Boffa Miskell

Rangiuru Road Subdivision, Ōtaki

Ecological Impact Assessment
Prepared for Classic Developments

12 December 2025

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Executive Summary

Project Description

Classic Developments propose to develop a 43-lot subdivision at 234 Rangiuru Road, Ōtaki (LOT 2 DP42874, 2.4 ha), zoned General Residential under the Operative Kāpiti Coast District Plan (2021).

All vegetation within the project footprint will be cleared, and stormwater will be managed through an integrated system comprising raingardens, two dry attenuation ponds, and a planted swale discharging via overland flow to Maringi-a-wai Stream.

Methods

Boffa Miskell ecologists visited the Site on 14 February 2022, 8 December 2023, and 3 October 2024 to describe ecological habitats and values. The first two visits investigated whether any natural inland wetlands were present, assessed habitat quality, and included surveys for rare species. The third visit assessed Maringi-a-wai Stream, a tributary of Rangiuru Stream north of the property.

The Site description combined existing datasets, aerial imagery, and field observations. A partial lizard habitat survey was completed; no avifauna survey was undertaken.

Existing Environment

- Vegetation: The Site is dominated by exotic species, and is comprised of improved pasture with a tall eucalyptus stand at the northwest of the Site and two taupata, karo, Japanese spindle tree and boxthorn hedges on the west of the Site. There are some naturally regenerating indigenous species, including māhoe, taupata, kawakawa, and poroporo. No indigenous vegetation of ecological significance remains.
- Wetlands: None identified.
- Lizard habitat: Potentially present in hedgerows and shelterbelts.
- Avifauna: Likely to only predominantly support common and exotic species.
- Maringi-a-wai Stream: Slow-run, soft-bottom channel with exotic macrophytes and periphyton. Macroinvertebrate community comprises resilient taxa typical of lowland streams. Water quality generally good; sediment heavy metal concentrations below guidelines. Fauna include longfin eel (At Risk – Declining), īnanga (Threatened – Nationally Vulnerable), shortfin eel, and koura.

Ecological Significance and Value

All terrestrial habitat on site is not significant and considered negligible ecological value, excluding the tall tree/woodland habitat, dominated by eucalyptus, which has low ecological value through its potential seasonal food source for some bird species.

Maringi-a-wai Stream is a significant waterway under the Greater Wellington Regional Council Natural Resources Plan and was assessed as moderate ecological value.

Potential Ecological Effects

The following ecological effects were considered and assessed for their level of effect based on the EIANZ guidelines:

- Loss of all vegetation, including winter-flowering exotic trees and māhoe – Very Low.
- Reduction of pest plants on the property – Positive.
- Loss of potential lizard habitat – Low.
- Loss of avifauna habitat – Very Low.
- Potential effects on water quantity and quality into Maringi-a-wai stream from the development catchment area were assessed as:
    - Sediment and contaminant discharge, excluding concrete (construction phase) – Very Low.
    - Concrete discharge (construction phase) – Moderate.
    - Sediment and contaminant discharge (operational phase) – Very Low.
    - Increase in impervious surfaces and potential changes to stream thermal regime – Very Low.

Managing Adverse Ecological Effects

The proposal requires the whole site will be developed. In that case, all negligible to low level ecological values currently on site will be lost.

Measures to Minimise Effects

- Herpetofauna: Undertake additional pre-clearance surveys to cover habitat not previously targeted. If lizards are found, a Lizard Management Plan and Wildlife Permit will be prepared, with translocation to a DOC-approved site and pest control at release site.
- Avifauna: Undertake vegetation clearance outside breeding season (after March and before September), or pre-clearance checks for nests of indigenous species should be conducted immediately prior to earthworks.
- Aquatic:

- No concrete is poured in areas where runoff could enter water; where unavoidable, works must be fully isolated.
- In-system testing of stormwater treatment performance is recommended, with all testing, limits, and parameters undertaken in accordance with Kāpiti Coast District Council's (KCDC) global discharge consent standards.
- Planting maintenance and monitoring in the stormwater system should include weed control, replacement planting where establishment failures occur, and sediment removal (if required), to ensure long term effectiveness.

Voluntary Enhancements

- Vegetation: Winter and early spring flowering trees have been included in planting design to replace lost nectar producing Eucalypt trees.
- Swale and amenity planting with locally sourced indigenous species will increase indigenous ecological values on the Site.

Recommended Monitoring

- Pre-clearance lizard monitoring, and salvage if required.
- Pre-clearance surveys for nesting indigenous birds.
- Reporting on planting success, weed control, and replacement of plants.
- Ensuring 80% plant cover in the swale at time of vesting with council.
- All pest plants removed from swale and attenuation ponds at time of vesting with council.
- Any stormwater testing to be undertaken in accordance with KCDC's global discharge consent standards.

Conclusion

Four māhoe trees were identified on site, naturally regenerating and listed in ECO Table 1 of the OKCDP, but overall vegetation is dominated by exotic species and not representative of indigenous habitat in the Foxton Ecological District. Vegetation clearance effects are assessed as Very Low, with lizard survey/salvage recommended as accepted good practice.

Maringi-a-wai Stream is a low-gradient, soft-bottom perennial waterway of moderate ecological value. Following mitigation, stormwater discharges are expected to have a Very Low adverse effect, unlikely to hinder planned stream restoration or future improvements in stream health.

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1.0 Introduction

1.1 Site and Project Background

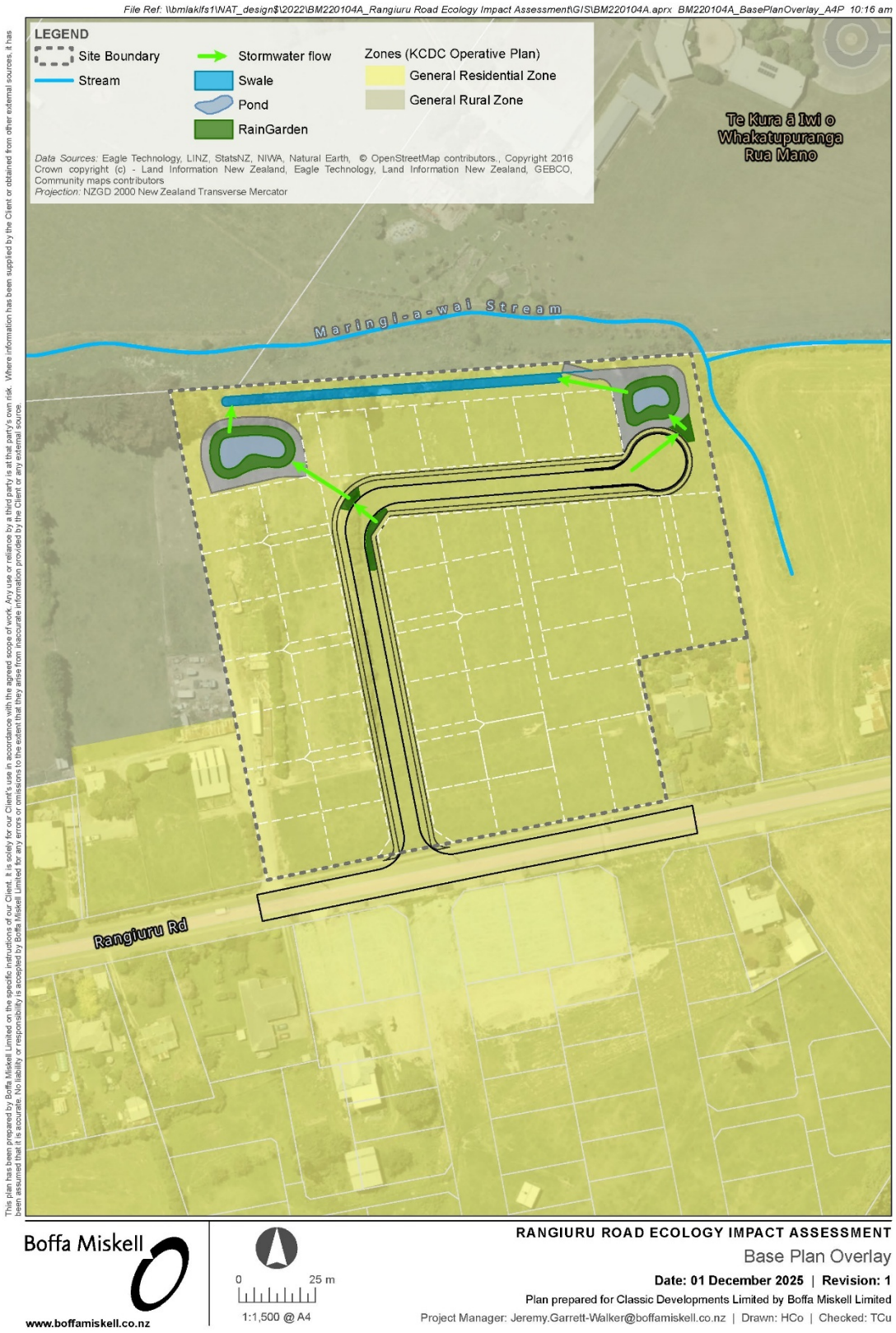
Classic Developments propose to establish a 43-lot subdivision on a 2.4 hectare site (LOT 2 DP42874; Map 1), zoned General Residential under the Operative Kāpiti Coast District Plan (OKCDP; Kapiti Coast District Council, 2021). The subdivision layout includes:

- 43 residential lots.
- Approximately 200 m of new roading and associated driveways.
- Clearance of all 2.4 ha of existing vegetation.
- Installation of wastewater and stormwater reticulation.
- Stormwater management via roadside raingardens, two dry detention ponds, and a planted swale along the northern boundary. This system is designed to attenuate flows, improve water quality, and replicate natural overland flow characteristics prior to diffuse discharge across land and eventual entry into Maringi-a-wai Stream.

1.2 Scope

Boffa Miskell were engaged to provide an Ecological Impact Assessment (EcIA). The assessment:

- Describes the existing environment.
- Identifies the presence or absence of ‘natural inland wetlands’ as defined in the National Policy Statement for Freshwater Management 2020 (NPS-FM).
- Assesses ecological values and habitat for indigenous fauna.
- Evaluates potential effects of the proposed development.
- Outlines mitigation measures where required.
- Considers opportunities for ecological enhancements.



Map 1. The Site at 234 Rangiuru Road, showing the General Residential Zoning (KCDC), proposed parcels, and the stormwater management system.

1.3 Definitions

The Site	Refers to the properties including the area affected by earthworks extent and the adjacent reserve areas beyond this.
Zone of Influence	The spatial area within which ecological values may be directly or indirectly affected by a proposed activity. It encompasses both the immediate footprint of works and the broader area where ecological processes or species may experience change.
Project Footprint	Total area of physical works, cut, fill, roading, drainage, reticulation, storm water treatment, etc.
Native or Indigenous	Species, habitats, or communities that occur in New Zealand as the result of natural process – without human influence.
Introduced or exotic	A species or a community formed by a species that has been brought to New Zealand by humans. Can include naturalised or cultivated plants.
Buffer	For this site a defined zone extending inland from the margin of a wetland or other area of indigenous vegetation. The buffer aims to protect core habitat from edge effects.
Endemic	Species that are native to and only found in Aotearoa, New Zealand, or are endemic to a part of or specific habitat within New Zealand.
Operative Kāpiti Coast District Plan (OKCDP)	Outlines the rules and guidelines for land use and development within the Kāpiti Coast District. It aims to ensure sustainable management of natural and physical resources, balancing environmental protection with community growth and development.
Natural Resource Plan (NRP)	Greater Wellington Regional Council's (GWRC) operative plan (2023) promoting sustainable and integrated management of land, water, air, and the coastal marine area.
Resource Policy Statement (RPS)	The GWRC RPS sets out the framework and priorities for managing natural and physical resources in the Wellington region. It is a statutory document required under the Resource Management Act 1991 (RMA). Policy 23 of the RPS focuses on the identification and protection of indigenous ecosystems and habitats with significant biodiversity values.
Conservation weeds	Exotic plants considered a threat to indigenous ecosystems due to aggressive and competitive growth. Lianas (vines), shade-tolerant ground cover, and shade-tolerant tree species are among the most problematic.
Natural Inland Wetland	As defined in clause 3.21 in the NPS-FM.
NPS-FM	National Policy Statement for Freshwater Management 2020.
EPT	Refers to mayflies (*Ephemeroptera*), stoneflies (*Plecoptera*), and caddisflies (*Trichoptera*). These taxa are widely recognised as indicators of healthy freshwater ecosystems due to their sensitivity to pollution and habitat degradation (Stark & Maxted, 2007).

2.0 Methods

2.1 Desktop Analysis

A desktop review was undertaken to establish the baseline ecological conditions of the Site, including its historical land use, current ecological features, and wider catchment context. This analysis compiled information from previous site investigations, management plans, aerial imagery, and national datasets. Key sources included:

- Land Cover Database (Ministry for the Environment, n.d.)
- LENZ model (Leathwick et al., 2004)
- Land Atlas of NZ (Manaaki Whenua Landcare Research, 2021)
- iNaturalist records.
- eBird and the New Zealand Bird Atlas.
- Aerial images from Google Earth and Retrolens (1948 to 2022; Appendix 7).

2.2 Site Investigation

Boffa Miskell ecologists undertook three site visits:

- 14 February 2022 – initial investigation of vegetation, habitat, and potential ecological values.
- 8 December 2023 – assessment for the presence of ‘natural inland wetlands’ (NPS-FM definition) and review of ecological values identified previously.
- 3 October 2024 – freshwater survey and habitat assessment of Maringi-a-wai Stream, a tributary of Rangiuru Stream.

Photographs were taken during each visit and are provided in the appendices.

2.2.1 Terrestrial Vegetation

Vegetation was mapped using aerial imagery and ground-truthed in the field. Plant communities were simple, so quantitative plot or transect surveys were not required. Each plant community was broadly described to the extent determined by the complexity of each community.

2.2.1.1 Threatened and At-Risk Plants

The Site was also assessed for Threatened and At Risk plants (de Lange et al., 2018; Townsend et al., 2008). A key resource for this was the KCDC District Plan, Eco-Table 1 (Appendix 8).

2.2.2 Wetland delineation

The Site was investigated for the presence of ‘natural inland wetlands’ as defined in the NPS-FM.

