ASSESSMENT OF ECOLOGICAL EFFECTS FOR A PROPOSED RURAL-RESIDENTIAL DEVELOPMENT AT PUKEHINA BEACH ROAD

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1. INTRODUCTION

Group 7 is applying for resource consent for a 137 rural-residential lot subdivision on farmland adjacent to Pukehina Beach Road and commissioned Wildland Consultants to provide ecological input as part of a multi-disciplinary team of specialists involved in the planning and design of this subdivision. The subject property - covering 166 hectares - is currently an intensively-utilised dairy farm operation.

This report provides a baseline ecological assessment of the site and a restoration approach for the proposed subdivision, which includes a very substantial wetland restoration initiative. Information is provided on site character, ecological context, descriptions of vegetation and habitats, and lists of vascular plants and fauna. Ecological values have been assessed, and ecological constraints outlined. Opportunities for ecological enhancement are discussed, along with an assessment of the effects of the land use changes proposed.

2. METHODS

- Relevant digital and hard copy information was collated and evaluated.
- An initial scoping site visit was undertaken on 21 November 2017. A second site visit was undertaken on 24 May 2018 to map and describe existing vegetation and habitats.
- Ecological values and opportunities for enhancement of existing vegetation and habitats were identified. Ecological constraints were also identified.
- Implications and effects of proposed land use changes on local ecology and that of the Waihī Estuary catchment in general were considered and evaluated.
- The approach to be used for wetland restoration and indigenous revegetation was developed in consultation with the project team landscape architect, engineers, and planners, along with Fish and Game New Zealand and Bay of Plenty Regional Council.

3. BACKGROUND

3.1 Ecological context

The proposed residential development and wetland restoration locality comprises farmland located between the Pukehina Canal and Pukehina Parade towards the southern end of Pukehina Beach, *c.*2.7 kilometres southeast of the Waihī Estuary.

Farmland at the subject property was originally part of the once great Kawa Swamp, which was an extensive freshwater wetland that extended across most of the Kaituna-Pongakawa Plains. Vegetation and habitat types within the wetland historically included *Machaerina* sedgeland, *Empodisma minus* sedgeland, *Gleichenia dicarpa* fernland, raupō (*Typha orientalis*) reedland, harakeke (*Phormium tenax*) flaxland (Newnham *et al.* 1995), mānuka shrubland, and bracken fernland (Kirk 1872) and it is likely that many of these vegetation and habitat types were present within the subject

property. The Kawa swamp at Maketū was also described as containing the most extensive habitat for the marsh shield-fern (*Thelypteris confluens*; formerly *Nephrodium thelypteris* var. *squamulosum*) in New Zealand (Kirk 1872). Kahikatea (*Dacrycarpus dacrydioides*), swamp maire (*Syzygium maire*), and pukatea (*Laurelia novae-zelandiae*) are likely to have been present on boggy ground on the margins of the swamp.

Following the arrival of Europeans, vast areas of wetland were drained and secondary shrubland and fernland cleared for farm development. Most of this clearance occurred in the early 1900s and the subsequent loss of wetland habitat led to a dramatic decline in wetland habitats and species (Wildland Consultants 2003). Since European settlement in the area around 1880, extensive wetlands such as the Kaituna Swamp, the Waihī Swamp, and the Kawa Swamp have been reduced to only 248 hectares, or less than 1% of the original wetland (Ministry for the Environment 1997).

The proposed development is within the Western Bay of Plenty District and does not have a significance designation under the Western Bay of Plenty District Plan. The subject property is located in close proximity to three Regionally significant Ecological Areas listed in the Western Bay of Plenty District Plan:

- V14/14 - Little Waihī Estuary: a large - 181 hectares - Category 1 site in Wildland Consultants (2008).
- V14/7 - Wharere Road wetland: a medium-sized - 46 hectares - Category 1 site in Wildland Consultants (2008).
- V14/5 - Waewaetutuki and surrounds: a large - 111 hectares - Category 1 site in Wildland Consultants (2008).

The Waihī Estuary Wildlife Management Reserve is also located nearby on the margins of the Little Waihī Estuary and provides good habitat for a range of Threatened, At Risk, and not threatened indigenous bird species including a small population of Australasian Bittern (Threatened-Nationally Critical in Robertson *et al.* 2017). The Little Waihī Estuary has been assessed as providing outstanding habitat for waders and waterbirds and as such it has been recommended for RAMSAR status as a Wetland of International Importance (Owen *et al*. 2006).

Maketū and Waihī Estuaries have been identified as nationally-important bird areas (Gaskin 2016).

3.2 Nutrient status of canals and receiving waterways

The farmland proposed for subdivision and wetland recreation is dissected by numerous ditches running NE-SW roughly every 180 metres. Also located within the site is one central drain running SE-NW roughly through the middle of the site; two other SE-NW running drains define the northeastern and southwestern boundaries of the site. All ditches drain into the Pukehina Canal which is located just outside the southwestern boundary of the property. Discharges of water from the property to the canal is via a pump. The Pukehina Canal discharges into the Pongakawa Canal

*c.*500 metres from where the Pongakawa Canal discharges into the Waihī Estuary. Nutrient load and bacterial load within the Pukehina Canal therefore influences nutrient and bacterial loads within the Waihī Estuary.

Recent water quality testing within the Pukehina Canal shows high levels of ammonia, dissolved reactive phosphorus, suspended solids, total nitrogen, and total phosphorus as well as high turbidity (Bay of Plenty Regional Council 2018), all of which contribute to conditions suitable for algal blooms, especially when combined with high water temperatures. Waihī Estuary is the receiving water body for the Pukehina and Pongakawa Canals and, in 2009, Waihī Estuary had the highest median bacterial indicator results (faecal coliform, *Escherichia coli*, and enterococci) of all sample sites in the Western Bay of Plenty District over the 12 months of sampling, which is likely to reflect the influence of the Pongakawa River and other freshwater inflows in the estuary (Joint Agency Report 2009). Increasing faecal contamination measured in the Waihī Estuary, the recent appearance of nuisance levels of the macro-algae *Gracilaria chilensis*, and average oxidised nitrogen concentrations above the ANZECC (2000) trigger level for 'slightly disturbed estuarine ecosystems', all indicate a strong water quality impact from agriculture within the catchment (Bay of Plenty Regional Council 2015b).

3.3 Statutory context and definitions

The subject property is in the Bay of Plenty Region, and, as noted above, is within the Western Bay of Plenty District. As such, it is subject to provisions in the Western Bay of Plenty District Plan. The proposal is to retire the entire existing dairy farm, excavate to create a large wetland across more than 80 percent of the site, and subdivide the balance into 137 2,000 m^2 residential lots. As such, the proposal will be subject to:

- Regional plan rules relating to excavation (which are not addressed further in this report).
- District Plan Protection Lot rules: see Appendix 1.
- Legal protection must also be provided:

  "Legal protection of the feature shall be achieved by way of a condition imposed on the subdivision consent requiring a Consent Notice, Memorandum of Encumbrance or similar legal instrument such as a QEII Covenant, Heritage Covenant, or the vesting of land into crown or territorial authority ownership. The type of instrument and the level of protection provided by it must be to the satisfaction of the *Council* and where relevant is to be registered on the title of the land containing the feature to be protected. All costs associated with compliance with this requirement shall be met by the applicant;

  Exclusions

  This rule shall not apply to any land that has been designated in the District Plan (for any purpose), or is classified under the Reserves Act 1997, or is subject to the Conservation Act 1987."

- The District Plan definition of a wetland:

  "Wetlands" 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. For the avoidance of doubt, the term 'wetland' applies to both water bodies and intermittently wet areas. The term does not apply to dry land that does not support a natural ecosystem of plants and animals that are adapted to wet conditions, and that occurs within an area commonly referred to in its entirety as a wetland.

