110 Te Moana Road, Waikanae Beach

Ecological Effects Assessment

Report prepared for
Vince & Raechel Osborne

Prepared by
RMA Ecology Ltd

Report number and date
Job 2375.100

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BETTER ECOLOGICAL OUTCOMES

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BETTER ECOLOGICAL OUTCOMES

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1.0 Introduction

1.1 Background

This report provides an assessment of the ecological values and the potential adverse effects on these values at 100 & 110 Te Moana Road, Waikanae, legal description Lot 1 DP 71916, and Part Lot 2 DP 71916, hereafter 'the site' (**Figure 1**). Vince and Raechel Osborne propose to rezone the land from General Rural to General Residential Zone and if successful implement a subdivision and residential development of the land, along with an associated accessway.

The site is a 5.497 ha property located to the west of the Kapiti Coast Expressway. The land was historically used for farming purposes and plantation pine forestry. The original dwelling that was once on the site has since been demolished when the area was purchased during the construction of the Kapiti Coast expressway. The site no longer supports livestock and is maintained through mowing.

An existing QEII Open Space Covenant (KCDC K068, 'Osbourne's Swamp') encompasses a wetland and artificial pond, which total approximately 7,757 m^2 of the site. The covenant was established in September 1993 voluntarily by the previous landowners.

1.2 Purpose and scope

Eric Osborne has engaged RMA Ecology Ltd on behalf of Vince and Rachel Osborne to undertake an assessment of the ecological values of the proposed site and an assessment of potential adverse effects arising from the subsequent development of the site if the private plan change of the property is successful.

The approach includes survey of ecological values and provides the following:

- Review of databases to identify the likelihood of species of conservation significance being present, with an emphasis on native freshwater fish, lizards, birds, bats, and plants.
- Site walkover to identify or validate the presence of native vegetation, especially areas that meet the criteria for wetland under the National Policy Statement for Freshwater Management (NPS-FM).
- Walkover and wetland-specific assessments to:
    - Determine wetland values, using qualitative scoring methods; and
    - Map the boundaries of wetlands.
- Walkover and stream-specific sampling to:
    - Determine stream categories, assessing streams against the Greater Wellington Natural Resource Plan criteria; and
    - Map the boundaries of waterways (river, stream, artificial watercourse, and farm drainage canal or ditch).

This report contains the following:

- An overview of the methods used to assess the ecological values of area potentially affected by the development; and
- A description of ecological values within the development footprint and immediate surrounds.

The report has been prepared with regard to the NPS-FM, the National Environmental Standards for Freshwater 2020 (NES-F), and the National Policy Statement for Indigenous Biodiversity (NPS-IB).

Figure 1. Location of the site at 110 Te Moana Road, Waikanae. The site boundary is marked with a red line and the existing QEII covenant is shown with a green line.

2.0 Methods

Desktop analyses and site visits were undertaken to assess the ecological values of areas within the site. This section describes the methods used for desktop and field investigations.

2.1 Desktop assessment

A desktop assessment of the site and surrounding area was undertaken to identify areas that had potential for supporting ecological values. The following databases and documents were reviewed:

- Land Environments New Zealand (LENZ) and the Threatened Environment Classification (TEC)
- Historic aerial photographs (Retrolens)
- Kapiti Coast District Plan maps
- NIWA New Zealand Freshwater Fish database
- Department of Conservation National Amphibian and Reptile Database (Herpetofauna)
- Department of Conservation bat records database

The maps and aerial photographs (sourced from Google Earth and Retrolens) were reviewed to identify existing vegetation and streams present on the site, and to establish an understanding of these features' ecological status. Streams, wetlands, and terrestrial vegetation identified from the maps were then surveyed and assessed on site.

Data from national fauna databases was analysed to assess the likelihood of their presence on site, or nearby, and their threat status checked against the relevant national threatened species classification lists (Hitchmough *et al.* 2021, Robertson *et al.* 2021, and Dunn *et al.* 2017).

Site-specific surveys for bats, fish, and lizards were not undertaken given the size of the site, the lack of obvious habitat, and the preliminary design of the subdivision.

2.2 Field assessment

A site visit was undertaken on 15 and 16 January 2024 to assess the ecological values present within the site. A survey of all wetlands and watercourses was undertaken, as were habitat assessments for fauna at the site, including birds, bats, and lizards. Wetlands, watercourses, and any areas of terrestrial fauna habitat recorded were mapped using hand held GPS (accurate to +/ - 4 m). An additional site visit to undertake a bird survey at the site was undertaken on 13 – 15 August 2024. Methods for assessing the ecological features present are described in the following sections, and full details of wetland assessment methods used can be found in **Appendix A**.

2.3 Streams

All waterways and flow paths were assessed against the Greater Wellington Proposed Natural Resource Plan (PNRP) definitions for rivers:

> • ***Rivers and streams****: for the purpose of determining stream width or intermittently flowing rivers and streams in Category 2 surface water bodies, the active bed is the area that is subject to at least frequent flows and is predominantly un-vegetated and made up of silt, sand, gravel, boulders or similar;*

A drain is defined in the National Planning Standards 2019 and it is this definition that the NES-FW refers to:

> *means any artificial watercourse designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes.*

2.4 Wetlands

Wetlands were assessed using the definition within the Resource Management Act 1991 (RMA):

> ***"Wetland****: 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, including within the coastal marine area".*

Wetlands on site were also assessed using the definition within the National Policy Statement for Freshwater Management 2020 (NPS-FM):

> ***"Natural inland wetland*** *means a wetland (as defined in the Act) 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 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*

The NPS-FM technical support documents updated by MfE in January 2024 regarding wetland classification and delineation require that a step-wise assessment is undertaken based on vegetation, soils, and hydrology.

Exclusions are then applied based on factors that include the percentage abundance of pasture species, whether the wetland has developed in or around a deliberately constructed water body, an assessment of threatened species habitat use, and then application of three separate vegetation tests (Rapid Test, Dominance Test, and Prevalence Index). Wetland soils and hydrology information can be applied if the results of vegetation community and exotic pasture grass exclusion are inconclusive. Key for the identification of natural inland wetlands at this site is whether any wet areas have developed in or around a deliberately constructed water body, or are dominated by pasture grasses.

We understand that the National Environmental Standards for Freshwater 2020 (NES-F) and NPS-FM require Councils to ensure that the loss of values and extent of 'natural inland wetlands' is avoided in most instances

(excluding some activities, including urban development). The NPS-FM and NES-F also restrict activities within a 10 m buffer around 'natural inland wetlands', and places controls on the level of potential adverse effects (from, for example, discharge of water or diversion of water) within 100 m from a 'natural inland wetland'.

The complete methodology applied for the identification of wetlands at this site is set out in **Appendix A**.

2.5 Terrestrial ecology

Vegetation was assessed across the site with a focus on the presence of indigenous species. Birds identified visually and audibly were recorded across the site, including native and introduced species. Potential food sources and nesting habitat were noted for the purpose of estimating the potential loss of resources associated with the planned development.

The field survey included identification of habitats potentially occupied by native lizards. The ecological investigation used the National Policy Statement for Indigenous Biodiversity (NPS-IB) criteria for Significant Natural Areas to assess the significance of terrestrial ecology values recorded from the site.

2.6 NPS-IB

The site contains ecological site K068 which is protected in perpetuity by QEII open space covenant (Ecosite K068). For formally protected sites on a local government database (such as QEII covenants areas and ecosites), the NPS-FM requires that adverse effects on the values of the site are avoided. Clause 3.10 (2) lists the adverse effects that must be avoided to constitute 'avoidance' of effects on the values of SNA sites under the NPS-FM.

The NPS-IB requires that any significant adverse effects on indigenous biodiversity outside of SNA areas (Clause 3.16) must be managed by applying the effects management hierarchy (Avoid, Minimise, Remedy, Offset, Compensate).

2.7 Avifauna

There were many unidentified birds heard within the QEII wetlands during the site visit on 15 and 16 January 2024, which prompted the need for a comprehensive bird survey to be undertaken. The bird survey was undertaken at dusk on 13 and 14 August 2024, and dawn on 15 August 2024.