The wetland delineation survey was undertaken in early summer, following a year of above-average rainfall. Site conditions at the time were likely wetter than normal.

2.2.2.1 Rapid Assessment

Potential wetland areas were assessed first using the rapid assessment protocol (Ministry for the Environment, 2022), to identify potential areas containing wetland plant species. We used the following criteria:

- Topographically low-lying areas.
- Visible indicators of a high-water table.
- Vegetation with obligate (OBL) or facultative wetland (FACW) species.

Table 1 provides the five different plant indicators' status ratings based on wetland habitat. All indigenous and exotic species have been assigned a wetland plant indicator status.

Table 1. Plant indicator status against predicted presence in wetland habitat.

Plant indicator status	Predicted presence in wetland habitat
OBL: Obligate wetland	Rarely in uplands (drylands)
FACW: Facultative Wetland	Usually in wetlands, occasionally in uplands
FAC: Facultative	Commonly occurs in wetlands and uplands
FACU: Facultative Upland	Occasionally in wetlands but usually in uplands
UPL: Obligate Upland	Rarely in wetlands, almost always in uplands

2.2.2.2 Vegetation Plots

If wetland vegetation was identified, representative 2 × 2 m plots were established and measured in accordance with Clarkson (2013) and Ministry for the Environment (2022). Plots were placed within each distinct vegetation community and at notable changes in gradient or composition. All species within each plot were recorded and their percent cover estimated (based on above-ground live biomass). Dominance and prevalence scores were used to determine the presence of wetlands.

Two approaches were used for plot establishment were used:

- Transects which traversed hydrological gradients.
- Random placement at corners and in the middle of one paddock.

2.2.2.3 Soil testing

Hydric soil testing (Fraser et al., 2018) can assist in confirming wetland status where vegetation evidence is inconclusive. However, given the Site's long history of pasture management and cropping, soil characteristics are not considered reliable indicators in this context, and testing was not undertaken.

2.2.3 Herpetofauna

Surveys were undertaken to assess potential lizard populations within the Site. The approach included:

- Site visits: Casual searches were conducted during the active lizard season in February 2022 and December 2023.
- Habitat assessment: Vegetation types and land cover were inspected to identify areas with potential lizard habitat, including shelterbelts, treeland, and ground layers.
- Artificial Cover Objects (ACOs): Twenty double-layered ACOs were placed beneath shelterbelt vegetation in late 2021 and left for four weeks to settle. They were then checked daily over five days in early 2022 during mild, overcast/rainy conditions, when lizards are most likely to use refuges.

2.2.4 Avifauna

Based on habitat characteristics and the desktop review, quantitative bird surveys were not considered necessary.

2.2.5 Aquatic Habitat

Maringi-a-wai Stream is situated north of the property boundary and, based on the proposed stormwater management system, is considered within the Project's Zone of Influence. A baseline survey and freshwater assessment was undertaken in Maringi-a-wai Stream. Three survey reaches (Map 2) of approximately 50 m were distinguished in relation to the Site:

- Site 1 (upstream of the Site)
- Site 2 (adjacent to the Site)
- Site 3 (downstream of the Site).

2.2.5.1 Water quality

Spot measurements were collected at each site using a Horiba U-50 multiparameter meter, recording temperature (°C), pH, turbidity (NTU), dissolved oxygen (mg/L and %), and conductivity (µS/cm). Visual clarity was assessed using a 1 m clarity tube, with three replicate readings averaged per site.

2.2.5.2 Sediment quality

Composite sediment samples were collected from the streambed (top 2 cm) at each site using a plastic trowel. Four scrapes were taken at 10 m intervals and combined into a 250 mL jar, drained, and transported chilled to Hill Laboratories. Samples were analysed using US EPA 200.2 methods for total recoverable heavy metals: arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), nickel (Ni), lead (Pb), and zinc (Zn).

2.2.5.3 Riparian and in-stream habitat:

Riparian and in-stream habitat parameters were recorded at each site, supported by photographs and general observations. Habitat quality was assessed using the Rapid Habitat Assessment (RHA; Clapcott, 2015), which scores between 1 to 10 for ten parameters (sediment deposition, macroinvertebrate habitat diversity and abundance, fish cover diversity and abundance, hydraulic heterogeneity, bank erosion, bank vegetation, riparian width, and shade). Scores for an RHA range from 10–100, with higher values indicating better habitat quality.

More detailed measurements were taken at three cross-sectional transects (15 m apart) per site, including water velocity, depth, sediment depth (following SAM6 of Clapcott et al., 2011), wetted width, inorganic and organic substrate cover, macrophyte cover, and riparian vegetation type and cover.

2.2.5.4 Macroinvertebrate community

Macroinvertebrates, such as insects, snails, and worms that live on the streambed, are vital components in stream ecosystems and serve as reliable indicators in biomonitoring and determining waterway 'health' due to their varying tolerance to environmental conditions.

A composite kick-net (0.5 mm mesh) sample was collected from each site, using an adaptation of the C2 soft-bottom, semi-quantitative protocol from Stark et al. (2001). Approximately 1.8 m^2 of streambed was sampled per site, with six scrapes targeting representative microhabitats:

- Two scrapes of macrophytes.
- Two scrapes of bank vegetation.
- One scrape of mixed substrate and macrophytes.
- One scrape of woody debris (substituted with macrophytes at the upstream site due to absence of debris).

Each macroinvertebrate sample was preserved in ethanol prior to sending to Boffa Miskell's taxonomy supplier for processing. All samples were processed in accordance with Protocol P3 (full count with subsampling option; Stark et al., 2001).

The following indices were calculated:

- Total abundance.
- Taxonomic richness.
- EPT taxonomic richness.
- %EPT abundance.
- Macroinvertebrate community index (MCI).
- Quantitative macroinvertebrate community index (QMCI).
- Average Score Per Metric (ASPM).

Interpretation and calculation of the MCI and QMCI indices is provided by Stark and Maxted (2007) and in Table 2, while guidance on APSM scoring is outlined in the NPS-FM

Table 2. Interpretation of MCI and QMCI scores for hard- and soft-bottomed streams (Stark & Maxted, 2007).

Stream health	Water quality descriptions	MCI	QMCI
Excellent	Clean water	≥120	≥6.00
Good	Doubtful quality or possible mild enrichment	100-119	5.00-5.99
Fair	Probable moderate enrichment	80-99	4.00-4.99
Poor	Probable severe enrichment	≤79	≤3.99

Note, the MCI and QMCI were developed primarily to assess the health of streams impacted by agricultural activities (e.g. organic enrichment) and should be interpreted with caution in relation to urban systems.

2.2.5.5 Fish community:

Fish were sampled within site using two standard fyke nets (mesh size 4 mm) and four Gee minnow traps (GMTs; mesh size 3.2 mm). Each fyke net was paired with a GMT positioned approximately 2 m upstream and downstream. All nets and traps were baited with marmite and set in the afternoon, left in situ overnight, and retrieved the following morning. Captured fish were identified to species level and measured to the nearest 10 mm before being released alive back into the stream.

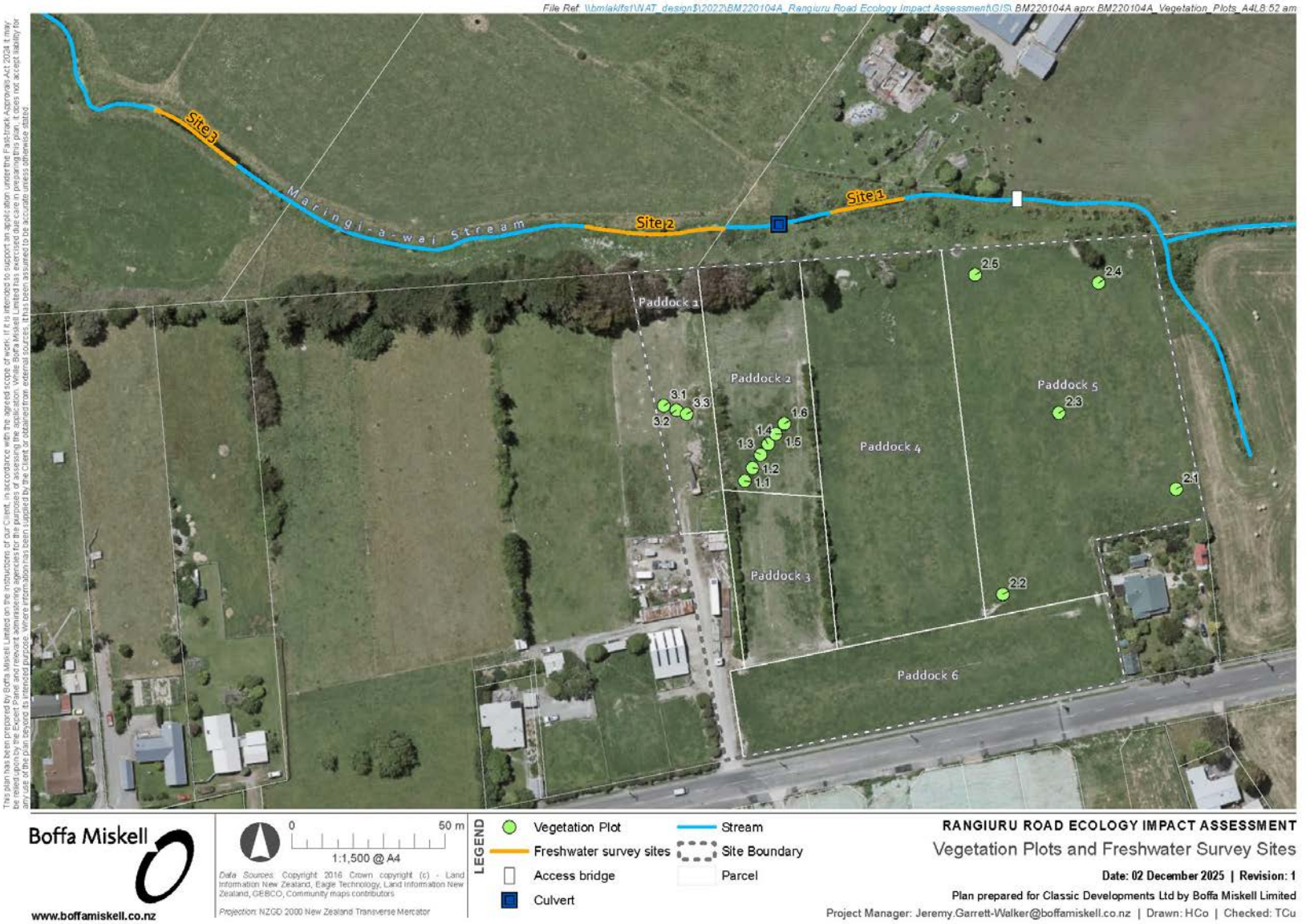
2.3 Nomenclature

Common and scientific names are provided at first mention. Where only the common name is used in the body of the report for readability, the corresponding scientific name is listed in the Appendices. The Biota of New Zealand[1] database has been adopted as the taxonomic authority for all botanical species.

2.4 Limitations

The most recent site visit was undertaken over one year ago. As the Site is unlikely to have changed significantly during this time, the assessment remains valid. Recommendations in Section 8.0 account for potential minor changes since that visit.

[1] (*Biota of New Zealand*, n.d.)



Map 2. Survey reaches in Maringi-a-wai Stream: Site 1 (upstream), Site 2 (adjacent), and Site 3 (downstream). The culvert and access bridge at Te Kura Kaupapa-ā-iwi o Whakatipuranga Rua Mano are shown, along with paddocks and wetland plots.

2.5 Assessment of Ecological Significance

A requirement of an ecological impact assessment is to carry out an assessment of significance under Section 6(c) of the Resource Management Act (RMA).

2.5.1 Local Government

The Greater Wellington Regional Council (GWRC) Regional Policy Statement (RPS) Policy 23 identifies significance based on four criteria: representativeness, rarity, diversity, and ecological context. Meeting any one of these criteria is sufficient for a habitat to be regarded as significant. In the absence of a policy definition of 'indigenous', we have assumed this to mean a plant community where native species comprise more than 50% of canopy cover.

Under the Kāpiti Coast District Plan (Rule ECO-P1), indigenous vegetation and habitats of indigenous fauna are considered significant if they meet one or more of the following criteria:

- Representativeness: ecosystems or habitats that are typical and characteristic examples of the full range of the original or current natural diversity of ecosystem and habitat types in the District or region, and that:
    - are no longer commonplace (less than ~30% remaining), or
    - are poorly represented in protected areas (less than ~20% legally protected).
- Rarity: ecosystems or habitats with biological or physical features that are scarce or threatened in a local, regional, or national context. This can include individual species, rare and distinctive biological communities and physical features that are unusual or rare.
- Diversity: ecosystems or habitats supporting a natural diversity of ecological units, species, and physical features within an area.
- Ecological context: ecosystems or habitats that:
    - enhance connectivity or otherwise buffers representative, rare, or diverse indigenous ecosystems and habitats, or
    - provide seasonal or core habitat for protected or threatened indigenous species.
- Tāngata whenua values: ecosystems or habitats with characteristics of spiritual, historical, or cultural significance to tāngata whenua, identified in accordance with tikanga Māori.[2]

We note that the NPS-IB was suspended by Central Government early in 2025, negating the requirement for District Councils to identify areas that are not already identified as significant.

[2] Tangata whenua values have not been assessed, as these fall outside the scope of this assessment.

2.6 Assessment of Ecological Effects

The methodology for assessing the level of terrestrial ecological effects associated with the proposed solar farm uses the EIANZ Ecological Impact Assessment Guidelines (Roper-Lindsay et al., 2018). In summary, this method requires:

- An assessment of the values of the terrestrial communities, habitats and ecosystems (Table 3).
- An assessment of the magnitude of the effects on these values based on criteria listed in (Table 4).
- The application of a matrix (Table 5) which determines the level of effect based on the ecological value of the Site or species present.

2.6.1 Assigning Value

Our assessment of ecological value is undertaken in accordance with the Environment Institute of Australia and New Zealand (EIANZ) guidelines (Roper-Lindsay et al., 2018). Ecological components are evaluated against four criteria: Rarity and Distinctiveness, Representativeness, Ecological Context, and Sustainability (Table 3).

