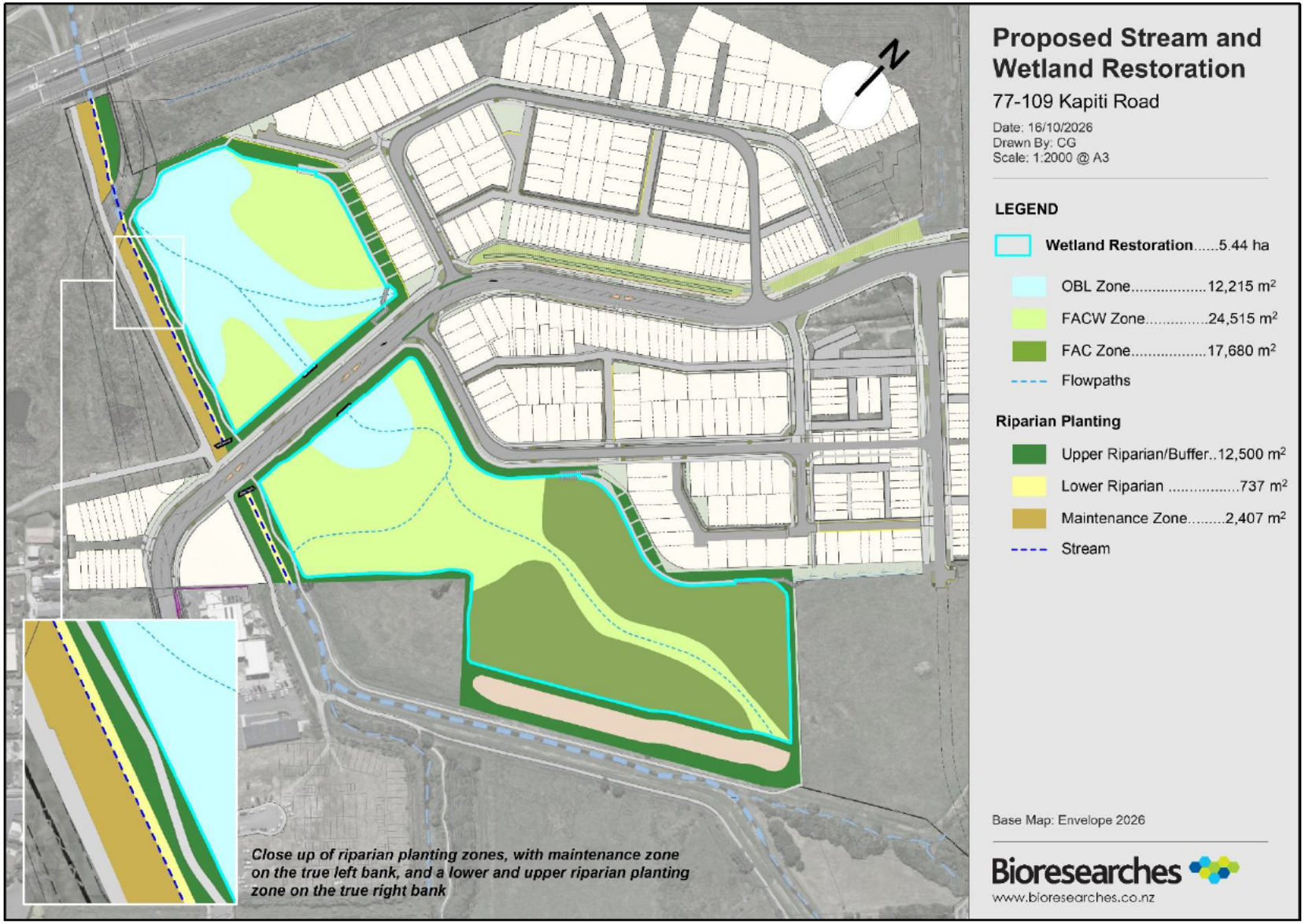


Figure 8: Map showing location of wetland and stream restoration planting

5.1.1.1 Stream/Riparian Plant Lists

Upper and Lower Riparian Planting

The streamside planting has generally been sectioned into a lower riparian, and upper riparian planting zone. The lower riparian planting is a narrow zone (generally 1-2m from the stream edge) that contains plant species with fibrous root systems that aid in providing bank stability as well as fish habitat (such as *Carex* spp. and *Cordyline australis*). Planting should be clustered in groups of species types close to the waters edge (particularly cabbage trees and *Carex* spp.) to create clumps of root systems within the waterway.

The upper riparian/buffer planting contains a terrestrial planting mix that will provide a high degree of shading to both the stream and sections of the created wetland. In general, the upper riparian/buffer planting has both a pioneer and enrichment planting mix.

True Left and True Right Banks

The stream planting also varies between the true left (southern) bank and the true right bank (Figure 9). Much of the northern section of the true left bank will be subject to flood management and as such, requires planting to have a high degree of disturbance-tolerant and responsive native species. This zone does not have a specific enrichment planting list, but rather will require infill where die-off is observed and adaptive management to ensure sufficient coverage is achieved. Clustering of species such as cabbage tree and *Carex* spp. at the water's edge is still required to create in-stream habitat. In addition, taller species (kahikatea, cabbage tree, mānuka, mingimingi) should be clustered together in groups spaced apart, to create gaps for maintenance activities while retaining areas of shading (Figure 10).

The true right bank contains a large proportion of woody species that are less disturbance tolerant but provide a higher degree of shading and other benefits that can be achieved with higher diversity.