  For the purposes of this District Plan, 'wetland' excludes:

  (a) Wetted pasture and pasture with patches of rushes.
  (b) Oxidation ponds.
  (c) Artificial waterbodies used for wastewater or stormwater treatment. This includes wetlands that have been developed primarily for effluent or stormwater treatment or disposal, but are managed to appear 'natural'.
  (d) Artificial farm dams and detention dams.
  (e) Land drainage canals and drains.
  (f) Artificial reservoirs for firefighting, domestic or municipal water supply.
  (g) Temporary ponded rainfall over areas that would not otherwise be considered a wetland.
  (h) Artificial waterbodies that are not in the bed of a stream, river or lake; and are not degraded natural wetlands that have been modified. This includes artificial waterbodies that are managed to appear 'natural'.
  (i) Artificial watercourses associated with hydroelectric power schemes.

  The edge of a wetland (i.e. where a wetland becomes land) should be determined by a person with appropriate expertise.

  This definition appears to be identical to the definition in the Bay of Plenty Regional Natural Resources Plan.

  It is also consistent with the definition of a wetland in the Resource Management Act 1991:

  "wetland 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 condition."

  The wetland definition in the District Plan appears to be identical to the definition in the Bay of Plenty Regional Natural Resources Plan.

  The District Plan also includes the following definition of "Fresh Surface Water" means freshwater in a river, lake (including pond), stream, and open drain, but excludes "wetland".

  Shallow water with respect to lakes and ponds are those where stratification of the water column does not occur. Land Air and Water Aotearoa (LAWA) defines a shallow lake as one less than 10 metres in depth (Land Air and Water Aotearoa 2016).

The District Plan also contains a definition of a "riparian area or riparian margin": "Riparian Area or Riparian Margin" means a strip of land of varying width adjacent to the bed of a stream, river, lake or wetland, which contributes or may contribute to the maintenance and enhancement of the natural functioning, quality and character of the stream, river, lake or wetland; and the natural character of the margins of streams, rivers, lakes and wetlands. For the purposes of the District Plan, the definition does not include land adjacent to artificial watercourses, artificial waterbodies, and ephemeral flowpaths."

To qualify for a potential Protection Lot, a wetland (above MHWS) must have a minimum size of 0.5 hectares and be surrounded by a 10 metre indigenous buffer. For multiple lots the minimum size requirement for a wetland is one hectare regardless of whether the wetland is listed as being significant in the District Plan.

The District Plan also defines what is required for buffering on wetlands:

(i) *Wetlands* less than two hectares require a minimum of 10 metre indigenous buffer (larger areas may be required where topography dictates). This buffer must be established prior to being eligible for a protection *lot*;

(ii) *Wetlands* greater than or equal to two hectares require a buffer area of a suitable width prescribed by the certifying ecologist and must be established prior to obtaining Section 224 consent.

4. VEGETATION AND HABITATS

4.1 Overview

Most of the site currently comprises grazed pasture with a network of drains of varying depth and width which are maintained to ensure the pasture areas remain in grassland and do not revert to natural wetland vegetation.

Four broad vegetation and types were identified and mapped (Figure 1) on the property:

- Grazed pasture (*c.*162.3 hectares).
- Rough grassland and effluent ponds (*c.*1.3 hectares).
- Built farm environment (*c.*2.6 hectares).
- Drains (*c.*16.8 kilometres).

The proposed subdivision would result in a significant proportion of the property being restored and revegetated to indigenous wetland and terrestrial habitat. This is discussed further in Section 9.

Current vegetation cover and habitats are shown in Figure 1, and type descriptions are provided below.

4.2 Descriptions of vegetation and habitat types

Descriptions for each vegetation and habitat type are provided below, and the location of these types on the property is shown in Figure 1.

1. Grazed pasture (*c.*162.3 ha)

Most of the site comprises intensively-grazed pasture utilised for dairy herd grazing. The pasture is dominated by annual rye grass (*Lolium perenne*) with locally common crowfoot grass (*Eleusine indica*) and broad-leaved dock (*Rumex obtusifolius*) and white clover (*Trifolium repens*) present throughout. Paddocks within this type that tend to have a wetter substrate support patches of water pepper (*Persicaria hydropiper*).

Depressions and shallow hollows within paddocks often support Mercer grass (*Paspalum distichum*), rather than rye grass, with local water celery (*Apium nodiflorum*). In the southwestern part of the site, standing water is present in regular hollows located at *c.*20 metre intervals.

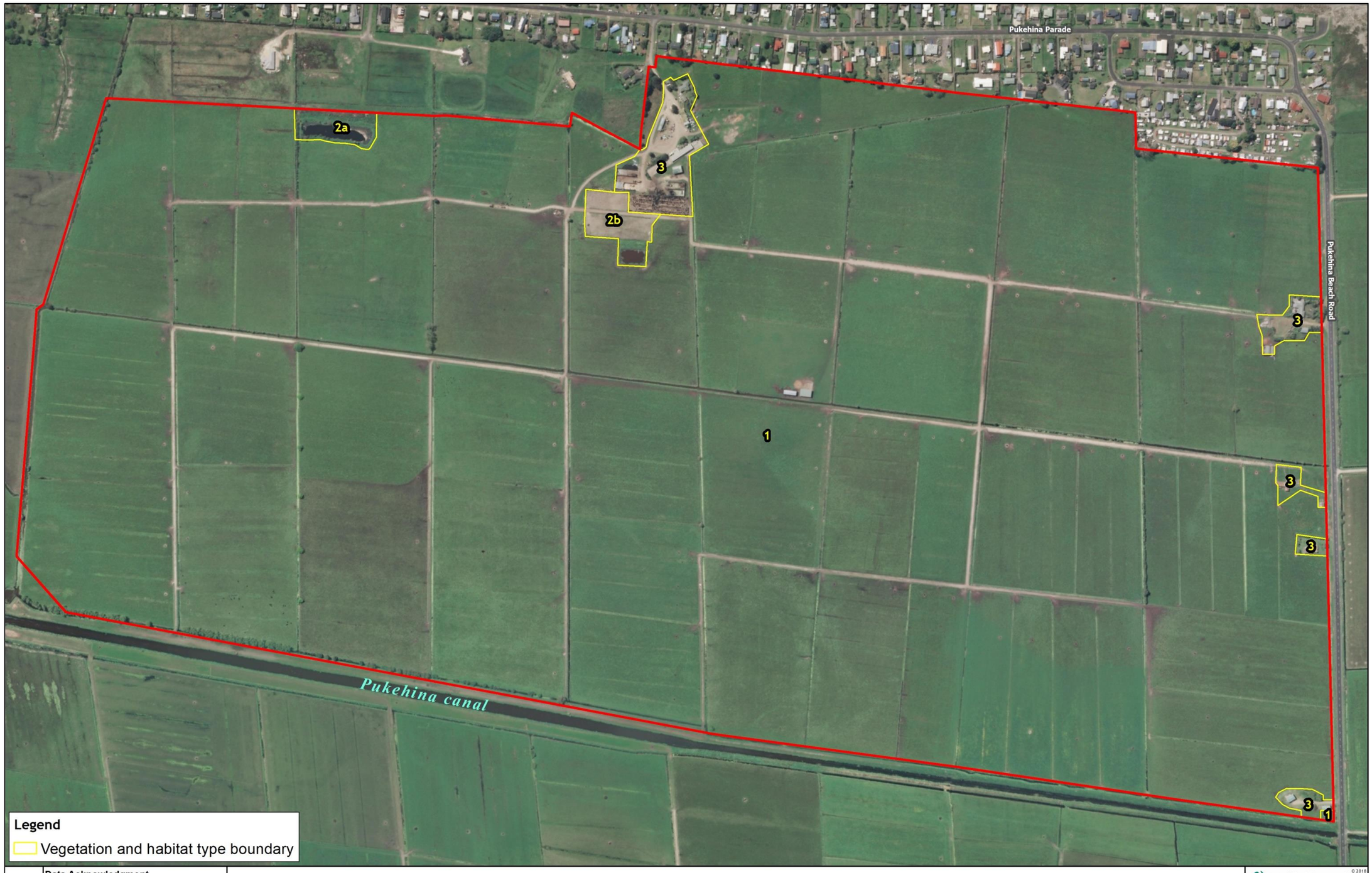
2. Rough grassland and effluent ponds (*c.*1.3 ha)

Rough grassland is present on flat land around, and on slopes leading up to, effluent ponds within the site. The area of this type in the northern part of the site (**2a**) comprises exotic dominated grassland dominated by cocksfoot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*) with patches of sea rush (*Juncus kraussii* var. *australiensis*) and cocksfoot sedgeland, and occasional pampas (*Cortaderia selloana*), and harakeke (*Phormium tenax*). The effluent pond in this area has Mercer grass around the margins and extending into shallow water, with local patches of water pepper.