Ecological features are ranked against each of the four criteria as “Very High”, High”, “Moderate”, “Low” or “Very Low”. The scores for each criterion are then combined to provide a single score for the feature (species, habitat, community, or ecosystem) from “Very High” to “Negligible”.

Table 3. Matters that may be considered when assigning ecological value to a to a site or area of vegetation/habitat/community (Roper-Lindsay et al., 2018).

Matter:	Attributes to be Considered:
Representativeness	Criteria for representative vegetation and aquatic habitats: • Typical structure and composition • Indigenous species dominate • Expected species and tiers are present • Thresholds may need to be lowered where all examples of a type are strongly modified Criteria for representative species and species assemblages: • Species assemblages that are typical of the habitat • Indigenous species that occur in most of the guilds expected for the habitat type
Rarity/Distinctiveness	Criteria for rare/distinctive vegetation and habitats: • Naturally uncommon, or induced scarcity • Amount of habitat or vegetation remaining • Distinctive ecological features • National priority for protection Criteria for rare/distinctive species or species assemblages: • Habitat supporting nationally Threatened or At Risk species, or locally uncommon species • Regional or national distribution limits of species or communities • Unusual species or assemblages

Matter:	Attributes to be Considered:
	• Endemism
Diversity and Pattern	• Level of natural diversity, abundance and distribution • Biodiversity reflecting underlying diversity • Biogeographical considerations – pattern, complexity • Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation
Ecological Context	• Site history, and local environmental conditions which have influenced the development of habitats and communities • The essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience (from "intrinsic value" as defined in RMA) • Size, shape and buffering • Condition and sensitivity to change • Contribution of the Site to ecological networks, linkages, pathways and the protection and exchange of genetic material • Species role in ecosystem functioning – high level, key species identification, habitat as proxy

2.6.2 Assessing Magnitude of Effect

Once the value of ecosystem components has been determined, the magnitude of effect is assessed. This represents the extent or scale of the impact, its duration, and the degree of change expected. Magnitude is typically classified on a scale from Very High to Negligible, as outlined in Table 4.

Table 4. Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018).

Magnitude of Effect:	Description:
Very High	Total loss of, or very major alteration to, key elements/ features of the baseline conditions, such that the post development character, composition and/or attributes will be fundamentally changed and may be lost from the Site altogether; AND/OR loss of a very high proportion of the known population or range of the element/feature.
High	Major loss or major alteration to key elements/ features of the baseline conditions such that post development character, composition and/or attributes will be fundamentally changed; AND/OR loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character, composition and/or attributes of the existing baseline will be partially changed; AND/OR loss of a moderate proportion of the known population or range of the element/feature
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character, composition and/or attributes of existing baseline condition will be similar to predevelopment circumstances/patterns; AND/OR having a minor effect on the known population or range of the element/feature.
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR having negligible effect on the known population or range of the element/feature.

2.6.3 Assessing Level of Effect

The overall level of the effect is determined by applying the following matrix (Table 5), which combines the ecological value and the magnitude of the effect.

Table 5. Criteria for describing the level of effect (Roper-Lindsay et al., 2018).

		Ecological Value				
		Very High	High	Moderate	Low	Negligible
Magnitude of Effect	Very High	Very High	Very High	High	Moderate	Low
	High	Very High	Very High	Moderate	Low	Very Low
	Moderate	High	High	Moderate	Low	Very Low
	Low	Moderate	Low	Low	Very Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low	Very Low
	Positive	Positive	Positive	Positive	Positive	Positive

Note we have modified the wording of the level of effect associated with Positive magnitudes from “Net Gain” in the EIANZ Guidelines to “Positive.” This change maintains clarity by distinguishing between a net gain formally calculated and validated through offset modelling, and positive effects identified through the qualitative assessment framework of the EIANZ Guidelines.

2.7 Project Shaping

Boffa Miskell provided advice on plant species selection within the attenuation ponds and swale to enhance their ecological function. Planting design was tailored to support biodiversity, improve stormwater treatment and attenuation, and ensure long-term plant survival.

3.0 Existing environment

3.1 Context

The proposed site lies within the Foxton Ecological District (31.02) which is defined by the most extensive sand dune system in the country. The climate is warm summers and mild winters, with prevailing NW winds and approximately 800 - 1000mm rainfall per annum (McEwen, 1987).

Sand dune country extends from Patea to Paekākāriki, with several estuaries, wetlands, dune lagoons and coastal swamp forest remnants.

Prior to human occupation, original ecosystems included large tracts of dune country, wetland hollows, swamp forest and podocarp broadleaf hardwood/dominated ridges.

3.2 Vegetation

3.2.1 Pre-human

Pre-human vegetation on site is predicted to have been dominated by podocarp forests (Figure 1A). This was likely podocarp forest, with tawa and mixed broadleaf common on rolling terrain. Semi-swamp forest (kahikatea, swamp maire, pukatea, kiekie, and supplejack) was present along streams and within natural hollows.

The Site has undergone transformation, since clearance of original forest communities in the 1800's. More recent land use, at least dating back to the 1940's has been market gardens and pasture (Figure 1B). Market gardens appear to be the dominant land use since the 1940's. The Site is currently used for grazing horses. Historic aerial images are shown in Appendix 6.

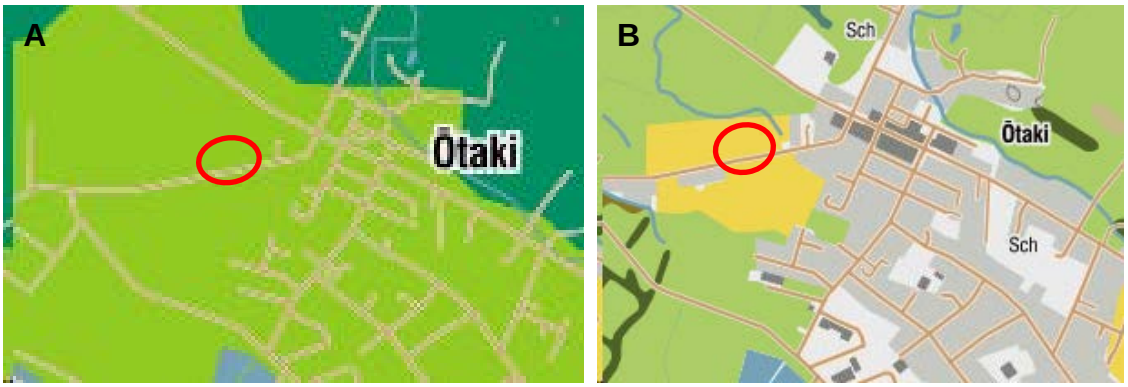


Figure 1. A: Probable pre-human podocarp forest. B: current short rotation cropland vegetation (Ministry for the Environment, n.d.).

3.2.2 Current

3.2.2.1 Overview

The Site is currently divided into six paddocks dominated by improved pasture that is grazed by horses, with shrubland and treeland occurring along margins. Five broad vegetation types were

identified (Table 6). Most vegetation is exotic, with limited native presence restricted to sub-canopy species in the woodland area and a small patch of mahoe (*Melicytus ramiflorus*). Representative photographs are provided in Figure 2, with mapped distributions shown in Map 3. Five broad vegetation types were identified (Table 6): improved pasture, Eucalypt woodland, blackberry shrubland, exotic shelterbelt (hedgerows), and mahoe trees.

Table 6. Approximate area of vegetation communities.

Vegetation	**Area (m²)**	**% Area**
Improved pasture	20,343	90%
Eucalyptus woodland	826	3%
Blackberry shrubland	596	2%
English spindle tree / taupata / barberry shelterbelt	865	4%
Isolated māhoe trees	42	< 1%
TOTAL	**22,672**	**100%**

3.2.2.2 Vegetation types

Improved Pasture

Improved pasture dominates the Site, extending over 6 paddocks which make up 90% of the Site. Ryegrass, Yorkshire fog, plantain, creeping bent, and clover are dominant species. Other species include creeping buttercup, blue-eyed grass, English daisy, broad-leaved dock, plantain, cocksfoot, juncus, Carex, Californian thistle, scotch thistle, tarweed bindweed, wild mustard, chamomile, ryeless chamomile.

Eucalypt woodland

Large exotic trees occupy the back (north-western) corner of the Site. The main tree is a eucalyptus, with two Poplar seen. Sub-canopy trees include small numbers of naturally regenerating māhoe, taupata, poroporo, kawakawa, elderberry, barberry, and burdock. Māhoe met the height criterion in ECO-Table 1 on the KCDC plan (see Section 7.1). Understorey plants include broad-leaved plantain, narrow-leaved plantain, Scotch thistle, creeping buttercup, broad-leaved dock, white clover, milkweed, hedge woundwort, water pepper, and stinking mayweed. Ivy is present in the understory and as a climber in the canopy trees.

Shrubland

Shrubland consist of young blackberry plants which are beginning to form into continuous areas, with *Prunus* sp. seen at one location.

Shelterbelt

Shelterbelt vegetation was dominated by English spindle tree, with occasional large taupata, karo, barberry, hawthorn, boxthorn, blackberry, māhoe (under 4m), and German ivy and part of the mix too, with rank grass and stinking iris on some edges.

Māhoe

One clump of two māhoe is located in the paddock at the north, near boundary with the kura. These were measured to be under 4m, and less than the 30cm diameter criteria to meet the ECO-Table1.

A. Improved pasture | B. Tall trees / woodland | C. Blackberry shrub/vineland

D. Shelterbelt | E. Two māhoe trees in rank grass

Figure 2. Photos of the five vegetation communities.

Map 3. Vegetation community types present at 234 Rangiuru Road.

3.2.3 Rare / Threatened Plants

We found no threatened plants as categorised by Department of Conservation (DOC) list (Hitchmough et al., 2007). Māhoe was the only plant species found on the KCDC ECO-Table 1 Appendix 8.

3.2.3.1 Pest Plants

No high priority ecological weeds were found on site, as set out in the Regional Pest Management Plan (Greater Wellington Regional Council, 2009). Table 7 lists five pest plant species which were found within the Site, and which are listed as harmful organisms where level of control is determined by localised threats.

Other non-conservation weeds, present on site, are of lesser ecological and regional concern.

The development will remove pest plant species, which will reduce weed spread into the Maringi-a-wai Stream riparian restoration from the Site. The constructed wetland and pond will also provide a native buffer at that part of the Maringi-a-wai Stream.

Table 7. Weed species observed on Site.

RPMP Pest Plant Category	Observations of Regional Priority Weeds	Area Found
Harmful Organism	Blackberry (*Rubus fruticosus*)	Shelterbelt, shrubland
Harmful Organism	Barberry (*Berberis glaucocarpa)*	Shelterbelt
Harmful Organism	Gorse (*Ulex europaeus*)	Shrubland
Harmful Organism	Hawthorn (*Crataegus monogyna*)	Shelterbelt
Harmful Organism	Ivy (*Senecio mikanioides*)	Shelterbelt, tree / woodland

3.3 Wetlands

3.3.1 Historical

Within the Site there are no identified ‘wetlands with outstanding indigenous biodiversity values’. No wetlands were identified through the Manaaki Whenua threatened environment classification (Figure 3-A) or within Greater Wellington Regional Council’s ARCGIS layer – ‘potential wetlands in Kāpiti, Porirua and Wellington’ (Figure 3B).

Figure 3. The Site in relation to a national (Ministry for the Environment, n.d.) and regional (GWRC Potential Wetlands in Kāpiti, Porirua, and Wellington) wetland datasets. A: Historic wetlands, B: KCDC mapped potential wetlands. Site represented approximately by the red circle.

3.3.2 Current

3.3.2.1 Rapid Assessment and Vegetation Plot placement

The rapid assessment method immediately confirmed that three paddocks (paddocks 3, 4 and 6) lacked wetland features or communities. In the remaining paddocks, the presence of wet-tolerant pasture species warranted further investigation through vegetation plots.

A total of 14 plots were established:

- Paddock 5: plots at each corner and one in the centre.
- Paddock 1: three plots along a transect through a shallow depression, the only area with wet-tolerant pasture species.
- Paddock 2: plots along a transect through a shallow depression, also the only area with wet-tolerant pasture species.

Plot locations are shown in Figure 4 and Map 2.

Detailed plot analyses are provided in Appendix 5, with images of all plots in Appendix 2Appendix 2.

No ‘natural inland wetland’ features were identified on site. Although wet-tolerant pasture and associated species were identified, all vegetation plots indicated non-wetland vegetation under the NPS-FM definition. The Site is therefore concluded to be dominated by improved pasture.

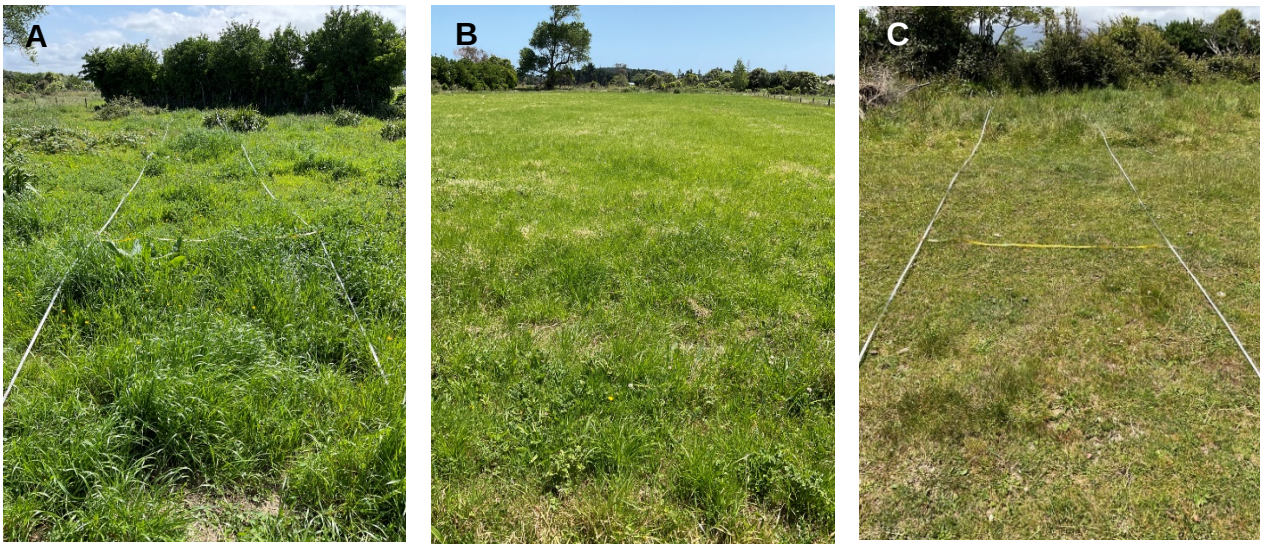


Figure 4. A. Transect 1 (plot series 1) B. Eastern paddock (plot series 2) C. Transect 3 (plot series 3, western paddock).

