Appendix L

Ecological Impact Assessment

ecoLogical Solutions

Environmental Consultants





May 2026

Wairākei South

Ecological Impact Assessment

Submitted to:

Bell Road Limited Partnership

water fauna flora land

Quality Assurance

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Executive Summary

Ecological Solutions has prepared an Ecological Impact Assessment (EcIA) for the proposed Wairākei South development located at 339 Bell Road, Papamoa, Bay of Plenty ('the Site') for Bell Road Limited Partnership. The key terrestrial and freshwater ecological features on-site and in the receiving environment were identified as well as the potential and actual effects attributable to the proposed development. The Wairākei South Development proposal was referred as a Fast-track Approvals Act 2024 project and confirmed in December 2024.

Wairākei South is a large-scale c. 350-hectare mixed use development within the high-growth Eastern Corridor between Pāpāmoa, Te Tumu, and Te Puke. It proposes to provide residential areas offering c. 2,700 - 3,000 new homes, 50 - 60 hectares of commercial land, plus community spaces, a school site and infrastructure such as stormwater and wetland management areas. The Site has been primarily used for intensive agriculture, specifically dairy stock grazing and maize crops both presently and historically. The balance of the land is made up of flat paddocks serviced by gently elevated, well-maintained farm races that provide access for livestock and vehicles.

Overall, the ecological value of terrestrial ecological features on the Site ranges from 'negligible' to 'moderate', with freshwater ecological values within the Site and the receiving environment ranging from 'low' to 'high'. There were no wetlands identified within the Site; however, several BOPRC mapped wetlands are located outside the Site in close proximity which have 'very high' ecological value. According to the BOPRC RPS criteria for indigenous vegetation and habitat of indigenous fauna of national importance the Site is not considered significant in relation to Section 6c of the Resource Management Act 1991 (RMA).

The ecological effects attributable to the proposed development include both positive and adverse effects. The positive effects include the removal of intensive stock grazing and associated effluent from the landscape and the introduction of an effective stormwater management system ensuring improved water quality entering the lower Kaituna catchment. In addition, the proposed development includes c. 70 ha of wetland creation, as part of the stormwater management area, adding to the functional wetland inventory of the lower Kaituna, improving ecological connectivity and biodiversity at both the local and district scales and enhancing the overall capability of the Site to deliver ecological services such as increased nutrient cycling, surface water filtration, and flood attenuation.

The actual and potential adverse ecological effects, after the application of the effects management hierarchy, including specific management measures outlined in ecological management plans for lizards, birds and bats (Ecological Solutions 2026a – Appendix AH of the application), are considered to be 'very low' to 'low' on terrestrial, freshwater and wetland ecological values, in accordance with the EIANZ impact assessment methodology. Consequently, no residual adverse effects are anticipated with positive residual effects expected associated with water quality and new wetland area as a result of the Wairākei South development.

A Wildlife Act Authorisation (WAA) will be required to implement the proposed lizard management measures outlined in the Lizard Management Plan (LMP) (Ecological Solutions 2026b – Appendix AJ of the application). The proposed lizard management measures will involve the capture and relocation of indigenous lizards prior to vegetation clearance within identified lizard habitat areas.

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1.0 Introduction

1.1 Background

The proposed Wairākei South Development is a privately funded urban development project aimed at addressing the Western Bay of Plenty sub-region's growing housing and business land shortfalls. The Wairākei South Development proposal was referred as a Fast-track Approvals Act 2024 project and confirmed in December 2024.

Wairākei South is a large-scale c. 350-hectare mixed use development within the high-growth Eastern Corridor between Pāpāmoa, Te Tumu, and Te Puke. It proposes to provide residential areas offering c. 2,700 - 3,000 new homes, 50 - 60 hectares of commercial land, plus community spaces, a school site and infrastructure such as stormwater and wetland management areas located at 339 Bell Road, Papamoa, Bay of Plenty directly off the Tauranga Eastern Link ('the Site') (Figure 1). The Site has been primarily used for intensive agriculture, specifically dairy stock grazing and maize crops both presently and historically. The balance of the land is made up of flat paddocks serviced by gently elevated, well-maintained farm races that provide access for livestock and vehicles.

The Site is located within the jurisdictional boundaries of the Bay of Plenty Regional Council (BoPRC) and the relevant district plan is the Western Bay of Plenty District Plan (TDP).

1.2 Scope of Report

Ecological Solutions was engaged by Bell Road Limited Partnership to undertake baseline terrestrial and freshwater ecological surveys necessary to prepare an ecological impact assessment (EcIA) for the 'Wairākei South' development. The following EcIA identifies the actual and potential ecological effects attributable to the proposal and provides recommendations for the management of adverse effects in accordance with the effects management hierarchy.

This EcIA is to inform the substantive Fast-Track Act 2024 application for resource consents and contribute to planning so that adverse ecological effects attributable to the development can be managed appropriately.

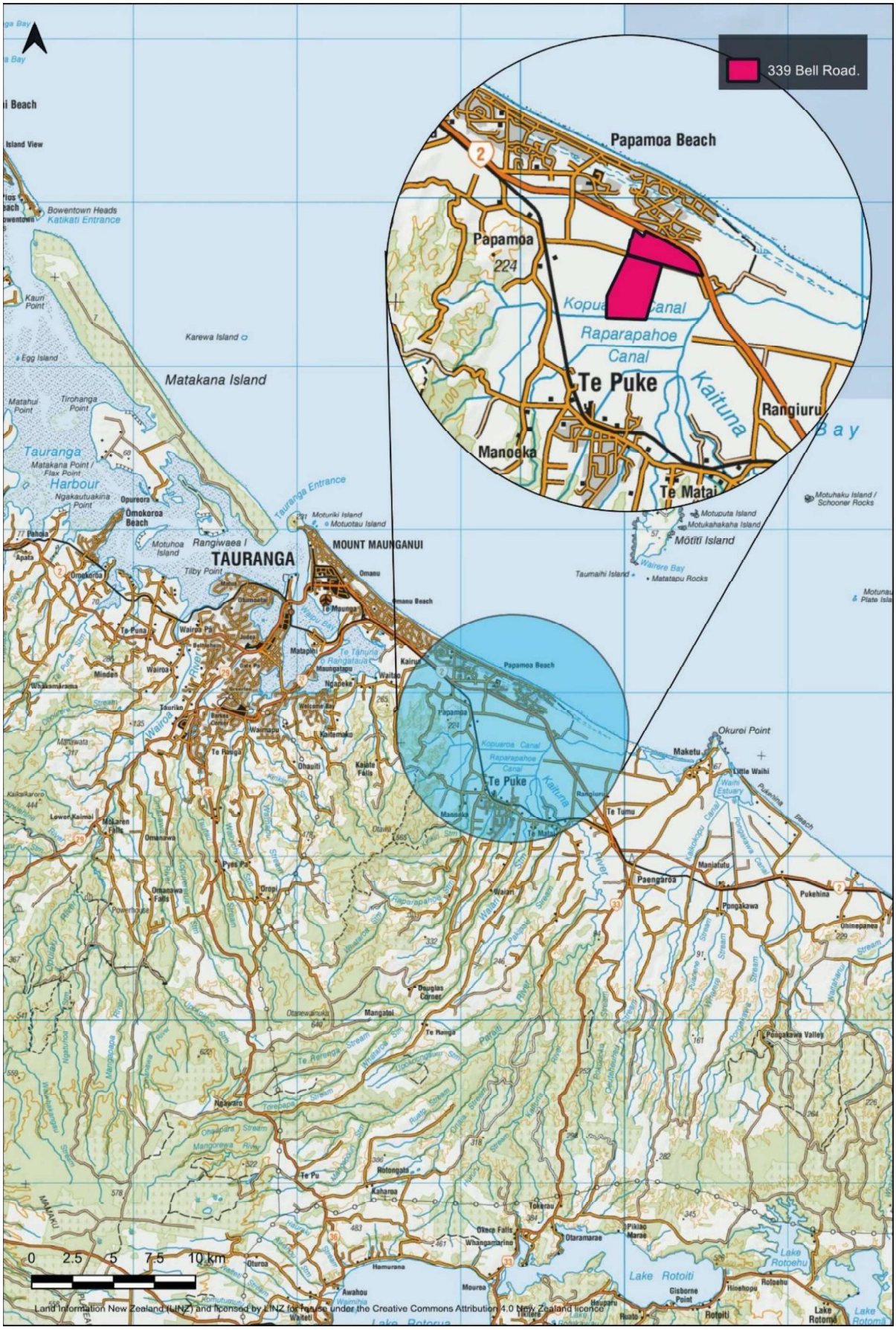

Figure 1: Location of the Site.

Figure 2: Development Concept Master Plan (Boffa Miskell 2026).

2.0 Ecological Setting

The Site is located within the Tauranga Ecological District (McEwen 1987), which is situated in the Western Bay of Plenty Ecological Region. The District is largely within the coastal bioclimatic zone, as only small portions extending beyond c. 1 km from the coastal environment. Beyond the coastal zone, the rest of the ecological district, including the Site, is in the semi-coastal bioclimatic zone.

The district is sunny, somewhat sheltered and has a strong maritime influence, receiving high intensity rain from the north-east and north. The district has a mean annual rainfall of approximately 1300 mm and receives between 2,220 and 2,400 hours of sunshine per year. The mean annual temperature is between 14–15ºC, 18–19ºC in the summer and 9–11°C in winter (NIWA 2021).

Soils are volcanic ash on terrace, rolling and hilly lands, but mainly deep silty soils from weathered brown ashes. The predominant soil type is a yellow brown loam, derived from the Whakatane and Waihi ashes, which extends across the ecological district to the west and south of the Tauranga Harbour, into the foothills of the Kaimai Range.

Indigenous vegetation in the district comprises forests which are almost all podocarp-hardwood (dominated by rimu (*Dacrydium cupressinum*), tawa (*Beilschmiedia tawa*), kamahi (*Pterophylla racemosa*) and tāwari (*Ixerba brexioides*). Since colonisation, much of the district has been cleared for farming (intensive dairying and some sheep and cattle) and horticulture (especially kiwifruit). A survey of flora in the Tauranga ED by Beadel (2002) resulted in a list of over 705 species of which 338 (47%) were native species and the remaining were exotic.

Wetlands in the district were mostly drained, with approximately 3% of freshwater wetlands remaining in the Bay of Plenty (41,000 hectares from estimate of vegetative cover in 1840, compared to 1,000 hectares in 1996) (RNRP 2017). Whilst a few wetlands have been only slightly modified, the majority of wetlands in the Bay of Plenty have been severely modified and are highly degraded (RNRP 2017).

The Site is not located within any Significant Natural Areas (SNA) identified in the Bay of Plenty Regional Council Regional Coastal Environment Plan. There are four such SNAs nearby (i.e. within 3 km) including the Kaituna Sand Dunes and Wetland, Ōtira Sand Dunes, Papamoa Sand Dunes and Shark Alley to Kaituna Spit Sand Dunes as shown in Figure 3.

2.1 Land Environment

The Threatened Environment Classification (TEC) combines data from three national databases: Land Environments of New Zealand (LENZ), the Land Cover Database (LCDB), and the national protected areas network (Cieraad et al. 2015, Walker et al. 2015). The TEC is designed as a regional-national scale tool for assessing the threat status of land environments based on the loss of original natural vegetation cover and the extent to which the remaining indigenous vegetation is protected.

The Site consists entirely of Land Environment A5.3a which consists of alluvium from a variety of sources, including estuarine sediments and rhyolitic and andesitic ash are dominant, along with peat and some older sands. Soils are typically poorly-drained and of low to moderate natural fertility. Land Environment A5.3a is assigned to Threat Category 2 which contains 10 - 20% remaining indigenous cover. In these environments, indigenous biodiversity values have been severely reduced with only fragmented indigenous habitats, sparsely distributed across the landscape, remaining (Cieraad et al. 2015).

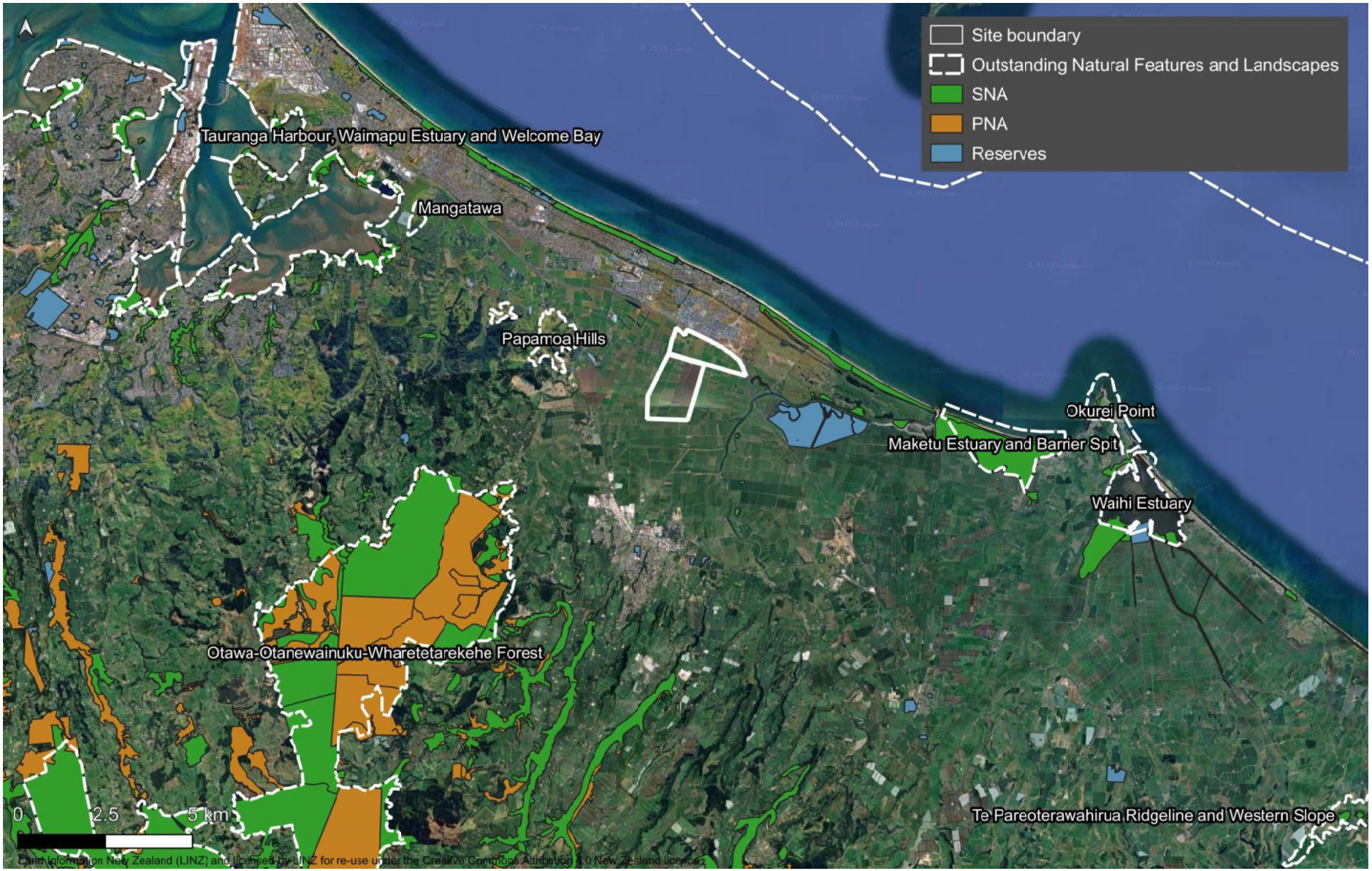

Figure 3: Significant areas and outstanding natural features in proximity to the Site.