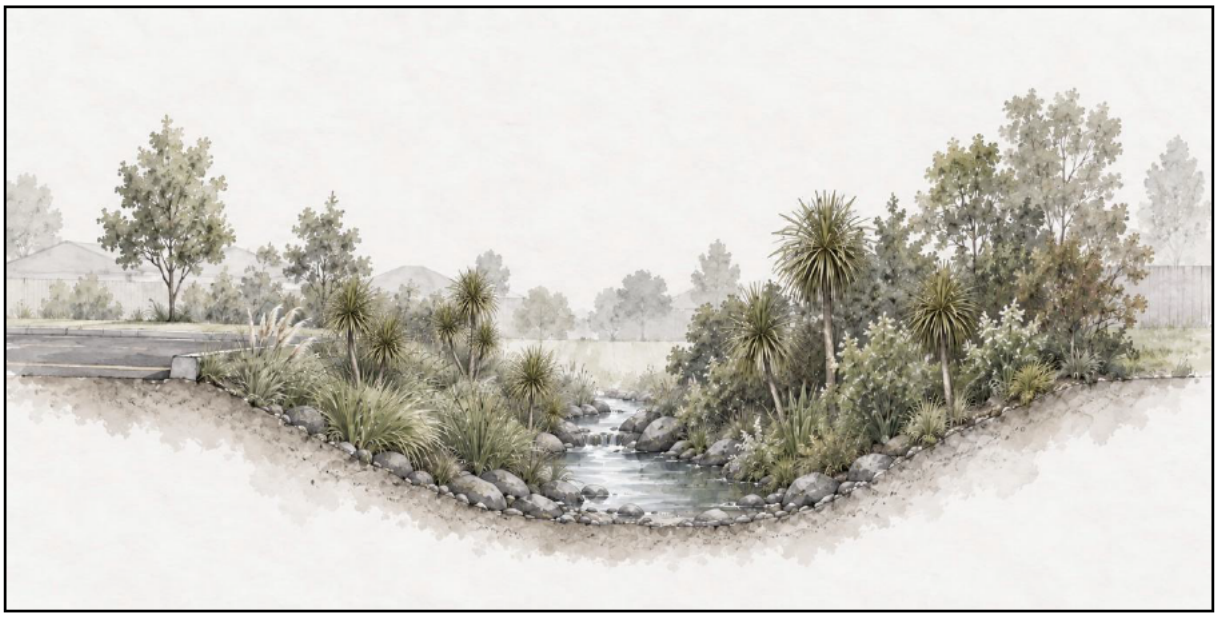


Figure 9: Diagram showing softer planting on true left bank adjacent to roadside to allow for flood maintenance; and denser, woodier planting on the true right bank where flood maintenance access is not required



Figure 10: Along the True Left Bank, clusters of taller planting occur at approximately 45% density between areas of lower growing grasses to allow for flood maintenance activities.

Table 8: Maintenance Zone Riparian Planting

Zone	Botanical name	Common name	Container size	Spacing (m)	Composition (%)	# Plants	# plants + 10%
Maintenance Zone 2,407 m²	*Austroderia fulvida*	toetoe	PB2	1	15	361	397
	Carex dissita	forest sedge	Root trainer	0.75	13	556	612
	*Carex secta**	pūrei	Root trainer	0.75	11	471	518
	*Carex virgata**	swamp sedge	Root trainer	0.75	11	471	518
	*Coprosma propinqua***	mingimingi	PB2	1	15	361	397
	*Cordyline australis***	tī kōuka / cabbage tree	PB2	1	15	361	397
	*Dacrycarpus dacrydioides***	kahikatea	PB2	1	15	362	398
	Parablechnum novae-zelandiae	kiokio	Root trainer	0.5	5	481	530
				Total:	**100**	**2581**	**2839**

*Must be planted closest to stream edge

**Plant in clusters spaced apart to provide gaps between taller vegetation (to allow for maintenance). Clusters of *Cordyline australis* can be planted adjacent to stream edge to provide in-stream habitat

Table 9: General Riparian Planting – Pioneer (continued over page)

Zone	Botanical name	Common name	Container size	Spacing (m)	Composition (%)	# Plants	# plants + 10%
Lower Riparian (1-2m) 737 m²	*Austroderia fulvida*	toetoe	PB2	1	5	37	41
	*Carex secta**	pūrei	Root trainer	0.75	12	157	173
	*Carex virgata**	swamp sedge	Root trainer	0.75	12	157	173
	Coprosma propinqua	mingimingi	PB2	1	10	74	81
	Coprosma tenuicaulis	swamp coprosma	PB2	1	7	52	57
	*Cordyline australis**	tī kōuka / cabbage tree	PB2	1	13	96	105
	*Dacrycarpus dacrydioides**	kahikatea	PB2	1	10	74	81
	Laurelia novae-zelandiae	pukatea	PB2	1	5	37	41

	Leptospermum scoparium	mānuka	PB2	1	12	88	97
	Melicytus micranthus	swamp māhoe	PB2	1	7	52	57
	Parablechnum novae-zelandiae	kiokio	Root trainer	0.5	7	206	227
				Total:	**100**	**823**	**905**
Upper Riparian/Buffer 12,500 m²	*Alectryon excelsus*	tītoki	PB2	1.4	5	319	351
	Aristotelia serrata	makomako/wineberry	PB2	1.4	10	638	702
	Coprosma repens	taupata	PB2	1.4	10	638	702
	Dacrycarpus dacrydioides	kahikatea	PB2	1.4	7	446	491
	Hoheria angustifolia	narrow-leaved houhere	PB2	1.4	10	638	702
	Kunzea robusta	kānuka	PB2	1.4	7	446	491
	Leptospermum scoparium	mānuka	PB2	1.4	10	638	702
	Melicytus ramiflorus	māhoe	PB2	1.4	10	638	702
	Myrsine australis	māpou	PB2	1.4	7	446	491
	Pennantia corymbosa	kaikōmako	PB2	1.4	5	319	351
	Pittosporum eugenioides	tarata	PB2	1.4	7	446	491
	Pittosporum tenuifolium	kōhūhū	PB2	1.4	7	446	491
	Sophora microphylla	kōwhai	PB2	1.4	5	319	351
				Total:	**100**	**6378**	**7015**

*Plant in clusters of same species along stream edge to provide in-stream habitat

Table 10: General Riparian Planting – Enrichment (continued over page)

Zone	Botanical name	Common name	Container size	Spacing (m)	Composition (%)	# Plants	# plants + 10%
Lower Riparian (1-2m) 737 m²	*Carpodetus serratus*	putaputawētā	PB2	2	15	28	30
	Coprosma rhamnoides	twiggy coprosma	PB2	2	13	24	26
	Piper excelsum var. excelsum	kawakawa	PB2	2	12	22	24

	Plagianthus regius subsp. regius	mānatu, Lowland ribbonwood	PB2	2	7	13	14
	Rhopalostylis sapida	nīkau	PB2	2	5	9	10
	Schefflera digitata	patē	PB2	2	13	24	26
				Total:	**65**	**120**	**132**
Upper Riparian/Buffer 12,500 m²	*Brachyglottis repanda*	rangiora	PB2	2	7	219	241
	Carpodetus serratus	putaputawētā	PB2	2	5	156	172
	Coprosma rhamnoides	twiggy coprosma	PB2	2	7	219	241
	Elaeocarpus hookerianus	pōkaka	PB2	2	7	219	241
	Olearia virgata	twiggy tree daisy	PB2	2	7	219	241
	Piper excelsum var. excelsum	kawakawa	PB2	2	7	219	241
	Plagianthus regius	manatu	PB2	2	7	219	241
	pseudopanax arboreus	whauwhaupaku	PB2	2	7	219	241
	Rhopalostylis sapida	nīkau	PB2	2	4	125	138
	Schefflera digitata	patē	PB2	2	7	219	241
				Total:	**65**	**2031**	**2234**

5.1.1.2 Wetland Plant Lists

The lower wetland areas will initially be planted with the herbaceous wetland species (wetland grasses, rushes, sedges) achieving a very similar form and function to the current herbaceous wetlands. The proportion of woody species increases as water levels become lower, transitioning from flood-prone, sedgeland/grassland in the west, to cabbage tree carr/kahikatea, pukatea (WF8) forest at the eastern end of the Site.