The wetland and pond on site are of sufficient quality to provide habitat for a range of bird species, including rare wetland bird species, such as bittern, crake, and fernbird. Rare wetland bird species are typically elusive and cryptic in their behaviour. Most wetland birds call primarily at dawn and dusk, therefore survey at optimal peak calling activity time, one hour either side of sunrise and sunset, is most appropriate for obtaining an indication of presence.

Rare wetland bird species that were targeted during this survey included; Australasian bittern (*Botaurus poiciloptilus*; Threatened – Nationally Critical), fernbird (*Poodytes punctatus*; At Risk - Declining), spotless crake (*Zapornia tabuensis*; At Risk - Declining), marsh crake (*Zapornia pusilla*; At Risk - Declining) and banded rail (*Gallirallus philippensis*; At Risk - Declining).

To determine the presence of rare species in the wetland at the site call playback was used for surveying. Two observers, Holly Madden and Douglas Fotheringham of RMA Ecology Ltd, worked together at each

playback point around the perimeter of the pond and wetland at the site. Playback calls for each of the five target species were downloaded from the nzbirdsonline.co.nz website and played using a bluetooth speaker connected to a smartphone at moderate volume for crakes, banded rail, and fernbird, and maximum volume for bittern.

At each survey point, 3 minutes of initial passive listening for bird species was undertaken before the two surveyors stood 10-15 m from the speaker, so any call responses during playback could be heard. Approximately 30 seconds of each species' call was played, followed by several minutes of listening, repeat of playback and then additional listening time before the next species call playback.

All bird species seen or heard at any stage during the survey at each of the 5 points was recorded to compile a list of the suite of birds present at the site.

3.0 Results

3.1 Ecological context

The site is located approx. 1 km east of the coastline. The original natural ecology has been heavily modified or removed through past farming and forestry activities; however, the site still supports freshwater ecosystems which are of ecological value. Historic aerial photographs indicate that the land has been cleared of native vegetation for many decades for farming activities (**Figure 2**).

The site is located in the Foxton Ecological District which is a narrow coastal strip from the Tangahoe River near Hawera, that widens in the Foxton area and narrows again to end at Paekākāriki in the south, totalling 105,500 ha. The Foxton Ecological District is dominated by dunes formed by historic sand movement. Today this sand movement continues but is so affected by human activities that few natural areas now remain. The district now contains mostly farmland, exotic pine plantations and urban areas. Little original vegetation remains within this ecological district.

The Threatened Environments Classification (*Walker et al*. 2015) shows how much native (indigenous) vegetation remains within land environments, and how past vegetation loss and legal protection are distributed across New Zealand's landscape. The site lies within the Threatened Environment class categorised as having < 10 % of indigenous cover left. In these environments, the loss of habitats for indigenous species has been greatest in the past.

Land Environments of New Zealand (LENZ) is a quantitatively-based classification of New Zealand's terrestrial environment developed by Landcare Research[1], which has resulted in a number of datasets including the Land Cover Database (LCDB).

LCDB v5.0 provides an indication of current land use, and land use change since its inception in 1996. The LCDB shows that the site has been used as 'High Producing Exotic Grassland', 'Exotic forest', and 'Herbaceous Freshwater Vegetation' since at least 1996.

[1] https://www.landcareresearch.co.nz/tools-and-resources/mapping/lenz/

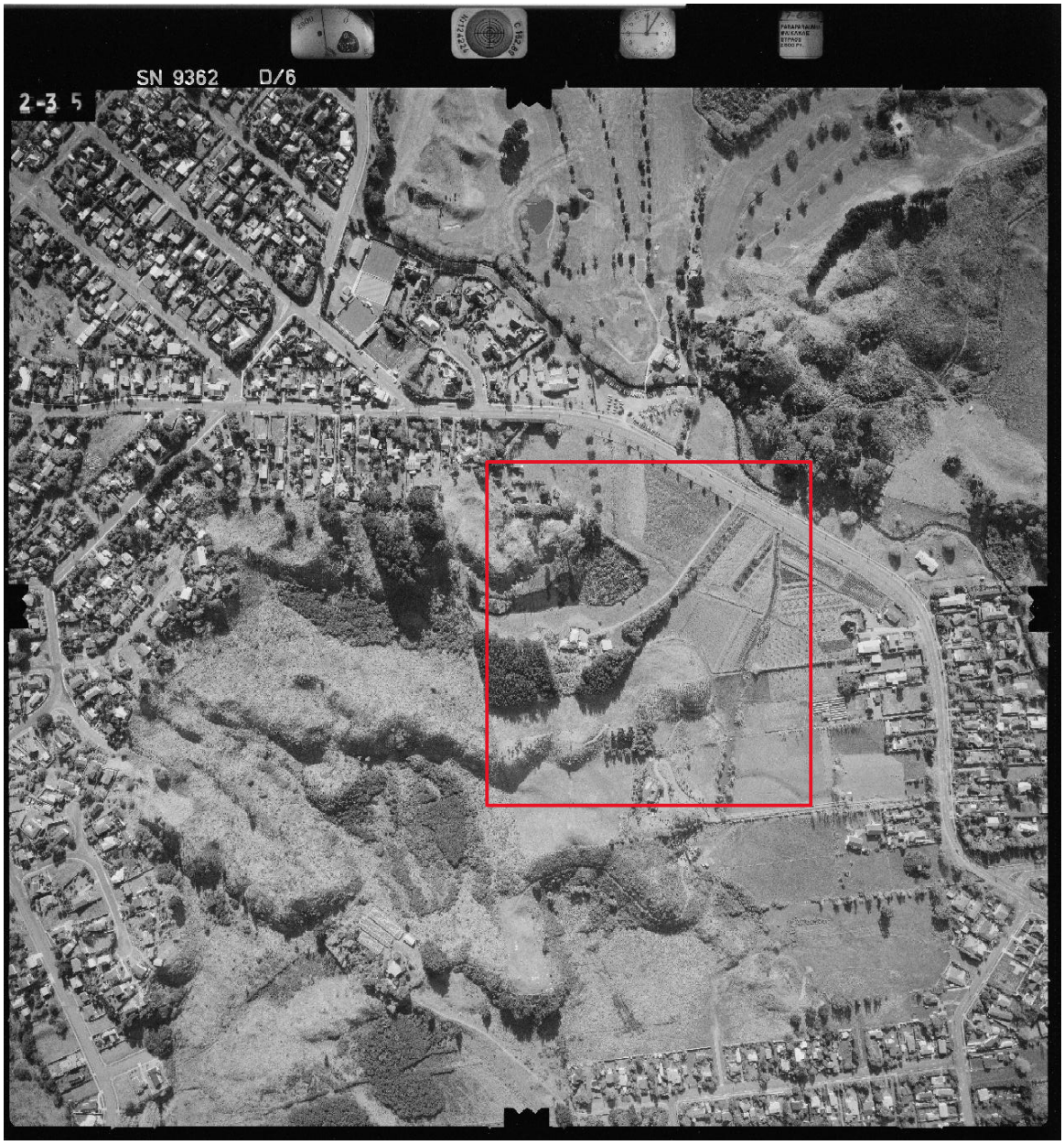

Figure 2: Aerial imagery from 1994 illustrating that the site (located within the red boundary) had been cleared and established as pasture for some time prior to the date of the photograph. Source: Retrolens.nz

3.2 Streams

No streams were located at the site. There is one open channel drain located on the site. The drain was dug in the paddocks on site from north to south circa 1950s in conjunction with the QEII protected wetland on site (current owner, pers comm). The purpose of the drain was to drain the boggy land and improve pasture for farming purposes.

The drain comprises straight sections of artificially created channels and has a culvert located at the northern end of the drain as it exits the property. The drain is filled with water derived from ground and surface water.

The culvert does not pose a known fish barrier as the culvert is not perched. The southern extent of the drain flows across the site from east to west for approx. 102 m in a straight channel before curving and flowing north for approx. 115 m until it flows into a culvert to exit the site beneath Te Moana Road.

The drain then becomes piped with other storm water system and is discharged into the Waimeha Stream. See **Figure 3** for the location of the drain on the site.