3.0 Methodology

3.1 Desktop Review

A desktop review of existing literature and databases for the project area was undertaken including the following:

- Bay of Plenty Regional Council (BOPRC) plans, policies and maps to determine if any significant freshwater or terrestrial features have been identified within the Site or the surrounding area.
- Significant Natural Area and Protected Natural Area reports.
- Database records held in the New Zealand Freshwater Fish Database, herpetofauna records (Department of Conservation database), bat records (Department of Conservation database) and bird records (New Zealand eBird database).
- Current and historical aerial images from Google Earth, LINZ and Retrolens to assist with identifying historical stream alignments and potential wetland habitat.

3.2 Survey Timing and Location

The Site was surveyed including assessment of terrestrial and freshwater ecological values, identification of natural inland wetlands and the identification of key habitat for bats, birds and lizards. Site surveys were undertaken on:

- 21 to 23 July 2025.
- 22 October 2025.
- 17 November 2025.

Details of survey outcomes are presented in Sections 3.3 and 3.4.

3.3 Terrestrial Ecology

3.3.1 Vegetation

An initial desktop assessment was carried out using aerial imagery (Google Earth, Retrolens, topographic maps, Digital Elevation Modelling (DEM) and GIS datasets) to assist in determining landcover and vegetation types, historic land use and hydrological patterns that might correspond with potential wetlands. Areas of vegetation and habitat were identified, mapped, described and photographed during the Site surveys.

3.3.2 Avifauna

Existing avifauna survey records within 10 km of the Site were obtained from the New Zealand eBird database (retrieved December 2024) to inform which species were likely to be present at the Site. All birds seen or heard during the Site surveys were recorded and potential avian habitats were identified.

3.3.3 Lizards

A search of the Department of Conservation BioWeb database within 12 km[1] of the Site was undertaken to identify species which might be present. Data were issued by the Department of Conservation in March 2025.

Any potential lizard habitat onsite was identified, photographed and mapped during the

[1] Distance to existing lizard records not precise. 12km equals smallest reporting distance in accordance with ESL's GIS data sharing agreement with the Department of Conservation.

site surveys. Manual habitat searches were undertaken within suitable lizard habitat areas during the November 2025 survey.

3.3.4 Bats

Both long-tailed bat (*Chalinolobus tuberculatus*) and Central lesser short-tailed bat (*Mystacina tuberculata rhyacobi*) survey records within 25 km of the Site were obtained from the Department of Conservation's bat database to assess the likelihood of bats using the Site. Data were issued by the Department of Conservation in February 2025. In addition, a literature review was undertaken in relation to previous bat surveys that have been conducted in the area.

Satellite imagery informed a desktop identification of habitat features within or near the Site that may be important to bats for navigation (e.g., hedgerows, canals, rivers), feeding (e.g., edges of tall vegetation, paddocks, wetlands, rivers) or roosting (e.g., trees >15 cm diameter at breast height (dbh) likely to exhibit potential roost features).

The Site was surveyed in July 2025 and October 2025 in order to ground truth potential bat habitat identified during desktop assessment (i.e., foraging, commuting and roosting areas/features). An Acoustic Bat Monitoring (ABM) survey was undertaken from 22 October to 17 November 2025. Twelve ABMs were deployed across the Site targeting bat habitat features where bats were most likely to be active if present.

3.4 Freshwater Ecology

3.4.1 Water Quality

A desktop review of water quality was undertaken, which focused on describing the existing environment and water quality values on the Site and receiving environment. The reviews focused on the Raparapahoe Canal, the Bell Road Drain, Kopuaroa Canal and the lower Kaituna River as the receiving environment.

Sources of information include published reports by NIWA (2024), BOPRC (2017) and online data bases: LAWA (Land and Water Aotearoa) and the BOPRC Water Ecology Tool (WET) (accessed 21 and 22 August 2025). Maven's stormwater management plan (Maven 2026a – Appendix G of the AEE) provided the information required to complete the effects of stormwater assessment on the receiving environment.

In addition, water physicochemical parameters including temperature, dissolved oxygen, conductivity, and pH were measured in watercourses that carried water and were representative of the wide network of drains within the Site during the survey performed July 2025, using a calibrated handheld YSI meter.

3.4.2 Watercourse Classification

Watercourses were classified in accordance with the definitions outlined in the Bay of Plenty Regional Plan (i.e., artificial, farm drainage canal, modified, ephemeral or perennial) (BOPRP 2017). Current and historical aerial photographs were also reviewed to provide an indication of historical alignments. The Regional Natural Resources Plan sets water quality classifications for rivers and streams in the Bay of Plenty Region (BOPRP 2017). The watercourse classifications are set out below.

Artificial watercourse – A watercourse which meets the following criteria:

a) Is not a natural or modified watercourse, and

b) Is a completely human-made channel along which water would not naturally flow. Includes irrigation canals, water supply race, canals for the supply of water for electricity power generation, farm drains and other drains (e.g. roadside drains). Excludes Land Drainage Canals.

Ephemeral flow path – An ephemeral flow path is where any one of the following criteria are met:

a) The flow path is an entrenched dry gully greater than 1 metre deep.

b) There is clear evidence of a channel within the valley system where overland flow occurs from time to time.

c) There is clear evidence of erosion (such as gullying or headward gully erosion) associated with short term water flow from time to time within the valley system.

An ephemeral flow path excludes the following:

a) A valley that does not show any evidence of overland flow channels, or erosion as a result of overland flow.

Intermittent watercourse –A watercourse that:

a) Flows for most of the year or is only dry for short periods of the year, and during such dry periods has stable pools or 'wet patches'; and

b) Has a defined water channel and banks; and (c) Connects with a permanently flowing surface water body; and

c) Provides habitat for aquatic flora and/or fauna species.

Land drainage canal – A modified watercourse that is part of a land drainage scheme.

Modified watercourse – A watercourse that meets any of following criteria:

a) Is a river or stream that has been channelled or diverted.

b) Is a Land Drainage Canal (as defined in this regional plan) constructed through a wetland or swamp, that generally follows the path of a historic natural watercourse or reasonably defined natural drainage channel.

c) Is a watercourse that has a natural headwater of either a channel or spring, and generally follows the path of a historic natural watercourse or reasonably defined natural drainage channel.

d) Is the oxbow of a diverted river.

River – Means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).

Note: 'River' includes intermittent watercourses, but excludes ephemeral flowpaths. Refer to the definitions of Intermittent Watercourse and Ephemeral Flowpath.

3.4.3 Stream Habitat Characteristics

The stream habitat characteristics of watercourses within the Site were assessed during the July 2025 survey. Habitat characteristics were assessed in accordance with the Rapid Habitat Assessment (RHA) assessment protocol (Cawthron 2015) and included parameters such as sediment deposition, invertebrate habitat, fish cover, flow variability, bank vegetation and shade, and channel alteration to assist with the assessment of ecological values. Each of these parameters were scored from 1 to 10 where 10 indicates optimal conditions. The RHA score is based on the sum of scores across all parameters with RHA scores ranging from 10 to 100.

3.4.4 Fish Fauna

A search of the New Zealand Freshwater Fish Database within the Catchment was

carried out to check for fish records within the Site and the wider area. Environmental DNA (eDNA) samples were collected within the Site during the July 2025 survey. Samples were sent to Wilderlab for basic multispecies analysis.

3.5 Wetlands

Identification and delineation of wetlands within the Site was undertaken in July 2025 to confirm whether there were any wetlands present which meet the definition of a wetland under the Resource Management Act 1991 (RMA) and 'natural inland wetland' provided in the National Policy Statement for Freshwater Management (NPS-FM) (Ministry for the Environment 2020). The wetland assessment was carried out in accordance with the delineation protocols set out in the relevant guidelines at the time of the assessment (Clarkson 2014; Fraser et al. 2018; Clarkson et al. 2021; MfE 2021, 2022a, 2022b).

Potential and actual wetlands within 100 m of the Site and within the combined drawdown extent (offsite) were identified via review of aerial imagery (to identify changes in vegetation patterns) and existing mapping. The locations and extent provided here are indicative only, and these wetlands would require additional survey work to confirm if they meet the definition of a natural inland wetland in accordance with the NPS-FM.

The Resource Management Act 1991 defines a wetland as; *"includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions".*

The NPS-FM defines natural wetlands meaning a wetland (as defined in the Resource Management Act 1991) that is **not**:

(a) in the coastal marine area; or

(b) a deliberately constructed wetland, other than a wetland constructed to offset impacts on, or to restore, an existing or former natural inland wetland; or

(c) a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body; or

(d) a geothermal wetland; or

(e) a wetland that:

  (i) is within an area of pasture used for grazing; and

  (ii) has vegetation cover comprising more than 50% exotic pasture species (as identified in the National List of Exotic Pasture Species (Cosgrove et al. 2022) using the Pasture Exclusion Assessment Methodology (see clause 1.8); unless

  (iii) the wetland is a location of a habitat of a threatened species identified under clause 3.8 of this National Policy Statement, in which case the exclusion in (e) does not apply.

3.6 Assessment of Ecological Values

Ecological values were assigned following the approach outlined in the Environment Institute of Australia and New Zealand's (EIANZ) Ecological Impact Assessment guidelines (EcIAG) (Roper-Lindsay et al. 2018). The EcIAG outline a standardised approach for defining ecological values.

The approach involves assessing four matters including representativeness, rarity/distinctiveness, diversity/pattern and ecological context with consideration of the attributes outlined in Table 7 of the EcIAG. The overall ecological values within the Site and vicinity were assigned based on the four matters outlined above and using the scoring system outlined in Table 6 of the EcIAG.

3.7 Assessment of Ecological Effects

The level of effects was assessed using the method recommended by the EcIAG (Roper-Lindsay et al. 2018). This method involves assigning ecological values as above and determining the magnitude of effects based on criteria outlined in Table 1 below and assigning the overall level of effect using the matrix in Table 2 below. The magnitude of the effects was considered at the Site level (unless otherwise indicated).

Table 1: Criteria for describing magnitude of effect.

Magnitude	Description
Very high	Total loss or very major alteration to key elements/ features of the baseline conditions such that the post development character/ composition/ 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 (pre-development) conditions such that post development character/ composition/ 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/attributes of 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/attributes of baseline condition will be similar to pre-development 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.

Table 2: Criteria for describing level of effect.

Effect level	Ecological value				
	Very high	***High***	***Moderate***	***Low***	***Negligible***
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	Net gain	Net gain	Net gain	Net gain	Net gain

3.8 Assessment of Matters of National Importance in the BOP Region

3.8.1 Indigenous vegetation and habitats of Indigenous fauna

Indigenous vegetation and habitats of indigenous fauna were assessed against the importance criteria outlined in Appendix C Set 3 of the Operative Bay of Plenty Regional Policy Statement (BOP RPS). Under the BOP RPS, areas of significant indigenous biodiversity are to be identified using a suite of nine criteria. A site that meets one or more of the criteria is deemed to be significant.

The importance criteria are qualitative standards that form a basis for decision-making. They identify the principles for assessing the significance of places or resources and can

help explain what makes them important in the context of section 6c of the RMA. The criteria for indigenous vegetation and habitat of indigenous fauna are grouped according to nine headings. These are: representativeness, rarity or distinctive, diversity and pattern, naturalness, ecological context, viability and sustainability, Māori, historical and community association. As the Māori, historical and community association criteria are not ecological, these criteria were not evaluated as part of this EcIA.

4.0 Terrestrial Ecological Features

The Site contained largely low-lying flat topography within historic Kaituna River floodplain bounded by rear dune sequence on the northern boundary. Vegetation was almost entirely exotic and comprised pasture grasses, shelterbelts and paddock trees. The only indigenous vegetation present was occasional cabbage trees (*Cordyline australis*) along the margins of farm drains and as paddock trees and sparse riparian planting of manuka (*Leptospermum scoparium*) and *Cyperus ustulatus* along one drain. The maize block was devoid of vegetation due to recent harvesting and no sowing having yet occurred. This block had areas of rank grass along drains and shelterbelts along with occasional cabbage trees.

4.1 Vegetation

The Site was largely dominated by exotic vegetation, with most of the Site being intensively managed pasture grass and cropped maize with exotic paddock trees and shelterbelts and only occasional isolated indigenous vegetation (cabbage trees and riparian planting). The vegetation communities present were reflective of typical intensively managed dairy farms within the Bay of Plenty region. A list of plant species recorded at the Site is provided in Appendix A.

4.1.1 Exotic pasture

Exotic pasture vegetation at the Site consisted of approximately 255 ha of pasture grass species dominated by perennial rye (*Lolium perenne*) and white clover (*Trifolium repens*) (Figure 4). Pasture species were intensively grazed at the time of the site surveys.

Figure 4: Exotic pasture within the Site

4.1.2 Native revegetation

The riparian margins of two drains contained a narrow band (~2 m on each bank) of sparse native riparian planting consisting of mānuka (*Leptospermum scoparium* agg.) and giant umbrella sedge (*Cyperus ustulatus*). These plantings appeared to have experienced a high level of mortality and remaining vegetation was sparse (Figure 5).

Figure 5: Sparse riparian planting of indigenous vegetation.

4.1.3 Cropped maize

Approximately 87 ha of the Site is regularly cultivated in maize (*Zea mays*). The maize had been harvested and not resown at the time of the July survey. The ground was bare, with no vegetation cover with the exception of three isolated cabbage trees (Figure 6 and Figure 7).

Figure 6: View of harvested maize within the Site.

Figure 7: Individual cabbage trees isolated within maize block.

4.1.4 Rank grass

There is approximately 6 ha of rank grass within the maize block along shelterbelts and drain margins. This vegetation is a mix of exotic grasses and herbaceous species with some areas overgrown with blackberry and moth plant.

4.1.5 Exotic Trees

Exotic tree species were located along fence lines, formed shelterbelts, within the grounds of residential dwellings and in discrete, isolated locations in paddocks. Species included crack willow (*Salix fragilis*), robusta poplar (*Poplar x canadensis*), London plane (*Platanus x hispanica*), European oak (*Quercus robur*), Japanese cedar (*Cryptomeria japonica*) and macrocarpa (*Hesperocyparis macrocarpa*) (Figure 8 and Figure 9).

Figure 8: Japanese cedar shelterbelt within maize block.

Figure 9: Location of vegetation types within the Site.

4.2 Avifauna

Bird species observed during the Site surveys were primarily common species of rural landscapes including the native pūkeko (*Porphyrio melanotus*), spur-winged plover (*Vanellus miles*), swamp harrier (*Circus approximans*), white faced heron (*Egretta novaehollandiae*) and welcome swallow (*Hirundo neoxena*), and the exotic mallard duck (*Anas platyrhynchos*) and house sparrow (*Passer domesticus*). All are 'Not Threatened'.

A large flock of black-backed gulls was loafing in a paddock on the northern block during the July survey, but foraging activity was not observed. A little shag (*Microcarbo melanoleucos,* "At Risk – Relict") was observed resting on a fence post onsite by the Bell Road Drain and was the only bird of conservation interest observed during the same survey.