3.4 Aquatic Habitats

3.4.1 Catchment context

The Rangiuru Stream network lies within the Ōtaki Freshwater Management Unit (FMU), identified in the Te Whaitua o Kāpiti Implementation Programme report[3]. Rangiuru Stream is a smaller spring-fed tributary of the Ōtaki River, and land uses within the FMU (including farming, forestry, horticulture, and urban development) influence water quality.

Maringi-a-wai Stream, one of two spring-fed tributaries to Rangiuru Stream, lies immediately north of the Site boundary. It has been recognised as a priority for restoration in the Greater Ōtaki Community Freshwater Vision (2006). That document describes this tributary as:

- "The first Stream emerges behind the Te Kura Kaupapa-ā-iwi o Whakatipuranga Rua Mano (Māori immersion school) on Tasman Road, and the tributary was known as the Maringi-a-wai Stream. The size and significance of this Spring was recognised by Adkin (1948) in his book Horowhenua, when he refers to the area as Te Puna, or the Spring."

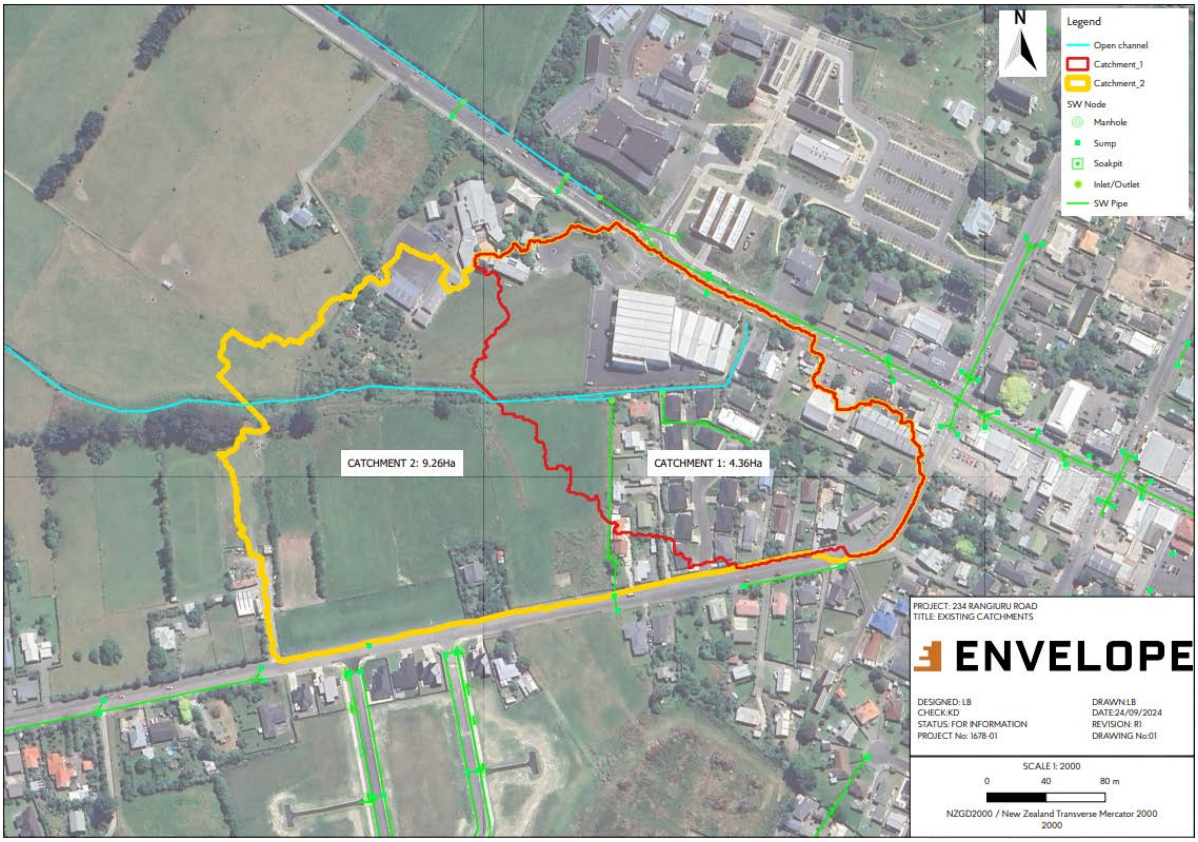
3.4.2 Maringi-a-wai Stream

Maringi-a-wai Stream is a soft-bottomed, spring-fed, first-order, low-gradient perennial stream within a mixed rural and urban catchment (Map 1).

The stream begins at the north-eastern property boundary but is largely dry upstream of the access bridge at Te Kura Kaupapa-ā-iwi o Whakatipuranga Rua Mano. At the bridge, shallow standing water (~10 cm) was present with dense macrophyte cover, dominated by water celery (*Helosciadium nodiflorum*). Below the bridge, standing water increases, consistent with spring inputs, though flow remains minimal until the culvert ~80 m downstream.

[3] https://www.gw.govt.nz/assets/Documents/2024/09/GWC0137_Kāpiti-Whaitua-Booklet_FA-2_WEB-spreads_lo-res.pdf

The culvert has a perched lip, but woven tī kōuka (cabbage tree) leaf ropes have been installed by the kura to assist fish passage.



Map 4. Catchment areas above (and including) the Site that contribute to Maringi-a-wai Stream. Drawing courtesy of Envelope Engineering Ltd.

3.4.2.1 Water quality

Spot measurements taken in October 2024 indicated generally good water clarity across all sites (Table 8). Turbidity was low (<1 NTU) at the Site 1 and 2, while Site 3 recorded a variable 9.9 NTU due to shallow water depth. These results suggest suspended sediment levels were low under the prevailing low-flow conditions.

pH ranged from 6.1–6.14, indicating slightly acidic water, and conductivity was consistently low (114–120 µS/cm). The acidity, outside the ANZECC (2000) guideline range of 6.5–8.0, may have reflected biological respiration and decomposition at the time of measurement.

Temperature was slightly higher upstream and cooler downstream, consistent with longer residence time upstream and mixing with spring inputs downstream.[4] Dissolved oxygen increased downstream: all sites were above the NPS-FM bottom line (4.0 mg/L)[5]. Site 2 and Site 3 exceeded Attribute A (>7.5 mg/L, no stress for aquatic life), while Site 1 was within Attribute B (≥5.0–<7.5 mg/L), indicating occasional stress during low-oxygen periods.

[4] Note the spot measurement at these two sites were at different times of day.

[5] The attribute limit used was the 1-day minimum, the lowest daily minimum across the whole summer period (1 November to 30 April), from the NPS-FM.

These results represent single daytime measurements and may vary seasonally and diurnally.

Table 8. Field-measured water quality parameters at the three sites in Maringi-a-wai Stream surveyed on the 3rd of October 2024.

Water quality parameter	Site 3	Site 2	Site 1
Time of measurement	10:00 am	10:30 am	2:30 pm
Water clarity (cm)	91	82	94.5
Temperature (°C)	15.3	15.75	16.74
pH	6.1	6.12	6.14
Conductivity (µS/cm)	120	118	114
Turbidity (NTU)	0.9	0.3	9.9
DO (mg/L)	9.06	8.32	6.61
% DO	93	86.9	68.9

3.4.2.2 Sediment quality

All heavy metals analysed were below the ANZECC (2000) default guideline values (DGV) at all sites (Table 9), indicating low risk to aquatic life.

Concentrations of Cd and Cr were similar across sites. Cu was highest at Site 1 downstream, lowest at Site 2, and intermediate at Site 3. Other metals (As, Pb, Zn) declined along the downstream gradient. Elevated concentrations at Site 1 may reflect its role as the first entry point for urban stormwater inputs (Map 4), combined with low flows that reduce dilution and increase sediment accumulation.

Table 9. The trace levels of total recoverable Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Nickel (Ni), Lead (Pb), and Zinc (Zn) from the sediment substrate collected from three sections of Marangi-a-wai Stream on 3rd October 2024. Units are mg/kg dry weight. The default guideline values (DGV) from ANZECC (2000) are shown.

Heavy metal	Site 3	Site 2	Site 1	ANZECC (2000) DGV
Arsenic	2.1	2.4	4.1	20
Cadmium	0.34	0.25	0.34	1.5
Chromium	14.7	15.1	15.3	80
Copper	18.5	16.4	25	65
Lead	18.2	19.5	23	50
Nickel	13.1	13.6	14.8	21
Zinc	85	89	171	200

3.4.2.3 Riparian and in-stream habitat

In-stream habitat

Across all sites, substrate was dominated by silt–sand with complete fine sediment cover. Only Site 3 contained minor gravel (5% small, 2% large). Fine sediment depth was greatest at Sites 2 and 3 (up to 38 cm), often anaerobic and deeper in the thalweg[6].

Refer to Appendix 9 for detailed measurements and results.

The stream was characterised by slow runs and very low velocity (<0.1 m/s), with flow, wetted width, depth, periphyton, and woody debris increasing downstream. Macrophyte cover was highest at Site 1, dominated by water celery, while diversity was greater at Sites 2 and 3. A small area below the culvert was used to cultivate watercress (*Nasturtium officinale*) by the kura.

Riparian condition

Riparian vegetation at Sites 2 and 3 consisted mainly of rank grass with a 2–3 m fenced setback. Site 2 also supported an indigenous silver fern / ponga (*Alsophila dealbata*; Not Threatened) and some exotic trees further back from the stream. At Site 1, the riparian buffer was wider (>5 m), with more overhanging vegetation, root mats, and undercut banks. Native species planted by the kura (harakeke, mānuka, *Coprosma* spp., *Carex secta*) provided shade and improved riparian condition. Banks were steeper at Sites 2 and 3 compared to Site 1.

Rapid Habitat Assessment

RHA scores were highest at Site 1 (58/100), intermediate at Site 2 (45/100), and lowest at Site 3 (31/100). Declining scores downstream reflected reduced riparian width, shade, and fish cover availability (see for individual parameter scores).

3.4.2.4 Macroinvertebrate community

The macroinvertebrate community at all three sites was dominated by tolerant taxa, particularly oligochaete worms and freshwater crustaceans (Figure 5). Abundance declined downstream, with oligochaetes most numerous at Site 1 (1291 individuals) and least at Site 3 (120 individuals). Other common taxa included Paracalliope (amphipods) and ostracods (Appendix 9).

The only EPT taxon recorded was *Oxyethira* sp. (axehead caddis), found at Site 2 (61 individuals) and Site 3 (101 individuals). Although in Order Trichoptera, Oxyethira is a Hydroptilid with a low tolerance score (1.2/10 for soft-bottom systems; Stark & Maxted, 2007). Its downstream increase likely reflects greater filamentous algae cover, which it feeds on (Bayly, 1990).

Macroinvertebrate metrics indicated poor ecosystem health at all sites (Table 10). MCI and QMCI scores fell within the “poor” category (MCI ≤79, QMCI ≤3.99; Stark & Maxted, 2007) and below NPS-FM national bottom lines (MCI ≥90, QMCI ≥4.5). ASPM scores were also below the NPS-FM threshold of 0.3, consistent with probable severe enrichment. Thes results are typical of lowland, soft-bottom streams surrounded by agricultural and urban land uses.

[6] The thalweg is defined as a line connecting the lowest (i.e., deepest) points of each cross-section along a stream/river channel. While it technically refers to a line between transects, it is also often used to describe the deepest point of any given cross-section

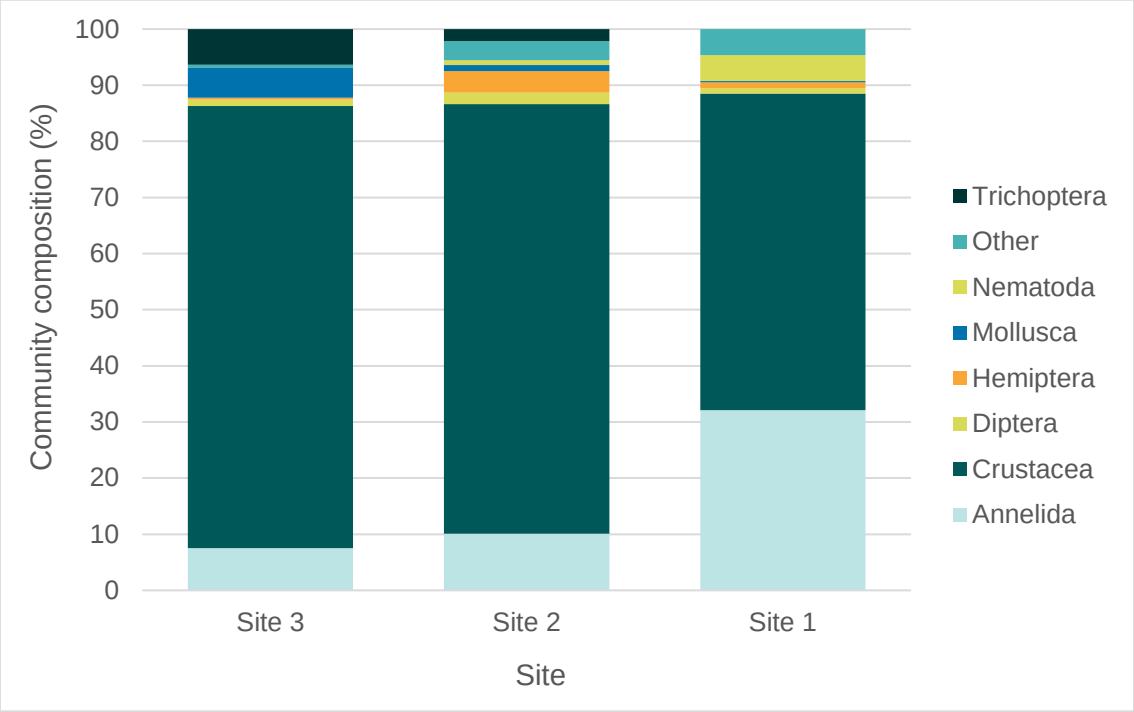


Figure 5. Relative abundances of macroinvertebrate taxonomic groups collected from three sites within Marangi-a-wai Stream collected on 3rd October 2024. Other = Arachnida (Dolomedes), Cnidaria (Hydra), Coleoptera (Dytiscidae, Liodessus), Collembola, Nemertea, Odonata (Xanthocnemis), Platyhelminthes (excl. Rhabdocoela).