The drain is fenced on one side, which does not exclude livestock access. The first 102 m section of the drain has moderate ecological conditions with some aquatic vegetation, undercut banks and shade provided by vegetation within the wetland on the true left banks of the drain (**Plate 1**). The 115 m section of drain once it rounds the corner is largely modified through straightened and scraped banks and does not support riparian vegetation (**Plate 2**).

Plate 1. View downstream from where the drain originates on site and flows west.. The drain has aquatic vegetation and some shade from the adjacent wetland.

Plate 2. View upstream from where the drain flows through a culvert under Te Moana Road. The drain is straightened and cleared of riparian vegetation.

Figure 3: Map illustrating the ecological values on the site.

3.3 Ponds

There is an artificial pond on site that abuts the wetland and is protected in the same QEII covenant open space covenant as the wetland. Aerial imagery shows that the pond was constructed prior to 1990 and shows it was constructed for recreation and amenity purposes.

The pond is approx. 0.4 ha in area and is bounded by the wetland to the east, mowed vegetation, and sand dune to the south, and a mix of native and exotic shrub/forest to the north.

Although the pond has been artificially created, it is an important component in the wider dune wetland system. It was excluded from being classified as a wetland in our assessment due to its artificial creation and lack of wetland vegetation.

Plate 3. Looking south from the northern extent of the pond, which is protected by the QEII covenant.

3.4 Wetlands

There is one wetland, Wetland 1, on the site, which is located down slope from a historic sand dune (**Figure 3**). The wetland is approximately 0.54 ha in area, as measured by a hand-held GPS accurate to +/ - 4 m, and ARC GIS. The total ecological site K068 is approx. 0.98 ha in area. This wetland is already protected in perpetuity through the QEII open space covenant that encompasses the wetland and the pond on this site.

The wetland is a coastal ephemeral dune hollow wetland. Dune lake and wetland systems are characterised by impounding sand barriers. The sand barriers trap water behind a ridge of sand dunes along the coastline creating lakes and wetlands that are maintained by rainfall, and seepages. Dune hollows are a depression in

the dunes that temporarily hold water and can occasionally dry out. The dune hollows are created with wind erosion of sand leaving depressions that are at or lower than the groundwater table.

Coastal dune lake and wetlands are considered nationally rare habitats. They provide vital habitat for various native fauna and flora.

The wetland vegetation community comprises mainly of harakeke (*Phorium tenax*), toetoe (*Austroderia toetoe*), mingimingi (*Coprosma propinqua)*, and raupo (*Typha orientalis*) (**Plate 4**). This vegetation mix is now considered uncommon in the Foxton Ecological District. The wetland passes the Rapid Wetland Test for a wetland, and therefore meets the criteria for a 'natural inland wetland' as per the NPS-FM. Further explanation of the criteria for assessing wetlands is presented in **Appendix A**.

During the site walkover, 15 wetland vegetation plots (**Figure 4**) were completed to accurately assess the extent of wetland across the site. No additional wetlands were identified during the site assessment The wetland assessment data can be found in Appendix B.

At the time of our site assessment the vegetation was mown short, and overrun with rabbits and their associated burrows. The assessment was undertaken in January which is within the main vegetation growing season (spring/summer) when sunlight and temperature conditions are optimal. It is also a time of year that is covered in the NPS-FM technical guidance as an appropriate time of year within which to undertake a wetland assessment.

The vegetation across the wider site at the time of the site assessment was pasture and the ground was very dry. The site has been grazed as pasture for a long time and pasture management is the usual use of the site. It does not operate as a wetland now as the drainage around the site has lowered the water table by approx. 300 mm.

As part of a review of the Applicant's lodged materials, we understand that Council has reviewed our previous version of this ecological assessment, and determined that natural inland wetland may occupy parts of the site that are low lying and which are currently grazed. We have reviewed the information provided by Council and note the dominance of wet-adapted plant species. We agree that the vegetation at the time of Council's visit is different and is dominated by wetland plant species.

The site has been grazed as pasture for a long time and pasture management is the usual use of the site. It does not operate as a wetland now as the drainage around the site has lowered the water table. In our opinion, this site is not a wetland even if it does occasionally during the year meet the NPS-FM vegetation criteria. The Env Court has recently clearly stated that an assessment of wetland status should not only rely upon the NPS-FM guidance; it needs to include expert judgment.

We can undertake further assessments on the site, however that it likely to only show that most/ all of the site was once wetland and occasionally supports wetland plants, but for most of the year is non-wetland pasture. In our opinion, this site is no longer a functioning wetland and nor does it support a wetland plant community in its normal state. Furthermore, it is used as grazing, pasture production and stock management. It is not wetland.

The dune hollow wetland at the site has improved in condition through planting and weed maintenance undertaken by the landowner. The ecological value of the wetland is high, due to the uncommon ecosystem type, the rarity of wetlands as a habitat across the country; wetlands have declined in area and number by over 90 % compared to their former, historic extent.

We could not access private land around the site to assess potential wetlands, however it is unlikely that there are qualifying natural inland wetlands as the land to the north is Te Moana Road, to the north-west is established residential housing, to the west is shrubland and ex-pine areas, and to the south is part of the same probable ex-wetland complex that has been drained and has been used for grazing for many decades.

Plate 4. Raupo in the wetland edge borders maintained mown grass on the southern edge.

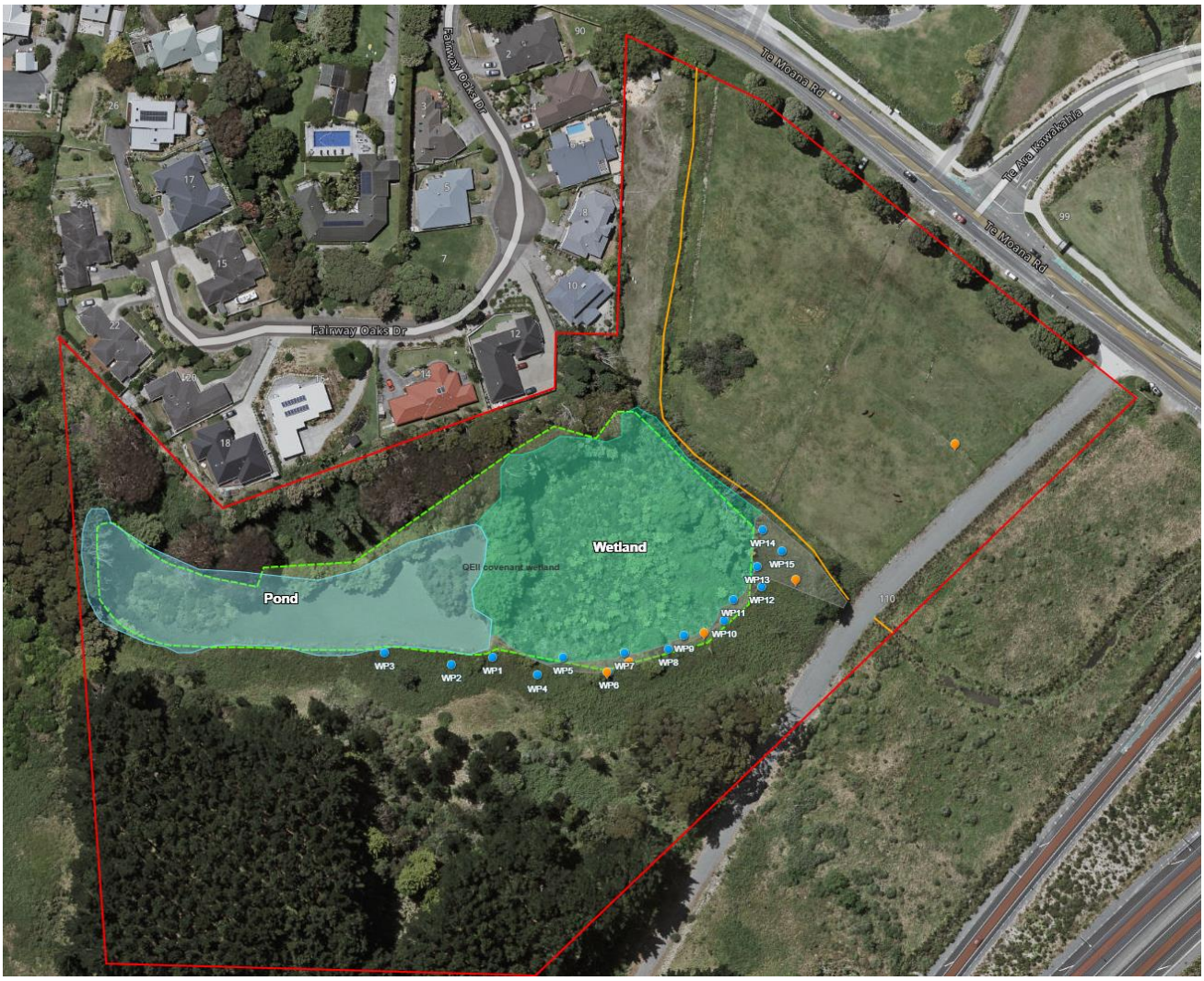

Figure 4. Location of wetland plots (blue dots with corresponding plot identifiers) and soil cores (orange dots) undertaken at the site.