The eBird database indicates 32 indigenous bird species have been previously recorded within proximity of the Site. Of these, 15 have been identified as being of conservation concern (i.e., considered 'At-Risk' or 'Threatened') (Table 3). Many of these species and records are associated with core habitats such as the Wairākei wetlands and coastal margin habitats. Such species represent highly mobile generalists which often utilise differing habitats depending on life history traits and/or seasonal foraging opportunities. In the context of the Site, bird species such as gulls, passeriformes (perching species), gruiformes (pukeko) and charadriiformes (plovers) are expected to visit the Site periodically for opportunistic roosting and/or foraging. However, the Site offers limited habitat opportunity to support core populations.

All bird species and their conservation status recorded in the eBird database within 10 km of the Site are listed in Appendix B.

Table 3: eBird records of conservation interest within 10 km of the Site.

Common Name	Scientific Name	Conservation Status (Robertson et al. 2021)
Australasian bittern	*Botaurus poiciloptilus*	Threatened – Nationally Critical
Black shag	*Phalacrocorax carbo*	At Risk – Naturally uncommon
Black-billed Gull	*Chroicocephalus bulleri*	At Risk – Declining
Buff-banded Rail	*Gallirallus philippensis*	At Risk – Declining
Grey duck	*Anas superciliosa*	Threatened – Nationally Vulnerable
Longtailed cuckoo	*Eudynamys taitensis*	At Risk – Naturally uncommon
Marsh crake	*Porzana pusilla affinis*	At Risk – Declining
New Zealand dabchick / Weweia	*Poliocephalus rufopectus*	Threatened – Nationally Increasing
Pipit	*Anthus novaeseelandiae*	At Risk – Declining
South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining
Fernbird/ Mātātā	*Poodytes punctatus*	At Risk – Declining
Spotless crake	*Porzana tabuensis tabuensis*	At Risk – Declining
Pied shag	*Phalacrocorax v. varius*	At Risk – Recovering
Royal spoonbill	*Platalea regia*	At Risk – Naturally Uncommon
Variable Oystercatcher	*Haematopus unicolor*	At Risk – Recovering

4.3 Herpetofauna

There were three indigenous lizard species identified within the Department of Conservation database as being previously recorded within 12 km of the Site. These included the copper skink (*Oligosoma aenum,* 'At Risk – Declining'), shore skink (*Oligosoma smithi*, 'At Risk – Declining') and moko skink (*Oligosoma moco,* 'At Risk -Relict') (Hitchmough et al. 2021). Records of the exotic plague skink (*Lampropholis delicata*) were also noted.

While no native skinks were confirmed onsite during two-man hours of manual habitat searching within sparse lizard habitat areas within the Site (Figure 10), there was potential for copper skink to be present in low numbers. Copper skinks are commonly found within rank pasture habitats and exotic gardens surrounding farm dwellings.

It is unlikely that shore or moko skink populations exist at the Site, due to their habitat preferences and the ongoing disturbance regime across the Site (i.e. farm practices, existing pest animal populations) and the distance to other suitable habitat that would allow for shore or moko skink recruitment. The Site contained no habitat suitable for native geckos due to historic vegetation clearance and the absence of suitable habitat connectivity to known gecko habitats.

Figure 10: Potential copper skink habitat areas

4.4 Bats

Long-tailed bats are considered 'Threatened – Nationally Critical' (O'Donnell et al. 2023) and populations are predicted to be declining at a rate of 5–9% per annum nationally (O'Donnell et al. 2023).

The central lesser short-tailed bat is considered 'At Risk – Declining' (O'Donnell et al. 2023).

4.4.1 Previous Surveys and Records

In accordance with the DOC bat database there have been historic bat surveys done within proximity of the Site which may provide some insight in to the level of bat activity in the wider area (Figure 11). The closest survey recorded was undertaken approximately c.1 km to the east at Te Tumu in 2019 and recorded no bat activity. The next closest bat surveys were c.7.5 km to the south in 2014 in Te Puke and c.9.2 km to the west in 2020 at Welcome Bay where long-tailed bats were recorded.

ABM surveys were undertaken by Tonkin & Taylor in 2017 for the Tauranga Northern Motorway Link c.17 km west of the Site. Two long-tailed bat passes were recorded during a March survey, while no bats were detected during subsequent follow up surveys undertaken in May 2017, April 2021 and April 2023 (Department of Conservation 2025).

Previous surveys have also detected long-tailed bat activity in the Kaharoa Range with substantial records in the Rotorua Lakes region (c. 30 km) (i.e., Lake Ōkāreka (Kaharoa Kokako Trust 2019) and Okere falls (Ecological Solutions 2024–2025 unpublished). A single record of lesser short-tailed bat (*Mystacina tuberculata)* from 2010 from the Kaharoa Range c.19 km south of the Site was also noted.

4.4.2 Habitat features

The exotic hedgerows, isolated trees and open productive pasture of the Site can provide suitable commuting, foraging and potential roosting opportunities for bats if they are present (Figure 9). The open pasture areas produce insects which bats forage on and the hedgerows provide linear features suitable for commuting routes. The few trees present with a diameter at breast height greater than 15cm did offer potential bat roost features such as flaking bark, cavities, and crevices etc.

4.4.3 Acoustic bat survey

Twelve acoustic bat monitors (DOC AR4s) were deployed across the Site for a period of 27 nights from 22 October to 17 November 2025 (Figure 12). No bat activity was recorded over 21 valid survey nights. A valid survey night was defined as having a minimum overnight temperature of 8°C, less than 2.5 mm of rainfall within the first two hours after sunset and low overnight winds.

Figure 11: DOC database records of bat activity within 25 km of the Site.

Figure 12: ABM survey distribution.

5.0 Freshwater Ecology

5.1 Watercourse Classification

There are three watercourses in proximity of the Site, which are part of the Kaituna Catchment Control Scheme and have been either created or modified to prevent flooding of the lowland agricultural areas (Table 4 and Figure 15). All three drains flow in an easterly direction.

The Bell Road drain is located centrally within the Site and is aligned with Bell Road which dissects the north and south blocks. The Bell Road drain discharges to the Kaituna River on the eastern side of the Tauranga Eastern Link Road. The Kopuaroa Canal flows parallel to and forms the south block boundary of the Site, before discharging to the Kaituna River approximately 600 m upstream of the Tauranga Eastern Link Road. The Raparapahoe Canal runs parallel to and lies approximately 600 m to the south of the Site and Kopuaroa Canal.

The Regional Natural Resources Plan sets water quality classifications for rivers and streams in the Bay of Plenty Regional Plan (BOPRP 2017), which have been set out in Table 4.

The Bell Road Drain is classified as 'Drain Water Quality' (DWQ) meaning it is an artificial watercourse and the National Policy Statement for Freshwater Management 2020 (NPS-FM) objectives and policies are not applicable. The Kopuaroa Canal and Raparapahoe Canal are classified as 'Modified with Ecological Values' (MEV) and are subject to the objectives and policies of the NPS-FM (2020).

All other watercourses within the Site meet the criteria of 'farm drain' under the BOPRP (2017) definitions. The classification of 'farm drain' was supported by historical aerial imagery analysis and ground truthing during surveys of the Site (Figure 15).

Table 4: Watercourse Water Quality Classification (BOPRP 2017).

Watercourse	RNPS Classification	Definition
Bell Road Drain	Drain Water Quality	Artificial watercourse. Objectives in NPS-FM (2020) not applicable but discharges are managed to support receiving environment objectives.
Kopuaroa Canal	Modified with Ecological Values	Freshwater bodies under the NPS-FM (2020) and RNRP and are subject to objectives and policies set as part of the NPS-FM (2020).
Raparapahoe Canal	Modified with Ecological Values	
Kaituna River	Contact Recreation	Any discharge of contaminants or water to water in a river or stream classified, as Contact Recreation in the Water Quality Classification Map shall not alter the quality of the water beyond the following standards and criteria after reasonable mixing of the discharge with the receiving water.

5.2 Instream Habitat

The farm drains within the Site provide limited to no habitat for much of the native fish fauna known to inhabit the Kaituna Catchment Control Scheme drains and canals. The following is a general description of the instream habitat features of the farm drain network within the Site. Not all drains were surveyed because of the similar characteristics of the drains across the Site (Figure 13).

Figure 13: Aerial view of a section of the drain network at Wairākei South.

Instream habitat within the farm drains was characterised by deep silt deposits, artificially incised channels with steep banks, and an absence of riparian vegetation or hydrological habitat types. Macrophytes were prolific and some drains were inundated close to 100% with various macrophyte species and types.

The most common macrophytes were: *Persicaria hydropiper and P. decepiens, Potamogeton crispus* (curly pondweed) *and Myriophyllum aquaticum* (parrots feather). Less dominant species include *Egria densa, Glyceria maxima* and *Nasturtium* sp. (watercress). Water levels varied between the drains ranging from completely dry, to surface pooling and deep stagnant water. Stagnant surface water was covered in green and brown algae and stained orangey brown from ferrous iron in some areas reflecting the low velocity environment of the drains, the absence of adequate shading and the high nutrient concentrations from the adjacent farming activities.

Habitat quality within the farm drain network was considered poor and only capable of supporting species such as short fin eel, Gambusia, and low water and habitat quality tolerant macroinvertebrates such as chironomids (midges), oligochaete worms and in the deeper channels, Dysticidae (diving beetles).

RHA scores were determined for three representative farm drains (A, B and C) as a subset of the drain habitat across the Site (Figure 15). The RHA is a standardised protocol that evaluates ten freshwater habitat parameters. The RHA scores across of all three drains were low, ranging from 28 to 38 (

Table 5). The low RHA scores were consistent with previous assessments undertaken of drains and land drainage canals in the Kaituna and Rangitaiki lowlands (Suren and Carter 2018) and are indicative of the high amounts of fine sediment, channel alteration, low habitat diversity, lack of bank vegetation and subsequent lack of shade.

The low-quality condition of the drains was not particularly surprising given the fact that the drains were constructed with a focus on maximising their hydraulic efficiency in the removal of excess water. Consequently, complex habitat features providing ecological benefits such as hydraulic heterogeneity in the channel beds and banks, meandering channels and overhead vegetation are generally not maintained as part of the farm drainage network as these features hinder hydraulic efficiency.

Figure 14: Representative farm drain sampled (Drain C)

Table 5: Physical habitat details.

Drain	Bank stability	Shading	Mean depth (m)	Channel	Substrate	RHA score
A	Mostly stable	<5%	0.42	Shallow run (low velocity)	100% silt	30
B	Mostly stable	<5%	0.22	Shallow run (moderate velocity)	100% silt	28
C	Mostly stable	5–10%	0.25	Shallow pools (occasional)	100% silt	38

Figure 15: Watercourse classifications and eDNA survey locations within the Site.

5.3 Water Quality

5.3.1 Farm Drains within the Site

The Site is located in an environment that has gone through significant landuse modifications for the purpose of agriculture and flood control. Artificial farm drains on the Site are typical of similar environments across the lowland areas of the Bay of Plenty. The farm drains on the Site are incised, soft bottomed and have poor water quality (see section 5.2). Water physiochemistry of three of the drains show low oxygen, low pH and elevated conductivity within the Site (Table 6). Low pH is indicative of the underlying peat layer in the area. Surface water temperature was moderate in the two southern block drains but likely rise above threshold temperatures for fish habitat during the warmer months due to a lack of shading from riparian vegetation.

Table 6: Water physicochemistry results during the July 2025 survey.

Watercourse	Time	Temp. (°C)	Dissolved oxygen		pH	Conductivity (µS/cm)
			(g/m^3)	(%)		
Drain 1	10.15	17.1	7.98	73.4	6.38	136.8
Drain 2	13.05	11.9	8.02	74.3	5.62	273.4
Drain 3	13.30	11.1	3.80	45.0	6.17	282.5

5.3.2 Kaituna Drainage Scheme

There are three watercourses in proximity of the Site, which are part of the Kaituna Drainage Scheme and have been either created or modified to prevent flooding of the lowland agricultural areas (BOPRC 2018). These drains flow into the Kaituna River and are therefore part of the description of the existing environment (Section).

Suren and Carter (2018) undertook a comprehensive assessment of the drains and land drainage canals in the Kaituna and Rangitāiki Plains, with the objective to fill knowledge gaps in the often-overlooked modified ecosystems. The following water quality summaries are taken from Suren and Carter (2018) and show summary statistics for drains with DWQ and MEV status in the Kaituna Drainage network, which are therefore indicative of the water quality values within the Bell Road Drain and the Kopuaroa and Raparahoe Canals respectively.

The DWQ sites are characterised by high *E. coli* counts (range: 20–5,600 cfu/100 mL) and high concentrations of ammonia (range: 0.008–1.73) and highly variable dissolved oxygen (range: 1.9–140%) (Table 7). There are similarities between the DWQ and MEV drains including similar DO ranges, although the MEV drains had a higher median value. pH was similar between the two drain types (DWQ median = 6.9; MEV median = 7.2). *E. coli* counts were higher in the DWQ drain type, compared to MEV. Median Nox concentrations in the MEV drain types was ten-fold higher than DWQ drains.

Comparisons to the NPS-FM (2022) indicate the MEV sites are within Attribute band B for ammonia (i.e. >0.03 and ≤ 0.24); Band B (>1.0 and ≤ 2.4) for NOx (Table 6) and Band D for median *E.* coli concentrations. DRP in the MEV drains were within the Attribute D band indicating that ecological communities are likely impacted by high DRP concentrations.

Table 7: Water Quality summary statistics for the Kaituna drainage network.

Class	Statistic	EC (mS/cm)	DO (%)	*E.coli* (MPN/100 mL)	Temp. (ºC)	pH	Ammonia	DRP	NOx	TN
DWQ	Median	0.62	38.8	190	19.6	6.9	0.511	0.033	0.10	0.19
	Min.	0.26	1.9	20	8.8	5.9	0.008	0.008	0.001	0.05
	Max.	21.9	140	5,600	29.8	8.0	1.73	0.18	2.34	0.58
	SD	4.88	36.1	818	4.8	0.4	0.45	0.04	0.407	0.14
MEV	Median	1.19	88.6	160	17.2	7.2	0.06	0.10	1.29	0.17
	Min.	0.11	1.3	9	9	6.5	0.004	0.06	0.003	0.12
	Max.	8.34	140	3,100	24.1	8.0	1.38	0.21	2.53	0.43
	SD	2.57	31.9	596	3.6	0.3	0.27	0.03	0.43	0.07

Notes: Nutrient units are all g/m^3. SD = Standard deviation.

5.3.3 Kaituna River

The following provides a summary assessment of water quality in the Ōkere-Te Awarua-Kaituna River and is based on a desktop review of existing information. Water quality in the Ōkere-Te Awarua-Kaituna River is well understood through more than 30 years of monitoring data from Bay of Plenty Regional Council, which regularly monitors water quality at Te Tumu, which is downstream of the Site (i.e., the receiving environment). Long-term trend data and five-year median data from Te Tumu is summarised in Table 9.

Long-term *E. coli* counts and turbidity indicate an improvement at Te Tumu. There is a longer-term trend to improving nitrate nitrogen (NO_3-N) and phosphorus concentrations at Te Tumu and improved status of all nutrient species at the Te Tumu site.