Note that the mapped wetland zones are indicative only based on the current design contours. Following construction, it will be critical that the project ecologist is able to review the final layout and adjust planting zones where deemed appropriate to ensure the zones align with the likely hydrology of the final Site layout.

The plant lists have been ordered according to their Wetland Indicator Rating (Clarkson et *al.,* 2021). The facultative zones (FACW and FAC) contain a variety of plants with varying wetland indicator ratings. For example, several OBL species have been included within the FACW planting zone; these should be interspersed near the transition zones between the OBL and FACW planting.

The wetland plants are best planted in swathes of single plant species, to create a mosaic pattern that mimics natural wetland environments. Small sections of elevated stairs traverse outer corners of the wetland (~150 m^2). Low-growing planting will be prioritised underneath stairwells to reduce maintenance issues.

Table 11: Wetland plant lists (continued over page)

Zone	Botanical name	Common name	Wetland Plant Indicator Rating	Container size	Spacing (m)	Composition (%)	# Plants	# plants + 10%
OBL 12,215 m^2	*Carex secta*	pūrei	OBL	Root Trainer	0.75	20	4343	4777
	Eleocharis sphacelata	kuta, tall spike sedge	OBL	Root Trainer	0.75	20	4343	4777
	Isolepis prolifera	budding club-rush	OBL	Root Trainer	0.75	20	4343	4777
	Machaerina articulata	jointed twig rush	OBL	Root Trainer	0.75	20	4343	4777
	Schoenoplectus tabernaemontani	kuta, lake clubrush	OBL	Root Trainer	0.75	20	4343	4777
					Total:	**100**	**21716**	**23887**
FACW 24,515 m^2	*Astelia grandis*	swamp astelia	OBL	PB2	1.2	2	340	375
	Austroderia fulvida	toetoe	FAC	PB2	1.2	7	1192	1311
	Carex geminata	cutty grass, rautahi	FACW	PB2	1.2	10	1702	1873
	Carex virgata	swamp sedge	FACW	PB2	1.2	10	1702	1873
	Coprosma propinqua	mingimingi	FAC	PB2	1.2	7	1192	1311
	Coprosma tenuicaulis	swamp coprosma	FACW	PB2	1.2	5	851	936
	Cordyline australis	cabbage tree, tī kōuka	FAC	PB2	1.2	10	1702	1873
	Cyperus ustulatus	giant umbrella sedge, Upoko-tangata	FACW	PB2	1.2	10	1702	1873
	Dacrycarpus dacrydioides	kahikatea	FAC	PB2	1.2	10	1702	1873
	Isolepis prolifera	budding club-rush	OBL	PB2	1.2	5	851	936

	Juncus edgariae	wīwī	FACW	PB2	1.2	10	1702	1873
	Laurelia novae-zelandiae	pukatea	FAC	PB2	1.2	3	511	562
	Phormium tenax	harakeke, New Zealand flax	FACW	PB2	1.2	10	1702	1873
	Syzygium maire	swamp maire, maire tawake	OBL	PB2	1.2	1	170	187
					Total:	**100**	**14641**	**16105**
FAC 17,680 m^2	*Coprosma propinqua*	mingimingi	FAC	PB2	1.2	5	614	675
	Coprosma rotundifolia	round-leaved coprosma	FAC	PB2	1.2	5	614	675
	Cordyline australis	cabbage tree, tī kōuka	FAC	PB2	1.2	12	1473	1621
	Dacrycarpus dacrydioides	kahikatea, white pine	FAC	PB2	1.2	12	1473	1621
	Freycinetia banksii	kiekie	FACU	PB2	1.2	2	246	270
	Hoheria angustifolia	narrow-leaved houhere	FACU	PB2	1.2	5	614	675
	Laurelia novae-zelandiae	pukatea	FAC	PB2	1.2	10	368	405
	Leptospermum scoparium	mānuka	FAC	PB2	1.2	5	1228	1351
	Melicope simplex	poataniwha	Not Rated	PB2	1.2	5	614	675
	Melicytus micranthus	swamp māhoe	FAC	PB2	1.2	3	614	675
	Myrsine divaricata	weeping māpou	FAC	PB2	1.2	5	368	405
	Pennantia corymbosa	kaikōmako	Not Rated	PB2	1.2	10	614	675
	Phormium tenax	harakeke, New Zealand flax	FACW	PB2	1.2	10	1228	1351
	Plagianthus regius subsp. *regius*	mānatu, lowland ribbonwood	FACU	PB2	1.2	5	1228	1351
	Sophora microphylla	kōwhai	Not Rated	PB2	1.2	3	614	675
	Streblus heterophyllus	tūrepo, small-leaved milk tree	Not Rated	PB2	1.2	5	368	405
					Total:	**100**	**12278**	**13506**

5.1.2 Planting Procedure

Planting should be completed in April through to September for the riparian planting and FAC wetland plant zones; and April-June, or September-October for the OBL and FACW wetland planting zones. Avoiding the wettest winter weather for wetland planting ensures new plants do not drown. Avoiding the summer months and planting before Spring where possible for drier zones ensures roots have sufficient time to establish and survive periods of drought.

During planting, the following procedures should be followed to ensure maximum survival of plants and optimal growth and health:

1. Prior to planting, ensure all plants are thoroughly watered and have been allowed to drain out of direct sunlight.
2. Set the plants out on site according to the recommended spacing. Aim to follow a randomised planting layout rather than straight lines, to achieve a "natural" rather than uniform look. Plant species should be mixed to avoid large single-species groupings.
3. Dig a hole 1.5 – 2 times wider than the plants' root ball. Ensure the edges of the hole are roughened, especially in clay soil, to avoid a "pot effect" and the drowning of plants. Back-fill with a small amount of soil to cover the base.
4. Carefully remove the plant from its container or bag and place into the hole.
5. Back-fill the hole with part new soil and part existing soil. Break up clumps of existing soil with a shovel as much as possible. As you fill, avoid stomping firmly on the soil, as this may over-compact the ground and restrict root growth. Some moderate tapping with the shovel or by hand once planted is adequate.
6. Fill the planting hole until the top of the root ball sits exactly level with the soil level. If plants are higher than the surrounding soil then they are likely to dry out over summer and if they are in an indent water may pool around them and cause their roots to rot.