3.5 Fish

The drain on site is heavily modified in condition and contains poor – moderate quality native fish habitat. The drain is a straightened channel, cleared of vegetation along the riparian margins along the majority of its extent. There is some overhanging vegetation where the drain passes along the edge of the wetland.

It is possible that native fish are present in the stream. Records from the New Zealand Freshwater Fish Database (NZFFD), held by NIWA, show that a number of native fish species are present within the Waimeha Stream.

The drain is a direct tributary of the Waimeha Stream; therefore, it is not unlikely that these species may also utilise the available habitat within the drain. There are two culverts on site that the drain passes through, neither of which pose a barrier to fish passage, and there are no other potential fish barriers on the site. The native fish species records held by NZFFD are summarised in **Table 1**.

Table 1. NIWA New Zealand Freshwater Fish Database (NZFFD) records for the Waimeha Stream.

Species	Common name	Waterbody name	Status	Date
Anguilla australis	Shortfin eel	Waimeha Stream	Not Threatened	2010
Anguilla sp.	Unidentified eel	Waimeha Stream	-	2010
Paranephrops	Koura	Waimeha Stream	Not Threatened	2010
Gobiomorphus cotidianus	Common bully	Waimeha Stream	Not Threatened	2010
Gobiomorphus huttoni	Redfin bully	Waimeha Stream	Not Threatened	2017
Galaxias fasciatus	Banded kokopu	Waimeha Stream	Not Threatened	2017
Galaxias maculatus	Inanga	Waimeha Stream	At Risk – Declining	2017
Galaxias argenteus	Giant kokopu	Waimeha Stream	At Risk – Declining	2018
Anguilla dieffenbachii	Longfin eel	Waimeha Stream	At Risk – Declining	2018
Rhombosolea retiaria	Black flounder	Waimeha Stream	Not Threatened	2018

3.6 Terrestrial vegetation

Land use at the site has primarily been plantation forestry and farming for many decades. Its current use continues to be as grazing land with the plantation forestry having been harvested. There are a range of terrestrial vegetation communities on the site, including:

- Duneland with scattered woody debris and scrambling weedland (**Plates 5 - 8**);
- Grazed/mown grasses (**Plate 9 - 10**);
- Pohutukawa row;
- Mature exotic trees (**Plate 11**);
- Rank grass (**Plate 11**);
- Mix of native plantings and mature exotic trees (**Plate 12**); and
- Scrambling weedland.

There is a diverse suite of species that make up the vegetation types on site. There is a stand of mature *Eucalyptus sp*. and *banksia sp*. near the existing access way and near the western boundary of the site.

The mixed exotic and native vegetation comprises mostly mahoe (*Melicytus ramiflorus*), totara (*Podocarpus sp*.), kawakawa (*Piper excelsum*), *Coprosma robusta*, *Cypress sp*., wattle *sp*., (all likely self-colonised) and planted amenity trees.

There are patches of scrambling weedland in the area of sand dune which was (until recently) plantation pine forestry. Scrambling weedland is also evident along the north western boundary in areas of open canopy cover. Common species include bindweed, climbing asparagus, thistle, blackberry, ivy, and nightshade.

Exotic trees (*Eucalyptus sp*., *Banksia sp., Pinus radiata*) on top of the bank to the north of the wetland have rank exotic grasses growing beneath them.

An assessment of the significance of the vegetation and habitats on the site within the proposed vegetation clearance and earthworks/ construction footprint under the RPS significance criteria is presented in **Table 2**.

The wetland is not included in this assessment as it is already protected under covenant.

The site does not meet the minimum test as a site of ecological significance under the RPS in terms of either indigenous vegetation or significant habitats of indigenous fauna.

3.6.1 NPS-IB significance assessment

Table 2. Assessment of the site against the RPS Ecological Significance criteria[2]. This assessment does not include wetland area and pond, which are already protected.

Criterion (factor)	Assessment	Conclusion
Representativeness	Most of the vegetation on this site is dominated by exotic plant species. The parts that are dominated by native vegetation comprise the protected wetland. Vegetation community present is not a typical example of a Kapiti Coast region indigenous ecosystem, as native vegetation within it is sparse, it is weed filled, and native plant species richness is very low. LENZ/ TEC classifies the site as a regional example where 20-30 % indigenous cover is left, and therefore does not comprise a Threatened ecosystem. The weed areas are not representative of native plant communities.	The vegetation **does not meet this criterion** for significance.
Rarity of ecosystems or species	The site does not support any rare or threatened species of plant. The site does not offer habitat for Threatened or At Risk birds. The site has habitat in the northern side of the pond – on the dry margins - that could potentially support the At Risk listed copper skink, although this has recently been 'cleaned up' in order to plant native trees (See Plate 12), rendering it essentially devoid of ground covers and copper skink habitat. Habitat quality is extremely poor for all native lizards, apart from northern grass skink (Not Threatened)	The site lacks habitat for At Risk or Threatened species and **does not meet this criterion**
Diversity; natural diversity within the area	The vegetation on the site supports only a sub-set of native plant species that would be expected in a more natural regenerating shrubland site. Weeds are common. Planted native trees are also present, for which provenance is unknown. The overall diversity of native plants and lack of dominance by them across most of the site indicates that this site is not representative of the natural diversity. The weed areas do not support a natural plant diversity.	The vegetation community **does not meet this criterion for significance**
Ecological context, connectivity, buffering and core habitat	The area to the north of the wetland which contains sparse mature exotic trees and recently planted native species provides some ecological connectivity, and habitat for native passerines (tui, warbler, kereru, silvereye, fantail). The weed areas provide no ecological value for connectivity, buffering or core habitat for fauna.	The vegetation on the northern boundary **does meet not this criterion** for significance. The weed areas also do not.
Tangata whenua values	The site has not been assessed in relation to this criterion.	n/a

[2] And accompanying technical document detailing the RPS criteria as laid out in Greater Wellington, August 2016. Identifying and protecting significant indigenous biodiversity in the Wellington Region: a guide to interpreting criteria in the Regional Policy Statement.

Plate 5. Looking toward the pond, wetland and north western boundary of the site from the sand dune which was once planted in pine forest.

Plate 6. Scrambling weedland encompassing a pile of slash from felled plantation pines.

Plate 7. Site of former plantation pine is now sand dune being colonised by weedy vegetation.

Plate 8. Piles of woody debris left from plantation pine harvesting.

Plate 9. Paddocks with grazed pasture on site border Te Moana Road.

Plate 10. Mown grass strip between the wetland and the existing accessway on site.

Plate 11. Mown vegetation borders the toe slope comprised of mature trees with an understory of harakeke rank grass.

Plate 12. Native species planted amongst mature exotic trees on the bank north of the pond and Wetland.

3.7 Native lizards

During the course of the site surveys, no lizards or lizard sign e.g. scat or sloughed skin were observed. A mature plantation pine forest had been harvested approx. 18 months prior to the site survey, leaving slash piles and stumps and bare sand dunes. Decaying woody debris constitutes good quality habitat for many native lizard species; however, if there are no persisting populations nearby it is unlikely the woody debris on site will have been colonised by native lizards to date, and the pine forest when it was standing would have offered no habitat for ground skinks or arboreal geckos.