Table 10. Macroinvertebrate indices from three sites within Marangi-a-wai Stream collected on 3rd October 2024. EPT = Ephemeroptera, Plecoptera, Tricoptera taxa. MCI = Macroinvertebrate Community Index. QMCI = Quantitative MCI. The MCI and QMCI scores used the soft-bottomed (SB) tolerance values (Stark & Maxted, 2007) as this is the dominant substrate type in the system.

Parameters	Site 3	Site 2	Site 1
Total abundance	1589	2863	4037
Taxonomic richness	16	24	22
% EPT abundance	6.4	2.1	0.0
% EPT abundance (excl. hydroptilids)	0	0	0
EPT taxonomic richness	1	1	0
EPT taxonomic richness (excl. hydroptilids)	0	0	0
MCI	55.8	73.8	73.2
QMCI	3.6	3.3	3.2
APSM	0.13	0.14	0.12

3.4.2.5 Fish community

Three freshwater fish species were recorded in Maringi-a-wai Stream: īnanga (*Galaxias maculatus*), longfin eel (*Anguilla dieffenbachii*), and shortfin eel (*A. australis*) (Table 10). [7] Īnanga and longfin eel are classified as Threatened – Nationally Vulnerable and At Risk –

[7] No eDNA or freshwater fish survey records were identified for Rangiuru Stream in the Wilderlab-administered Discover DNA webpage or the NIWA-administered New Zealand Freshwater Fish database, respectively. The common bully (*Gobiomorphus cotidianus*; Not threatened) is the only core fish species predicted to be within Rangiuru Stream by Cameron (2016) that wasn't captured.

Declining (Dunn et al., 2025), respectively, though both remain widespread across diverse habitats (e.g. Jellyman, 2012). Shortfin eel is currently listed as Not Threatened (Dunn et al., 2025).

Only larger eels (>450 mm) were captured, absent from Site 1. Īnanga were restricted to Site 3, ranging from 50–120 mm, including adults. The presence of īnanga indicates fish passage below the sampled reach is occurring as īnanga are considered poor climbers.[8]

No fish were recorded at Site 1, though a koura/freshwater crayfish (*Paranephrops planifrons*) was captured, which are classified as Not Threatened (Grainger et al., 2018). The lack of fish upstream may be attributable to the perched culvert providing a long-term fish passage barrier and recent efforts to reinstate fish passage using the ti kouka 'ropes' had not yet manifested in a stable fish population upstream and/or a lack of preferable habitat.

Table 11. Freshwater fish species captured in Maringi-a-wai Stream on 4th October 2023 after setting fyke nets and Gee minnow traps overnight. All individuals were caught in the fyke nets.

	Site 3			**Site 2**			**Site 1**	
Species	**Total**	**Average size (mm)**	**Size range (mm)**	**Total**	**Average size (mm)**	**Size range (mm)**	**Total**	**Average size (mm)**
Longfin eel	2	785	470 - 1100	1	1000	-	0	-
Shortfin eel	3	667	500 - 800	2	650	600 - 700	0	-
Īnanga	33	80	50 - 120	0	-	-	0	-
Koura	0	-	-	0	-	-	1	35

3.5 Herpetofauna

3.5.1 Casual searches

No lizards were detected during site visits in 2022 or 2023.

3.5.2 Habitat assessment

The Site is dominated by grazed pasture, which is generally unsuitable for lizards. Shelterbelts and the small treeland in the north-western corner, comprised largely of eucalypts with a scattered understory of young natives (māhoe, kawakawa, taupata, and poroporo), provide limited cover and are unlikely to provide habitat for arboreal lizards given its small size, that it is dominated by exotic species, and is isolated within a landscape of managed pasture.

A ground layer of ~350 m² stinking iris beneath the treeland offers some cover but disturbance from grazing was evident. A long history of horticulture and grazing suggests if native lizards are present, they will be robust, common, and widespread species tolerant of stock trampling (e.g. northern grass skink).

[8] Downstream entries in the NIWA-administered New Zealand Fish Passage Assessment Tool include a culvert with a flap gate (response ID's 1706, 1777, 134330), with a high risk to fish passage, and a culvert slightly further upstream, with a low risk to fish passage (response ID 136040). The flood gate has been modified to slow the closing rate on incoming tide to give more time for fish to move from the sea into the Rangiuru catchment (Cameron, 2016).

Hedge rows elsewhere (e.g. between paddocks 3 and 4) may provide potential habitat but were not surveyed (Map 5).

3.5.3 ACO surveys

No lizards were observed during checks, and no indirect evidence (e.g. scat, shed skin) was recorded.

Map 5. Location of Lizard ACOs are shown as orange dots in the north-west corner. Hedgerows seen between paddocks 1 and 4.

3.6 Avifauna

3.6.1 Desktop assessment

A desktop review using the citizen science database eBird identified 62 bird species within a 10x10 km grid encompassing the Site (grid BT70). Of these, 40 species were native, 20 exotic, with single records of a coloniser (black-fronted dotterel) and a migrant (cattle egret) (Appendix 6).

Exotic species and non-threatened native species recorded are widespread and abundant within the ecological district and are not considered further. Several species observed within 10 km are associated with habitats absent from the project footprint, including:

- Coastal environments (e.g. red-billed gull, banded dotterel, Caspian tern)
- Mature native forest (e.g. rifleman)
- Freshwater/wetland habitats (e.g. brown teal, black shag)

These species are not relevant to the assessment. After exclusions, two species remain that may interact with the Site (Table 12).

Table 12. At Risk or Threatened Species to be considered for this development.

Species	**Scientific name**	**Conservation status (Robertson et al., 2021)**		
NZ bush falcon	*Falco novaeseelandiae* "bush"	Endemic	Threatened	Nationally Increasing[CR Inc]
NZ pipit	*Anthus n. novaeseelandiae*	Native	At Risk	Declining[CI CR]

The NZ bush falcon moves widely within a large home range that can extend for between 44 and 587 km^2 (Thomas et al., 2010). A local pair may therefore have a home range that includes this 2.4 ha site, but it will only form a small portion of their total foraging habitat. There is no obvious nesting habitat for this species.

Like falcon, pipit have a home range that can extend several square kilometres (Beauchamp, 2007, 2009) and so may have a range that includes this site. However, while pipit have expanded into rural landscapes within the ecological district and throughout NZ, their habitat preferences are still coastal dunelands and braided rivers. This is supported by the majority of observations of this species on eBird (NZ Bird Atlas) which are predominantly along the Ōtaki River, its river mouth, Chrystalls Lagoon (approx. 4km southeast from site) and waterbodies in Waitohu further north.

4.0 Ecological significance

Policy 23 of the GWRC RPS (2013) was applied to assess indigenous vegetation and habitats against Section 6(c) of the RMA, using DOC threat classifications (Townsend et al., 2008). Several specimens of māhoe occur on site. While māhoe is listed as a “Key Species” under Rule ECO-R6 of the KCDC District Plan, this rule relates to the assessment of vegetation clearance and does not, in itself, denote ecological significance.

KCDC has carried out exhaustive SNA surveys within the Kāpiti Coast (Wildland Consultants Ltd, 2007), building on earlier work by Ravine (1992). These surveys have not identified this site as being ecologically significant, and our survey confirms this. Specifically:

- The Site is not listed in Schedule 1 (Ecological Sites).
- No key indigenous trees are present (Schedule 2).
- No rare or threatened vegetation species are present (Schedule 3).
- No notable trees are present (Schedule 8).

The Site was also assessed against national frameworks:

Within the LENZ Threatened Environments (Walker et al., 2007) framework, the study area lies entirely within the “Acutely Threatened” land class (<10% indigenous cover remaining). Intact indigenous habitats within this land class are therefore highly valuable. No intact indigenous habitat remains at this site.

Within the National Priority Environments (Ministry for the Environment & Department of Conservation, 2007) – a non-statutory framework, vegetation and habitats within the Site do not qualify as naturally uncommon ecosystems.

4.1 Summary

Table 13 shows that no plant communities or habitats within the project footprint meet the RPS criteria for ecological significance. Maringi-a-wai Stream, a tributary of the Ōtaki River, is recognised as a significant waterway under Schedule F1 of the GWRC NRP NRP for its role within the wider catchment.

Table 13. Summary of Ecological Significance.

Significance Criteria	**Represent-ative**	**Rarity**	**Diversity**	**Context**	**Significant**
Exotic Plant Communities					
Improved pasture	No	No	No	No	No
Eucalyptus Tall trees / woodland	No	No	No	No	No
Blackberry Shrub / Vineland Weedland	No	No	No	No	No
English Spindle Tree / boxthorn Shelterbelt	No	No	No	No	No
Indigenous Plant Communities					
Māhoe (4 trees)	No	No	No	No	No
Wetlands					
No wetlands present	N/A	N/A	N/A	N/A	N/A
Freshwater					
Maringi-a-wai Stream					Yes

5.0 Ecological value

5.1 Vegetation

5.1.1 Improved pasture, shrublands and weedlands

The three vegetation communities that are improved pasture, blackberry shrub/vineland weedland, and the English spindle tree/boxthorn shelterbelt are all are dominated by exotic grasses, shrubs, and weeds. They lack representative indigenous elements, rarity, diversity, or ecological function and provide poor habitat for indigenous fauna. These vegetation communities therefore have negligible ecological value.

5.1.2 Eucalyptus woodland

Eucalypt trees dominate the hedgerow canopy. While not indigenous, they flower in autumn and winter, providing nectar for native birds during periods of limited forage. This offers a minor seasonal habitat contribution within a wider landscape already supporting these species. At the catchment scale, their ecological value is negligible.

5.1.3 Māhoe trees

Four scattered māhoe occur within an exotic matrix. As isolated individuals, they do not form a representative indigenous community, lack rarity and diversity, and provide only limited habitat for native fauna. We consider these two trees to have negligible ecological value.

5.2 Herpetofauna

No lizard species were recorded on site in 2022. Potential habitat for northern grass skink (*Oligosoma polychroma*) remains. Based on previous surveys, the species occurs in very low numbers across the Kāpiti Coast, likely due to predation pressure. For assessment purposes we assume northern grass skink may be present. While classified as Not Threatened nationally (Hitchmough et al., 2021), its local scarcity and modest presence at this site give it some ecological value. Therefore, we consider the ecological value of northern grass skink at this site is moderate (if it is present).

5.3 Avifauna

Two native bird species with national threat classifications (Robertson et al., 2021) may include the Site within their home range. The NZ bush falcon is listed as Threatened – Nationally Increasing, and the NZ pipit is listed as At Risk – Declining. Both species may use the Site as part of their wider territory.

Falcon has a very high ecological value; NZ pipit has a high ecological value.

5.4 Maringi-a-wai Stream

The assessment of ecological value of Maringi-a-wai Stream described below relates only to the Sites 2 and 3 as these are in the area of influence of the potential effects associated with the proposed stormwater swale and diffuse discharge.

Maringi-a-wai Stream is a first-order tributary within the Ōtaki River catchment. Riparian margins are dominated by exotic grasses with little indigenous vegetation, providing limited shading and ecological function. In-stream habitat is relatively homogenous, with slow runs, extensive macrophyte and periphyton growth, offering little habitat diversity and indicating an impaired aquatic system. Macroinvertebrate communities are dominated by pollution-tolerant taxa, consistent with poor stream health typical of low-gradient agricultural waterways. Longfin eel (At Risk – Declining) and īnanga (Threatened – Nationally Vulnerable), along with shortfin eel and koura (both Not Threatened), were recorded, adding some rarity value. Overall, the stream has very low representativeness, low diversity and ecological context, but high rarity due to the presence of threatened fish species. Maringi-a-wai Stream is assessed as being of moderate ecological value, at the lower end of this category as three of the four considered matters are low.

5.5 Summary

Table 14. Assessment of ecological value summarise for each ecological component, using the EIANZ guidelines (Roper-Lindsay et al., 2018).

Ecosystem Component	Represent-ative	Rarity	Diversity	Context	Overall
Exotic Plant Communities					
Improved pasture	Very Low	Very Low	Very Low	Very Low	Negligible
Eucalyptus Tall trees / woodland	Very Low	Very Low	Very Low	Low	Low
Blackberry Shrub / Vineland Weedland	Very Low	Very Low	Very Low	Negative	Negligible
English Spindle Tree / boxthorn Shelterbelt	Very Low	Very Low	Very Low	Very Low	Negligible
Indigenous Plant Communities					
Māhoe (4 trees)	Very Low	Very Low	Very Low	Very Low	Negligible
Lizards					
Northern grass skink	Common and widespread locally. Not at risk or threatened.				Low
Avifauna					
NZ Pipit	At Risk – declining				High
Bush falcon	Threatened - Nationally Increasing				Very High
Freshwater					
Maringi-a-wai Stream	Very Low	High	Low	Low	Moderate

6.0 Proposed works

For comprehensive details on the construction and operation (primarily stormwater) please refer to the Infrastructure Report, R001v1-1678-0 (Envelope Engineering Limited, 28/11/25).

6.1 Construction phase

6.1.1 Earthworks

All vegetation will be removed and the land progressively raised to enable surface water discharge to land along the northern boundary via a dispersion swale. Earthworks will be staged from south to north to minimise exposed ground, with topsoil stripped, stockpiled, and reused where practicable. Imported fill will be placed and compacted to NZ standards, with stabilisation occurring progressively.