The area of this type close to the built farm habitats (**2b**) comprises rough sprayed pasture dominated by narrow-leaved carpet grass (*Axonopus fissifolius*), inkweed (*Phytolacca octandra*), black nightshade (*Solanum nigrum*), and wireweed (*Polygonum aviculare*) on the flats north of the effluent pond, with cocksfoot, black nightshade, broad-leaved dock, and creeping buttercup (*Ranunculus repens*) grassland and herbfield on the slopes leading up to the pond. Small patches of water pepper are present around the margins of the effluent.

3. Built farm environment (*c.*2.6 ha)

This habitat type contains all of the hard surfaces surrounding the milking shed, the feed pad, driveways, sileage pit, and all farm buildings within the site. Clusters of planted indigenous and exotic species are present around buildings including agapanthus (*Agapanthus praecox*), pōhutukawa (*Metrosideros excelsa*), taupata (*Coprosma repens*), tī kōuka (*Cordyline australis*), yukka (*Yucca gloriosa*), elephant's ear (*Alocasia brisbanensis*), kahili ginger (*Hedychium gardnerianum*), and various cactus species.



Data Acknowledgment
Map contains data sourced from LINZ
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Figure 1. Vegetation and habitat types within a proposed residential development at Pukehina Beach. May 2018

0 100 200 400 m

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Scale: 1:5,000
Date: 8/06/2018
Cartographer: TP
Format: A3R

Several residential dwellings with associated amenity plantings are present on the southeastern boundary of the property.

4. Drains (*c.*16.8 km)

Eight main drains of varying width and depth are present within the site running NE-SW between each paddock. One central drain runs SE-NW through the approximate middle of the site, and two other SE-NW running drains define the northeastern and southwestern boundaries of the site. Numerous shallow, smaller drains running NE-SW are also present in the south-eastern corner of the site.

A wide variety of vegetation is present on the margins of the drains within the site. Generally, the drain margins in the northeast of the site support a range of indigenous-dominated vegetation of varying density; in the remainder of the site, vegetation on the margins is less common and comprises a mixture of indigenous and exotic species. The drains have been grouped into four broad types based on the depth and width of the drain and the drain margin vegetation:

4a. Shallow drains with abundant decomposing organic matter support standing water covered with large patches of duckweed (*Lemna disperma*). The drain margins support sprayed exotic grasses and weeds. Small patches of Mercer grass are present within the drains.

4b. Deeper drains in the northeastern part of the site do not contain duckweed. The margins of the drain support a wide variety of indigenous species including tī kōuka, pōhutukawa saplings, taupata, pōhuehue (*Muehlenbeckia complexa*), harakeke, sea rush, spike sedge (*Eleocharis acuta*), *Machaerina juncea*, and *Apodasmia similis*, with patches of sprayed exotic grasses and herbs. Occasional pampas and blackberry (*Rubus fruticosus* agg.) plants are also present.

4c. Most of the drains within the site are between 1 and 1.5 metres wide and contain standing water with local patches of duckweed. The margins of these drains support sprayed exotic grasses and herbs with occasional individual plants of pōhutukawa, grey willow (*Salix cinerea*), English oak (*Quercus robur*), pōhuehue, barberry (*Berberis glaucocarpa*), taupata, harakeke, *Cyperus ustulatus*, *Carex virgata*, and soft rush (*Juncus effusus*).

4d. Very shallow drains within the site are becoming colonised by Mercer grass but still contain areas of standing water.

The margins of the drain that defines the northeastern boundary of the site contains small patches of indigenous and exotic species, including kāpūngāwhā (*Schoenoplectus tabernaemontani*), harakeke, Mercer grass, grey willow, paspalum (*Paspalum dilatatum*), pampas, and blackberry. Standing water is present in the drain itself, with reed sweetgrass (*Glyceria maxima*) filling the drain towards the cowshed.

The northeastern end of the drain that defines the southwestern boundary of the site is deep, with visibly flowing water. The margins support sprayed exotic grasses and

herbs with patches of arrow bamboo (*Pseudosasa japonica*) and harakeke, and scattered woody species including grey willow, pōhutukawa, tortured willow (*Salix matsudana* 'Tortuosa'), and māpou (*Myrsine australis*). A long line of crack willow trees is present, *c.*1.5 metres back from the drain.

5. FLORA

Seventy-six vascular plant species - comprising 23 indigenous species and 53 exotic species - were recorded during the May 2018 site assessment.

Small numbers of mānuka (*Leptospermum scoparium*), kānuka (*Kunzea robusta*), and pōhutukawa are present as small trees and saplings within the site along some drains. All three of these species are now classified as being Threatened-Nationally Vulnerable in de Lange *et al.* 2018 due to the predicted potential effects of Myrtle rust on *Myrtaceae* species. No regionally uncommon plant species were recorded from the site.

6. FAUNA

6.1 Avifauna

Flocks of sparrows (*Passer domesticus*) and starlings (*Sturnus vulgaris*) were observed within the site. Eight other exotic bird species, and seven indigenous bird species were seen or heard during the survey including black-backed gull (*Larus dominicanus dominicanus*), kingfisher (kōtare; *Todiramphus sanctus vagans*), paradise shelduck (pūtangitangi; *Tadorna variegata*), pūkeko (*Porphyrio melanotus melanotus*), spur-winged plover (*Vanellus miles novaehollandiae*), swamp harrier (*Circus approximans*), white-faced heron (*Egretta novaehollandiae*), Australian magpie (*Gymnorhina tibicen*), chaffinch (*Fringilla coelebs*), dunnock (*Prunella modularis*), Eurasian blackbird (*Turdus merula*), Eurasian skylark (*Alauda arvensis*), mallard (*Anas platyrhynchos*), myna (*Acridotheres tristis*), and yellowhammer (*Emberiza citrinella*).

No Threatened or At Risk bird species, as per Robertson *et al.* (2017), were noted during the site visit.

6.2 Freshwater fauna

No freshwater fauna records were found for the stretch of Pukehina Canal that passes alongside the subject property. However, a whitebait spawning site (species unspecified but probably inanga - *Galaxias maculatus*) is present near the confluence of the Pukehina Canal and the Pongakawa Canal (Bay of Plenty Regional Council 2008) and common indigenous and exotic fish species tolerant of nutrient-rich water and soft substrates are likely to be present, e.g. shortfin eel, common bully, and mosquito fish.

7. CURRENT ECOLOGICAL VALUES AND CONSTRAINTS

The site does not currently contain any significant indigenous vegetation or significant habitat for indigenous fauna.

There are scattered small pōhutukawa, kānuka, and mānuka trees and saplings which are now classified as Threatened-Nationally Vulnerable (due to the threat potentially posed by myrtle rust to these taxa), but these are only present in low numbers in a highly modified environment. Overall, vegetation and habitats on the property are highly modified and of low ecological value, with few constraints to development.

Drains within the site ultimately discharge into the Waihī Estuary, which is a Significant Ecological Site in the Western Bay of Plenty.

Although the original vegetation was cleared for flax farming and/or agricultural purposes, the necessity of regular pumping to maintain low water levels and ongoing maintenance of drains and drainage depressions throughout the site indicates that, should drain maintenance, pumping, and grazing cease, the substrate would become sufficiently waterlogged year-round to allow natural reversion to a wetland state.