5.1.3 Plant Sourcing

All new plants must be eco-sourced from within the Foxton Ecological District. Eco-sourcing protects the genetic lineage of plants in the area, increases the likelihood of plant survival long-term and ensures plants are adapted to their specific regional climatic conditions.

5.2 Plant Maintenance

The maintenance plan of this report details the required plant aftercare, including replacement plants, plant disease management, and pest plant management. It includes activities which should be undertaken for a minimum of 5 years following planting, or until 90% canopy closure and a minimum survival density of 90% of the specified original density is met.
Plant maintenance will include:

- Manually removing weed species should they re-establish, with focus on releasing new plants from encroaching weeds.
- Fertilising and watering new plants if considered essential.

- Replacing any plants that do not survive.

Plant maintenance will include manually removing weed species should they re-establish, as well as replacing any plants that do not survive during the 5-year period. In the instance that planting targets are not being met (i.e., plants continue to fail despite replacement planting), a substitute species may be used subject to the approval of a consulting ecologist. Replacement plants should be at least of the same size (relative to surrounding plants). Replacement planting should only occur within the planting season (April to September), although again noting that planting is better undertaken up until August in Auckland due to increasingly drier Spring and Summer weather.

Where weeds are re-establishing, it should be ensured that removal includes hand-releasing the stems of new or existing native plants, particularly from kikuyu grass. A sample schedule of the plant maintenance and management activities required are below in Table 12.

Table 12: Sample plant maintenance schedule

Tasks - Year 1	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March	April	May	Jun
Site preparation - initial pest plant control												
Planting												
Tasks - Year 2	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**Jun**
Planting												
Plant monitoring and maintenance												
Infill Planting (if required)												
Tasks - Year 3-4	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**Jun**
Infill Planting (if required)												
Plant monitoring and maintenance												
Tasks - Year 5	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**March**	**April**	**May**	**Jun**
Plant monitoring and maintenance												

The below tables provide sample monitoring schedules for pest plant control, as well as planting. Plant monitoring requirements have been assigned to ensure measures of success are achieved within five years post-planting (i.e., 90% canopy closure and 90% survival of the original planting density.

Table 13: Sample pest plant monitoring schedule

Pest Plant Control Monitoring					
Date:		**Contractor:**			
Species	**Control Method**	**Notes**	**Herbicide Used**	**Application Rate**	**Quantity Used (concentrate)**

Table 14: Sample planting monitoring schedule

Planting Monitoring			
Date:	**Person Surveying:**		
Number of Failed Plants		**Failed Species (if identifiable)**	
Survival Estimate (0-100%)			
Average Plant Height (cm)			
Canopy Closure (0-100%)			
Notes			
Ensure photos taken			

5.3 Monitoring and Reporting

5.3.1 General Planting Reporting

A post-planting completion report is required to be submitted to Greater Wellington Regional Council no more than 12 months following planting. A final completion report shall be submitted within 12 months of the completion of the five-year maintenance period, or once the performance targets of 90% plant survival and 90% canopy cover have been achieved, whichever is first.

While not required throughout the five-year maintenance period, frequent assessment of the planting and liaising with the project ecologist is recommended, to ensure that plant failure is managed and canopy closure is achieved. Keeping records of the following information is required:

- Eco-sourcing
- Timing of planting
- Plant maintenance frequency
- Pest plant invasions, control methodology, follow up required, and location of major incursions
- Any replanting required, location or species types of major die-offs, and replanting undertaken

5.3.2 Wetland Compensation, Enhancement and Monitoring Plan

The wetland and riparian planting areas should be monitored annually for weed presence, with problem weeds controlled periodically. Wetland monitoring should be undertaken biennially (once every two years), in general accordance with the Wetland Condition Index (Clarkson *et al.*, 2003) or other suitable monitoring methodology to assess trends in wetland condition.

The monitoring methodology will include the implementation of permanent vegetation plots within the wetland. The calculations in the Wetland Condition Index will be utilised to derive a score for each plot, and also the wetland as a whole, which will enable trends in wetland condition to be tracked. It is recommended that the dominance test and prevalence index calculations (as per Clarkson, 2014) also be applied to the plot data, to also provide some indication of the frequency and degree of saturation of the plots and consequently the success of the wetland habitat creation.

6 MAMMALIAN PEST CONTROL

Mammalian pests such as rats, hedgehogs, mustelids, and possums are a significant threat to New Zealand forests. Rodents, mustelids (stoats, ferrets, and weasels) and possums prey upon eggs and fledglings of native birds and will predate upon native lizards of any life stage. Rodents increase browsing impact by eating seeds on the forest floor, inhibiting the next generation of plants from replacing those lost. Possums are prolific browsers and will selectively browse young saplings or new shoots, preventing the restoration of forests and ultimately threatening the ecosystem integrity.

6.1 Methods

Pest animal control methods would follow current industry best practice, and for the purpose of this Plan have been based on the guidelines outlined in Predator Free 2050 – A practical guide to trapping (Department of Conservation, 2023).

Pest management would be implemented for a duration of **five years** following planting. A suitably qualified contractor should be employed to undertake all pest animal management. Adaptive responses are encouraged as part of this Plan, as new traps, baits and methodologies are created over time that can improve pest management strategies.

As such, this Plan is not prescriptive in trap/bait station type; but rather gives suggestions that can be altered at the discretion of the contractor, **in co-ordination with** the project ecologist.

A map showing the location of proposed stations can be found in Figure 11.