A sediment retention pond (SRP) will be constructed in the north-east corner to provide primary treatment of runoff during construction. The SRP has been intentionally oversized to ensure effective treatment capacity, discharging via spreader bar to undisturbed land. Geotextile with large rock will be used to break up flows, and an emergency spillway will be stabilised if bare, or otherwise retained over existing grass cover.

Controls are outlined in the Earthworks Report (R002v1-1678-02, dated 5/11/25) and will be implemented in accordance with Greater Wellington Regional Council's Erosion and Sediment Control Guide (Greater Wellington Regional Council, 2021). All measures will be monitored, maintained, and decommissioned once the Site is fully stabilised. Earthworks are expected to take approximately three months, with winter works approval not anticipated.

6.2 Operational phase

6.2.1 Stormwater management

Full design details are provided in the Stormwater Report (R003v2-1678-02, dated 27/11/25), with the planting design of the stormwater features outlined in the Landscape Urban Design Report by Blac Limited (dated 02/12/25). In summary, the subdivision will adopt an integrated, multi-stage stormwater management system combining lot-scale retention, raingarden treatment, attenuation ponds, and a planted discharge swale.

- Lot-scale retention: Roof runoff will be collected in rainwater reuse tanks on each lot, with overflow directed to the piped network.
- Raingardens: Road runoff will drain to roadside raingardens, planted with native shrubs and sedges suited to bioretention (e.g. *Muehlenbeckia astonii, Apodasmia similis*).
- Attenuation ponds: Larger storm events will be conveyed as overland flow to two dry ponds in the north-east and north-west corners of the Site. With side slopes of 1:3, they are designed to reduce post-development peak flows to pre-development rates. Pond margins will be planted with moisture-tolerant natives such as *Carex* spp., mingimingi

(*Coprosma propinqua*), and tī kouka (*Cordyline australis*), with grassed basins in the centre.

- Discharge swale: From the ponds, water will discharge via bubble-up manholes into a vegetated swale along the northern boundary. The swale is 0.75 m deep and ~330 m², incorporating two concrete level spreaders to release flows uniformly across a 3 m buffer before reaching Maringi-a-wai Stream. Swale planting will include wetland sedges and rushes suited to marsh and edge zones (e.g. *Schoenoplectus tabernaemontani, Carex secta*).

Hydraulic modelling confirms the system achieves hydraulic neutrality.

Overall, the design ensures stormwater is managed on site, with flows dispersed to land in a manner consistent with natural catchment distribution.

7.0 Assessment of Ecological Effects

Ecosystem components are assessed at the scale of the Foxton Ecological District, with potential effects on Maringi-a-wai Stream considered at the catchment scale given its upstream and downstream ecosystem services.

Potential ecological effects, and the activities that may cause them, are discussed below for both the construction and operation phases of the subdivision. Measures already incorporated into the project design and proposed works have been taken into account in this assessment..

7.1 Potential Effects of Vegetation Loss

All vegetation on site will be cleared.

7.1.1 Improved Pasture and Shrubland

Improved pasture and shrubland are dominated by exotic grasses and weeds, with negligible ecological value. Vegetation clearance in these areas will have a negligible magnitude of effect, and therefore an overall **Very Low level of effect**. The level of effect may in fact be considered **Positive** where pest plants are removed.

7.1.2 Tall Tree Woodland / Shelterbelt (including māhoe – ECO-Table 1 OKCDP)

The shelterbelt along the north-west boundary contains four small māhoe that are listed in ECO-Table 1 of OKCDP meet height (>4 m tall) criteria but do not meet diameter (>30 cm) criteria. This means they require assessment under Rule ECO-R6. The shelterbelt is otherwise dominated by exotic trees, shrubs, and broadleaved weeds, with native plants forming only a minor component. Despite the presence of some native plants, this community is not ecologically significant and has low ecological value.

The total area to be lost will be approximately 10% of that larger shelterbelt, within a rural landscape with many km of similar shelterbelts and whose extent is dynamic in terms of removal and replanting over time. Several large eucalyptus trees will also be cleared; while they provide seasonal nectar for native birds, their contribution is minor at the catchment scale.

The magnitude of effect from clearance of the shelterbelt vegetation is assessed as low, representing a minor effect on the known population or range. This results in an overall **Very Low level of effect.**

A. 23.5cm dbh (4.5m high)

B. 24cm dbh (6m high)

C. 20cm dbh (6m high)

D. 16cm dbh (5.5m high.)

Figure 6. Photos and size of tall māhoe trees. DBH =Diameter at Breast Height.

Map 6. Ecological effects – Māhoe trees.

7.2 Potential Effects on Herpetofauna

No lizards were recorded in the treeland/woodland area within the Site during 2022 surveys, and previous studies by Boffa Miskell indicate that populations on the Kāpiti Coast are generally low.

As the shelterbelt and rank grassland have not been comprehensively assessed, the potential presence of lizards cannot be excluded. Vegetation clearance may therefore pose some risk to lizards, although this is considered unlikely. Given their scarcity and the limited habitat value of these areas, the magnitude of effect is assessed as Low, resulting in an overall **Low level of effect.**

7.3 Potential Effects on Avifauna

Two native bird species may interact with the Site: NZ falcon and NZ pipit. Both have extensive home ranges of hundreds to thousands of hectares, thus this 2.4 ha site is likely to lie within a territory of a pair of these species, however, it would only form a small part of their territory

There is no breeding habitat for falcon and so it will not be resident or reliant on this site for breeding, and foraging opportunities are replicated across the wider pastoral landscape.

Similarly, pipit may occur in low numbers (e.g. at most two pairs), but suitable breeding habitat is minimal within the Site and abundant in the surrounding region, with preferred habitats along the coast and Ōtaki River. The largest number of local observations of this species are along the coast and the Ōtaki River which are preferred habitats for this species.

The magnitude of effect from pasture and vegetation clearance is assessed as negligible for local populations of NZ falcon and pipit, resulting in **Low and Very Low levels of effect**, respectively.

7.4 Potential Effects on Aquatic Habitat

7.4.1 Inputs of sediment and contaminants

Contaminants such as petrochemicals (oil, fuels), heavy metals, and fine sediments can adversely affect stream ecology. Suspended sediments reduce water quality by lowering dissolved oxygen, increasing turbidity, and limiting light penetration, as well as impair fish feeding and damage their gills (Cavanagh et al., 2014; Rowe et al., 2009). Deposited sediment can smother algae and macroinvertebrates, reducing survival and food availability (Clapcott et al., 2011; Ryan, 1991). Oils and fuels may have toxic or sub-lethal impacts. While such discharges are expected to be infrequent and short-lived, large spills or prolonged works could have more extensive effects.

Potential effects differ between the construction and operational phases of the subdivision, and are considered separately below.

7.4.1.1 Construction phase

Earthworks will expose soil to mobilisation by rainfall and wind, increasing the risk of sediment entering waterways. Construction-phase contaminants (e.g. fuels, lubricants, concrete slurry) may also be discharged.

Section 6.1.1 details the measures to manage these risks such as an SRP and Erosion and Sediment Controls. The localised, temporary, and non-fatal nature of any sediment or contaminant discharge (excluding concrete) means that, if such discharge were to enter the active channel, the magnitude of effect would be assessed as Low. However, with the controls outlined in Infrastructure Report R001v1-1678-0, the severity of such discharges is expected to be negligible, resulting in a **Very Low level of effect**.

If concrete slurry is being used in any location where there is the potential it could enter the active stream channel, then concrete discharge, although unlikely, is the most likely contaminant to be released during construction that may have an easily measurable adverse effect, with aquatic fauna fatalities likely. Although unlikely to occur, a concrete discharge event could have a high magnitude of effect on aquatic fauna and **Moderate level of effect**, at least in the vicinity of the discharge.

7.4.1.2 Operational phase

Stormwater will be managed via rainwater tanks, roadside raingardens, two dry attenuation ponds, and a vegetated swale. Together, these devices form a treatment train designed to slow, filter, and reduce runoff before diffuse discharge or overland flow to Maringi-a-wai Stream, which lies within the Project's Zone of Influence as the receiving environment.

The attenuation ponds and swale are designed to maintain discharge flow rates to Maringi-a-wai Stream as close to natural conditions as practicable. The swale alone, without the raingardens and attenuation ponds, equates to approximately 2.5% of the impervious surface area within the subdivision catchment. NIWA research indicates that wetlands sized at ~2–3% of catchment area can achieve 50–100% reductions in total suspended sediments, depending on site conditions and rainfall variability.[9]

The swale will be planted with native wetland species (sedges, rushes) to filter and attenuate stormwater, while the attenuation ponds will be managed in grass and edged with riparian species listed in Appendix 10 to provide shading.

Although dry ponds are not the preferred option for water quality treatment, their inclusion within a multi-stage treatment train aligns with New Zealand best practice (e.g. Wellington City Council, n.d.) The low-density residential nature of the subdivision, combined with the vegetated swale and managed grass in the attenuation ponds, is expected to reduce contaminant loads and sediment discharge, overland to Maringi-a-wai Stream.

Contaminants and heavy metals from hard surfaces may accumulate and enter the attenuation ponds and swale during rainfall events. Some contaminants may reach Maringi-a-wai Stream, particularly during high rainfall when filtration capacity is exceeded. However, the source of contaminants is considered low, given the subdivision's residential scale, the use of modern construction materials, and the relatively low vehicle numbers. Discharge is also expected to be low due to the filtration function of the wetland, attenuation ponds, and existing riparian buffers.

The performance of these devices is conditional on plant density, maintenance, and survival, which are critical to sustaining treatment efficiency. This conditional reliance has informed our recommendations in Section 8.0.

Given the design of the stormwater management system, including the filtration function of the wetland and attenuation ponds, the low-density residential nature of the subdivision, the high tolerance of the existing stream system, and the identified aquatic species of Maringi-a-wai

[9] Wetland Practioner guide, NIWA, 2022

Stream, the magnitude of effect of operational discharges of fine sediment and contaminants is assessed as negligible, resulting in a **Very Low level of effect.**

7.4.2 Increased impervious surfaces

The proposed development will increase impervious surfaces within the 2.4 ha property, with approximately 56% of the Site becoming impervious[10]. Without intervention, this would reduce natural soakage to ground and associated groundwater inputs to the stream during rainfall events, while substantially increasing surface-flow inputs. Such changes typically result in more rapid rises and falls in instream flows (i.e. 'peakiness').

The proposed attenuation ponds and swale wetland are designed to mitigate these effects by reducing the magnitude of 'flashy' flood events and maintaining flows more consistent with natural hydrological patterns. Overland flow from the wetland is also designed to maintain hydraulic neutrality, discharging to Maringi-a-wai Stream in a manner not anticipated to alter the receiving system.

Overall, the proposed design is assessed as having a negligible magnitude of effect, based on the function of the swale wetland and attenuation ponds, and the hydraulic neutrality confirmed in the Stormwater Report. This results in a **Very Low level of effect**.

7.4.3 Thermal regime of Maringi-a-wai Stream

Stormwater discharges can elevate stream temperatures, primarily when stormwater is warmed by the rapid heating of initial runoff from contact with warm impervious surfaces and/or solar radiation during temporary ponding in detention systems. Elevated water temperatures may reduce dissolved oxygen and adversely affect sensitive macroinvertebrate and fish communities, particularly in shaded, cool-water streams.

Dry attenuation ponds are generally considered less effective at mitigating thermal gain; however, shading around the ponds will limit heating, and the dense vegetation cover within and around the swale provides additional shading, infiltration, and residence time to help maintain lower water temperatures. Given these design features and the thermal regime of Maringi-a-wai Stream, which may already be slightly elevated in summer (associated with limited riparian cover), the incremental thermal effect of stormwater discharges is assessed as negligible, resulting in a **Very Low level of effect.**

7.5 Summary of Potential Ecological Effects

Table 15. Summarises our assessment of effects for each ecological component prior to mitigation being implemented (other than mitigation that can be reasonably assumed a requirement of the development, such as erosion and sediment control). Using the EIANZ (2018) guidelines.

Ecosystem Component	Ecological Value	Magnitude of Effect	Potential Level of Effect
Terrestrial Vegetation - other			
Improved pasture	Negligible	Low	Very Low
Eucalyptus Tall trees / woodland	Low	Low	Very Low

[10] Infrastructure Report, Envelope, November 2025

Ecosystem Component	Ecological Value	Magnitude of Effect	Potential Level of Effect
Blackberry Shrub / Vineland Weedland	Negligible	Low (Positive)	Positive
English Spindle Tree / boxthorn Shelterbelt	Negligible	Low (Positive)	Positive
Māhoe (4 trees)	Low	Low	Very Low
Herpetofauna			
Northern grass skink	Moderate	Low	Low
Avifauna			
NZ pipit	High	Negligible	Very Low
NZ Bush Falcon	Very High	Negligible	Low
Aquatic Habitat (Maringi-a-wai Stream)			
Sediment / contaminant discharge, excl. concrete (construction phase)	Moderate	Low	Low
Concrete discharge (construction phase)	Moderate	High	Moderate
Sediment discharge (operational phase)	Moderate	Negligible	Very Low
Contaminant discharge (operational phase)	Moderate	Negligible	Very Low
Increase in impervious surfaces	Moderate	Negligible	Very Low
Thermal regime	Moderate	Negligible	Very Low

8.0 Effects Management Recommendations

8.1 Measures to Minimise Effects

8.1.1 Herpetofauna

- Additional surveys are recommended to cover habitat not previously targeted and given the time lapse of three years since the last survey.
- If lizards are found, a Lizard Management Plan and Wildlife Permit Application will be required.
- Due to the development of the entire site, lizards will need to be captured and released at a near-by protected site, approved by DOC, as part of the LMP and wildlife permitting process.

8.1.2 Avifauna

- No At Risk or Threatened species are expected to be affected or displaced by this proposal, thus no mitigation is required. For NZ Bush Falcon, the level of effect remains at ‘Low’ due to the ‘Very High’ value of this species, but that is not a concern for this project as effects are less than minor.
- Clearance of tall eucalyptus will result in minor loss of habitat for common species (e.g. tūī, kererū). This habitat loss is expected to be replaced through street planting of native flowering species.
- It is good practice to check potential nest sites prior to felling of tall trees, particularly where there are potential nest cavities for species like ruru (morepork). If tree clearance occurs outside the breeding season, (1 September to 28 February) no nest checks would be required.