The subject property is located *c.*1.5 kilometres from Waihī Estuary Wildlife Management Reserve which contains significant habitat for a range of Threatened, At Risk, and common indigenous avifauna (Bay of Plenty Regional Council 2015; Gaskin 2016).

The main ecological constraint to development of a subdivision on the site is the Pukehina Canal and associated drains. There should be no adverse effects on water quality.

8. POTENTIAL ECOLOGICAL EFFECTS OF THE PROPOSED SUBDIVISION

(a) Overview

The proposed rural-residential lots will comprise *c.*17% of the site (*c.*27.8 hectares), which will be 137 rural-residential lots with an area of *c.*2,000 m^2 per lot. Significant earthworks will be undertaken within the site to create open water habitats with the excavated, sandy material to be transported within the site to elevate proposed building platforms and provide contouring within the site (refer to the consent application by Aurecon).

Internal drains within the site will be removed during the earthworks except for drains on margins necessary to protect neighbouring properties (see the Geotechnical and Hydrological sections of the application for details).

Potential effects are set out below for the range of features present on and adjacent to the subdivision site:

- Current vegetation
- Avifauna at the proposed subdivision site
- Freshwater habitats
- Current water quality within drains
- Future water quality
- Potential sewage effects
- Potential stormwater effects
- Land cover and use
- Proposed vegetation and habitats
- Potential weed issues
- Summary
- Staging and completion of development

Discussion is also provided below of potential effects that could occur if the subdivision was not to be completed (in response to a query from Western Bay of Plenty District Council).

(b) Current Vegetation

There will be only minor ecological effects resulting from clearance of the existing vegetation and plant species as a result of the subdivision. Virtually all of the site is characterised by intensively-grazed exotic pasture species and no adverse effects on indigenous vegetation and plant species will result from land development for the subdivision.

The minor occurrences of pōhutukawa, kānuka, and mānuka are of no particular ecological significance (even though each of these species now have threat rankings).

Creation of an extensive area of wetland habitats and the proposed indigenous revegetation of the site will result in positive effects that far outweigh any adverse effects on current habitats within the site.

(c) Avifauna at the Proposed Subdivision Site

No bird species recorded at the site are classified as threatened, either locally, regionally, or nationally, and only common indigenous and exotic species are known to be present at or use the site (see Section 6 above).

The surrounding landscape is dominated by grazed pasture similar to that currently present within the subject property. Therefore extensive areas of habitat suitable for the avifauna observed during the site visit will still exist in the local area and there will therefore be no adverse effects on the current avifauna complement or their habitats as a result of the proposed subdivision.

The proposed creation of large areas of open water and indigenous wetland vegetation within the site will significantly increase the amount of habitat available for indigenous water birds and wetland avifauna. The proposed project will therefore have a significant positive effect on avifauna diversity within the site and numbers of birds using the site.

(d) Freshwater Habitats

Freshwater habitats on the property currently comprise a network of degraded drains which will be providing habitats for a limited suite of species, such as inanga, shortfin eel, common bully, and mosquito fish. The outer drains, which separate the site from neighbouring properties and the main road into Pukehina, will still be maintained to ensure that neighbouring properties are not affected by the proposed hydrological changes, and some existing drain habitat will therefore remain largely unaltered. Removal of the internal drains will result in minor adverse effects to freshwater fauna species that may be present and these are to be addressed by the proposed restoration works (see Section 9 below).

(e) Current Water Quality Within Drains

No data was found for water quality measures in the Pukehina Canal however, the nearby Pongakawa Canal shows high levels of total nitrogen, oxidised nitrogen, dissolved reactive phosphorus, and total phosphorus (Land Air Water Aotearoa 2017), all of which contribute to conditions suitable for algal blooms. Water quality within the Pukehina Canal is likely to be similar to that of the Pongakawa Canal as it passes through similar land use.

(f) Future Water Quality

Research within the Rotorua Lakes District has shown that restored/recreated surface flow wetlands have the potential to remove around 368 kilograms of total nitrogen per hectare of restored wetland and 11 kilograms of total phosphorus per hectare of restored wetland (Opus 2010). Consequently, recreation of wetland habitat within the subject property has the potential to remove up to 30,000 kilograms of total nitrogen and 894 kilograms of total phosphorous per year from water entering the Pukehina Canal.

(g) Potential Sewage Effects

Residential development will require an appropriate sewage treatment system. All sewerage and stormwater will be required to go through appropriate treatment systems to ensure that enhanced levels of sediment, nutrients, or other potential contaminants are not discharged into Waihī Estuary or any of its tributaries.

(h) Potential Stormwater Effects

Care will need to be taken during earthworks and development of the site to ensure that sediments generated by the earthworks do not end up in the estuary. Accepted best practice techniques for the control of water flows and

associated sediment should be adopted, with earthworks staged to minimise potential adverse effects. A sediment management plan should be prepared which sets out the measures to be used to avoid or minimise sediment discharges. This should be relatively easy to achieve due to the hydrological separation of the site from the adjacent canal.

The proportion of hard surfaces will increase within the project area as a result of the subdivision. Residential stormwater also contains a number of heavy metals such as zinc (from car tyres and uncoated galvanised iron roofing), petroleum-based hydrocarbons, chromium, nickel and suspended solids from roads and vehicle emissions. It is important that stormwater is treated adequately to ensure that these contaminants are removed before they reach the estuary. If stormwater treatment is done to a high standard then there will be no adverse effects on the canal or estuary.

(i) Land Cover and Use

Most of the land to be affected by the proposed subdivision is currently pasture, subject to periodic nutrient inputs from fertiliser, effluent discharged directly from a large dairy herd, and spray irrigation of stored dairy wastes. The proposed change in land use will result in a significant reduction in pastoral nutrient inputs.

Retirement of the subject property would result in a *c.*0.3% reduction of high-producing exotic grassland area within the Kaituna-Maketū and Pongakawa-Waitahanui catchment (Bay of Plenty Regional Council 2016). Although small in isolation, the cumulative effect of such reductions in dairy farm areas within the Waihī Estuary catchment is likely to result in the gradual improvement of estuarine water quality in the future.

(j) Proposed Vegetation and Habitats

Once the revegetation and wetland development has been completed, the proposed subdivision will result in significantly enhanced indigenous vegetation and habitats within the subject property and will be beneficial to ecological values in the wider landscape within the Pukehina and Little Waihī areas.

Restoration of wetland habitat within the remainder of the property is likely to significantly increase habitat for indigenous avifauna and will also provide habitat for Threatened and At Risk indigenous species present in nearby significant natural areas.

(k) Potential Weed Issues

Disturbance of the substrate within the site and creating open areas of bare earth during revegetation and prior to house construction provide ideal sites for weed establishment.

Wetland weeds are a particular threat within the proposed development, especially willow species, but also alder (*Alnus glutinosa*), *Glyceria*, and yellow flag (*Iris pseudacorus*). Grey willow, crack willow (*Salix ×fragilis*), tortured willow, arrow bamboo, pampas, blackberry, *Glyceria*, kahili ginger, and agapanthus are already present within the property and control of these species should be undertaken prior to subdivision. Aquatic weeds are also an issue, including hornwort (*Ceratophyllum demersum*) and parrots feather (*Myriophyllum aquaticum*), which are already present in the Pukehina Canal.

Summary

A summary of potential ecological effects associated with various aspects of the works proposed is set out in Table 1 below:

Table 1: Summary of potential ecological effects associated with the subdivision and wetland restoration within farmland at Pukehina Beach Road.

Potential Effect	Degree of Likely Adverse Effects	Opportunities to Avoid, Reduce, or Mitigate Effects
Indigenous vegetation and habitat	Positive	• Wetland recreation at the site will significantly enhance the indigenous biodiversity values of the site.
Avifauna habitat	Positive	• Wetland restoration at the site will provide a wider range of habitats for use by a much wider range of indigenous avifauna
Increased weed invasion	Minor	• Clean vehicles and equipment before use at the site. • Implement a regular surveillance and control plan for pest plant species. • Ensure that contouring and water flow within the site does not result in long dry periods within proposed wetland habitats.
Water quality within drains	Positive	• Creation of wetland habitat within the site is likely to improve water quality within the site and within the Pukehina Canal.
Sedimentation of streams/harbour	Positive	• Appropriate sediment control measures during construction/development.