Lizard habitat types on site at the time of the site visit include the following:

- Native and exotic scrub/forest with an understory of scrambling weedland and regenerating native scrub;
- Mature trees with an understory of dense leaf litter in raised areas of the wetland;
- Duneland with woody debris and scrambling weedland; and
- Rank grass on hillslope north of the wetland.

There are no records of native lizards from the site, according to the Department of Conservation herpetofauna database. Records from the DOC herpetofauna database show that the native lizards most likely to be encountered at the site are the northern grass skink (*Oligosoma polychroma, recorded 450 m from site*), copper skink (*Oligosoma aeneum*), ornate skink (*Oligosoma ornatum*), barking gecko (*Naultinus punctatus*, recorded 2 km from site in 2020), and ngahere gecko (*Mokopirirakau 'southern North Island',* recorded 3.7 km away). The native lizards that are known to occupy the wider region and their likelihood of being present at the site are summarised in **Table 3**.

For most of the lizards recorded locally, the site does not support adequate or appropriate habitat. For others, the site has been modified so much over the past several decades – and again recently with pine forest harvesting – that the likelihood of lizards being present is very low or nil.

The one part of the site that until recently could support native lizards (with the species most likely to be northern grass skink) is the area of previously rank weedland and mixed exotic/ native shrubland on the northern side of the pond and wetland; this has now been cleared of weeds and undergrowth and planted in native trees. There is no habitat for native lizards remaining in this area.

Table 3: Native lizards known to inhabit the wider region around the site. Source: New Zealand Herpetological Society Website.

Species	Common Name	Threat Classification	Preferred Habitat Type	Likelihood of presence
Oligosoma aeneum	Copper skink	At Risk	Inhabit areas of good ground cover in forest, coastal areas, urban areas. Prefer thick rank grass, compost heaps, logs and debris.	Very low/ nil
Oligosoma polychroma	Northern grass skink	Not Threatened	Wide range of habitats, including gardens, coastal vegetation, rock piles, grassland, flaxes, shrubland, scree, forest margins, tussocks, and modified suburban areas.	Low
Oligosoma kokowai	Northern spotted skink	At Risk - Relict	Prefer open sunny areas, boulder beaches, sand dunes, coastal scrub/forest, grassland, shrubland. Will take refuge under coastal debris such as rocks and logs or in dense vegetation such as flaxes.	nil

Oligosoma ornatum	Ornate skink	At Risk - declining	Inhabit vegetated coastlines, forests, shrubland. Takes refuge in leaf litter, dense low foliage, rank grass, under rocks or logs.	nil
Oligosoma zelandicum	Glossy brown skink	At Risk - Declining	Coastal areas, pebble banks, grassland, wetland, scrubland, forest, and prefer to inhabit areas with dense ground cover.	nil
Oligosoma aff. infrapunctatum	Kupe skink	Threatened - nationally critical	A range of habitats including dune systems, shrubland, scrub, grassland, forest, and boulderfields.	nil
Lampropholis delicata	Rainbow skink	Introduced and naturalised	Occur in a wide range of habitats including industrial areas, gardens, road/railway clearings, rank pasture, coastal habitats, clearings around established forest/shrub. Prefer low dense vegetation or wood and household debris in urban settings.	Low
Woodworthia maculata	Raukawa gecko	Not Threatened	Prefer rocky terrestrial habitats but can be found in an array of habitats from the coastline to beech and broadleaf forests.	nil
Woodworthia chrysosiretica	Goldstripe gecko	At Risk - Declining	Prefer flaxlands, gardens, farmland, coastal vegetation open forest and scrubland.	nil
Woodworthia "Marlborough mini"	Minimac gecko	At Risk - Declining	Boulder beaches and rocky habitats.	nil
Mokopirirakau 'southern North Island'	Ngahere gecko	At Risk - Declining	A range of forested habitats including mature forests, scrubland, and swamps.	nil
Naultinus punctatus	Barking gecko	At Risk - Declining	A range of forest types such as, swamps, scrubland, mature broadleaf, and regenerating scrub/forest.	nil

3.8 Birds

An avifauna desktop investigation was undertaken to compile a list of bird species possibly present or possibly frequent at the site. Data from the ornithological society of New Zealand Bird Atlas was collated from the 10 x 10 km grid square (BU69) which encompassed the project area. The data available for this grid square provided a list of 96 species of birds (both native and exotic species).

The habitats available for birds at this site limit the likelihood of many of the 96 species recorded in the database being present on the site. Some species recorded are also likely only occasional visitors to the region. The records of all 96 species were from June 2019 – March 2024. **Table 4** lists a condensed version of the birds from these records that could possibly frequent the site.

Bird species observed and heard during the overall site survey on 15 and 16 January 2024 were noted. Seven native bird species, and six exotic species were noted at, or nearby, the site during the survey. The species present are all common and 'Not Threatened' and are typical of the of the area. There was a lot of bird activity from unidentified birds within the QEII wetland during the site visit which prompted an additional site visit on 13 – 15 August 2024 to undertake the bird survey.

A comprehensive bird survey was undertaken in optimal calm weather conditions. The temperature on each of the three survey days was cool – mild with no wind. Moderate to loud anthropogenic noise was constant

during the surveys, largely in part due to the nearby Kapiti Coast Expressway. The species present are all common and 'Not Threatened' and are typical of the area.

The call playbacks of the five targeted rare wetland bird species did not elicit calls from any of the target species, and none were observed using the lake during the surveys. It is unlikely that any of the target Threatened or At Risk bird species are occupying the site as the area is small, there is a lack of dense habitat to support cryptic birds, and a lack of nesting habitat for wetland birds.

The site may however be part of a network of sites that mobile wetland or waterfowl species use in the local area. That possibility has not been able to be assessed in this Plan Change assessment, and will form the basis for future site investigations, depending upon the layout of a future subdivision in proximity to the wetland/ pond system.

Table 4 provides a summary of the bird species observed as present at the site. The table also contains a list of species recorded from the wider area, as listed by the New Zealand Bird Atlas. **Figure 4** shows the different locations around the wetland and pond where call playback surveys were undertaken.

Table 4: Bird species recorded from incidental observations and the formal bird survey at the site.

Scientific name	Common name	Threat Status (Robertson *et al.* 2016)	Heard	Seen	Records from wider area[3]
Gymnorhina tibicen	Australian magpie	Introduced and Naturalised	✓	✓	✓
Callipepia californica	California quail	Introduced and Naturalised	✓		✓
Branta canadensis	Canada goose	Introduced and Naturalised	✓	✓	✓
Fringilla coelebs	Common chaffinch	Introduced and Naturalised	✓	✓	✓
Acridotheres tristis	Common myna	Introduced and Naturalised			✓
Prunella modularis	Dunnock	Introduced and Naturalised			✓
Platycercus eximius	Eastern rosella	Introduced and Naturalised	✓		✓
Turdus merula	Eurasian blackbird	Introduced and Naturalised	✓	✓	✓
Alauda arvensis	Eurasian skylark	Introduced and Naturalised	✓*		✓
Carduelis carduelis	European goldfinch	Introduced and Naturalised	✓	✓	✓
Chloris chloris	European greenfinch	Introduced and Naturalised		✓*	✓
Sturnus vulgaris	European starling	Introduced and Naturalised	✓		✓
Anser anser	Greylag goose	Introduced and Naturalised			✓
Passer domesticus	House sparrow	Introduced and Naturalised	✓		✓
Anas platyrhynchos	Mallard duck	Introduced and Naturalised		✓	✓
Pavo cristatus	Peafowl	Introduced and Naturalised			✓
Acanthis flammea	Redpoll	Introduced and Naturalised	✓	✓	✓
Phasianus colchicus	Ring-necked pheasant	Introduced and Naturalised	✓		✓
Columba livia	Rock pigeon	Introduced and Naturalised			✓

[3] Records from New Zealand Bird Atlas BU69, obligate estuarine/coastal and seabirds have been excluded from the table as the habitat at site would not support them.