8.1.3 Aquatic Habitat

8.1.3.1 Contaminants

- Water quality objective: Discharges to Maringi-a-wai Stream should be of equal or better quality than existing stream water, ensuring they do not impede future improvements in aquatic ecosystem health.
- Concrete works: As far as practicable, no concrete shall be poured in areas where runoff could enter water connected to Maringi-a-wai Stream. Where unavoidable, concrete-pouring sites must be fully isolated from the stream. Slurry toxicity may persist if captured within sediment retention ponds and subsequently discharged via overland flow; however, dilution is expected to reduce the magnitude of effect.
- Stormwater system efficacy: In-system testing of the stormwater system is recommended to confirm treatment performance. Any testing, limits, parameters, and

monitoring responsibilities should be determined in accordance with KCDC's global discharge consent standards.

- Planting maintenance and monitoring: Stormwater treatment performance is conditional on plant density, survival, and ongoing management. Swale planting should achieve at least 80% cover at the time of vesting with council. Maintenance should include weed control, replacement planting where establishment failures occur, and sediment removal if required, to ensure long-term effectiveness.

8.2 Recommended Monitoring

8.2.1 Vegetation Clearance

- Pre-clearance surveys for nesting indigenous birds.
- Pre-clearance lizard survey and salvage if lizards are present.

8.2.2 Revegetation

- The contract with the planting contractor to include:
    - The planting management plan.
    - Requirement to remove any conservation weeds before vegetation requirements are considered complete.
    - Replacement of dead plants annually (early in planting season) until sign-off.
    - Requirement for 80% indigenous canopy cover in the swale to be achieved before completion standards are met.
    - Annual reporting to Classic Developments during the timeframe the asset is managed by the developer. KCDC to confirm compliance before vesting with council.

8.2.3 Herpetofauna

- If lizards are found and translocation is permitted by DOC, we recommend lizard monitoring at a release site. To be agreed with Iwi and DOC and detailed in the LMP.
- We recommend pest control for rats, mice, mustelids, and hedghogs at the release site for 3 years. To be detailed in the LMP

8.2.4 Contaminants

- Any testing, limits, and parameters of the stormwater system should be in accordance with KCDC's global discharge consent.

8.3 Summary of Effects after Mitigation

Table 16. Table of actual level of effect, considering above mitigation.

Ecosystem Component	Ecological Value	Magnitude of Effect	Actual Level of Effect
Terrestrial Vegetation - other			
Improved pasture	Negligible	Low	Very Low
Eucalyptus Tall trees / woodland	Low	Negligible	Very Low
Blackberry Shrub / Vineland Weedland	Negligible	Positive	Positive
English Spindle Tree / boxthorn Shelterbelt	Negligible	Positive	Positive
Māhoe (4 trees)	Low	Low	Very Low
Herpetofauna			
Northern grass skink	Moderate	Negligible	Very Low
Avifauna			
NZ pipit	High	Negligible	Very Low
NZ Falcon	Very High	Negligible	Low
Aquatic Habitat			
Sediment / contaminant discharge, excl. concrete (construction phase)	Moderate	Negligible	Very Low
Concrete discharge (construction phase)	Moderate	Negligible	Very Low
Sediment discharge (operational phase)	Moderate	Negligible	Very Low
Contaminant discharge (operational phase)	Moderate	Negligible	Very Low
Increase in impervious surfaces	Moderate	Negligible	Very Low
Thermal regime	Moderate	Negligible	Very Low

9.0 Conclusion

The subdivision at 234 Rangiuru Road is located within a highly modified pastoral landscape, with exotic trees and shelterbelts (primarily eucalyptus) and occasional native species such as māhoe, but no remaining original vegetation. Vegetation communities are dominated by exotic species, are not ecologically significant, and hold Very Low to Low ecological value. Clearance effects are therefore assessed as Very Low, or Positive where conservation weeds are removed.

No lizards were recorded in 2022; however, some potential unexplored habitat remains. Effects are assessed as Very Low, subject to survey and salvage (if required) as a consent condition.

Maringi-a-wai Stream, already constrained by upstream modification and its lowland soft-bottom character, will receive treated stormwater via a constructed swale wetland and attenuation ponds. With filtration, attenuation, and appropriate management/maintenance in place, discharges are expected to be of equal or better quality than current stream water, in part due to the design featuring swale plants for filtering contaminants. Residual effects on hydrology, contaminants, and thermal regime are assessed as Very Low.

The lost source of winter nectar from removing eucalyptus trees will be compensated for by planting indigenous winter to spring flowering species. Native plant species designated within amenity planting, attenuation basins, and swale planting will increase local plant biodiversity.

Overall, the subdivision is not anticipated to result in residual ecological effects, provided recommendations are implemented.

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Appendix 1: Species List

All species observed on site during biological investigations. Indigenous species highlighted.

Species name (*=exotic)	Common name	Threat Status	Growth Form
*Anthemis cotula**	Stinking milkweed	N/A	Dicot Herb
*Arstium minus**	burdock	N/A	Dicot Herb
*Bellardia viscosa**	tarweed	N/A	Dicot Herb
*Bellis perennis**	English daisy	N/A	Dicot Herb
*Berberis glaucocarpa**	barberry	N/A	Tree
*Brassica rapa**	Wild brassica	N/A	Dicot Herb
*Calistegia sylvatica**	bindweed	N/A	Dicot Herb
*Chamaemelum nobile**	chamomile	N/A	Dicot Herb
*Cirsium arvense**	Californian Thistle	N/A	Dicot Herb
*Cirsium vulgare**	Scotch Thistle	N/A	Dicot Herb
Coprosma repens	taupata	N/A	Tree
*Crataegus monogyna**	hawthorn	N/A	Tree
*Dactylis glomerata**	Cocksfoot	N/A	Grass
*Digitalis purpurea**	Foxglove	N/A	Dicot Herb
*Eucalyptus sp.**	gum	N/A	Tree
*Euonymus europaeus**	Spindle tree	N/A	Tree
*Euphorbia peplus**	milkweed	N/A	Dicot Herb
*Hedera helix**	ivy	N/A	Liane
*Holcus lanatus**	Yorkshire Fog	N/A	Grass
Iris foetidissima	Stinking iris	N/A	Shrub
Juncus sp	rush		Rush
Lycium ferocissimum	boxthorn	N/A	Shrub
Matricaria discoidea	Rayless chamomile	N/A	Dicot Herb
Melicytus ramiflorus	Māhoe	Not Threatened	Tree
*Persicaria hydropiper**	Water Pepper	N/A	Dicot Herb
Piper excelsum	Kawakawa	Not Threatened	Tree
*Pittosporum crassifolium**	karo	N/A	Tree
*Plantago lanceolata**	Narrow-leaved plantain	N/A	Dicot Herb
*Plantago major**	Broad leaved plantain	N/A	Dicot Herb
*Populus sp.**	Poplar	N/A	Tree
*Prunus sp.**		N/A	Tree
*Ranunculus repens**	Creeping Buttercup	N/A	Dicot Herb
*Rubus fruticosus**	Blackberry	N/A	Shrub
*Rumex obtusifolius**	Broad-leaved dock	N/A	Dicot Herb
*Sambuca nigra**	elderberry	N/A	Tree
*Sisyrinchium rosulatum**	Annual blue-eyed grass	N/A	Monocot Herb
*Solanum laciniatum**	Poroporo / bullibulli	N/A	Dicot Herb

*Solanum chenopodioides**	Velvety nightshade	N/A	Shrub
*Stachys sylvatica**	hedge woundwort	N/A	Dicot Herb
*Trifolium repens**	White Clover	N/A	Dicot Herb
*Ulex europaeus**	Gorse	N/A	Shrub
*Veronica sp.**	Field speedwell	N/A	Dicot Herb
Vicia hirsuta	Hairy vetch	N/A	Dicot Herb

Appendix 2: Site Photos – Vegetation Plots

Vegetation Plots – Transect 1 – Series 1 (Plots 1.1 to 1.6)

Vegetation Plots - Eastern Paddock – Series 2 (Plots 2.1 to 2.5)

10.1.1.1 Vegetation Plots – Transect 3 – Series 3 (Plots 3.1 to 3.3)

Appendix 3: Site Photos – Habitat

Figure A3.4 – Improved Pasture

Figure A3.5 - Shrubland

Figure A3.6 - Treeland

Figure A3.7 - Shelterbelt

Appendix 4: Site photos - Maringi-a-wai Stream

Photo A4.1. Site 1 (upstream site; facing upstream) of Maringi-a-wai Stream, with harakeke as riparian vegetation and high amounts of water celery in-stream.

Photo A4.2. Downstream end of culvert, containing harakeke woven rope as a fish passage remediation tool.

Photo A4.3. Site 2 (facing downstream) of Maringi-a-wai Stream, with ponga on the true right bank and filamentous periphyton in-stream.

Photo A4.4. Above Site 2 (facing downstream) with an area of water celery growth in-stream and various non-indigenous riparian vegetation species.

Photo A4.5. Site 3 (facing upstream) of Maringi-a-wai Stream, with a fence either side and rank grass and creeping buttercup as riparian vegetation.

Photo A4.6. High number of filamentous periphyton / algae cover present at the downstream site (Site 3).

Photo A4.7. Large longfin eel observed at the downstream site.

Photo A4.8. Adult īnanga caught within a fyke net at the downstream site.

Appendix 5: Vegetation Plot Data

Table A5.1. Wetland vegetation plot summary.

Plot No.	Dominant Species %	Dominant Affinity (Obligate to Upland)[11]	Wetland / Non-wetland – (Wetland Prevalence)
1.1	Ryegrass 80	FACU	Non-wetland vegetation (Prevalence score of 3.76)
1.2	Ryegrass 40, creeping bent 15, creeping buttercup 15.	FACU-FACW	Non-wetland vegetation (Prevalence score of 3.47)
1.3	Ryegrass 90	FACU	Non-wetland vegetation (Prevalence score of 3.90)
1.4	Ryegrass 25, creeping bent 25, Californian thistle 30	FACU-FACW	Non-wetland vegetation (Prevalence score of 2.81)
1.5	Ryegrass 55, creeping bent 20, creeping buttercup 15.	FACU-FACW	Non-wetland vegetation (Prevalence score of 3.00)
1.6	Yorkshire fog 50, Ryegrass 20, Californian thistle 20	FAC-FACU	Non-wetland vegetation (Prevalence score of 3.19) NB: Pasture exclusion would kick in for this one is there were other wetland indicators.
2.1	Clover 40, plantain 20, ryegrass 25	FACU	Non-wetland vegetation (Prevalence score of 3.85)
2.2	Ryegrass 50, clover 20	FACU	Non-wetland vegetation (Prevalence score of 3.97)
2.3	Ryegrass 35, clover 20, creeping buttercup 25	FAC-FACU	Non-wetland vegetation (Prevalence score of 3.57)
2.4	Ryegrass 50, clover 25	FACU	Non-wetland vegetation (Prevalence score of 3.85)
2.5	Plantain 50, clover 50	FACU	Non-wetland vegetation (Prevalence score of 4.00)
3.1	Plantain 50, rush 20	FACU-FACW	Non-wetland vegetation (Prevalence score of 3.53)
3.2	Ryegrass 45, clover 40	FACU	Non-wetland vegetation (Prevalence score of 4.00)
3.3	Ryegrass 80	FACU	Non-wetland vegetation (Prevalence score of 3.92)

[11] Refer to 'prevalence' in methodology to decipher code category.

Appendix 6: Bird species common and scientific name and regional conservation status

Table A6.117. All native birds present within a 10km radius of the Site (eBird Grid Square BT70) which may be present at the proposed site. Sorted by common name and scientific name provided. Regional conservation status shown (Crisp, 2020)

SPECIES	CONSERVATION STATUS - Robertson et al. 2017	Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
Kingfisher	Native	■		▫	▫	■			
Morepork	Native	■	▫	▫	▫				
Bellbird	Endemic	■	▫	▫					▫
Bush falcon	Endemic	■	▫	▫					
North Island fantail	Native	■	▫	▫					▫
Kereru	Endemic	■		▫					
North Island rifleman	Endemic	■	▫	▫					
Shining cuckoo	Native	■		▫					
North Island tomtit	Endemic	■	▫	▫					
Tui	Endemic	■		▫					
Whitehead	Endemic	■	▫	▫					
California quail	Introduced			■	▫				
Eastern rosella	Introduced	▫	▫	■					
Blackbird	Introduced	▫	▫	■	▫				▫
Grey warbler	Endemic	▫	▫	■					▫
Pheasant	Introduced			■					
Silvereye	Native	▫	▫	■					▫
Magpie	Introduced		▫		■				▫
Chaffinch	Introduced	▫	▫	▫	■				▫
Dunnock	Introduced	▫	▫	▫	■				▫
Cattle egret	Migrant				■	▫			
Skylark	Introduced				■				
Goldfinch	Introduced			▫	■				▫
Greenfinch	Introduced		▫	▫	■				▫
Starling	Introduced				■				▫
House sparrow	Introduced				■				▫
Redpoll	Introduced			▫	■				▫
Spur-winged plover	Native				■	▫			
Song thrush	Introduced	▫	▫	▫	■				▫

SPECIES	CONSERVATION STATUS - Robertson et al. 2017	Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
Swamp harrier	Native								
Welcome swallow	Native								
Yellowhammer	Introduced								
Canada goose	Introduced								
NZ pipit	Native								
Pukeko	Native								
Brown teal	Endemic								
Mallard	Introduced								
NZ dabchick	Endemic								
Grey duck	Native								
Paradise shelduck	Endemic								
Australian shoveler	Native								
Black swan	Native								
Black-billed gull	Endemic								
Black-fronted dotterel	Coloniser								
Grey teal	Native								
Feral goose	Introduced								
Black shag	Native								
Little black shag	Native								
Little shag	Native								
North Island fernbird	Endemic								
NZ scaup	Endemic								
Australian shoveler	Native								
Pied shag	Endemic								
Pied stilt	Native								
Caspian tern	Native								
Banded dotterel	Endemic								
Black-backed gull	Native								
Royal spoonbill	Native								
Red-billed gull	Native								
White-faced heron	Native								
Barbary dove	Introduced								
Rock pigeon	Introduced								

Appendix 7: Land Use Over Time

Photo A7.1. 1948/04/28(Local Government Geospatial Alliance, n.d.)