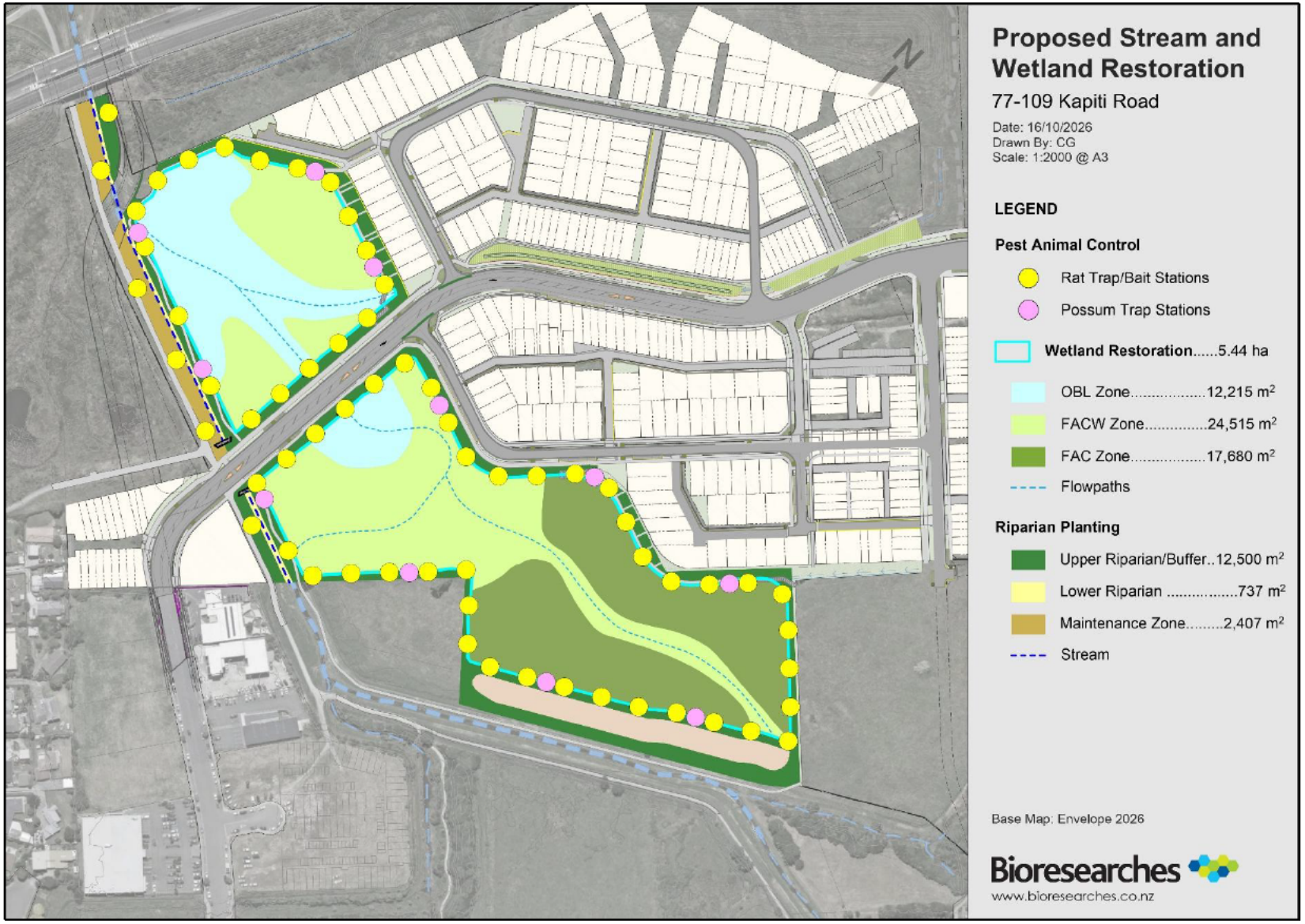


Figure 11: Map showing location of pest animal control network

6.1.1 Possum Trap Networks

Trap lines should be placed at 100m intervals, with traps placed at 100m spacing along each line. The size of the project means that traps are generally spaced at 100m intervals around the circumference of the wetland and along the stream edge. Traps are not to be placed within the wetland.

Suitable traps include the Trapinator, or AT220s, which should be placed a minimum of 1.3m above ground and secured to either a tree, fence post or other secure structure. AT220s are a particularly useful trap as they are self-resetting, self-re-baiting, and have been shown to be a cost-effective option. They are approved for both possums and ship rats.



Figure 12: NZ AutoTraps AT220, suitable for possums and rats

6.1.2 Rat Trap and/or Bait Station Networks

Trap/bait lines should be placed at 100m intervals, and stations placed at 50m spacing along each line. Along perimeters, stations will be placed at 25m spacing.

Given the size and context of the restoration site (with the wetland at the centre of the site), traps and/or bait stations will be placed at 25m intervals around the circumference of the wetland, and at 50m intervals along the stream riparian planting. No stations will be placed within the wetland, as these will be prone to flooding and difficult to maintain.

Suitable traps include but are not limited to NZ Autotraps AT220s; DOC200s; and DOC250s. To increase the diversity and efficacy of the network, a combination of lockable bait stations, traps, and self-resetting traps should be used.

6.2 Timing

The pest management programme would be pulsed three times per year. Each pulse would consist of a 6-week period through September to October, January to February, and May to June.

Table 15: Pulsed control program for pest animal management

Time	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Three times per year	Pulse period												
	Self-setting instant kill	Check for carcasses				Check for carcasses				Check for carcasses			

During each pulse period, bait stations would be maintained with fresh cereal baits or paste, and checked weekly until bait take ceases. For self-resetting instant kill varieties, all traps would be checked bi-weekly during this same 6-week period to ensure proper functioning and clearance of any carcasses.

6.3 Record keeping

Accurate recording of results from the pest control programmes is important for providing information on the status of predator populations on the properties over time. Annual reports summarising the results of the pest control should be prepared and made available to the project ecologist for review. The pest control operator would be responsible for collecting data on trap catches, maintaining the pest control devices, and preparation of summary reports.

Software such as Trap.NZ are useful tools for collecting pest animal control programme records.

At a minimum, the following set of information should be collected:

Trapping Records:

- Location of the traps
- Number of kills (number of carcasses) for instant kill traps
- Number of triggers for self-resetting traps and carcasses where applicable
- Number of traps nights
- Lure/bait (i.e. apple) used

Baiting records:

- Placement of bait stations
- Bait type
- Timing of placement
- Quantity used during each re-baiting
- Quantity of bait take each check (i.e. percentage bait-take)

Appendix I provides a suggested pest animal monitoring record sheet.

6.4 Health and safety

When using toxin-based baits, always follow the manufacturers' instructions, and ensure the baits are stored in a dry safe area locked away from pets and children. If bait is consumed by a person, call the poison hotline (**0800 764 766**) immediately. If a pet consumes brodifacoum, take them to a vet immediately to receive Vitamin K1, an effective antidote to the anticoagulant.

7 COMPLETION REPORTS: SUMMARY

PLANTING AND PEST CONTROL

A post-planting completion report is required to be submitted to Greater Wellington Regional Council no more than 12 months following planting. A final completion report shall be submitted within 12 months of the completion of the five-year maintenance period, or once the performance targets of 90% plant survival and 90% canopy cover have been achieved, whichever is first.