E. coli monitoring places the Te Tumu site in Attribute Band A for the 5-year median (LAWA 2024), although a 2022 analysis determined the Te Tumu site was in Attribute Band D and the other lower mid to lower-Kaituna sites were in Attribute Band B, suggestive of a possible worsening trend (BoPRC 2022).

The NPS-FM attribute states for ammoniacal nitrogen (Amm-N) toxicity and NO_3-N toxicity are in Attribute Band A. There is an increase in dissolved reactive phosphorus (DRP) concentrations between the Lake Rotoiti Outlet site (A-band) and sites further downstream (all Attribute Band D). Water clarity at the three lower mid to lower-Kaituna sites is at or below the bottom line (BoPRC 2022; BoPRC 2023a).

The recent expert panel review of estimates of sources of key contaminants, *E. coli*, total nitrogen (TN) and total phosphorus (TP), to the Kaituna River catchment found the greatest load contribution was from dairy. The source of the notable DRP load is the AFFCO abattoir wastewater discharge (BoPRC 2023b).

Table 8: Long-term water quality trends on the Ōkere-Te Awarua-Kaituna River.

	E. coli (MPN/100 mL)	Turbidity (NTU)	TN (g/m^3)	Amm-N (g/m^3)	NO_3-N (g/m^3)	DRP (g/m^3)	TP (g/m^3)
Te Tumu	++	++	NA	++	++	+	++

Notes: ++ very likely improving; + likely improving; 0 indeterminate; - likely degrading; -- very likely degrading; NA not assessed (LAWA 2024).

Table 9: Median water quality data on the Ōkere-Te Awarua-Kaituna River.

	E. coli (MPN/100 mL)	Turbidity (NTU)	Clarity (m)	Org-N(g/m^3)	TN (g/m^3)	Amm-N (g/m^3)	NO_3N (g/m^3)	DRP (g/m^3)	TP (g/m^3)
Te Tumu	90 (A-band)	2.9	1.67	0.17	0.68	0.024 (A-band)	0.49 (A-band)	0.023 (D-band)	0.038

Notes: Median data from November 2019 to November 2024 except for clarity, which is from July 2008 to February 2012 (LAWA 2024). Median Org-N estimated via calculation: Org-N = TN – Amm-N – NO_3-N. General current attribute state bands are provided in parenthesis.

5.4 Freshwater Fish

5.4.1 New Zealand Freshwater Fish Database

The New Zealand Freshwater Fish Database (NZFFD) holds extensive records of fish species within the Kaituna River Catchment (Table 10), which are also described in Suren and Carter (2018) and indicate that drains classified as 'modified with ecological value' provide fish passage for a variety of diadromous New Zealand fish species and therefore provide an important ecological function. All these species (except for shortfin eel and introduced species) are of conservation interest for threat status (Dunn et al. 2025).

Table 10. NZFFD fish records for the Kaituna River catchment (accessed October 2025).

Common name	Scientific name	Conservation status (Dunn et al. 2025)
Longfin eel	*Anguilla dieffenbachii*	At Risk – Declining
Shortfin eel	*Anguilla australis*	Not Threatened
Brown trout	*Salmo trutta*	Introduced and naturalised
Rainbow trout	*Oncorhynchus mykiss*	Introduced and naturalised
Gambusia	*Gambusia affinis*	Introduced and naturalised
Koi carp	*Cyprinus carpio*	Introduced and naturalised
Inanga	*Galaxias maculatus*	Threatened - Nationally Vulnerable
Common bully	*Gobiomorphus cotidianus*	Not Threatened
Redfin bully	*Gobiomorphus huttoni*	At Risk - Naturally Uncommon
Common smelt	*Retropinna retropinna*	At Risk – Declining
Torrentfish	*Cheimarrichthys fosteri*	At Risk - Naturally Uncommon
Giant kōkopu	*Galaxias argenteus*	At Risk – Declining
Banded kōkopu	*Galaxias fasciatus*	At Risk - Naturally Uncommon
Lamprey	*Geotria australis*	Threatened - Nationally Vulnerable
Crans bully	*Gobiomorphus basalis*	At Risk - Naturally Uncommon
Rudd	*Scardinius erythrophthalmus*	Introduced and naturalised

5.4.2 Environmental DNA

Results of the eDNA sampling are presented in Table 11 and identify the presence of native shortfin eel and exotic gambusia as the dominant fish fauna occupying the drain habitat. Shortfin eels and gambusia are somewhat ubiquitously distributed across rural low land watercourses with the Bay of Plenty Region. They are robust species which can tolerate a wide range of water quality conditions and are well adapted to marginal and poor-quality habitats where other indigenous fish are less likely to survive. The low reads for longfin eel, koi carp and rudd suggest potential false positive results, but the detected presence of these species is consistent with the NZFFDB and the findings outlined in Suren and Carter (2018).

Table 11. Fish species detected from eDNA samples.

Species	Watercourse (North Block)	Watercourse (South Block)	Conservation status (Dunn et al. 2025)
Longfin eel	16 ± 25	-	At Risk – Declining
Shortfin eel	4,800 ± 1,747	4,387 ± 543	Not Threatened
Unidet. trout	-	48 ± 117	Not Threatened
Gambusia	12,996 ± 5,475	75 ± 148	Introduced
Koi carp	16 ± 25	-	Introduced
Rudd	61 ± 93	-	Introduced

Note: *the number of eDNA reads. ^ Average number of reads (± 1 SD).

6.0 Wetlands

The Site was a flat, low-lying area characterised by intensive high producing agricultural land use dominated by pasture grass species as described in section 4 above, and containing areas of small, discrete and widely scattered wet pasture with pooled water where livestock pugging was extensive. Vegetation communities in these areas were characterised by wet-tolerant grass species such as creeping bent (*Agrostis stolonifera*) and Yorkshire Fog (*Holcus lanatus*) as well as common herbaceous species such as creeping buttercup (*Ranunculus repens*), spearwort (*Ranunculus flammula*) and lotus (*Lotus pedunculatus*) (

Figure 16). These features had no surface connectivity to each other or other freshwater features and were considered somewhat transient whereby farm management practices likely resulted in these fragmented wet areas being redistributed periodically.

There were no areas within the Site identified as wetlands in accordance with the RMA definition whereby the RMA defines a wetland as:

> *"permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions".*

That is there were no areas deemed to be supporting a natural ecosystem of plants and animals.

While the guidance provided by the RMA definition is limited, and in the absence of any further policy guidance in New Zealand, the Quality Planning website (QP) which exists to 'promote good practice by sharing knowledge about all aspects of practice under the RMA'

provides some additional clarity regarding the definition for a "natural ecosystem".

QP provides the following definition:

> "*Natural habitats and ecosystems: Habitats and ecosystems with a dominant or significant indigenous natural character. They do not include modified areas, such as farm or forestry land, where the indigenous vegetation has largely been replaced, although these areas may still provide important habitats for indigenous species*".

QP cites the NZ Biodiversity Strategy (2020) with this definition; however, this term is not contained in the glossary of the NZ Biodiversity Strategy. It is however included in the Department of Conservation: Prioritising and partnering to manage biodiversity (2012) glossary of terms.

While there is no known definition of "indigenous natural character" in any of the national policy documents, in the case of the Site, the explicit exclusion of "modified areas, such as farm or forestry land, where the indigenous vegetation has largely been replaced" appears to provide some clarity. This can be interpreted to mean that highly modified areas dominated by exotic species do not possess "dominant or significant indigenous natural character".

The lack of guidance on defining these terms within New Zealand legislation or national policy documents leads to the inference that professional judgement must be used to define what is a 'natural ecosystem' and the above definition and rational are deemed technically sound.

The BOPRC has mapped several wetlands within proximity of the Site (Figure 17). The closest mapped wetland was c. 140 m from the Site boundary on the opposite side of the Tauranga Eastern Link Road. These wetlands were not surveyed and as such there is no specific description of their characteristics, condition or extents here.

Figure 16: Wet pasture within the Site.

Figure 17: BOPRC mapped wetlands outside the Site.

7.0 Ecological Values

7.1 Terrestrial Ecology Values

7.1.1 Vegetation

The exotic vegetation communities within the Site were typical of an intensive agricultural landscape with very low ecological value. Indigenous vegetation within the Site was negligible and isolated. The indigenous species recorded were all common, widespread and typical remnants or specimens within rural, low land farms. Overall, the vegetation onsite was of 'negligible' – 'low' ecological value (Table 12).

7.1.2 Birds

The bird species recorded within the Site and most of the historic records within the local area comprise predominantly exotic and common native species typical of rural and urban areas. Of the species of conservation concern, a single little shag (*Microcarbo melanoleucos*, 'At Risk – Relict') (Robertson et al. 2021) was recorded onsite. No 'Threatened' birds were recorded during the site visits.

It is considered that some 'At Risk' species recorded in the eBird database (e.g., NZ pipit, variable oyster catcher, pied stilt) may utilise the pasture habitat for foraging from time to time. Variable oyster catcher and Pied stilts nest in coastal areas but will occasionally use paddocks or pastures for foraging when in close proximity to their coastal habitats, particularly after rain events. Pipit will use pasture for nesting but tend to avoid intensively managed, high producing pasture.

The habitats onsite are considered unlikely to provide critical breeding or nesting opportunities for bird species of conservation concern. Therefore, the overall ecological value for birds and bird habitat within the Site was considered 'low' (Table 13).

7.1.3 Lizards

The Site contains low-quality habitat for native skinks and no habitat suitable for native geckos due to historic vegetation clearance, current intensive farm practices, local pest animal populations and the distance to other habitat and known indigenous lizard populations. The low-quality skink habitat present was fragmented and surrounded by intensively managed pasture. No indigenous lizards were detected during manual habitat searches of identified habitat areas. If present, the lizard species most likely to be found onsite is copper skink (At Risk – Declining). It is expected that any lizards present will be at low numbers with low detectability. Therefore, the overall ecological value for lizards within the Site was considered 'moderate' (Table 13).

7.1.4 Bats

While long-tailed bats themselves are of 'very high' ecological value because of their conservation status, no bat activity was detected within the Site during a valid acoustic survey and limited bat activity has been previously recorded in proximity to the Site. The potential bat habitat features within the Site were of low quality. Therefore, the Site is not considered to be important bat habitat.

Consequently, the ecological value for bats within the Site was considered 'moderate' (Table 13).

Table 12: Terrestrial (botanical) ecological values assessed using the Roper-Lindsay et al. (2018) framework.

Feature	Representativeness	Rarity/distinctiveness	Diversity and pattern	Ecological context	Overall
Exotic pasture and cropped maize	**Very low**, Does not represent any native vegetation type.	**Very low.** No natural ecosystem remnants. Intensively managed pasture.	**Very low.** Low diversity, intensively managed pasture. Poorly connected to indigenous habitats.	**Low**, Exotic vegetation community, intensively managed as pasture.	**Negligible**
Exotic Trees	**Very Low** Does not represent any native vegetation type.	**Very Low,** Vegetation is exotic.	**Very Low.** Vegetation has a low level of diversity and has been planted.	**Low** Scattered exotic trees, isolated and not contributing to any botanical significance or ecosystem services such as shading some small drains.	**Negligible**
Riparian planting and Cabbage trees	**Low.** Although native, do not represent any former vegetation type.	**Low.** Planted vegetation. Not rare or distinctive in structure or composition.	**Low,** Does not include a high diversity of species or demonstrate ecological gradients. .	**Moderate,** Vegetation does provide ecosystem services such as watercourse shading and adds native species to a predominantly exotic landscape.	**Low**

Table 13: Ecological values of terrestrial fauna and fauna habitat using the Roper-Lindsay et al. (2018) assessment framework.

Fauna	Representativeness	Rarity/distinctiveness	Diversity and pattern	Ecological context	Overall
Birds/Bird Habitat	**Low.** Not representative of indigenous ecosystems. .	**Moderate.** One at risk and no threatened or locally important bird species were observed within the Site. It is possible coastal or aquatic species of conservation interest might visit the site for loafing or foraging and species such as shags likely feed within the major drains along the boundaries.	**Low.** The avifauna present included common species and lacked the diversity present in intact ecosystems. No habitats are large enough to sustain more than a very small number of birds for part of the year.	**Low.** The habitat provides for foraging, some roosting, and potential breeding for common native and exotic species. With the majority of the lower kaituna cleared for agriculture, these habitats are not unique within the wider landscape.	**Low**
Lizards/Lizard Habitat	**Low.** The habitat value for lizards within the Site (excluding grazed pasture, which is not considered habitat), while lacking diversity and complexity, is representative of habitat for copper skinks within rural landscapes. Local records of lizards identify three species within 12 km of the Site (copper, moko and shore skink).	**High.** Copper skink are considered "At Risk – Declining'. Although if this species is present within the Site, it is likely to be low numbers due to historic vegetation clearance and current farming practices.	**Low.** There is a low diversity of species and limited suitable habitat (i.e., rank pasture with organic and inorganic debris and ornamental gardens). These habitats are small and sparsely distributed. Given the Site's isolation from suitable habitats nearby, it is unlikely that lizards are present in large numbers. .	**Moderate.** Copper skink are potentially sparsely distributed at low density across much of the lower Kaituna. Given the likely low population levels, any individuals that can contribute to sustaining the population are important.	**Moderate**
Bats/Bat Habitat	**Low -** The mosaic of farmland and exotic specimen trees found across the Site are characteristic of intensive farming landscape. Not representative of (high quality) bat habitat.	**Very high.** Long-tailed bats recorded within 10km. LTB have a conservation status of 'Threatened - Nationally critical' (O'Donnell et al.,2023) which is the highest possible threat ranking.	**Low –** No bats detected across the site and no historical records of bat activity within 9km.	**Low –** Although the vegetation and habitat of the Site could provide linkages/stepping stones between bat populations and also provide foraging opportunities, no bats were detected across the site and no historical records of bat activity within 9km.	**Moderate**

7.2 Freshwater Ecology Values

7.2.1 Farm Drains and Drainage Canals

The Site is situated within the Kaituna Catchment Control Scheme. Farm drains within the Site were typical of artificial watercourses across the region (Suren and Carter 2018). The drains were devoid of riparian vegetation exposing the channel to temperature extremes, a lack of filtration and a higher risk of bank erosion. The instream habitat was characterised by poor water quality, low substrate diversity and a lack of riparian shading and filtering leading to high rates of primary nutrient inputs and production.

The catchment control scheme canals/drains are indicative of the extensive rural / urban landscape which can be seen in the summary of nutrient concentrations and microbial data presented in (Table 7). Bell Road Drain, Kopuaroa Canal and the Raparapahoe Canal support a limited number of fish species but play a role in providing fish migration pathways to the upper catchment. The water quality in these drains has likely contributed to the water quality characteristics in the Kaituna River. Consequently, the farm drains and drainage canals within the Site were considered to have 'low' ecological values (Table 14).

7.2.2 Kaituna River

The Kaituna River has been modified through riparian vegetation clearance, streambank modification (e.g., armouring, stop-bank construction) and channel realignment for flood management purposes. The channel is moderately deep and apart from the upper end of the reach provides aquatic habitat that is generally poor quality for invertebrates. Aquatic flora within the Kaituna River is characterised by exotic species of low ecological value including *Egeria*, Canadian pondweed and reed sweetgrass along the shallower channel margins.