Staging and Completion of Development

The approach proposed for the site is a new and innovative concept. Due to the current substrate levels and state of the property, it is necessary to undertake large scale earthworks to establish the house sites and the wetland restoration site. Substantial excavation, levelling, and contouring of the wetland site will be required, along with establishment of a water management system and substantial indigenous planting.

While it is feasible to carry out this work, the large scale of it means that it is very unlikely that it will be fully completed prior to the need to be able to sell titles. It will be feasible, however, to ensure that all excavation, levelling, contouring, structures, and relevant plans are in place. When the excavation/contouring/levelling has been completed, and the water management system is in place, the site will effectively comprise a 'wetland'. In a worst case scenario, at that stage, the site would naturally

re-establish in wetland vegetation, probably comprising a mixture of indigenous and exotic species.

9. OVERVIEW OF OPPORTUNITIES FOR ECOLOGICAL ENHANCEMENT

The subdivision development proposed includes the restoration/recreation of a very large area of wetland and terrestrial habitats, including wetland vegetation and open water areas comprising *c.*82% (*c.*136 hectares) of the site, with the balance of the site (27.8 hectares) to comprise rural-residential lots of *c.*2,000 m^2 per lot. Wetland habitat will also be present on many of the private lots.

The proposed ecological restoration will involve three different habitat types (see Figure 2):

- A mosaic of vegetated wetland types.
- Open water areas.
- A buffer zone between the existing high density residential strip along Pukehina Beach Road and the main cluster of sections. This area is likely to be planted in taller indigenous tree species that will provide an effective screen from the high-density housing.

Other opportunities for ecological enhancement of the site include:

- Establishment of a permanent pest control network (e.g. traps and bait stations) within the revegetated areas for ongoing pest animal control. Feral cats and mustelids could be controlled by trapping along the revegetation area margins, or possibly along established tracks within the recreated habitats.
- The proposal is for a 'cat-free' subdivision, to avoid the negative effects that wandering domestic cats have on indigenous fauna.

The property is currently used for intensive dairy herd grazing, with an associated intensive fertiliser regime to maintain pasture production. Restoration of a wetland complex and indigenous revegetation across most of the site will result in a significant improvement in ecological values, will support and enhance ecological values in nearby natural areas, and is likely to result in water quality improvement within the Pukehina Canal and therefore the Little Waihī Estuary.

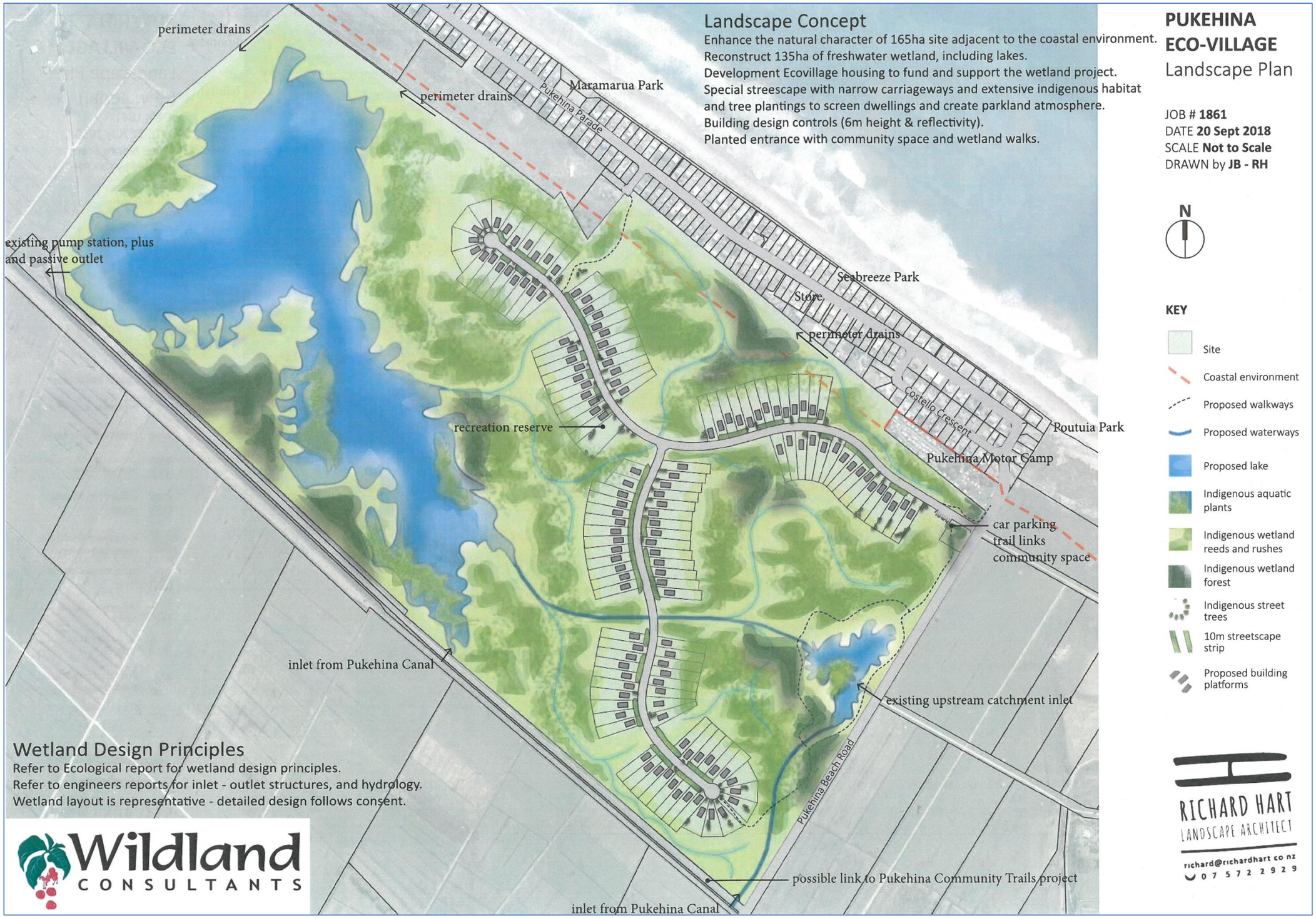

Figure 2: Restoration and revegetation areas within a proposed rural-residential development at Pukehina Beach.

10. WETLAND CREATION

10.1 Overview

Design of the wetland will be a key issue to ensure the proposed wetland areas do not require substantial ongoing management. Although existing the low-lying paddocks provide a blank slate for wetland development at this site, water depth and hydrological management along with well thought out access arrangements are critical factors in ensuring the successful rehabilitation of the proposed wetland areas.

10.2 Wetland construction

The following are key matters that need to be addressed during wetland construction:

- Hydrology
- Water quality
- Substrate contours
- Vegetation establishment and management
- Weeds
- Predator management
- Human use

Hydrology

- Water flows into and through the wetland are very important. Water levels should be maintained at or preferably somewhat higher than ground level year round. Bare substrates exposed during dry conditions risk being colonised by invasive species such as pampas and grey willow, while very shallow wetlands can rapidly be transformed to dryland communities through sediment deposition and/or accumulation of organic dieback and natural successional processes.

- An upstream water inlet will be required, and a downstream inlet. If possible, passive inlet and outlet structures should be used. A pump should be retained, to provide added flexibility with water egress.

- Water level control structures need to be fitted with facilities to manage/fine tune water levels within the wetlands, and some should be fitted to provide fish passage into and out of the wetlands.

- Hydrological budgets need to be generated to determine how much water needs to be introduced to maintain design water levels to offset evapotranspiration and seepage losses (if any in the case of the latter), and seasonal variation in water supplies.