While not required throughout the five-year maintenance period, frequent assessment of the planting and liaising with the project ecologist is recommended, to ensure that plant failure is managed and canopy closure is achieved.

The wetland and riparian planting areas should be monitored annually for weed presence, with problem weeds controlled periodically. Wetland monitoring should be undertaken biennially (once every two years), in general accordance with the Wetland Condition Index (Clarkson *et al.*, 2003) or other suitable monitoring methodology to assess trends in wetland condition.

Annual reports summarising the results of the pest animal control programme should be prepared and made available to the project ecologist for review.

FISH

Following the relocation, a short report will be prepared detailing the fish captured (species and number of fish) during the recovery, their status (i.e. recovered, accidentally injured or killed) as well as details on the relocation site. GWRC Council shall be provided with a copy of the report within five days of completion of dewatering. Fish records will also be sent to NIWA to be included in the New Zealand Freshwater Fish Database.

LIZARDS

Upon completion of the lizard salvage and relocation programme, all findings will be submitted as an ARDS card to DOC and post salvage completion report will be submitted to GWRC.

Post-release monitoring is a requirement of all DOC WAA's issued for the purpose of relocating protected wildlife. Thus, population monitoring is recommended where lizards are salvaged and relocated as part of the Project. The triggers and post-release monitoring provisions is discussed in Section 2.10.

The results of each monitoring session and any recommendations emerging from the results would be reported to GWRC and DOC. In addition, all records of lizards would be submitted to the DOC and GWRC for inclusion in their respective herpetofauna databases.

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9 APPENDICES

Appendix I. Bait take and trap catch recording template

The below are some suggestions of the basic info you should record each time a trap and / or station is checked.

Bait Take Record

Location					
Person					
Date		*Time*			
Bait name					
Safety issues identified					
		record bait in 1/4 blocks, eg 1 1/4, 1 1/2, etc			
Line #	Station ID #	Estimate how much bait is still in station? (blocks)	How much bait did you remove? (blocks)	How much bait did you put in? (whole blocks)	Other comments eg. birds seen/heard, lizards seen, slug/snail damage, bait station condition

Trap catch record

Location					
Person					
Date		*Time*			
Safety issues identified					
Line #	Trap ID #	Has the trap caught anything? (Y/N)	Species caught	How much bait did you put in? (whole blocks)	Other comments eg. Nothing caught but lure gone; notes of trap / station damage etc

Appendix II. NFT Permit

Fisheries New Zealand
Tini a Tangaroa

File Ref: NFT 422

Bioresearches Group Limited
PO Box 2027
AUCKLAND 1140

AUTHORISATION pursuant to section 26ZM(2)(a) of the *Conservation Act 1987* is given to:

Bioresearches Group Limited

Species to be transferred:	Any native freshwater aquatic life.
To capture/transfer from:	Any freshwater waterbody (as defined in the *Conservation Act 1987*) in New Zealand.
To release to:	Appropriate freshwater waterbodies in the same catchment[1] as the capture/transfer site.

This authorisation is valid from the date of signature to 8 August 2028, subject to the following conditions:

Inclusions and limitations

1. This generic authorisation is limited to projects/transfers for the purposes of;
    a) investigative research and monitoring of environmental effects;
    b) mitigating the environmental effects of habitat modification; and
    c) addressing the effects of structures impeding the passage of aquatic life.
2. This generic authorisation is limited to use for any project involving relocation of aquatic life where the aquatic life is caught using non-destructive methods and is transferred as soon as practicable within the same waterbody, catchment[1] or flood plain.

Capture and release sites

3. The capture and release sites must be as close as possible while ensuring the transferred aquatic life is removed from potential harm.
4. The release sites must be connected to and exchange water with, or be in the same waterbody, catchment[1] or flood plain as the capture site.
5. There must be no permanent barriers to the passage of aquatic life that would

[1] Catchments defined in the map series published by the Ministry for the Environment in 2010 from the New Zealand River Environment Classification (Snelder *et al.*, 2004).

preclude the target aquatic life from moving between the capture and release sites (this provision does not apply where the capture site does not continue to be a water body, e.g., reclamations).

6. The release site must have appropriate habitat for the aquatic life to be transferred to as determined by a suitably qualified ecologist.

Husbandry and fishing methods

7. All aquatic life must be released in appropriate numbers to ensure the best ecological outcomes for the release site. For instance, numbers must be such that they reduce the likelihood of predation of existing native populations at the release site, and that they are within the system's carrying capacity (e.g., there is adequate food supply).

8. The handling, holding, breeding, euthanasia and transport of aquatic life must meet the obligations set out in the *Animal Welfare Act 1999* and relevant provisions of codes of welfare including the code of welfare for transport. The aquatic life must have access to sufficient food and must not be overcrowded to the point that their welfare is compromised.

9. Non-destructive capture methods (e.g., netting, trapping or electric fishing) appropriate to the site and situation that minimise stress and harm to aquatic life must be used.

Biosecurity measures

10. The health of all fish must be visually assessed during capture to ensure no pest species or aquatic plants are transported with the fish.

11. Where necessary to mitigate stress on fish, water in transport tanks may be from the capture site. In which case, fish are to be removed from the transporter tanks using a dip net, placed into a holding tank at the release site and the water and fish inspected for any unwanted plant, zooplankton or other animal material alien to the receiving environment prior to release.

12. In all instances, water in holding containers prior to release of the fish must be from the receiving environment, town supply water (dechlorinated if necessary), bore water or collected rain water. The water must not be from a source potentially contaminated with plant, zooplankton or other animal material alien to the receiving environment and must be clear enough to easily view the fish.

13. Water and other material in the holding containers, transport vessels and observation tanks shall be disposed of through an approved wastewater system, or to land where there is no runoff to any waterbody, or be returned to the waterbody of the collection site.

14. Directly prior to release, fish to be transferred must be inspected for obvious signs of disease (e.g., lesions) whilst in holding tanks/containers. Fish that are affected by disease, obviously in stress, and unlikely to survive must be humanely

euthanised.

15. Notwithstanding the above conditions, the authorisation holder must notify the Ministry for Primary Industries (MPI) exotic pest and disease hotline 0800 80 99 66 (request an Aquatic Incursion Investigator) should significant mortality (i.e., more than 5%) or abnormally high numbers of distressed, diseased, or moribund fish occur. In that instance, the authorisation holder must retain and chill the affected fish for MPI investigation unless otherwise advised by MPI. The remaining fish and water must be retained and disposed of as instructed by MPI.