Suren and Carter (2018) provide evidence that sensitive receiving environments such as the Kaituna-Maketu have been strongly influenced by excess nutrients and sediment from the drainage canal network including the three drains in proximity to the proposed development. The benthic macroinvertebrate fauna communities are dominated by taxonomic groups commonly found in slow flowing or degraded/modified systems (e.g., snails, Crustacea, Diptera, worms).

The lower river supports a more diverse fish fauna than upstream habitats due to good access to the sea and includes 'At Risk – Declining' species (i.e., longfin eel, īnanga, giant bully) and provides an important pathway for native diadromous fish to migrate into the lower gorge section and more preferable habitat in tributaries (i.e., lamprey, giant kōkopu, kōaro). The Kaituna River is also a significant migratory pathway, including for species of conservation interest, and provides important īnanga spawning habitat above the saltwater wedge.

Consequently, the overall ecological value of the Kaituna River in proximity to the Site was considered 'high'.

7.2.3 Freshwater Fish

The drainage management scheme including the Bell Road Drain and Kopuaroa Canal provide important fish migration pathways for a variety of diadromous fish of conservation concern (Suren and Carter 2018). NZFFD records and eDNA sampling confirm the presence of diadromous fish such as short-fin eels (Not Threatened) within these drains. Consequently, the ecological value of freshwater fish within the Site was considered 'moderate'.

Table 14: Ecological values of the freshwater environment using the Roper-Lindsay et al. (2018) assessment framework.

Feature	Representativeness	Rarity/ Distinctiveness	Diversity and pattern	Ecological Context	Overall
Farm drains/drainage canals	**Low.** The farm drains on the Site are typical of farmland throughout the Bay of Plenty region but are not representative of historic waterways	**Low.** The farm drains do not support nationally or regionally threatened species.	**Very Low.** Farm drains within the Site provide limited habitat to freshwater fauna.	**Very Low.** The drains may have a role in providing connectivity through the Site and between watercourses, and might hold water when other watercourses do not, therefore they may have some ecological value during low flow periods.	**Low**
Kaituna River	**Moderate** The stream channel has been highly modified for flood control and agriculture. Pastureland reflects the modified catchment land use. The Kaituna River provides habitat for longfin eel, īnanga and giant kōkopu all of which have a conservation status of "at-risk" declining. Vegetation clearance within the catchment has been high and little of the original vegetation types remain.	**Moderate.** The Kaituna River has been highly modified but provides important spawning and nesting habitat.	**Moderate.** Fish diversity in the Kaituna River is moderate in the regional context.	**High.** Within the broader catchment context, the Kaituna River provides valuable ecological functions and services. It provides important eel and giant kōkopu habitat and provides habitat for water birds. Connectivity between the tributaries is low because of the extent of channel incision. Supports moderate native fish diversity due to proximity to the coast including longfin eel, torrentfish, kōaro and īnanga with an 'At Risk – Declining' conservation status. Provides access into tributaries for giant kōkopu and lamprey.	**High**
Freshwater Fish	**Moderate -** Indigenous fish present within the drains onsite are partially representative of the natural diversity in the catchment; with only short-fin eels noted. The Kaituna River provides habitat for longfin eel, īnanga and giant kōkopu all of which have a conservation status of "at-risk" declining.	**Moderate –** Species present within the drains Not Threatened and somewhat ubiquitous across much of the drain habitat in the region, but species of conservation concern are present in the Kaituna and therefore could have access to the drains onsite.	**Moderate -** Fish diversity in the Kaituna River is moderate in the regional context.	**Moderate –** Diversity of fish species navigating the drains is low and is restricted to primarily short-fin eels.	**Moderate**

7.3 Wetland Values

No wetlands were identified on the Site. The Bay of Plenty Regional Council has mapped several wetlands outside the Site between c. 120m and 200 m of the boundary (Figure 17). These wetlands are considered to have 'very high' ecological value collectively due to their representativeness, ecological context and the rarity of freshwater wetlands in the region (Table 15).

Table 15: Ecological values of regional wetlands outside the Site using the Roper-Lindsay et al. (2018) assessment framework.

Feature	Representativeness	Rarity/ Distinctiveness	Diversity and pattern	Ecological Context	Overall
Regional wetlands outside the Site	**High.** The BOPRC mapped wetlands in proximity to the Site are some of the best examples of the historical wetland features that dominated this portion of the Tauranga ecological district.	**High.** Natural wetlands are inherently rare across the Bay of Plenty Region and nationally.	**Moderate.** The BOPRC mapped wetlands in proximity to the Site are fragmented and subject to ongoing exotic and pest plant ingress.	**High.** The BOPRC mapped wetlands in proximity to the Site play an important role in surface and ground water control, provide valuable habitat for indigenous and migratory birds and contribute to an overall increase in ecosystem connectivity and biodiversity within a landscape dominated by agricultural land use.	**Very high**

8.0 Assessment of Matters of National Importance (BOPRPS)

The Bay of Plenty Regional Policy Statement (BOP RPS) sets out the criteria in Set 3 for assessing matters of national importance pertaining to indigenous vegetation and habitats of indigenous fauna (BOPRC 2014, BOPRC 2025a). Table 16 below summarises the assessment of indigenous vegetation and habitats of indigenous fauna recorded across the Site against these criteria. If any one criteria are met, the Site is deemed significant under the BOP RPS (BOPRC 2014, BOPRC 2025a).

In summary the Site is deemed not significant under Section 6(c) of the RMA 1991 with respect to indigenous vegetation cover and habitats of indigenous fauna in accordance with criteria 3.1 - 3.17.

Table 16: Assessing indigenous vegetation and habitats of indigenous fauna for matters of national importance in the Bay of Plenty Regional Policy Statement (BOPRC 2014).

Set	Matters	Description	Assessment
Set 3 – Indigenous vegetation and habitats of indigenous fauna	Representativeness	**3.1** Indigenous vegetation or habitat of indigenous fauna contains associations of indigenous species representative, typical or characteristic of the natural diversity of the region or any relevant ecological districts.	Vegetation communities present across the Site are not indigenous nor characteristic of the natural diversity of the ecological district.
	Rarity or distinctive features	**3.2** Indigenous vegetation or habitat of indigenous fauna supports an indigenous species or associations of indigenous species threatened or rare nationally, regionally or within the relevant ecological district.	Vegetation communities present across the Site are not indigenous nor do they support threatened or rare flora or fauna.

	3.3 Indigenous vegetation or habitat of indigenous fauna can contribute to the maintenance or recovery of a species threatened or rare nationally, regionally or within the relevant ecological district.	Vegetation communities present across the Site are not indigenous nor can they contribute to the maintenance or recovery of threatened or rare species.
	3.4 Indigenous vegetation or habitat of indigenous fauna is distinctive, of restricted occurrence, or at the limits of its natural distribution range, or has developed as a result of factors such as natural geothermal activity, historical cultural practices, altitude, water table, or soil type.	Vegetation communities and species present are not indigenous nor characteristic of this criterion
	3.5 Indigenous vegetation or habitat of indigenous fauna is one of the largest remaining examples of its type within the region or any relevant ecological district.	Vegetation communities and habitats present are not indigenous nor characteristic of this criterion.
	3.6 Indigenous vegetation or habitat of indigenous fauna is significantly reduced in area and is degraded but retains key natural ecosystem functions (for example hydrology) and has a high potential for restoration.	Vegetation communities and habitats present are not indigenous. Exotic plant species and land management practices including the regional drainage scheme have compromised habitat integrity beyond that which could be considered to have a high potential for restoration.
Diversity and pattern	**3.7** Indigenous vegetation or habitat of indigenous fauna contains a high diversity of indigenous ecosystem or habitat types, or changes in species composition, reflecting the existence of diverse natural features (for example landforms, soil types or hydrology), or communities along an ecological gradient.	Vegetation communities and habitats present are not indigenous and are representative of composition changes induced from human activity as opposed to natural underlying properties.
Naturalness	**3.8** Indigenous vegetation or habitat of indigenous fauna is in a natural state or healthy condition, or is in an original condition.	Vegetation communities and habitats present are not indigenous nor in a natural state.
Ecological context	**3.9** Indigenous vegetation or habitat of indigenous fauna contributes to the ecological viability of adjoining natural areas and biological communities, by providing or contributing to an important ecological linkage or network, or providing a buffer from adjacent land uses.	Vegetation communities and habitats present are not indigenous nor contiguous or capable of forming a network with adjacent habitat enabling species spread and dispersal within the Ōkere-Te Awarua-Kaituna River catchment or the Tauranga ED.
	3.10 Indigenous vegetation or habitat of indigenous fauna provides habitat for indigenous species at key stages of their life cycle.	Vegetation communities and habitats present are not indigenous. Nor are they representative of direct examples of critical habitat features for indigenous fauna.
Viability and sustainability	**3.11** Indigenous vegetation or habitat of indigenous fauna is of sufficient size and compact shape and has the capacity to maintain its ecological viability over time.	Vegetation communities and habitats present are not indigenous and are subject to intensive disturbance regimes associated with land management practices.
	3.12 Indigenous vegetation or habitat of indigenous fauna supports intact habitats and healthy functioning ecosystems.	Vegetation communities and habitats present are not indigenous not reflective of health functioning ecosystems

	3.13 Indigenous vegetation or habitat of indigenous fauna is of sufficient size and compact shape to resist changes initiated by external agents.	Vegetation communities and habitats present are not indigenous. Historical pressures from land management regime ensures the remaining habitats will not reach a point of supporting representative vegetation and fauna communities due to the depleted state.
Māori	**3.14** Indigenous vegetation or habitat of indigenous fauna contributes to the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu and other taonga.	Non ecological criterion and therefore not assessed as part of this ecological effects assessment
Historical	**3.15** Indigenous vegetation or habitat of indigenous fauna is known and valued for its connection to the history of the place.	Non ecological criterion and therefore not assessed as part of this ecological effects assessment
Community association	**3.16** Indigenous vegetation or habitat of indigenous fauna is known and valued by the immediate and wider community for its contribution to a sense of place leading to community association with or public esteem for the place, or due to its value for recreation or education.	Non ecological criterion and therefore not assessed as part of this ecological effects assessment
	3.17 Indigenous vegetation or habitat of indigenous fauna is valued for the contribution it is making to research into the Bay of Plenty's or New Zealand's ecosystems.	Non ecological criterion and therefore not assessed as part of this ecological effects assessment

9.0 Assessment of Effects

9.1 Introduction

This section assesses the actual and potential ecological effects associated with developing the Wairākei South site as described in Section 1.2 and shown on the Wairākei South Master Plan presented in Figure 2. Activities that have potential to result in both positive and adverse ecological effects are:

Terrestrial Effects

- Positive
    - Increased terrestrial biodiversity values associated with large scale (c. 70 ha) wetland habitat creation.
    - Increased functional terrestrial connectivity across the lower Kaituna through large-scale wetland creation establishing "stepping stones" for wildlife movement. This is expected to allow highly mobile species to move more freely between the coastal dunes, the Site and the larger Te Pourepo o Kaituna wetland restoration project area.
- Adverse
    - Vegetation clearance.
    - Loss of local fauna habitat, potential mortality or injury to indigenous or protected fauna attributable to vegetation clearance and earthworks.

Freshwater Effects

- Positive
    - Increased water quality within the Site and the lower catchment through the removal of intensive dairy stock farming and associated effluent and the implementation of effective onsite stormwater management.
    - Increased freshwater biodiversity values associated with large scale (c. 70 ha) wetland habitat creation.
- Adverse
    - Reclamation of artificial drains and potential mortality or injury to indigenous fish.
    - Stormwater discharge to the Bell Road Drain and Kopuaroa Canal.
    - Impediments to indigenous fish migration.
    - Sedimentation and erosion.

In accordance with EcIA guidelines, measures to avoid, minimise and remedy adverse effects are focused on ecological values where the level of effect was assessed to be 'moderate', 'high' or 'very high', or in cases of a 'low' level of effect, if the Wildlife Act applies. Actual and potential adverse effects of the proposed development on the terrestrial and freshwater values are summarised below and in Table 17.

9.2 Adverse Effects on Terrestrial Ecological Values

9.2.1 Introduction

The nature and level of actual or potential adverse ecological effects attributable to the proposal are addressed below with recommendations for the management of adverse effects in accordance with the effects management hierarchy.

9.2.2 Vegetation

It is anticipated that the entirety of the 'negligible' to 'low' ecological value exotic vegetation across the Site will be removed.

The pre-effects management magnitude of effect on vegetation is expected to be 'very high', resulting in a pre-effects management level of effect of 'very low' to 'low' as set out in (Table 17).

9.2.3 Birds and Bird Habitat

Almost all birds are protected under the Wildlife Act 1953, except those listed in Schedule 5 of the Act. The proposed activities attributable to the development of the Wairākei South development will result in the removal of low-quality potential bird nesting habitat in the form of exotic trees, hedgerows, and pasture grasses. In addition, during earthwork activities there is potential for coastal birds to move into the Site and temporarily use exposed soil areas and any residual open water for breeding, and nesting. If vegetation clearance and earthworks occur between September and February, direct mortality or injury to birds could result due to the potential presence of nests and nesting birds. Consequently, the pre-effects management magnitude of effect on birds and bird habitat is expected to be 'moderate' leading to a pre-effects management level of effect of 'low' as set out in Table 17.

9.2.4 Lizards and Lizard Habitat

All indigenous lizards are protected under the Wildlife Act 1953. There are small areas of potential lizard habitat (i.e. rank grass, organic and inorganic debris, exotic gardens) along drains, hedgerows and adjacent to dwellings within the Site (Figure 10). The presence of indigenous lizards onsite has not been confirmed; however, it is likely that copper skinks (At Risk – Declining) are present in low numbers. Consequently, vegetation clearance within the identified habitat areas has the potential to cause injury or death to native lizards, leading to a pre-effects management magnitude of effect of 'high' and a pre-effects management level of effect of 'moderate'.

A lizard management plan (LMP) outlining capture and relocation protocols will be prepared and implemented within mapped lizard habitat areas to mitigate the potential effects of this activity prior to vegetation clearance. Implementation of the lizard management plan will ensure the overall effects on lizards will be 'low' as set out in Table 17.

Vegetation clearance will also result in a loss of lizard habitat. Given the low value of this habitat onsite, the pre-effects management magnitude of effect on lizard habitat is considered 'moderate' and the pre-effects management level of effect on habitat is 'low', as set out in Table 17.

9.2.5 Bats and Bat Habitat

No bats were detected utilising the Site and the Site was determined to not be important bat habitat based on the absence of bat activity and the low value habitat features present.

Bats are protected under the Wildlife Act 1953. While no bats were detected utilising the site, suitable roosting features may be utilised in future and as such clearance of trees with a diameter at breast height (dbh) greater than 15cm and containing at least one bat roost feature has the potential to cause injury or death to native bats should they be present at the time of clearance. Consequently, the clearance of suitably size trees with identified bat roost features was considered to have a pre-effects management magnitude of effect of 'moderate' and a pre-effects management level of effect of 'moderate'.

A Bat Management Plan (BMP) outlining the Department of Conservation's potential bat roost tree protocols (Department of Conservation 2024) will be prepared and implemented to mitigate the potential effects of this activity prior to vegetation clearance. Implementation of the bat management plan will ensure the overall effects on bats will be 'low' as set out in Table 17.