- Structures to promote the sediment deposition from water introduced to the wetland need to be installed to minimise the infilling of reticulation channels and wetland habitats. Similarly, these areas should incorporate structures or facilities to intercept and minimise the ingress of plant pests into the wider wetland area.

- Water reticulation channels should be relatively wide (up to five metres) and swale shaped to minimise frictional resistance arising from submerged or emergent aquatic plant growth. Tailings from the construction and maintenance of these waterways should be used to maintain a management access causeway on one side only of the channel.

Water Quality

- Water quality is a potential issue because the source water for the wetland will come from the Pongakawa Canal, a highly nutrient-enriched waterway.

- Nutrient-enriched water could, potentially, with the right combination of circumstances, lead to algal blooms and/or prolific growths of aquatic macrophytes in the wetland. To overcome this it may be necessary to excavate the wetlands below their current ground level more widely, and reduce the amount of water required to inundate and create wetlands at existing ground levels.

- Management of water flows into and through the wetland network will be important.

Substrate Contours

- For much of the wetland, water levels should be 0.2-0.3 metres or thereabouts, above substrate level.

- The main bodies of open water should be 2.5-4.0 metres deep (or deeper), to avoid future encroachment by raupō.

- Margins of the largest body of open water should be uneven, with small 'embayments' *c.*50 metres across. Littoral areas should generally be gently shelved.

Vegetation Establishment and Management

- Substrate and water levels are critically-important determinants of the species and types of vegetation that could potentially be established at the site.

- Planting could, potentially, be required across about 100 hectares, which would be astronomically expensive.

- An 'uneven' substrate should be created, with potential for different wetland plant communities and habitat types, e.g. flaxland, raupō reedland, *Carex* sedgeland, *Machaerina* sedgeland.

- Raised areas should be formed locally for terrestrial plant communities, which will need to be planted with species such as harakeke, kahikatea, mānuka, tī kōuka (cabbage tree).

Weeds

- Wetland weeds are a particular threat, especially species such as grey willow, but also alder, yellow flag, and *Glyceria*, which is already present within the proposed subdivision site. Aquatic weeds are also an issue, including hornwort and parrots feather, which are already present in the Pukehina Canal.
- Ongoing weed monitoring will be required, along with control effort if/when invasive species are found.
- Mesh-enclosed 'cages' could be established at the water inlets, to 'capture' inflows of aquatic weeds.

Predator Management

- It is proposed that landowners will not be able to own cats.
- A predator control network should be established from the outset.
- Predator control should use a permanent network of traps and bait stations to target feral cats, mustelids, hedgehogs, and rats.

Human Use

- It is important that most of the wetland is not subject to ongoing disturbance.
- Walkways, cycleways, and other facilities within the wetlands should be confined to the east and north of the proposed residential areas. The greater wetland area occupying the western half of the property should be managed as a 'wilderness/wildlife refuge' area, the exception being for access to strategically located maimai for the purpose of hunting during the game bird season.
- It may be appropriate to have a focal point, such as a bird hide or shelter, at one point.

11. INDIGENOUS REVEGETATION

11.1 Overview

Revegetation of most of the site will provide significant amenity and indigenous ecological enhancements to the subject property which will more than address any detrimental ecological effects of the proposed subdivision on the receiving environments.

Appropriate plant species selection and sensitive and timely management of revegetated areas will be required to ensure the revegetated areas perform optimally for nutrient load reduction and biodiversity enhancement of the project area. Planting the entire area proposed for wetland recreation at 'normal' plant spacings would require a very substantial financial outlay. The water levels proposed for parts of the site will mean that some of the wetter areas can be planted at wider spacings which

will quickly develop into indigenous-dominated vegetation given appropriate management. The following sections provide guidelines for implementation and management of the proposed revegetation areas.

11.2 Principles for species selection

The Western Bay of Plenty District Plan includes criteria for protection lots, which relate to diversity and pattern, shape, ecological viability and sustainability, naturalness, rare and special features, fragility and threat, ecological context, and long-term viability. In the event that the landowners wish the site to be eligible for a protection lot in the future, the restored areas need to meet these criteria, and therefore restoration plantings will need to comprise only appropriate, indigenous species that are "eco-sourced" (see Section 11.4 below). The use of cultivars should be avoided, e.g. variegated flax, purple or red akeake, cultivated varieties of *Pseudopanax*, and cultivated hybrids of *Pittosporum* species.

It is important to select suitable species for the particular characteristics of each planting site. For example, most of the areas to be restored are permanently, or at least ephemerally freshwater wetland, along with smaller areas of dry land.

Additional criteria for selecting plant species include:

- They are species that are characteristic of the landform and physical site parameters into which they are being planted.
- They are species which, in association, will blend with existing/adjacent vegetation cover both structurally, and where possible, compositionally.
- They are species suited to the site conditions and most likely to prosper there.
- They are species that will form an effective screen where required to do so.
- Collectively they include both relatively fast growing "secondary cover" species that provide canopy closure earlier rather than later, and "enrichment/restoration/ emergent" species such as kahikatea, pōhutukawa, pukatea, rimu, swamp maire, tōtara, and tānekaha that will contribute to a later successional state.
- They are species that will augment or enhance existing habitat values for birds.
- While serving several or more of these functions, they are species that will not compromise view shafts where it is intended these be preserved, or trigger other constraints, e.g. interfere with power lines.

Suitable Species

Plant species that are appropriate for planting in the restoration areas are listed in Table 2.

Table 2: Provisional list of species suitable for planting within the subject property, Pukehina Beach, in Tauranga Ecological District.

Key

1. Plant after a cover of fast-growing indigenous species has been established.
2. Plant in low numbers (i.e. 30-40 plants per hectare).
3. Plant these species to attract birds.

Scientific Name	Common Name	Indigenous Buffer Zone	Alluvial flat Forest	Freshwater Wetland	Indicative Plant Spacing (m)
Trees, Shrubs, and Vines					
Aristotelia serrata[3]	Makomako	✓			1.5
Brachyglottis repanda[2, 3]	Rangiora	✓			1.5
Carpodetus serratus[2, 3]	Putaputaweta	✓	✓		1.5
Coprosma grandifolia[2, 3]	Kanono	✓	✓		1.5
Coprosma lucida[2, 3]	Shining karamū	✓			1.5
Coprosma propinqua			✓	✓	1.5
Coprosma repens[3]	Taupata	✓	✓		1.5
Coprosma robusta[3]	Karamū	✓	✓		1.5
Coprosma tenuicaulis	Hukihuki		✓	✓	1.5
Cordyline australis[3]	Tī kōuka, cabbage tree	✓	✓	✓	1.5
Cordyline banksii[3]	Tī ngahere, forest cabbage tree	✓			1.5
Coriaria arborea var. *arborea*	Tutu	✓	✓		1.5
Corynocarpus laevigatus[3]	Karaka	✓	✓		5.0
Dacrydium cupressinum[2]	Rimu	✓	✓		5.0
Dacrycarpus dacrydioides[2]	Kahikatea		✓	✓	5.0
Dodonaea viscosa[2]	Akeake	✓	✓		1.5
Dysoxylum spectabile[1,2]	Kohekohe	✓			5.0
Entelea arborescens[1]	Whau	✓			1.5
Fuchsia excorticata[2, 3]	Kōtukutuku	✓			1.5
Hebe stricta var. *stricta*[3]	Koromiko	✓	✓		1.5
Hedcarya arborea[2, 3]	Porokaiwhiri, pigeonwood	✓	✓		5.0
Knightia excelsa[3]	Rewarewa	✓			5.0
Kunzea robusta	Kānuka	✓			1.5
Laurelia novae-zelandiae[2, 3]	Pukatea		✓	✓	5.0
Leptospermum scoparium	Mānuka	✓	✓	✓	1.5
Leucopogon fasciculatus[2]	Mingimingi	✓			1.5
Melicytus ramiflorus[3]	Māhoe	✓			1.5
Metrosideros excelsa[2,3]	Pōhutukawa	✓			5.0
Myoporum laetum	Ngaio	✓			1.5
Myrsine australis	Māpou	✓	✓		1.5
Olearia rani	Heketara	✓			1.5
Olearia solandri	Coastal tree-daisy	✓			1.5
Pennantia corymbosa	Kaikōmako	✓	✓		1.5
Phormium cookianum[3]	Whatariki, mountain flax	✓			1.5
Phormium tenax[3]	Harakeke, flax		✓	✓	1.5
Phyllocladus trichomanoides	Tānekaha	✓	✓		5.0
Piper excelsum[3]	Kawakawa	✓	✓		1.5
Pittosporum crassifolium[3]	Karo	✓			1.5
Pittosporum tenuifolium[3]	Kōhūhū	✓			1.5
Podocarpus totara[2]	Tōtara	✓	✓		5.0
Pseudopanax arboreus[3]	Whauwhaupaku, five-finger	✓			1.5
Pseudopanax crassifolius	Horoeka, lancewood	✓	✓		1.5
Pseudopanax lessonii[3]	Houpara	✓			1.5
Solanum aviculare	Poroporo	✓			1.5
Syzygium maire[2]	Maire tawake, swamp maire		✓	✓	5.0
Vitex lucens[2, 3]	Pūriri	✓			5.0