16. All appropriate measures must be taken to reduce the risk of transferring notifiable, unwanted or pest organisms[2] between capture and release sites including:

    a) where possible, releasing aquatic life downstream of the capture site;

    b) if releasing between water bodies or releasing upstream, taking additional measures to prevent the release of pest material at the release site;

    c) visually assessing the aquatic life during capture to ensure no pest species or aquatic plants are transported;

    d) humanely euthanising any aquatic life that is a recognised pest within the region in which the relocation is occurring;

    e) paying special attention to ensure didymo is not transferred to locations where it is currently not present (i.e., no relocation of aquatic life from a site known to have *didymo* to one known not to have didymo) and applying the Check, Clean, Dry protocol (available at https://www.mpi.govt.nz/travel-and-recreation/outdoor-activities/check-clean-dry/);

    f) To mitigate the possibility of plant, zooplankton or other animal material from a release site being transferred to other locations, all equipment used in the transport, holding and release of aquatic life should be treated, as outlined below, before being used again:

        i. all non-fibrous (metal and plastic) smooth surfaced equipment is to be thoroughly cleaned using freshwater (chlorinated town supply water, bore water or collected rain water);

        ii. any non-fibrous smooth surfaced equipment that can retain water such as under seals and hollows within handles, etc., must be dismantled in such a way that all surfaces can be thoroughly cleaned using freshwater (chlorinated town supply water, bore water or collected rain water);

[2] Unwanted means "Unwanted aquatic life" as defined in the *Fisheries Act 1996*. Pest organisms means those listed in the regional pest management strategy of the region the biota relocation is within, or those listed in the National Pest Plant Accord in the aquatic plant category.

iii. all other equipment must be:

- immersed for a minimum of 30 seconds, in a water bath heated to at least 50° C; or
- immersed in water, for a minimum of five minutes containing at least 35 g of sodium chloride per litre.

General conditions

17. The transfer and release of aquatic life must be conducted by a suitably qualified ecologist operating under a valid special permit for the purpose of relocating aquatic life (section 97(1)(c) of the *Fisheries Act 1996*).

18. The authority to take aquatic life under this authorisation does not preclude the authorisation holder from obtaining any other approvals for the taking, possession, transfer or retention of any aquatic life under any legislation or regulations administered by other authorities.

19. The permit holder must supply a brief annual report to Fisheries New Zealand giving the date, capture and release locations, reason for transfer, and estimated number of fish by species transferred, sent to specialpermits@mpi.govt.nz. This information can be aligned and included within the appropriate special permit annual report.

20. Fisheries New Zealand may at any time amend, add or revoke any conditions to this transfer authorisation, or revoke this transfer authorisation, by notice in writing (including email) to the authorisation holder.

In exercise of powers delegated to me pursuant to the *Public Service Act 2020*.

Monique Andrew
Director Verification and Operations
Dated at Wellington on 4 August 2023

9.1 Appendix III. Planting Lists: Kapiti Whaitua Swamp Type Wetland (Source: GWRC)

Kapiti Whaitua Swamp Type Wetland - Planting - Suitable Species list
Foxton Ecological district

Found in wetland 99-100% of the time	Plant in the wettest areas of the swamp	
Found in wetlands 60-99% of the time	Plant in the other areas of the swamp	
Found in wetlands 30-60% of the time	Plant on the dryer margins of the swamp	

Trees

Cordyline australis	Tī kōuka, cabbage tree	
Dacrycarpus dacrydioides	Kahikatea, white pine	
Hoheria angustifolia	Narrow-leaved lacebark	
Laurelia novae-zelandiae	Pukatea	
Syzygium maire	Swamp maire	

Shrubs

Coprosma pedicellata		
Coprosma propinqua	Mingimingi	
Coprosma propinqua var. propinqua	Mingimingi	
Coprosma rotundifolia		
Coprosma tenuicaulis	Hukihuki, swamp coprosma	
Coprosma X cunninghamii		
Leptospermum scoparium	Mānuka	
Plagianthus divaricatus (Plant only within 500m of the coast)	Mākaka, saltmarsh ribbonwood	

Ferns and fern allies

Azolla rubra	Kārearea	
Blechnum minus	Swamp kiokio	
Blechnum novae-zelandiae	Kiokio	
Gleichenia dicarpa	Tangle fern	
Gleichenia microphylla	Carrier tangle fern	
Histiopteris incisa	Water fern	
Hiya distans		

Grasses/Tussocks

Amphibromus fluitans	Swamp grass	
Astelia grandis	Swamp astelia	
Austroderia fulvida	Toetoe	
Austroderia toetoe		
Deschampsia cespitosa	Tufted hair grass	
Deyeuxia quadriseta		
Hierochloe redolens	Kāretu	
Isachne globosa	Swamp millet	
Lachnagrostis filiformis	Wind grass	
Phormium tenax	Harakeke, flax	
Typha orientalis	Raupō	

Rushes

Apodasmia similis	Oioi (Plant only within 500m of the coast)	
Juncus australis		
Juncus distegus		
Juncus edgariae		
Juncus kraussii subsp. *australiensis*	Sea rush (Plant only within 500m of the coast)	
Juncus pallidus		
Juncus pauciflorus		
Juncus planifolius		
Juncus prismatocarpus		
Juncus pusillus		
Juncus sarophorus		
Juncus usitatus		

Sedges

Bolboschoenus caldwellii	(Plant only within 300m of the coast)	
Carex coriacea	Rautahi	
Carex dipsacea		
Carex dissita		
Carex geminata		
Carex lambertiana		
Carex lessoniana		
Carex maorica		
Carex resectans		
Carex secta	Pūrei	
Carex sinclairii		
Carex solandri		
Carex virgata	Swamp sedge	
Cyperus ustulatus	Upokotangata, giant umbrella sedge	
Eleocharis acuta	Sharp spike-sedge	
Eleocharis gracilis	Slender spike-sedge	
Eleocharis sphacelata	Kuta Kuta	
Gahnia xanthocarpa	Kauri grass	
Isolepis basilaris		
Isolepis distigmatosa		
Isolepis inundata		
Isolepis prolifera		
Isolepis reticularis		
Machaerina arthrophylla		
Machaerina articulata	Jointed twig rish	
Machaerina juncea		
Machaerina rubiginosa		
Machaerina tenax		
Schoenoplectus pungens	Three-square(Plant only within 500m of the coast)	
Schoenoplectus tabernaemontani	Kuta, lake sedge	
Schoenus apogon		
Schoenus concinnus		
Schoenus maschalinus		
Schoenus nitens		