Vegetation clearance will result in a loss of suitable bat foraging and commuting habitat. Given the low value of this habitat onsite and the absence of detected bat activity, the pre-effects management magnitude of effect on bat habitat is considered 'moderate' and the pre-effects management level of effect on bat habitat is 'low', as set out in Table 17.

9.3 Adverse Effects on Freshwater Ecological Values

9.3.1 Effects of Habitat Removal on Native Fish

The proposed development will involve reclaiming approximately 25 km of artificial internal and boundary farm drains on the Site (Figure 18). Under the NPS-FM (2024) and the Bay of Plenty Regional Plan, reclamation of artificial drains is a permitted activity.

There are no records of native fish species within the farm drains on the Site. eDNA surveys in two of the drains indicated the presence of shortfin eel and potentially longfin eel (northern block only). The likelihood of the drains hosting other native species is low due to the poor instream habitat, water quality and lack of connectivity in the network.

The reclamation of artificial drains may result in injury or mortality of indigenous fish, primarily shortfin eel should they be present at the time of reclamation. Consequently, the reclamation of artificial drains was considered to have a pre-effects management magnitude of effect of 'high' and a pre-effects management level of effect of 'moderate'. Therefore, a fish management plan (FMP) will be prepared, which will outline the measures to mitigate the potential effects of this activity by relocating fish prior to earthworks. The FMP measures will be implemented within drains that contain suitable water depth at the time of works. With the implementation of a FMP, the overall effects on native fish populations will be 'low'.

9.3.2 Earthworks and Sedimentation Effects

The activity most likely to cause sedimentation effects is the earthworks required to develop the wider Site and during the construction of the pumpstation. Because the proposal requires reclamation of all artificial drains onsite, the ecological risk to the internal watercourses is nil assuming that the artificial drains are re-claimed and the FMP is implemented prior to earthworks. Once the drains have been reclaimed, there is a remaining risk to the receiving environment through the on-going development.

Earthworks associated with constructing the proposed sub-division and pumpstation have the potential to result in bulk sediments entering the Kopuaroa Canal and the Kaituna River. The addition of fine sediment has the potential to alter water chemistry, increase turbidity, smother instream surfaces, and adversely affect aquatic biota.

The Kopuaroa Canal is separated from the Site by an earth bunded stop bank which extends beyond the length of the southern site boundary. If this remains intact during the earthworks and site development, the risk of sediment entering the drain will be low.

Consequently, the sedimentation of Kopuaroa Canal and the Kaituna River was considered to have a pre-effects management magnitude of effect of 'moderate' and a pre-effects management level of effect of 'moderate'.

All earthworks are to be carried out in accordance with the Bay of Plenty Regional Council guidelines (BOPRC 2012) and controls should include silt fencing around watercourses within the earthwork's footprint, and a network of decanting earth bunds to settle suspended material before run-off is discharged. Temporary nova coil and geotextile fabric should be incorporated into the clean and dirty water diversions to prevent run-off through earthworks surfaces.

With the presence of the stop bank, and implementation of silt controls the overall effects on water quality and aquatic habitat during construction will be minimised and the overall level of effect was assessed as 'low' Table 14.

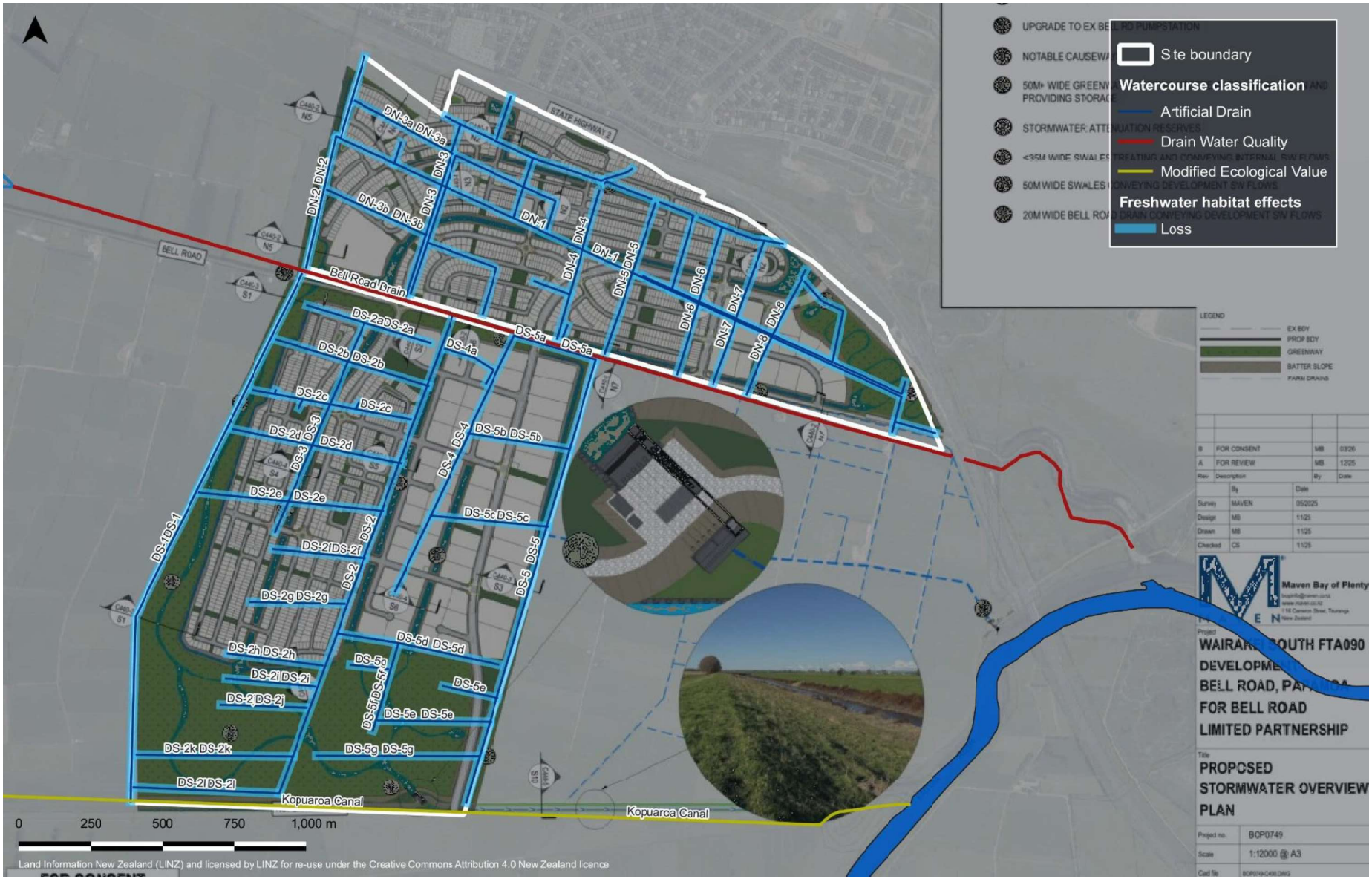

Figure 18: Effects of the development on freshwater ecology habitat and features.

Figure 19: Proposed diversion of Bell Road Drain (Maven 2026b – Appendix D of the AEE).

9.3.3 Stormwater Effects

The proposed stormwater management plan for the Site (Maven 2026a – Appendix G of the AEE) includes engineered wetland swales and two new stormwater attenuation ponds, which will replace the existing farm drains, to manage groundwater levels and convey surface water from west of the Site towards the Kaituna River (Figure 19).

Maven (2026a) have provided the following in relation to the stormwater treatment specifications:

Stormwater quality treatment for the development is designed in accordance with the Bay of Plenty Regional Council (BOPRC) Stormwater Management Guidelines 2012. The primary treatment method across the site is wetland swales, designed in line with the recommended approach and based on storage and residence time.

The treatment network is design to have a level of treatment that accords with the BOPRC Stormwater Management Guidelines:

- *TSS: ~70–90%.*
- *Nitrogen: ~15%.*
- *Phosphorus: ~25%.*

In short, the stormwater quality strategy relies on primary treatment via wetland swales and wetlands. Wetland and swale sizing and inverts have been designed in accordance with ENGEO who have provided inputs to groundwater levels.

Discharges from roads will be collected by vegetated swales and conveyed to an appropriate crossing point. Erosion effects are unlikely to occur as a result of the increased volumes of diverted stormwater as the swales carrying the stormwater will dissipate flows and the rock aprons or reno mattresses at the pumpstation outlet will provide protection against erosion. This proposed design will require Bell Road drain to be diverted through the Site on the western side then into the Kopuaroa Canal via a 50 m+ greenway, which will also provide storage.

The diversion from Bell Road, classified as drain water quality (DWQ), to the Kopuaroa Canal, classified as “modified with ecological value (MEV)” has the potential to effect water quality downstream of the point where the Bell Road Drain enters the Kopuaroa Canal and the ~1.5 km section of canal before entering the Kaituna River and the ecological values within the receiving environment.

Suren and Carter’s (2018) assessment of watercourses in the Bay of Plenty compared DWQ and MEV sites and found that the main differences were a ten-fold difference in NOx concentrations in MEV sites compared to DWQ sites. DWQ had higher *E. coli* counts, compared to MEV sites, but did not differ statistically. DRP concentrations were highest in DWQ and MEV sites. Overall, there were similarities in the ranges in the other water quality parameters used in the analysis and both watercourse types were subject to highly variable temperature and dissolved oxygen cycling. Stormwater swales are proposed on the Site (Figure 20) which will provide onsite treatment of stormwater and would likely improve water quality leaving the Site compared to the present situation where there no treatment on the Site.

Based on the similar water quality characteristics of the two watercourse types, the diversion would potentially result in similar concentrations of nutrients in the reach between the diversion entering the canal and the Kaituna River. The diversion inputs would also likely increase, the extent of which is depended on volume, in the load of nutrients in this section of the canal, noting that there would likely be no noticeable change in the Kaituna River.

On this basis, the only foreseeable effect could be on the canal, downstream of where the diverted Bell Road drain enters the canal. Given the poor existing environment and the low ecological values in the waterway, the magnitude of effects on the receiving environment will likely be ‘low’ considering the level of modification and impact from surrounding landuse.

The stormwater management plan provided by Maven (2026a) indicates the treatment train has been designed in accordance with the BOPRC Stormwater Management Guidelines. Consequently, the overall level of effect of stormwater discharge from the Site, on the receiving environment, was assessed as likely having a positive effect compared to the untreated water leaving the site under the existing environment (Table 18).

9.3.4 Effects on Fish Passage

The diversion of Bell Road drain into the Kopuaroa Canal will require a pump station to be build connecting the diversion swale to the canal. Pump stations are common throughout the Kaituna Plains (Suren and Carter 2018) and have been shown to adversely affect migration patterns of eels (Vaipouhi Consulting 2017) and many of the existing pumpstations have fish screens to prevent entrainment and mortality.

Therefore, the construction of a pump station at the diversion discharge to the Kopuaroa Canal has the potential to delay or impede fish passage and cause mortality to migrating fish through entrainment. Based on fish database records the portion of the Kopuaroa Canal adjacent to the Site is likely to support one or more bully species, shortfin eel and longfin eel and potentially provides a migration pathway for species known to occur in the lower Kaituna River.

The pump station will comprise one initial Archimedes screw pump and four additional flood pumps discharging via outlet flap gates to the Kopuaroa Canal. Floodwaters will be conveyed to the pumps via an intake structure incorporating an intake screen (mesh size to be confirmed).

The pump station and intake structure will be supported by rip rap armouring or sheet piling generally in accordance with Maven's pump station concept design, with final structural support solutions to be confirmed at detailed design stage. (Figure 21).

The NPS-FM requires all new structures to provide for fish passage (NPS-FM 2024). The new pump station design provides for a fish friendly screw pump solution with a screening of the intake and includes a bypass to allow alternative passage around the pump station (Figure 21).

Assuming that the pump station is designed to facilitate fish passage and mitigate entrainment by suitable screening in accordance with the New Zealand fish passage guidelines (Franklin et al. 2014), regional guidelines and National Environmental Standards for Freshwater (NES-F; MfE 2024) by not preventing passage for the species present, the effects on fish migration are expected to be very low.

9.4 Adverse Effects on Wetlands

There were no wetlands identified within the Site. However, several BOPRC mapped wetlands were located outside the Site between c.120m and 200m of the boundary. The stormwater management design and proposed diversion of the Bell Road drain will result in a redistribution of surface and groundwater levels within the Site. ENGEO's groundwater modelling and hydrogeological assessment of the post-development condition indicates only minor groundwater level changes at the Site boundary with predicted drawdown of up to 0.5 m and a drawdown level of less than 0.1 m within 160 m of the Site where soils are compressible peat (ENGEO 2025). ENGEO concludes that the proposed Wairākei South development will have less than minor effects on regional groundwater levels, flow gradients, and discharges compared to existing conditions. This is because the proposed development activities will primarily result in a rearrangement or a redistribution of the existing extensive drainage network which has a controlling influence on groundwater and surface water, as opposed to adding or removing any drainage capacity (ENGEO 2025).

Consequently, the pre-effects management magnitude of effect on regionally mapped wetlands outside the Site was considered 'negligible' and the pre-effects management level of effect was considered 'low'. Low levels of effect should not normally be of concern and as such no specific effects management measures are recommended.

Figure 20: Proposed stormwater swale overview (Maven 2026b – Appendix D of the AEE).

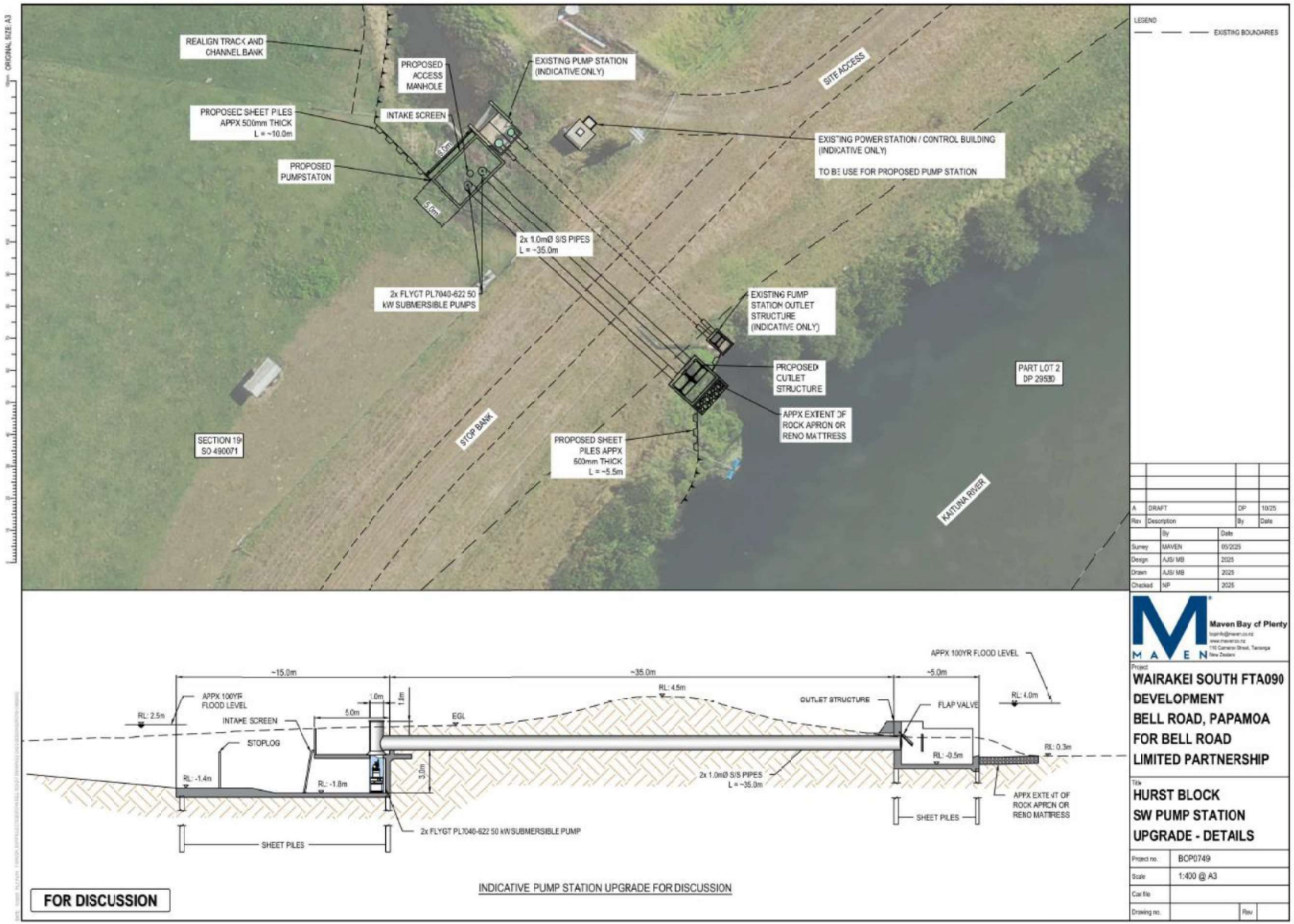

Figure 21: Proposed pump station location and specifications (Maven 2026b – Appendix D of the AEE).