Scientific name	Common name	Threat Status (Robertson *et al.* 2016)	Heard	Seen	Records from wider area[3]
Turdus philomelos	Song thrush	Introduced and Naturalised	✓		✓
Cacatua galerita	Sulphur-crested cockatoo	Introduced and Naturalised			✓
Emberiza citrinella	Yellowhammer	Introduced and Naturalised	✓	✓	✓
Spatula rhynchotis	Australasian shoveler	Native – Not Threatened			✓
Anthornis melanura	Bellbird	Native – Not Threatened			✓
Larus dominicanus	Black backed gull	Native – Not Threatened	✓	✓	✓
Cygnus olor	Black swan	Native – Not Threatened	✓	✓	✓
Rhipidura fuliginosa	Fantail	Endemic – Not Threatened	✓	✓	✓
Anas gracilis	Grey teal	Native – Not Threatened	✓	✓	✓
Gerygone igata	Grey warbler	Endemic – Not Threatened	✓		✓
Hemiphaga novaeseelandiae	Kererū	Endemic – Not Threatened		✓	✓
Ninox novaeseelandiae	Morepork	Native – Not Threatened			✓
Tadorna variegata	Paradise shelduck	Endemic – Not Threatened	✓	✓	✓
Himantopus himantopus	Pied stilt	Native – Not Threatened			✓
Porphyrio melanotus	Pūkeko	Native – Not Threatened	✓	✓	✓
Acanthisitta chloris	Rifleman	Endemic – Not Threatened			✓
Todiramphus sanctus	Sacred Kingfisher	Native – Not Threatened			✓
Aythya novaeseelandiae	Scaup	Endemic – Not Threatened			✓
Chrysococcyx lucidus	Shining cuckoo	Native – Not Threatened			✓
Zosterops lateralis	Silvereye	Native – Not Threatened	✓	✓	✓
Vanellus miles novaehollandiae	Spur-winged plover	Native – Not Threatened	✓	✓	✓
Circus approximans	Swamp harrier	Native – Not Threatened		✓	✓
Petroica macrocephala	Tomtit	Endemic – Not Threatened			✓
Prosthemadera novaeseelandiae	tūī	Endemic – Not Threatened	✓	✓	✓
Hirundo neoxena	Welcome swallow	Native – Not Threatened		✓	✓
Egretta novaehollandiae	White faced heron	Native – Not Threatened			✓
Fulica atra	Australian coot	Native – Naturally Uncommon			✓
Anthus novaeseelandiae	Pipit	Endemic – Naturally Uncommon			✓
Phalacrocorax carbo	Black Shag	Native – Relict			✓
Microcarbo melanoleucos	Little shag	Native – Relict			✓
Falco novaeseelandiae	Falcon	Endemic - Recovering			✓
Nestor meridionalis	Kaka	Endemic - Recovering			✓
Chroicocephalus bulleri	Black-billed gull	Endemic - Declining			✓

Scientific name	Common name	Threat Status (Robertson *et al.* 2016)	Heard	Seen	Records from wider area[3]
Poodytes punctatus	Fernbird	Endemic - Declining			✓
Chroicocephalus novaehollandiae	Red-billed gull	Native - Declining			✓
Zapornia tabuensis	Spotless crake	Native - Declining			✓
Anas chlorotis	Brown teal	Endemic – Naturally Increasing			✓
Poliocephalus rufopectus	Dabchick	Endemic – Naturally Increasing			✓
Podiceps cristatus	Australasian Grebe	Native – Nationally Vulnerable			✓
Anas superciliosa	Grey duck	Native – Nationally Vulnerable			✓
Eudynamys taitensis	Long-tailed cuckoo	Native – Nationally Vulnerable			✓

*Incidental observation made during the initial site visit, no observation during the formal survey.

Figure 4. locations at the site where bird counts, and playbacks were undertaken at dawn and dusk are identified by purple stars.

3.9 Bats

Long-tailed bats/ pekapeka (*Chalinolobus tuberculatus*), are currently classified 'Threatened – Nationally Critical' (O'Donnell *et al.*, 2022). Long-tailed bats require large trees (including standing dead trees) with cavities (e.g. deep knot holes), epiphytes, or loose bark for roosting. They typically use linear landscape features such as bush edges, gullies, water courses, and roadways to transit between roosting and feeding sites (Borkin and Parsons, 2009).

There are no records of bats at the site, or in the local area, according to the national bat database held by DOC. The nearest records of bats are 10 km to the north west of the site, where there are records of long-tailed bat on Kāpiti Island.

Surveys for bats have been undertaken in potential areas of habitat within 30 km of the site, during the construction of Transmission Gully approx. 16 km south of the site and along the forested margin of the Otaki River in the Tararua Ranges to the north east of the site, but no signs of bats were recorded.

There are large mature exotic and native trees remaining at the north western boundary of the site, which have the potential to provide roosting habitat for the long-tailed bat. However, this borders onto residential property and suggests that it is highly unlikely that bats use the site for roosting, foraging, or transiting across.

3.10 Invertebrates

At Risk or Threatened invertebrate species have the potential to be present at the site within the best habitat on site, the area already protected under QEII covenant – the pond and wetland.

The pond and wetland will not be disturbed during earthworks for the development of the site and no targeted invertebrate surveys were undertaken at the site during the site assessments.

The native invertebrate species *Powelliphanta traversi* (Threatened – Nationally Endangered) and *Peripatoides novaezealandiae* (Not Threatened) are known from the wider region. Preferred habitat for both species is wetlands, and forest, with a dense under growth and rotting logs. Sufficient moisture is a vital habitat requirement for both species.

The site has a long history of modification and disturbance, and as such, lacks the habitats that these species are typically associated with; it is unlikely that the site supports these invertebrate species.

The least disturbed area of the site was the northern slope to the north of the pond and wetland; however, this has recently been completely cleared of weeds, undergrowth and rubbish and planted in native plants. This part of the site is now completely inhospitable to native snails and peripetus.

3.11 Summary of ecological values

The site, of approximately 5.5 ha in area, has been under low intensity livestock grazing for a number of decades, and it is now maintained through mowing.

A small remnant of the original native dune forest vegetation remains on the northern side of the wetland, which is protected by a QEII open space covenant.

Pine forest cover over the southern part of the site was harvested approximately 18 months ago and is now managed as pasture grazing.

Most of the site is modified through past farming and forestry harvesting.

The following ecological features have been recorded:

- No streams were located on site that meet the criteria of 'river or stream' under the Greater Wellington PNRP. One open channel drain is present at the site in poor overall ecological condition, with few hydrological conditions, and in-channel features that provide habitat for aquatic invertebrates and fish.
- Native fish species may be present in the drain, as a number of fish species have been recorded in the Waimeha Stream, of which the drain is a tributary.
- An artificial pond is present on the site and is protected in conjunction with the wetland on site under a QEII Open Space covenant.
- One wetland, Wetland 1, that meets the criteria of 'natural inland wetland' in the National Policy Statement for Freshwater Management. It is currently already protected by a QEII Open Space covenant.
- No native lizards, or their sign (e.g. scat or skin slough) were observed on the site. There is no potential habitat for copper skinks on the site. The northern side of the pond and wetland area, may support northern grass skink although this area has been recently modified to remove most habitat features for grass skink as part of the planting programme.
- The site provides habitat for a number of common, 'Not Threatened' native bird species, as well as exotic species. Bird life is evident in the wetland on site, although includes no Threatened or At Risk species.
- The site is very unlikely to support native long-tailed bats. The mature trees on site may provide suitable roost sites, however, the large distance of the site from any long-tailed bat records indicate that the site is unlikely to be used by bats for roosting, foraging, or transiting across.

4.0 Development proposal and management of adverse effects

The Private Plan Change (PPC) is proposed to rezone the land at 100 and 110 Te Moana Road from General Rural Zone to General Residential Zone under the Operative Kāpiti Coast District Plan. The total area of the site is approximately 5.5 ha.

The purpose of the PPC is to extend the General Residential zone to accommodate a residential development which will comprise of approximately 40-45 lots and their associated accessways, and infrastructure.

The applicant is seeking to re-zone the existing property at 100 and 110 Te Moana Road from Rural to Residential zoning. While the site is broken into two stages (stage 1 outside highly productive land & stage 2 being highly productive land), the rezoning is sought across the site as a whole. For the avoidance of doubt, if only Stage 1 were to proceed, the ecological effects would be less or no different to what has been assessed for the site as a whole.