Climbers

Calystegia sepium subsp. roseata	Pink bindweed	
Rubus australis	Swamp lawyer	
Rubus schmidelioides	Tātarāmoa, bush lawyer, white-leaved lawyer	

Orchids

Prasophyllum colensoi	Leek orchid	

Herbs and ground covers

Althenia bilocularis		
Apium prostratum	New Zeland celery	
Argentina anserinoides	Silverweed	
Callitriche muelleri		
Callitriche petriei		
Cardamine corymbosa		
Cardamine dolichostyla	Panapana	
Centella uniflora		
Centipeda cunninghamii		
Centipeda elatinoides	Sneezeweed	
Centipeda minima	Sneezeweed	
Cotula coronopifolia	Yellow buttons	
Crassula sinclairii		
Dichondra brevifolia		
Drosera binata	Forked sundew	
Elatine gratioloides		
Epilobium billardiereanum		
Epilobium brunnescens		
Epilobium chionanthum		
Epilobium hirtigerum		
Epilobium insulare		
Epilobium komarovianum		
Epilobium nerteroides		
Epilobium pallidiflorum		
Euchiton involucratus		
Glossostigma elatinoides		
Gonocarpus micranthus		
Gratiola sexdentata		
Gunnera dentata		
Gunnera prorepens		
Hierochloe redolens	Kāretu	
Hydrocotyle hydrophila		
Hydrocotyle microphylla		
Hydrocotyle moschata	Hairy pennywort	
Hydrocotyle moschata var. Moschata		
Hydrocotyle novae-zeelandiae		
Hydrocotyle pterocarpa		
Hypericum pusillum		
Lemna disperma	Duckweed	
Leptinella tenella		
Limosella lineata		
Lobelia angulata	Pānakenake	
Mazus novaezeelandiae subsp. Impolitus f. impolitus		
Myriophyllum propinquum		
Myriophyllum triphyllum		
Myriophyllum votschii		
Nertera scapanioides		
Ophioglossum petiolatum	Stalked adder's tongue	
Oxalis exilis		
Persicaria decipiens		

Pilularia novae-hollandiae	Pillwort	
Potamogeton cheesemanii	Manihi, red pondweed	
Potamogeton ochreatus	Blunt pondweed	
Potamogeton suboblongus	Rērēwai, mud pondweed	
Ranunculus amphitrichus	Waoriki	
Ranunculus glabrifolius		
Ranunculus macropus	Swamp buttercup	
Ranunculus membranifolius		
Rorippa palustris	Poniu, marsh yellow cress	
Rumex flexuosus	Native dock	
Ruppia polycarpa		
Sebaea ovata		
Sparganium subglobosum	Mārū, burr-reed	
Stuckenia pectinata		
Urtica perconfusa	Swamp nettle	
Viola filicaulis	Forest violet	
Viola lyallii	Haaka	
Wolffia australiana	Watermeal	
Zannichellia palustris	Horned pondweed	

Moss

Sphagnum australe	Sphagnum	
Sphagnum cristatum	Sphagnum	
Sphagnum falcatulum	Sphagnum	

Orchids

Prasophyllum colensoi	Leek orchid	

Herbs and ground covers

Althenia bilocularis		
Apium prostratum	New Zeland celery	
Argentina anserinoides	Silverweed	
Callitriche muelleri		
Callitriche petriei		
Cardamine corymbosa		
Cardamine dolichostyla	Panapana	
Centella uniflora		
Centipeda cunninghamii		
Centipeda elatinoides	Sneezeweed	
Centipeda minima	Sneezeweed	
Cotula coronopifolia	Yellow buttons	
Crassula sinclairii		
Dichondra brevifolia		
Drosera binata	Forked sundew	
Elatine gratioloides		
Epilobium billardiereanum		
Epilobium brunnescens		
Epilobium chionanthum		
Epilobium hirtigerum		
Epilobium insulare		
Epilobium komarovianum		
Epilobium nerteroides		
Epilobium pallidiflorum		
Euchiton involucratus		
Glossostigma elatinoides		
Gonocarpus micranthus		
Gratiola sexdentata		
Gunnera dentata		
Gunnera prorepens		
Hierochloe redolens	Kāretu	
Hydrocotyle hydrophila		
Hydrocotyle microphylla		
Hydrocotyle moschata	Hairy pennywort	
Hydrocotyle moschata var. Moschata		
Hydrocotyle novae-zeelandiae		
Hydrocotyle pterocarpa		
Hypericum pusillum		
Lemna disperma	Duckweed	
Leptinella tenella		
Limosella lineata		
Lobelia angulata	Pānakenake	
Mazus novaezeelandiae subsp. Impolitus f. impolitus		
Myriophyllum propinquum		
Myriophyllum triphyllum		
Myriophyllum votschii		
Nertera scapanioides		
Ophioglossum petiolatum	Stalked adder's tongue	
Oxalis exilis		
Persicaria decipiens		

9.2 Appendix IV. Planting Lists: Kapiti Whaitua Marsh Type Wetland (Source: GWRC)

Climbers

Calystegia sepium subsp. roseata	Pink bindweed	

Orchids

Herbs and ground covers

Althenia bilocularis		
Apium prostratum	New Zeland celery	
Argentina anserinoides	Silverweed	
Centella uniflora		
Centipeda cunninghamii		
Cotula coronopifolia	Yellow buttons	
Epilobium billardiereanum		
Epilobium brunnescens		
Epilobium chionanthum		
Epilobium hirtigerum		
Epilobium komarovianum		
Epilobium macropus		
Epilobium nerteroides		
Epilobium pallidiflorum		
Euchiton japonicus		
Gonocarpus micranthus		
Hydrocotyle moschata	Hairy pennywort	
Hydrocotyle moschata var. Moschata		
Hydrocotyle novae-zeelandiae		
Lemna disperma	Duckweed	
Leptinella dioica	Hairless leptinella	
Leptinella tenella		
Lobelia carens		
Mazus novaezeelandiae subsp. Impolitus f. impolitus		
Myriophyllum propinquum		
Myriophyllum triphyllum		
Myriophyllum votschii		
Nertera scapanioides		
Oxalis magellanica		
Persicaria decipiens		
Ranunculus amphitrichus	Waoriki	
Ranunculus glabrifolius		
Ranunculus limosella		
Rumex flexuosus	Native dock	
Sonchus kirkii	Shore Pūhā	FAC
Viola lyallii	Haaka	

Moss

Sphagnum australe	Sphagnum	
Sphagnum cristatum	Sphagnum	
Sphagnum falcatulum	Sphagnum	