Table 17: Magnitude and level of terrestrial adverse effects for the proposed Wairākei South Development pre and post effects management.

Activity	Ecological feature	Effect	Ecological value	Magnitude of effect	Level of effect (pre-effects Management)	Effects Management Measures	Level of effect (post-effects management)
Vegetation removal	Exotic pasture grass and trees. Scattered native trees	Loss of botanical value	**Negligible-Low**	**High**	**Very Low/Low**	Low and Very Low effects should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. Native dominated landscape planting and maintenance of large greenway will increase biodiversity and indigenous vegetation cover.	**Very Low/Positive**
		Risk of disturbance, injury or death of birds during vegetation clearance and earthworks.	**Low**	**Moderate**	**Low**	Avoid vegetation clearance between September and February inclusive. If this is not possible, check trees prior to felling and if native bird species are nesting, leave the tree standing until the nest can be declared empty.	**Very low**
		Risk of disturbance, injury or death of lizards during vegetation clearance and earthworks	**Moderate**	**High**	**Moderate**	Implementation of Lizard Management Plan prior to vegetation removal to capture and relocate indigenous lizards. A Wildlife Act Authorisation will be required	**Low**
		Loss of lizard habitat	**Low**	**Moderate**	**Low**	Low effects should not normally be of concern. Native dominated landscape planting and maintenance of large greenway will increase biodiversity and indigenous vegetation cover possibly improving lizard habitat across the Site.	**Low/Positive**
		Risk of disturbance, injury or death of bats during vegetation clearance and earthworks	**Moderate**	**Moderate**	**Moderate**	Implementation of DOC Bat Roost Tree Protocols to ensure no injury or mortality to bats during potential roost tree removal if bats present at the time.	**Low**
		Loss of suitable foraging and commuting features for bats	**Low**	**Moderate**	**Low**	Low effects should not normally be of concern. Creation and maintenance of large greenway and SW wetland areas will retain some potential for bat foraging in the future should bats be present.	**Low**

Table 18: Magnitude and level of freshwater adverse effects for the proposed Wairākei South Development pre and post effects management.

Activity	Ecological feature	Effect	Ecological value	Magnitude of effect	Level of effect (pre-effects Management)	Effects Management Measures	Level of effect (post-effects management)
Earthworks	Fish Fauna	Injury or mortality of indigenous fish	**Moderate**	**High**	**Moderate**	Implement fish management plan to relocate eels.	**Low**
	Farm drains/drainage canals (Kopuaroa Canal)	Sedimentation	**Low**	**Moderate**	**Low**	Implementation of Bay of Plenty Regional Council sediment and erosion control standards prior to commencing earthworks	**Low**
Stormwater	Kaituna River	Changes in water quality and volume	**High**	**Low**	**Low**	Mitigation through online stormwater treatment. Flow volume control through storage and pumps. Prepare and implement a stormwater monitoring plan.	**Net positive effect**
	Farm drains/drainage canals (Bell Road Drain)		**Low**	**Low**	**Low**		
	Farm drains/drainage canals (Kopuaroa Canal)		**Low**	**Low**	**Low**		
Construction of Pump Station	Fish Fauna	Barrier to Fish Passage	**Moderate**	**Moderate**	**Moderate**	Pump station design will comply with BOPRC, and New Zealand fish passage and screening guidelines.	**Low**
		Fish mortality through entrainment	**Moderate**	**Moderate**	**Moderate**		**Low**

9.5 Positive Effects on Terrestrial, Freshwater and Wetland Ecological Values

Creating approximately 70 ha of new wetland area as part of the Wairākei South development stormwater management area is expected to deliver substantial, long-term gains for terrestrial and freshwater ecological values across the Kaituna/Wairākei landscape.

The extensive new wetland areas will act as a large, indigenous vegetated network of wetland ecosystems enhancing stormwater runoff quality before it reaches the Bell Road Drain and Kopuaroa Canal of the Kaituna Catchment Control Scheme and eventually the Kaituna River and coastal/estuarine environments. As upper catchment flows and runoff enter the new wetland areas, flow velocities will decrease promoting sedimentation of fine particles and associated contaminants such as phosphorus, and heavy metals. Dense native wetland plants such as macrophytes, rushes and sedges will provide extensive surface areas for biofilms, which support microbial processes that transform and remove nitrogen through plant uptake and denitrification, reducing nutrient loads that would otherwise drive algal growth downstream. By reconnecting surface flows to shallow groundwater and spreading water across a wider floodplain, the wetland areas will help to attenuate peak flows, lowering downstream flood risk and buffering rapid water level changes that can otherwise stress aquatic ecosystems. Over time, this hydrological moderation improves baseflows, stabilises stream temperatures, and enhances overall ecological integrity of receiving waters, including the Kaituna River and coastal/estuarine areas identified as regionally significant.

Converting c. 70 ha of intensively grazed or modified land into functional wetlands generates a substantial increase in indigenous wetland habitat extent in a region where lowland wetlands have been reduced to a small fraction of their former area. The proposed design will provide for wetland areas characterised by shallow and deep marsh ecosystems with suitable wetland species (i.e. rushes and sedges) planted to filter the water and provide habitat for terrestrial and aquatic wildlife including birds, fish and invertebrates.

Trees with large scale canopy structure and riparian shrub species will be planted in clusters throughout the wetland areas to provide shading of water bodies, habitat for birdlife, vertical scale and form and increase the biodiversity of the wetland. Old logs and tree stumps discovered in the Site excavation works can be repurposed into the wetland area to act as natural fish and lizard habitat, and bird perching structures.

Permanent low flow channels will run throughout stormwater management area, with meandering alignment and varied form and size channel profiles, plus deep pools providing areas of open water for managing sedimentation and enabling waterfowl to better interact with the wetlands. Slow-flowing open-water areas linked to the Bell Road Drain, Kopuaroa Canal and Kaituna River via fish passable pumps and gates will offer rearing habitat for native fish such as eels and potentially other indigenous species.

Emergent vegetation belts and shrubland margins will create foraging and breeding habitat for wetland birds, including regionally important species that utilise the Kaituna–Maketū wetland complex, and provide movement corridors between existing remnants. As plantings mature, the wetland will function as a core node within the wider Te Ara o Wairākei ecological corridor, strengthening landscape scale connectivity from inland urban areas to the coastal and estuarine environments.

10.0 Residual Effects

The overall level of adverse effects on terrestrial, freshwater and wetland ecological values are no more than 'low'. Low effects should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. Consequently, no residual adverse effects are anticipated.

The removal of intensive stock farming, the introduction of an effective onsite stormwater management system and the creation of c. 70 of new wetland area is anticipated to result in a positive residual effect.

11.0 Conclusions

This report provides an assessment of ecological impacts associated with the proposed Wairākei South development located at 339 Bell Road, Papamoa, Bay of Plenty. Overall, the ecological value of terrestrial ecological features on the Site ranges from 'negligible' to 'moderate', with freshwater ecological values within the Site and the receiving environment ranging from 'very low' to 'high'. There were no wetlands identified within the Site; however, several BOPRC mapped wetlands were located within c.120m to 200m of the Site, which have 'very high' ecological value. According to the BOPRC RPS criteria for indigenous vegetation and habitat for indigenous fauna of national importance the Site is not considered significant in relation to Section 6c of the RMA.

The ecological effects attributable to the proposed development include both positive and adverse effects. The positive effects include the removal of intensive stock grazing and associated effluent from the landscape and the introduction of an effective stormwater management system ensuring improved water quality entering the lower Kaituna catchment. In addition, the proposed development includes c. 70 ha of wetland creation adding to the functional wetland inventory of the lower Kaituna, improving ecological connectivity and biodiversity at both the local and district scales and enhancing the overall capability of the Site to deliver ecological services such as increased nutrient cycling, surface water filtration, and flood attenuation.

The actual and potential adverse ecological effects, after the application of the effects management hierarchy, including specific ecological management measures outlined in ecological management plans for lizards, birds and bats (Ecological Solutions 2026a & b – Appendix AH and AJ of the application) are considered to be 'very low' to 'low' on terrestrial, freshwater and wetland ecological values, in accordance with the EIANZ impact assessment methodology. Consequently, no significant residual adverse effects are anticipated with a positive residual effect expected to be realised in terms of water quality and new wetland area as a result of the Wairākei South development.

A Wildlife Act Authorisation (WAA) will be required to implement the proposed lizard management measures outlined in the Lizard Management Plan (LMP). The proposed lizard management measures will involve the capture and relocation of indigenous lizards prior to vegetation clearance within identified lizard habitat areas.

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APPENDIX A

Plant Species List

Common name	Scientific name
browntop	*Agrostis capillaris*
creeping bent	*Agrostis stolonifera*
Daisy	*Bellis perennis*
praire grass	*Bromus willdenowii*
she oak	*Casuarina cunninghamiana*
cabbage tree, ti kouka	*Cordyline australis*
giant umbrella sedge	*Cyperus ustulatus*
	Eucalyptus sp
glaucous sweetgrass	*Glyceria declinata*
Yorkshire fog	*Holcus lanatus*
Isolepis	*Isolepis aucklandica*
jointed rush	*Juncus articulatus*
soft rush	*Juncus effusus*
track rush	*Juncus tenuis*
duckweed	*Lemna disperma*
manuka	*Leptospermum scoparium*
perennial ryegrass	*Lolium perenne*
Lotus	*Lotus pedunculatus*
Paspalum	*Paspalum dilatatum*
Mercer grass	*Paspalum distichum*
Mercer grass	*Paspalum distichum*
Persicaria	*Persicaria lapathifolia*
ersicaria	*Persicaria sp.*
inkweed	*Phytolacca octandra*
narrow-leaved plantain	*Plantago lanceolata*
annual poa	*Poa annua*
bamboo	*Pseudosasa japonica*
pin oak	*Quercus palustris*
creeping buttercup	*Ranunculus repens*
ranunculus	*Ranunculus sceleratus*
blackberry	*Rubus fruticosus agg.,*
clustered dock	*Rumex conglomeratus*
broad-leaved dock	*Rumex obtusifolius*
grey willow	*Salix cinerea*
nightshade	*Solanum chenopodioides*
dandelion	*Taraxacum officinale agg.*
swamp cypress	*Taxodium distichum*
red clover	*Trifolium pratense*
white clover	*Trifolium repens*
maize	*Zea mays*

APPENDIX B

eBird Species List

Common name	Scientific name	Breeding habitat	Conservation status (Robertson et al. 2021)
Australasian bittern	*Botaurus poiciloptilus*	Wetlands	Threatened – Nationally Critical
African collared-dove	*Streptopelia risoria*	Urban/rural	–
Australasian shoveler	*Spatula rhynchotis*	Open water; wetland	Not Threatened
Australasian swamphen/pūkeko	*Porphyrio melanotus*	Open water; wetland	Not Threatened
Australian magpie	*Gymnorhina tibicen*	Exotic forest; pasture; open areas	–
Black swan	*Cygnus atratus*	Open water; wetland	–
California quail	*Callipepla californica*	Exotic forest; pasture; open areas	–
Canada goose	*Branta canadensis*	Pasture; open water	–
Caspian tern	*Hydroprogne caspia*	Coastal; braided rivers	Threatened – Naturally Vulnerable
Common chaffinch	*Fringilla coelebs*	Urban; rural	–
Common myna	*Acridotheres tristis*	Urban; rural	–
Dunnock	*Prunella modularis*	Urban; rural	–
Eastern rosella	*Platycercus eximius*	Exotic forest; pasture; open areas	–
Eurasian blackbird	*Turdus merula*	Urban/forest; pasture; open areas	–
Eurasian coot	*Fulica atra*	Open water; wetland	At Risk – Naturally uncommon
Eurasian skylark	*Alauda arvensis*	Pasture; open areas	–
European goldfinch	*Carduelis carduelis*	Urban; rural	–
European greenfinch	*Chloris chloris*	Urban; rural	–
European starling	*Sturnus vulgaris*	Urban; rural	–
Gray warbler	*Gerygone igata*	Urban; forest	Not Threatened
House sparrow	*Passer domesticus*	Urban; rural	–
Indian peafowl	*Pavo cristatus*	Rural	–
Lesser redpoll	*Acanthis flammea*	Urban; rural	–
Mallard	*Anas platyrhynchos*	Open water; wetland	–
Masked lapwing	*Vanellus miles*	Pasture; open areas	Not Threatened
Morepork	*Ninox novaeseelandiae*	Forest	Not Threatened
Muscovy duck	*Cairina moschata*	Open water; wetland	–
New Zealand bellbird	*Anthornis melanura*	Forest	Not Threatened
New Zealand fantail	*Rhipidura fuliginosa*	Forest; pasture; open areas	Not Threatened
New Zealand pigeon	*Hemiphaga novaeseelandiae*	Forest; pasture; open areas	Not Threatened
New Zealand scaup	*Aythya novaeseelandiae*	Open water; wetland	Not Threatened
New Zealand falcon	*Falco.novaeseelandiae*	Forest; pasture; open areas	Threatened – Nationally Vulnerable
Grey duck	*Anas superciliosa*	Freshwater	Threatened – Nationally Vulnerable