Photo A7.2. 1976/03/15(Local Government Geospatial Alliance, n.d.)

Photo A7.3. 2022/08 (Google)

Appendix 8: ECO-Table 1 - Key Indigenous Tree Species by Size as it applies to this site.

Common Name	Species	Māori Name	Dimensions That Relate to Rules	
			Diameter (circumference in cm)	Height (m)
Black maire	*Nestegis cunninghamii*	Maire rau nui	15.0 (47)	4
Black pine	*Prumnopitys taxifolia*	Matai	15.0 (47)	4
Broadleaf	*Griselinia lucida*	Puka	15.0 (47)	4
Brown pine	*Prumnopitys ferruginea*	Miro	15.0 (47)	4
Cabbage Tree	*Cordyline australis*	Tī kōuka	30.0 (95)	4
Cork Tree	*Entelea arborescens*	Whau	15.0 (47)	4
Hīnau	*Elaeocarpus dentatus*	Hīnau	15.0 (47)	4
Kaikōmako	*Pennantia corymbosa*	Kaikōmako	15.0 (47)	3
Kāmahi	*Weinmannia racemosa*	Kāmahi	15.0 (47)	4
Kohekohe	*Dysoxylum spectabile*	Kohekohe	15.0 (47)	4
Kōwhai	*Sophora microphylla*	Kōwhai	30.0 (95)	4
Lacebark	*Hoheria sextylosa*	-	15.0 (47)	4
Large leaved milk tree	*Steblus banksii*	Turepo	15.0 (47)	4
Marbleleaf	*Carpodetus serratus*	Putaputaweta	15.0 (47)	4
Narrow leaved lacebark	*Hoheria angustifolia*	-	15.0 (47)	4
Narrow-leaved maire	*Nestegis montana*	Maire kōtae or rōroro	15.0 (47)	4
New Zealand honeysuckle	*Knightia excelsa*	Rewarewa	15.0 (47)	4
New Zealand myrtle	*Lophomyrtus bullata*	Ramarama	15.0 (47)	4
New Zealand myrtle	*Lophomyrtus obcordata*	Rōhutu	15.0 (47)	4
Nīkau	*Rhopalostylis sapida*	Nīkau	15.0 (47)	4
Northern Rātā	*Metrosiderous robusta*	Rātā	15.0 (47)	4
Pigeonwood	*Hedycarya arborea*	Porokaiwhiri	15.0 (47)	4
Poataniwha	*Melicope simplex*	Poataniwha	15.0 (47)	4
Pōkākā	*Elaeocarpus hookerianus*	Pōkākā	15.0 (47)	4
Pukatea	*Laurelia novaezealandiae*	Pukatea	15.0 (47)	4
Red mapou	*Myrsine australis*	Matipo	15.0 (47)	3
Red Pine	*Dacrydium cupressinum*	Rimu	15.0 (47)	4
Ribbonwood	*Plagianthus regius*	Mānatu	15.0 (47)	4
Small leaved milk tree	*Streblus heterophyllus*	Turepo	15.0 (47)	4
Swamp maire	*Syzygium maire*	Maire tawake	15.0 (47)	4
Tawa	*Beilschmiedia tawa*	Tawa	15.0 (47)	4

Tea tree	*Leptospermum scoparium*	Mānuka	15.0 (47)	3
Thin-leaved coprosma	*Coprosma areolata*	-	15.0 (47)	3
Tītoki	*Alectryon excelsus*	Tītoki	15.0 (47)	4
Toro	*Myrsine salicina*	Toro	15.0 (47)	4
Tōtara	*Podocarpus tōtara*	Tōtara	30.0 (47)	4
Tree fuchsia	*Fuchsia excorticata*	Kōtukutuku	15.0 (47)	4
Wharangi	*Melicope ternata*	Wharangi	15.0 (47)	3
White maire	*Nestegis lanceolata*	Maire rauriki	15.0 (47)	4
White Pine	*Dacrycarpus dacrydioides*	Kahikatea	15.0 (47)	4
White tea tree	*Kunzea robusta or Kunzea amathicola*	Kānuka	15.0 (47)	3
Whiteywood	*Melicytus ramiflorus*	Māhoe	30.0 (95)	4
Wire netting brush	*Corokia cotoneaster*	Korokio tāranga	15.0 (47)	3

Appendix 9: Maringi-a-wai Stream survey data

Table A9.1. Average and range of percentage cover of macrophyte species estimated from three cross-sectional transects within the three sites within Maringi-a-wai Stream.

	Site 1	Site 2	Site 3
Floating species			
Red azolla (*Azolla rubra*)	3 (2-6)	0 (0-1)	
Common duckweed (*Lemna disperma*)	6 (3-10)	2 (1-4)	2 (0-6)
Floating crystalwort (*Riccia fluitans*)	2 (0-3)	2 (0-4)	
Submerged species			
Water starwart (*Callitriche stagnalis*)	2 (0-4)	1 (0-2)	
Water celery (*Helosciadium nodiflorum*)		0 (0-1)	
Emergent species			
Water starwart (*Callitriche stagnalis*)	14 (3-30)	0 (0-1)	
Water celery (*Helosciadium nodiflorum*)	9 (5-12)	38 (1-100)	67 (15-95)
Water cress (*Nasturtium officinale*)	2 (2-5)	2 (0-5)	
Creeping bent (*Agrostis stolonifera*)	4 (2-5)		
Buttercup (*Ranunculus repens*)	2 (1-4)	1 (0-2)	

Note all three floating species are considered Not Threatened (de Lange et al., 2020, 2024), while all other macrophyte species are considered Exotic.

Table A9.2. Summary of the Rapid Habitat Assessment (Clapcott, 2015) undertaken at the three sites within Maringi-a-wai Stream

Habitat parameter	Site 1	Site 2	Site 3
Deposited sediment	1	1	1
Invertebrate habitat diversity	4	7	5
Invertebrate habitat abundance	1	1	1
Fish cover diversity	4	7	7
Fish cover abundance	4.5	5	10
Hydraulic heterogeneity	1	1	1
Bank erosion	9.5	9.5	10
Bank vegetation	2.5	3	6
Riparian width	2.5	6	8
Riparian shade	1	4.5	9
Total RHA score	31	45	58

Table A9.3. Physical habitat characteristics of three sections of Marangi-a-wai Stream assessed on 3rd October 2024.

Habitat characteristic	Site 3	Site 2	Site 1
Average water velocity (m/s)	0.067	0.029	0.008
Average (range) wetted width (m)	3.9 (3.5 – 4.5)	3.0 (2.4 – 3.7)	1.7 (1.2 – 2.2)
Average (range) water depth (cm)	51.0 (36 – 62)	26.3 (15 – 37.5)	12.3 (6 – 19)
Average (range) sediment depth (cm)	13.1 (0.5 – 34)	12.7 (1 – 38)	4.5 (0.5 – 14)
Average (range) filamentous periphyton % cover	97 (90-100)	55 (0-95)	0 (-)
Average (range) macrophyte % cover	42 (25-65)	42 (10-100)	68 (20-90)
Average (range) woody debris % cover	10 (2-20)	0	0

Table A10.2. Abundance of macroinvertebrate taxa at three sites within Maringi-a-wai Stream.

Group	Species	Site 3	Site 2	Site 1
ACARINA	ACARINA			49
ANNELIDA	HIRUDINEA			6
ANNELIDA	OLIGOCHAETA	120	289	1291
ARACHNIDA	Dolomedes			2
CNIDARIA	Hydra			38
Coleoptera	Dytiscidae, Liodessus	2	17	
COLLEMBOLA	COLLEMBOLA		7	4
CRUSTACEA	Amphipoda, Phreatogammarus	34	7	
CRUSTACEA	Amphipoda, Talitridae		4	
CRUSTACEA	Cladocera	16	21	284
CRUSTACEA	Copepoda	76	66	15
CRUSTACEA	Ostracoda	381	1062	1211
CRUSTACEA	Paracalliope	744	1031	767
Diptera	Chironomus	4	8	
Diptera	Corynoneura	9	4	
Diptera	Orthocladiinae, excl. Corynoneura	5	18	7
Diptera	Paradixa		4	2
Diptera	Polypedilum		6	2
Diptera	Psychodidae		11	1
Diptera	Tanypodinae		9	26
Hemiptera	Anisops		85	
Hemiptera	Microvelia	6	24	43
MOLLUSCA	Lymnaeidae			6
MOLLUSCA	Physa = Physella	8	26	

MOLLUSCA	Potamopyrgus	9		2
MOLLUSCA	Sphaeriidae	67	5	
NEMATODA	NEMATODA		24	188
NEMERTEA	NEMERTEA			27
Odonata	Xanthocnemis	7	36	63
PLATYHELMINTHES	PLATYHELMINTHES, excl. Rhabdocoela		38	3
Trichoptera	Oxyethira	101	61	

Appendix 10: Planting schedule. Sourced from Landscape Urban Design Report (Blac Limited, 2025)

Plant Schedule: Rangiuru - Public Realm Planting Mix

Code	Botanical Name	Common/ Maori Name	Min Grade	Area (m²)	Percentage Mix	Quantity	Spacing guide	Spread at maturity (m)	Height at maturity (m)	Remarks
	Street Trees Palette									
Ke	*Knightia excelsa*	Rewarewa	25L	As shown	N/A		As shown	5	10	
Ds	*Didymocheton spectabilis*	Kohekohe	25L					4	10	
Pc	*Pseudopanax crassifolius*	Lancewood	25L					3	5	
G1	**Amenity / Raingarden Planting Mix**									
	Veronica speciosa	Hebe ‚Napuka'	PB5	359			@0.75m Ctrs	1	1	
	Muehlenbeckia astonii	Pohuehue ‚Astoni'	PB5				@0.75m Ctrs	1	0.2	
	Apodasmia similis	Oioi	PB5				@0.75m Ctrs	1	1	
	Coriaria arborea	Tutu	PB5				@1.5m Ctrs	2	3	
	Muehlenbeckia axillaris	Pohuehue ‚Axillaris'	PB5				@0.75m Ctrs	1	0.2	
	Stormwater Reserve Trees Palette									
Ke	*Knightia excelsa*	Rewarewa	25L	As shown	N/A		As shown	5	10	
Ml	*Myoporum laetum*	Ngaio	25L					3.5	6	
Ds	*Didymocheton spectabilis*	Kohekohe	25L					4	10	
Pc	*Pseudopanax crassifolius*	Lancewood	25L					3	5	
G2	**Swale/ Wetland Planting Mix**									
	Schoenoplectus tabernaemontani	Kuawa, Lake club rush	PB5	471			@0.75m Ctrs	1	1.5	
	Eleocharis sphacelata	Kutakuta, Tall spike sedge	PB5				@0.75m Ctrs	1	1.5	
	Carex secta	Pūrei, New Zealand Sedge	PB5				@1m Ctrs	1.5	1.5	
	Eleocharis acuta	Spike rush, Sharp spike sedge	PB3				@0.3m Ctrs	0.5	0.5	
	Machaerina rubiginosa	Baumea	PB5				@0.75m Ctrs	1	1.5	
	Cyperus ustulatus	Coastal cutty grass	PB5				@0.75m Ctrs	1	1	
	Carex lessoniana	*Rautahi, Cutty Grass*	PB5				@0.75m Ctrs	1	1.2	
	Carex geminata	Rautahi, Cutty grass	PB5				@0.75m Ctrs	1	1.2	
G3	**Pond Edges Planting Mix**									
	Carex virgata	Swamp sedge, Pukio	PB5	214			@0.75m Ctrs	1	1	
	Carex lessoniana	*Rautahi, Cutty Grass*	PB5				@0.75m Ctrs	1	1.2	
	Coprosma propinqua	Mingimingi	PB5				@0.75m Ctrs	1	2.5	
	Austroderia fulvida	Toe toe	PB5				@1m Ctrs	1.5	1.5	
	Leptospermum scoparium	Manuka	PB5				@2m Ctrs	3	5	
	Cordyline australis	TI kōuka, NZ Cabbage Tree	PB5				@1.5m Ctrs	2	6	

Plant Schedule: Rangiuru - Lot Planting Mix

Code	Botanical Name	Common/ Maori Name	Min Grade	Area (m²)	Percentage Mix	Quantity	Spacing guide	Spread at maturity (m)	Height at maturity (m)	Remarks
	Trees Palette									
Ls	*Leptospermum scoparium*	Manuka	25L		N/A		As shown	3	5	
Pc	*Pseudopanax crassifolius*	Lancewood	25L					3	5	
Sm	*Sophora microphylla*	Kōwhai	25L					3	6	
G4	**Shrubs**									
	Veronica speciosa	Hebe ‚Napuka'	PB5				@ 0.75m Ctrs	1	1	
	Muehlenbeckia astonii	Pohuehue ‚Astoni'	PB5				@0.75m Ctrs	1	0.2	
	Veronica salicifolia	Koromiko	PB5				@0.75m Ctrs	1	1	
	Parablechnum novae-zelandiae	Kiokio	PB5				@1.5m Ctrs	2	1.5	
G5	**Hedges**									
	Corokia 'frosted chocolate'	Korokio	PB5				@0.75m Ctrs	1	2	
	Griselinia littoralis	Kapuka, NZ broadleaf	PB5				@2m Ctrs	2.5	5	
	Sophora prostrata	Prostrate kōwhai	PB5				@1m Ctrs	1.5	2	
G6	**Groudcovers**									
	Muehlenbeckia axillaris	Pohuehue ‚Axillaris'	PB5				@0.75m Ctrs	1	0.2	
	Pratia angulata 'Blue Star'	*Blue Star Creeper*	PB5				@0.75m Ctrs	1	0.1	

Together. Shaping Better Places.

Boffa Miskell is a leading New Zealand environmental consultancy with nine offices throughout Aotearoa. We work with a wide range of local, international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, Te Hīhiri (cultural advisory), engagement, transport advisory, climate change, graphics, and mapping. Over the past five decades we have built a reputation for creativity, professionalism, innovation, and excellence by understanding each project's interconnections with the wider environmental, social, cultural, and economic context.

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