Scientific Name	Common Name	Indigenous Buffer Zone	Alluvial flat Forest	Freshwater Wetland	Indicative Plant Spacing (m)
Ferns					
Blechnum minus	Swamp kiokio			✓	1.5
Blechnum novae-zelandiae	Kiokio	✓	✓	✓	1.5
Cyathea dealbata	Ponga	✓			5.0
Cyathea medullaris	Mamaku	✓			5.0
Dicksonia squarrosa	Whekī	✓	✓		5.0
Grasses, Sedges, Rushes, and Herbs					
Austroderia fulvida	Toetoe		✓	✓	1.5
Austroderia toetoe	Toetoe		✓	✓	1.5
Machaerina articulata				✓	2.5
Machaerina juncea				✓	2.5
Machaerina tenax				✓	2.5
Carex maorica				✓	2.5
Carex secta	Pūrei		✓	✓	2.5
Carex virgata			✓	✓	2.5
Dianella nigra	Tūrutu	✓	✓		1.5
Gahnia pauciflora		✓			2.5
Gahnia setifolia		✓			2.5
Typha orientalis	Raupō			✓	2.5

Some species are likely to colonise the site naturally after grazing ceases, which means that not all areas will require planting. Tree species such as kahikatea (*Dacrycarpus dacrydioides*), pukatea (*Laurelia novae-zelandiae*), and maire tawake (swamp maire; *Syzygium maire*) can be planted in groups within wet areas.

It is suggested that 80% or more of the plants to be established on dry sites are fast-growing shrub or small tree species that will rapidly create a closed canopy, e.g. mānuka, kānuka, karamū, harakeke, koromiko (*Hebe stricta*), and tī kōuka (*Cordyline australis*). Occasional specimens of larger, slower-growing trees can be planted amongst the faster-growing species (e.g. at 4-6 metre spacing).

11.3 Plant sizes

For dryland areas and areas tagged for alluvial or swamp forest, PB 2/3 plant grades should be used with the possible exception of the *Carex* species which generally perform very well in root trainer or tube stock. For wetter areas on the margins of open water areas, 'plugs' of reeds and sedges such as raupō, *Machaerina* species, and harakeke can be planted. These species generally perform well from plugs as long as the hydrological requirements are met. Use of plugs rather than PB size plants will reduce planting costs.

The rationale for using PB 2/3s is that their stature and robustness reduces their vulnerability to light or incidental browsing from herbivorous animal pests, they are more resilient to frosts and other environmental extremes at both ends of the climatic spectrum, they are less likely to be overcome by plant pests or other competing vegetation, they are easier to locate and manage in terms of releasing and/or monitoring, and they will be immediately discernible to residents and visitors to the estate.

11.4 Plant spacing, plant densities, and plant numbers

Plants should generally be spaced at 1.5 metre centres which equates to approximately 4,450 plants per hectare. A spacing of 1.5 metres, as opposed to a lesser distance of one metre for example, will enable spot-spraying to be used for site preparation rather than blanket spraying. Where pasture is being revegetated, there is a distinct advantage in retaining a grass sward between the plants as it significantly reduces the risks of invasion by pest plants which might otherwise threaten the plantings during their establishment phase. For wet areas on the margins of open water, 'plugs' of sedges, rushes, and reeds should be spaced at 2.5 metre centres.

Tall emergent species such as kahikatea, pōhutukawa, pukatea, rimu, swamp maire, tōtara, and tānekaha, and other species planted in lesser numbers to provide diversity (e.g. cabbage tree, mamaku and whekī), will generally be spaced at intervals of 4-6 metres or greater between one another.

Absolute plant numbers have not been prescribed but, if planted using the guidelines above, and regular surveillance and maintenance is undertaken, canopy closure should be achieved within five years.

11.5 Plant sourcing

All plants should be "eco-sourced" (grown from seeds, propagules or cuttings) collected from naturally-occurring populations within the Tauranga Ecological District. Plants should be ordered as soon as actual numbers required are confirmed.

11.6 Site preparation

Fencing

Stock-proof fencing will need to be erected at each planting location prior to any planting being undertaken at that site if stock are still present within the property when restoration planting is undertaken.

Weeds and Existing Ground Cover

Site preparation is a key factor in the successful implementation of any planting, and effective initial control of weeds can significantly reduce the amount of effort and cost of weed control required after planting.

Most of the sites to be revegetated comprise grazed pasture with little, if any invasive plant species present. These sites will require spot spraying only using a Glyphosate-based herbicide. Any woody weeds present within revegetation areas should be controlled via the 'cut and paste' method, where the stump of the plant is swabbed using a herbicide such as Glyphosate or Metsulfuron.

It is important that any bare surfaces are stabilised as quickly as possible. This could be achieved by closely spaced, bulk planting, or by establishing an interim grass cover over the site. Immediately prior to planting, spot-spraying of individual planting sites would be undertaken as elsewhere.

Pest Animals

Site preparation should also entail a control programme for any herbivorous animal pest species that might be present including rabbits, hares, and possums. This will include a control effort immediately prior to planting to minimise plant losses due to browsing, scratching or burrowing, with such follow ups as may be necessary. Subject to animal numbers present, it may be advisable to spray the plants with a repellent such as Treepel or Plantskydd prior to planting.

11.7 Planting

Timing

Subject to weather conditions, planting should be undertaken in winter. If the late summer/autumn period is deemed to have been too dry to plant in April, planting will be deferred until such time as conditions are more suitable, and risks of plant mortality have been reduced.

Planting Technique

During planting, individual planting sites should be "screefed" (scraped clear using a spade), to physically remove plant material and roots from an area *c.*35 cm in diameter. Plants will then be placed into the midst of these clear areas. Planters will be briefed on how planting is to be undertaken, and planting will need to be overseen to ensure it is undertaken to a high standard.

Fertiliser

Soils are unlikely to be N-deficient, having previously been farmed, and fertiliser need not be applied initially. If some plants later indicate nutrient impoverishment, these should be treated individually with an appropriate slow-release fertiliser.

Blanking and Infill Planting

Blanking (replacement of dead plants) should be undertaken as required, approximately 2-3 months after initial planting, to replace any plants that have succumbed at that point. Other plants that die in the first and second years will need to be replaced to reduce the risk of invasion by aggressive weeds, and/or where it is necessary to ensure there is no reduction in vegetation cover as a consequence of plant mortality. Infill planting requirements will be identified in February/March preceding the next planting season.

11.8 Ongoing management

Monitoring

Regular monitoring of the revegetation programme should be undertaken to identify what management intervention might be required from time to time, and when, to ensure revegetation goals are met. Site inspections should be undertaken at least

weekly immediately following planting, with a particular focus on monitoring plant survival, and whether animal pests are present. After this initial period, and for the first year thereafter, plantings should be inspected on a fortnightly to monthly basis, depending on seasonal conditions and upcoming management that might be required such as releasing. Inspections will focus on assessing the survival of plants and the need for infill planting; assessing the success of invasive weed control, releasing operations, and ongoing requirements; and assessing the success of animal pest control and the need for further effort in this area.