Under the concept subdivision plan all existing vegetation will be removed from the footprint of the development, and the site earth-worked to create appropriately graded ground for construction. The earthworks footprint will avoid the wetland and pond on site, and include a 10 m setback. The pond and wetland are protected in perpetuity under QEII open space covenant. The drain will be realigned along the northern part of the site between the wetland and Te Moana Road with a margin to allow for riparian planting.

Potential adverse effects that may arise from the future development of this site include:

1. Discharge of sediment to pond and wetland;
2. Dewatering if the water table is affected through flood control activities;
3. Dewatering if the catchment of the pond and wetland is reduced;
4. Direct effects on the pond and wetland if infilling is proposed;
5. Adverse effects on wetland or waterfowl that may use the pond or wetland – these may be temporary during construction and/or permanent due to increased people use of the developed area; and
6. Injury or death of native lizards, and loss of potential native lizard habitat.

Plans for the management of stormwater arising from the development are being development now, and will involve the careful, buffered discharge of stormwater into the drainage ditches across the site, with appropriate scour protection installed. The proposal seeks to minimise the extent of non-permeable surfaces through the site to allow stormwater to continue to discharge into the ground.

Good practice erosion and sediment controls will be implemented for the duration of the earthworks.

Details of the earthwork extents, volumes and cut/fill on site, as well as the generic controls that will be put in place will be addressed in a further resource consent application. For the purposes of this assessment, we assume that good practice controls will be put in place and that the risk of sediment mobilisation and discharge to wetlands and watercourses is a low risk.

While the actual or potential adverse effect of any future subdivision and development of the site can be assessed through the resource consent process, we note that the QEII covenant, NES-F, and existing District and Regional rules will provide appropriate protections to ecology values on the site.

This will be achieved by:

- Avoidance of any earthworks within the covenant area – encompassing the pond and wetland areas;
- Earthworks will be required to comply with a 10 m setback from the wetland at the site;

- Potential for stormwater runoff will be managed through existing subdivision provisions of the District Plan – i.e. the requirement to achieve hydraulic neutrality (SUB-FW-R25). Use low impact stormwater design options in the elevated parts of the site, to utilise the filtering properties of the in-situ material to treat contaminants. Discharge water to ground as close to source as possible (not via an outlet to the wetland) to mimic the natural hydrology of the pre-developed site;
- Good practice erosion and sediment controls during earthworks to prevent unwanted sediment discharges. Earthworks will be in accordance with the Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region (ESCGLDAWR, 2021);
- If the drain is proposed to be realigned a regional consent will be sought and the realigned drain will cater for fish habitat that includes riparian planting to shade the watercourse;
- No new provisions are proposed as part of the Plan Change. That means that the existing rules and provisions of the Regional Plan (GWRC NRP), District Plan (KCDC DP), and national rules (e.g. NES-F) will apply;
- Potential effects on birds that use the pond and wetland will be managed by:
    - Undertaking a survey during spring/ summer to ascertain if there are any noise sensitive birds that use the site; and
    - Designing a visual screen (e.g. 10 m wide planted vegetation screen – if necessary – between the pond/ wetland and any new housing; and
- Assessment of parts of the site that could constitute lizard habitat (drier, elevated parts to the north of the pond and wetland) if development is expected in those locations, with a view to preparing a lizard management plan and undertaking a lizard salvage/ relocation if required.

Site management should be guaranteed by consent conditions applied in the resource consent to provide assurance of good practice to minimise ecological effects. The following management plans may be required as part of future resource consent conditions;

- Fish capture and relocation plan if the drain is proposed to be realigned; and
- Lizard Management Plan and DOC Wildlife Act Authority – if lizards are identified at a future lizard survey (if lizard habitat re-establishes within areas proposed to be modified under development).

5.0 Conclusion and recommendations

The proposed Plan Change application to change the zoning at 100 & 110 Te Moana Road, Waikanae Beach, will – if successful – result in a resource consent application to create residential allotments and associated vehicle access, and infrastructure.

Construction at the resource consent stage will require clearance of mainly exotic grassland, with a small area of exotic shrubland and piping and realignment of the drain.

Potential adverse effects that may arise from this future development of site include:

- Discharge of sediment to the pond and wetland, with associated risks to the existing ecological values of the Covenant;
- Dewatering of the pond and wetland areas if the water table is affected through flood control activities;
- Dewatering of the pond and wetland areas if the catchment of the pond and wetland is reduced; and
- Adverse effects on wetland or waterfowl that may use the pond or wetland – these may be temporary during construction and/or permanent due to increased people use of the developed area; and
- Injury or death of native lizards, and loss of potential native lizard habitat.

Adverse effects that will be avoided or mitigated through the design of the project include:

- Avoidance of any works within the wetlands or pond, and care that any works within 10 m of the wetland or pond do not result in adverse effects;
- Minimisation of clearance of native shrubland – although little is remaining following the restoration clean-up and planting of the northern side of the pond and wetland area;
- Good practice erosion and sediment controls during earthworks (ESCGLDAWR);
- Good practice stormwater management so that discharges to the edge of the pond/ wetland area avoided and so that stormwater is treated prior to discharge;
- Avoidance of changes to the overall catchment area and overland discharge rates such that overland recharge of the pond and wetland is not affected; and
- The existing provisions of the regional and district plans, and the NES-F will apply to the site and offer adequate protections of the few ecological values that exist on the site.

By applying the recommended ecological controls listed above, the overall adverse effects of the proposed development on the ecological values of the site will be reduced to a negligible level.

There will most probably be, therefore, no residual adverse effects that are more than minor, and there will likely be no requirements for any biodiversity offsetting or ecological compensation measures.

6.0 References

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Appendix A: Wetland assessment methods

Areas of a site that are considered to be a potential wetland, based on an initial, visual assessment of vegetation and hydrological conditions, are then further assessed, following the steps detailed below:

- Visual assessment as to whether the potential wetland area could support a threatened species;
- Visual assessment as to whether the potential wetland and surrounding area is clearly dominated by pasture grass species (the Rapid Pasture Test) or whether the potential wetland is clearly dominated by wetland species (the Rapid Wetland Test);
- Visual assessment of areas where the vegetation composition includes species that are scored as wetland obligate, facultative wetland, or facultative (e.g., rushes, wet pasture or 'wetland-type' vegetation) as assessed by Clarkson *et al.*[4] (following the Pasture Exclusion Test, and Wetland Delineation Protocols as laid out in the Pasture Exclusion Assessment Methodology[5]);
- Where these compositions exist, an assessment of vegetation, soils, and hydrology is required according to the Pasture Exclusion Assessment Methodology:
    - Vegetation is assessed through plant identification and percentage cover estimates (as per the method described by Clarkson[6]) of 2 m x 2 m plot areas within each potential wetland area;
    - Soils are assessed by applying the criteria outlined in Fraser[7] for identifying hydric (wetland) soils – which involves excavation and examination for gleyed, mottled, peaty, or wet soils; and
    - Hydrology is assessed by applying the criteria outlined in the Ministry for the Environment tool[8].
- The boundaries of potential wetland areas are delineated by carrying out assessments of the various vegetation communities and through professional judgement.

Figure A1 below outlines the steps taken to determine the presence of a wetland.