New Zealand dabchick/weweia	*Poliocephalus rufopectus*	Open water	Threatened – Nationally Increasing
New Zealand grebe	Poliocephalus rufopectus	Open water; wetland	Threatened – Nationally Increasing
Black-billed gull	*Chroicocephalus bulleri*	Braided rivers	At Risk – Declining
New Zealand pipit	*Anthus n. novaeseelandiae*	Pasture; open areas	At Risk – Declining
Pacific black duck	*Anas superciliosa*	Open water; wetland	–
Paradise shelduck	*Tadorna variegata*	Pasture; open water	Not Threatened
Pied stilt	*Himantopus himantopus*	Riverbeds; coastal; pasture	Not Threatened
Ring-necked pheasant	*Phasianus colchicus*	Exotic forest; pasture; open areas	–
Rock pigeon	*Columba livia*	Urban; rural	–
South Island pied oystercatcher	*Haematopus finschi*	Riverbeds; coastal; pasture	At Risk – Declining
Sacred kingfisher	*Todiramphus sanctus*	Forest; pasture; open areas	Not Threatened
Shining bronze-cuckoo	*Chrysococcyx lucidus*	Forest; pasture; open areas	Not Threatened
Silvereye	*Zosterops lateralis*	Urban; forest; pasture; open areas	Not Threatened
Song thrush	*Turdus philomelos*	Urban; rural	–
Spotted dove	*Streptopelia chinensis*	Urban; rural	–
Sulphur-crested cockatoo	*Cacatua galerita*	Rural	–
Swamp harrier	*Circus approximans*	Forest; pasture; open areas	Not Threatened
Tui	*Prosthemadera novaeseelandiae*	Forest; pasture; open areas	Not Threatened
Welcome swallow	*Hirundo neoxena*	Forest; pasture; open areas	Not Threatened
Wild turkey	*Meleagris gallopavo*	Forest; pasture; open areas	–
Yellowhammer	*Emberiza citrinella*	Urban; rural	–
Spotless crake	*Porzana tabuensis tabuensis*	Wetlands	At Risk – Declining
Little black shag	*Phalacrocorax sulcirostris*	Coastal; freshwater	At Risk – Naturally Uncommon
Black shag	*Phalacrocorax carbo*	Coastal; freshwater	At Risk – Relict
Little shag	*Microcarbo melanoleucos brevirostris*	Coastal; freshwater	At Risk – Relict
Kākā	*Nestor meridionalis*	Forest	At Risk – Recovering
Pied shag	*Phalacrocorax v. varius*	Coastal	At Risk – Recovering
Eurasian coot	*Fulica atra*	Open water	At Risk – Naturally Uncommon
Royal spoonbill/Kōtuku ngutupapa	*Platalea regia*	Coastal; freshwater	At Risk – Naturally Uncommon
Silver gull	*Chroicocephalus novaehollandiae*	Coastal; freshwater	At Risk – Declining

APPENDIX C

eDNA results

November 2023

ScientificName	CommonName	Group	Komakorau Stream	Watercourse B
Anas platyrhynchos	Mallard duck; rakiraki	Birds	1,559	5,699
Porphyrio melanotus	Pukeko; pūkeko	Birds	534	99
Passer domesticus	House sparrow; tiu	Birds	24	0
Turdus philomelos	Song thrush	Birds	8	0
Passeriformes	Song birds	Birds	0	19
Paracyclops fimbriatus	Copepod	Crustaceans	24	9
Cyprinus rubrofuscus	Koi carp; toretore	Fish	5,202	0
Ameiurus nebulosus	Brown bullhead catfish	Fish	1,055	0
Anguilla australis	Shortfin eel; tuna; hao; aopori; hikumuti	Fish	720	32
Gobiomorphus basalis	Crans bully; titikura	Fish	723	0
Scardinius erythrophthalmus	Rudd	Fish	323	0
Retropinna retropinna	Common smelt; ngaore; paraki; pōrohe	Fish	285	23
Chelidonichthys kumu	Bluefin Gurnard; kumukumu; pūwahaiau	Fish	263	0
Gambusia affinis	Mosquitofish	Fish	0	50
Carassius auratus	Goldfish; morihana	Fish	23	0
Galaxias maculatus	Inanga; īnanga	Fish	16	0
Anguilla dieffenbachii	Longfin eel; tuna; kūwharuwharu; rehere	Fish	12	0
Gobiomorphus	Bullies	Fish	394	0
Paratanytarsus grimmii	Chironomid	Insects	48	5,213
Corynoneura scutellata	Non-biting midge	Insects	0	101
Chironomus cloacalis	Grey midge	Insects	0	100
Oxyethira albiceps	Micro caddisfly	Insects	27	15
Rhopalosiphum nymphaeae	Waterlily aphid	Insects	0	33
Symplecta pilipes pilipes	Cranefly	Insects	0	22
Limnophyes	Non-biting midge	Insects	0	505
Paratanytarsus	Parthenogenetic cosmopolitan chironon	Insects	0	74
Thripidae	True thrips	Insects	0	6
Ovis aries	Sheep; pirikahu; hipi	Mammals	3,008	0
Oryctolagus cuniculus	European Rabbit; rāpeti	Mammals	11	2,634
Bos taurus	Cattle; kau	Mammals	459	48
Rattus norvegicus	Norway Rat; pouhawaiki; pou o hawaiki	Mammals	6	9
Trichosurus vulpecula	Common brushtail possum; paihamu; p	Mammals	8	0
Lepus europaeus	Brown hare; hea	Mammals	7	0
Lepus	Hares	Mammals	10	0
Deroceras reticulatum	Grey field slug; Grey garden slug	Molluscs	0	9
Ceratophysella aff. denticulata L3	Mushroom springtail	Springtails	0	12
Isotomurus palustris	Marsh springtail	Springtails	8	0
Orthonychiurus folsomi	Springtail	Springtails	5	0
Hypogastruridae	Elongate-bodied springtails	Springtails	0	13
unclassified Bourletiellidae		Springtails	1,433	0

October 2024

ScientificName	CommonName	Group	WD 1/3	WD 2/3	WD 3/3	WB D/S	WB U/S	WJ 1/3	WJ 2/3	WJ 3/3	WF 1/3	WF 2/3	WF 3/3
Anas chlorotis or gracilis	Brown or grey teal; pāteke	Birds	0	0	0	16	0	0	0	0	0	0	0
Fringilla coelebs	Common chaffinch; pahirini	Birds	0	0	0	0	0	0	0	0	23	0	0
Sturnus vulgaris	Common starling; tāringi	Birds	0	0	0	0	0	0	0	0	51	0	0
Anatidae	Ducks/Geese/Swan	Birds	0	0	91	0	0	0	6	83	0	0	0
Carduelis carduelis	Goldfinch	Birds	0	0	0	0	0	0	0	0	167	9	135
Passer domesticus	House sparrow; tiu	Birds	0	0	0	0	0	0	0	0	35	0	0
Anas platyrhynchos	Mallard duck; rakiraki	Birds	2,307	347	1,579	477	448	8,040	3,485	5,137	4,509	2,547	3,260
Phasianus colchicus	Pheasant	Birds	0	0	0	11	0	0	0	0	0	0	0
Porphyrio melanotus	Pukeko; pūkeko	Birds	628	1,801	384	371	185	25	262	574	3,462	1,298	846
Passeriformes	Song birds	Birds	0	0	0	0	0	0	0	0	127	164	65
Turdus philomelos	Song thrush	Birds	0	0	0	0	0	0	0	0	33	0	0
Spilopelia chinensis	Spotted dove	Birds	0	0	0	0	21	0	0	0	0	0	0
Mesocyclops leuckarti	Copepod	Crustaceans	0	0	0	2,188	3,624	0	0	0	0	0	0
Paracyclops fimbriatus	Copepod	Crustaceans	11	303	46	49	43	0	8	75	6	0	0
Acanthocyclops robustus	Copepod	Crustaceans	0	0	0	141	231	0	36	104	20	6	0
Arcitalitrus	Sandhopper	Crustaceans	0	0	0	7	8	0	0	0	25	15	5
Chydorus brevilabris	Water flea	Crustaceans	0	0	0	580	828	0	0	0	0	0	0
Porcellio scaber	Woodlouse; Slater	Crustaceans	0	0	0	0	0	0	0	0	9	0	0
Sellaphora pupula	Diatom	Diatoms	12	12	0	5	0	5	172	54	0	0	0
Frustulia vulgaris	Diatom	Diatoms	0	6	0	0	0	0	0	0	39	0	6
Pinnularia grunowii	Diatom	Diatoms	0	0	0	0	0	0	0	5	0	0	0
Sellaphora	Diatom	Diatoms	0	0	0	0	0	0	0	0	52	11	0
Pinnularia sp. 10 CS-2011	Freshwater diatom	Diatoms	0	9	0	0	0	7	39	15	0	0	0
Pinnularia	Freshwater diatom	Diatoms	0	52	11	0	7	55	475	469	6	0	0
Nitzschia	Pennate diatom	Diatoms	0	0	0	9	9	0	8	8	7	0	0
Bacillariophyceae	Raphid; pennate diatoms	Diatoms	0	0	0	0	0	46	747	556	0	0	0
Anguilla	Eels	Fish	0	88	0	0	0	0	0	0	0	0	0
Gambusia affinis	Mosquitofish	Fish	0	0	0	137	553	0	0	0	151	0	0
Anguilla australis	Shortfin eel; tuna; hao; aopori; hikumuti	Fish	1,295	2,562	2,224	526	1,526	0	0	0	337	539	444
Rhopalosiphum	Aphid	Insects	0	30	6	75	28	3,906	107	21	11	7	0
Listronotus bonariensis	Argentine stem weevil	Insects	0	0	0	0	0	0	0	5	0	0	0
Rhopalosiphum padi	Bird cherry-oat aphid	Insects	53	181	201	557	271	0	0	149	99	73	30
Lepidoptera	Butterflies and moths	Insects	0	0	0	0	0	0	0	0	8	0	0
Paratanytarsus grimmii	Chironomid	Insects	15	26	0	301	22	37	1,098	60	119	22	344
Psychoda	Drainfly; mothfly	Insects	0	0	0	0	0	0	0	0	13	0	0
Smittia	Flies	Insects	0	0	0	6	0	0	0	0	8	0	0
Diptera	Flies	Insects	0	0	0	18	0	0	0	0	20	5	0
Aulacorthum solani	Foxglove aphid	Insects	0	7	0	0	0	0	0	0	6	0	0
Opogona	Fungus moth	Insects	0	0	0	0	6	0	0	0	0	0	0
Nasonovia ribisnigri	Lettuce aphid	Insects	0	0	0	0	0	0	0	0	7	0	0
Oxyethira albiceps	Micro caddisfly	Insects	0	0	0	0	0	0	0	0	16	60	0
Chironomus	Midges	Insects	0	12	11	90	489	0	117	957	766	1,401	67
Corynoneura scutellata	Non-biting midge	Insects	730	314	71	14	0	0	0	0	436	109	136
Limnophyes	Non-biting midge	Insects	9	0	0	29	8	0	0	0	31	17	0
Chironomidae	Nonbiting midges	Insects	0	0	0	0	0	0	0	0	0	0	345
Ectopsocus briggsi	Psocopteran fly	Insects	0	0	0	0	11	0	0	0	10	0	0
Austrosimulium australense	Sandfly	Insects	0	0	0	0	0	0	0	0	63	0	21
Drepanosiphum platanoidis	Sycamore aphid	Insects	0	0	0	0	0	0	0	0	17	0	0
Rattus rattus	Black Rat; hinamoki; inamoki	Mammals	0	0	0	0	0	3,548	0	0	0	0	83
Bos taurus	Cattle; kau	Mammals	168	0	386	4,936	3,633	415	1,633	3,264	1,914	1,638	1,485
Trichosurus vulpecula	Common brushtail possum; paihamu; p	Mammals	0	0	0	0	0	0	0	0	250	108	151
Erinaceus europaeus	European hedgehog; hetiheti; tuatete	Mammals	0	0	0	0	0	0	0	0	30	0	0
Oryctolagus cuniculus	European Rabbit; rāpeti	Mammals	0	250	0	0	0	144	0	0	202	0	142
Artiodactyla	Hoofed Animals	Mammals	0	0	0	0	0	0	0	0	0	5	0
Mus musculus	House mouse	Mammals	0	0	0	0	0	0	0	0	10	0	0
Rattus norvegicus	Norway Rat; pouhawaiki; pou o hawaiki	Mammals	0	0	0	16	5	0	0	0	2,841	2,197	757
Deroceras invadens	Chestnut slug; tramp slug	Molluscs	0	0	0	8	7	0	0	0	0	0	0
Physella	Freshwater Snail	Molluscs	0	0	0	0	0	0	0	0	97	15	8
Comu aspersum	Garden snail	Molluscs	0	0	0	5	0	0	0	0	0	0	0
Deroceras reticulatum	Grey field slug; Grey garden slug	Molluscs	0	0	0	8	5	8	0	7	12	0	0
Potamopyrgus	Mud snails	Molluscs	0	0	0	0	5	0	0	0	0	0	0

APPENDIX D

Qualifications

Chad Croft – Senior Ecologist

Chad Croft is a terrestrial and freshwater ecologist with 20+ years experience delivering on a wide range of ecology projects and programmes from small scale land development to large scale infrastructure, public and private land management and landscape scale restoration. He has extensive experience in planning, managing and implementing both terrestrial and freshwater impact assessments, ecological surveys, ecosystem restoration, mitigation strategies, preparation of ecological management plans and residual effects management through offset and compensation design.

Chad has prepared and presented evidence to various Council level hearings associated with proposed private plan changes, notice of requirements, and resource consent applications, for a range of small and large-scale land development projects.

Dr Gary Bramley – Director and Senior Terrestrial Ecologist, PhD

Gary's whakapapa includes Ngāti Kahu ki Whaingaroa and Ngāpuhi ki Whangaroa, two Northland based hapū. Gary started The Ecology Company in 2016 and heads our terrestrial ecology team. He is a highly experienced terrestrial ecologist with a wealth of experience working for a wide range of clients throughout New Zealand, particularly in the mining sector including gold, coal, mineral sand mining and quarrying clients. His project experience spans assessments of effects for mining, port and energy sector projects, land development, roading, forestry as well as private plan changes and implementation of consent conditions - preparation of restoration plans, management plans (including hapū management plans) and peer review.

Gary has carried out research and ecological assessments in a variety of forest, agricultural, shrubland, grassland, urban, coastal, alpine and wetland settings between Nightcaps in the south and Ngataki in the north. This work has included risk assessments, ecological due diligence/estimates of future liability, assessments of ecological opportunities and constraints, ecological surveys, monitoring, design and management of pest control programmes, translocation of threatened and other native species, the planning and management of restoration projects and the management of external contractors and ecological projects. Gary has prepared and presented evidence to the Environment Court and the Environmental Protection Agency for a range of large scale land development and mining projects.

Richard Montgomerie – *Director and Senior Freshwater Ecologist*

Richard is the founder and managing director of Ecological Solutions and specialises in providing freshwater environmental services to address management issues. Richard has held senior roles at Kingett Mitchell Ltd, the Water Research Centre (UK), Golder Associates and was the founder and managing director of Freshwater Solutions Ltd.

Richard holds an MSc in Zoology from the University of Otago and has over 27 years of ecology consulting experience. Throughout the past 27 years, Richard has led or supported assessments of the ecological effects of small and large scale land development, hydro schemes, primary industry, forestry and mining throughout New Zealand.

Richard's technical expertise includes water quality assessment, freshwater ecological values and effects assessments of streams, lakes and wetlands, aquatic plant, benthic invertebrate, native and introduced fish assessments and management the assessment of recreational and commercial freshwater fishery values.