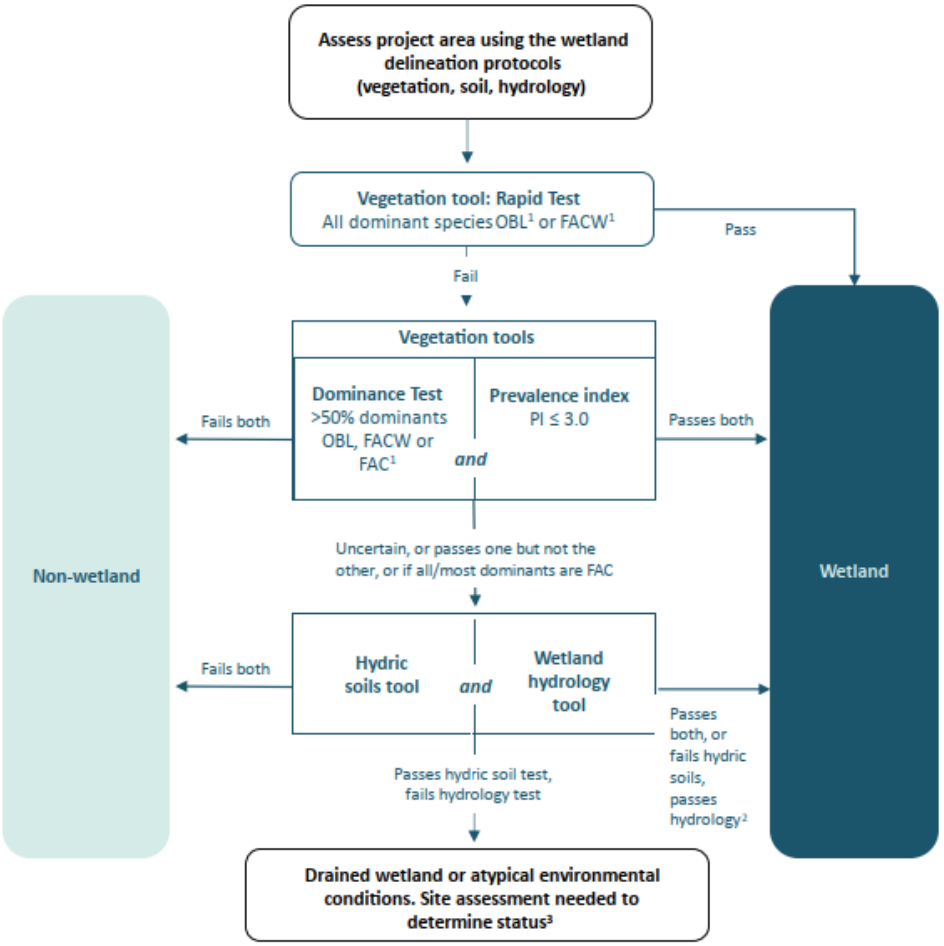
[4] Clarkson B. R., Fitzgerald N. B., Champion P. D., Forester L., Rance B. D. (2021). *New Zealand wetland plant indicator status ratings 2021: Data associated with Manaaki Whenua - Landcare Research contract report LC3975* for Hawke's Bay Regional Council.

[5] Ministry for the Environment. 2022. *Pasture exclusion assessment methodology*. Wellington: Ministry for the Environment.

[6] Clarkson, B. (2013). *A vegetation tool for wetland delineation in New Zealand*. Report prepared for Meridian Energy Limited by Landcare Research.

[7] Fraser S., Singleton P., Clarkson B. (2018). *Hydric soils – field identification guide*. Envirolink Tools Contract C09X1702. Manaaki Whenua – Landcare Research Contract Report LC3233 for Tasman District Council.

[8] Ministry for the Environment. (2022). *Wetland delineation hydrology tool for Aotearoa New Zealand*. Wellington: Ministry for the Environment.



Footnotes:
[1] Wetland indicator status abbreviations: FAC = facultative, FACW = facultative wetland, OBL = obligate wetland.
[2] For example, recent wetland.
[3] The US procedures for atypical or problematic situations are recommended.

Figure A1. Flow chart of steps for wetland vegetation determination. Wetland indicator status abbreviations: FAC = facultative (equally likely to occur in wetlands or non-wetlands – estimated probability 34-66%); FACW = facultative wetland (occurs usually in wetlands – 67-99%); OBL = obligate wetland (occurs almost always in wetlands >99%).

Appendix B: Wetland assessment data

Table B1: Wetland vegetation recorded in a series 2 m x 2 m representative plots across 15 different plots to delineate the extent of the wetland.

Site	110 Te Moana Rd			pasture grasses														
Date & Recorders	15-16 Jan 24 Holly Madden																	
Common name	**Species (hydrotype)**	**group score**		WP1	WP2	WP3	WP4	WP5	WP6	WP7	WP8	WP9	WP10	WP11	WP12	WP13	WP14	WP15
Mercer grass	*Paspalum distichum* FACW	2											1%	2%	12%	22%	20%	18%
Soft rush	*Juncus effusus* FACW	2		3%	1%	1%		10%				9%	3%		3%			
creeping buttercup	*Ranunculus repens* FAC	3		20%	22%	10%	60%	18%	35%	65%	65%	12%	30%	30%	22%	29%	31%	18%
Yorkshire fog	*Holcus lanatus* FAC	3			5%		6%	3%			5%	4%	8%	11%		2%	3%	12%
Lotus	*Lotus pedunculatus* FAC	3		30%	24%	24%	15%	18%	8%	5%	25%	32%	30%	25%	25%	16%	28%	32%
Creeping bent	*Agrostis stolonifera* FACW	2																
Blackberry	*Rubus fruticosus* FAC	3			3%				2%		2%	2%						
Water pepper	*Persicaria hydropiper* FACW	2		13%	8%	18%	3%	8%	4%	5%	3%		8%			2%		
kikuyu	*Cenchrus clandestinus* FACU	4		15%		5%							6%	10%	9%	10%	8%	
Raupo	*Typha orientalis* OBL	1						3%		4%								
Toad rush	*Juncus bufonius* FACW	2							1%									
Creeping mallow	*Modiola caroliniana* UPL	5			20%													
Clubrush	*Isolepis prolifera* OBL	1						28%		8%		1%			2%			
Mint	*Lamiaceae sp.*				2%													
Water forget-me-not	*Myosotis laxa* OBL	1	*possibly field sp. Check photos*	3%	1%	3%		2%	12%	3%								
Loosetrife	*Lythrum hyssopifolia* FACW	2				1%			1%									
White clover	*Trifolium repens* FACU	4			1%		3%		16%						2%			
Purei	*Carex secta* OBL	1								3%		3%						
Browntop	*Agrostis capillaris* FACU	4		10%	11%	5%	8%								9%	11%	6%	15%
Broad-leaved dock	*Rumex obtusifolius* FAC	3		1%		2%	2%						2%				1%	
Umbrella sedge	*Cyperus eragrostis* FACW	2		2%	1%		5%	8%	19%	7%		37%	12%	22%	16%	7%		5%
Pimpernel	*Lysimachia arvensis* UPL	5			1%	1%			2%									
Narrow-leaved plantain	*Plantago lanceolata* FACU	4		2%		3%											3%	
Vietnamese mint	*Persicaria odorata*	2	possibly maculosa - scored based on relatives			26%												
Broad-leaved plantain	*Plantago major* FACU	4		1%												1%		
Bachelor's button	*Cotula coronopifolia* FACW	2				1%		2%										
			Total cover	100%	100%	100%	102%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			% pasture grasses	57%	41%	37%	32%	21%	24%	5%	30%	36%	44%	46%	45%	39%	48%	59%
Prevalence Index (Hydrophytic vegetation ≤3)			as per Clarkson calculation	3.000	3.4	2.6	3.000	2.1	2.7	2.5	3.000	2.5	2.8	2.9	2.9	2.9	3.000	2.9
Excluded as NPSFM wetland (>50% pasture in improved pasture?)			Yes = not wetland; stop															
			No = go to 'Dominance Test' score	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	yes
Dominance Test score (>50%) for OBL, FACW, or FAC			Yes = go to 'Prevelance Index'															
			No = go to 'Prevelance Index'		no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
Prevelance Index (≤ 3.0)			Yes = wetland, if passes Dominance Test also															
			No = not wetland; stop OR if Dom Test 'yes' go to next steps		no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
All or most dominants FAC?			Yes = go to 'hydric soils and wetland hydrology'															
			No = wetland		yes	yes	yes	yes	yes	yes	yes	no	yes	yes	yes	yes	yes	
Hydric soils present	M = mottling; G = gleyed; W = wet		Yes = go to 'wetland hydrology rpesent'															
			No = not wetland; stop		no	no	no	yes	no	yes	no		no	yes	no	no	no	
Wetland hydrology present			Yes = wetland					yes		no	no			no	no	no	no	
			No = not wetland; stop															
NPSFM wetland (Yes or No)				**no**	**no**	**no**	**no**	yes	no	no	no	yes	no	no	no	no	no	no