In addition to site inspections, a simple monitoring system of photopoints should be established at appropriate locations to record changes in vegetation composition at each location. These need to be installed prior to or at the time of planting, and need to be re-photographed annually for the first five years of the programme.

Maintenance

Maintenance weed control and releasing should be undertaken for at least 24 months following planting to ensure the successful establishment of the plantings. During the first year, some plants may need to be released from weed competition 1-2 or even three times, and possibly once in the year thereafter. Following their initial establishment, the greatest risk to the plantings will arise from the invasion of aggressive weeds, and blackberry in particular. Wilding pines are also likely to colonise some areas, and these will need to be dealt with as they appear.

Post planting animal pest control should be implemented in response to animal damage detected during the surveillance programme described above, and as required.

In addition to environmental weed and animal pest control, ongoing management will need to include monitoring and maintenance of fences.

12. ECOLOGICAL VALUES OF THE PROPOSED WETLAND COMPLEX

Wetlands have been reduced severely across New Zealand, with more than 90 percent drained or infilled. In the Bay of Plenty Region more than 97 percent of wetlands have been lost due to the land development. As discussed in Section 3 above, little wetland habitat now remains on the alluvial plains across the western Bay of Plenty, and in the catchments that flow into Waihī Estuary (or any other Bay of Plenty estuaries).

The plan to restore *c.*138 hectares of wetland habitat and associated buffering is a major initiative, within regional and national contexts.

To give an indication of the relative scale of the proposal, the largest 'natural' wetland remaining in the Western Bay of Plenty is Te Pourepo o Kaituna (the lower Kaituna wetland), with an area of 243 hectares and a planned extension of 79 hectares, i.e. total eventual area of 352 hectares. The restoration project in the Kopurererua

valley, in Tauranga, is about 300 hectares, comprising a mixture of terrestrial, riparian, and wetland restoration. Other relatively large 'natural'[1] wetlands in the eastern Bay of Plenty include Awaiti (80 hectares), Tumurau (140 hectares), and Matatā (110 hectares). Any natural or restored wetland in the Bay of Plenty over 10 hectares is certainly regionally significant and all better quality and/or larger sites are nationally significant.

The proposal to establish a large wetland comprising a complex of terrestrial margins, shallow vegetated wetland, and deeper areas of open water will provide habitat for a diverse range of wetland plants, birds, fish, and invertebrates. This type of complex is what is present in natural Bay of Plenty wetlands, such as Tumurau.

Variation in the diversity and types of habitat present will be strongly positive in terms of the ecological functioning of the wider wetland. The combination of open water and vegetated wetland provides habitat for a wider range of birds, including species that rely on open water, such as dabchick, ducks, coots, and shags, along with species that rely on vegetated wetlands, such as puweto/spotless crake, koitareke/marsh crake, and matuku/bittern. Even the open water specialists rely on vegetated wetland margins for breeding sites. Variation in water depths and degree of cover will provide more habitat for indigenous freshwater fish, and deeper areas of open water will help to buffer the system from extreme temperatures during hot summers.

The proposal includes a buffer of varying widths, with a gradation in this buffer from wetland habitats to terrestrial habitats. The gradation zone, technically, is wetland as it will be permanently damp. The terrestrial zone will be planted with various species typical of an alluvial floodplain in the lowland Bay of Plenty. As such, the buffer zone should be regarded as being an integral part of the wetland system.

Because of the large scale of the wetland complex it will have very significant ecological values, and will make a significant contribution as an additional 'island' of wetland habitat in this otherwise seriously depleted part of the district and region.

13. POTENTIAL PROTECTION LOTS

Restoration of wetland habitat within the property, if planted with appropriate species as described above in Section 11, could qualify the property to be subject to protection lot rules within the operative Western Bay of Plenty District plan (Western Bay of Plenty District Council 2012).

For a wetland to meet the Western Bay of Plenty District Plan criteria for wetland protection lots, the site must meet the definition of a wetland as set out in the District Plan (see Section 3 above), and must score highly for three of the following criteria: diversity and pattern, shape, ecological viability and sustainability, naturalness, rare and special features, fragility and threat, ecological context, and long-term viability (see Table 3 below and Appendix 2).

[1] Most freshwater wetlands in coastal and lowland environments in the Bay of Plenty are now highly modified due to the combined effects of drainage, altered hydrological regimes, and invasion of exotic plants.

Table 3: Ecological evaluation for current and proposed habitats within potential protection lots at Pukehina Beach, July 2018.

Criteria		Current State				Proposed Future State			
		H	M	L	Comments/Justification	H	M	L	Comments/Justification
(i)	*Representativeness*: the extent to which an area is characteristic or representative of natural diversity.			✓	The site is currently dominated by exotic pasture species.	✓			The proposed habitats should be representative of range of habitat types historically present within the area.
(ii)	*Diversity and pattern*: The diversity of species and community types.			✓	Indigenous species diversity is low within the site and only very small remnants of indigenous habitat types are present.	✓			A wide range of habitat types is proposed within the wetland area including alluvial forest, sedgeland, rushland, reedland, and flaxland.
(iii)	*Shape*: Larger areas with a compact shape are more likely to be ecologically viable.			✓	Only small areas of indigenous dominated wetland habitat are currently present within the site.	✓			The proposed wetland area is large and compact.
(iv)	*Ecological viability and sustainability*: The likelihood of an area remaining ecologically viable and the management and input necessary for long term sustainability.			✓		✓			With appropriate design, the proposed wetland should maintain itself in the long term with minimal management.
(v)	*Naturalness*: Degree of modification as compared with likely original unmodified character.			✓	The current site contains some natural habitat types that are reflective of historical vegetation within the area.	✓			Although the proposed wetland area will be recreated, the final state will reflect the natural, historical character of the area.
(vi)	*Rarity and special features*: Presence of rare community types, species or other rare features.			✓	No rare or special features are currently present within the site.	✓			The wetland will include examples of habitat/vegetation types that are now no longer common within the Tauranga Ecological District including kahikatea forest and swamp maire forest. The open water and reedland/ sedgeland areas are also likely to provide habitat for Threatened and At Risk indigenous avifauna which are known from the Waihī Estuary and associated wetlands.
(vii)	*Fragility and threat*: Threat processes or agents (actual or potential) which are likely to destroy or substantially modify the feature, and the vulnerability of the feature to damage.			✓	The site is already highly degraded and is unlikely to change significantly from what is currently present given current management.		✓		With appropriate sediment controls, sewage management systems, and regular pest plant surveillance and control the site should not face significant threats.

Criteria		Current State				Proposed Future State			
		H	M	L	Comments/Justification	H	M	L	Comments/Justification
(ix)	*Ecological context:* the extent to which an area is buffered from modifying influences, or provides a key buffer for other ecological areas, or the connectivity role that site provides for the wider landscape.			✓	The current vegetation does little to support wider landscape ecological context or connectivity.	✓			The proposed wetland will provide an extension of significant wetland habitats already present within the catchment and will therefore support the existing ecological values of the wider landscape.
(x)	*Long term viability:* the extent to which the features of the area will maintain themselves in the long term.	✓			The site is already highly degraded and is unlikely to change significantly from what is currently present given current management.	✓			With appropriate design, the proposed wetland should maintain itself in the long term with minimal management.

Additionally, the minimum area for a wetland protection lot that has not previously been identified as a Significant Ecological Feature (in the District Plan) is 0.5 hectares, with additional lots allowed for at an average of one hectare of wetland per lot.

Open water areas proposed for the site will be 4-5 metres deep, at most and, because they will be less than 10 metres deep, all proposed wetland habitats within the site will qualify as wetland habitat under the District Plan definitions (refer to Section 3.3 above). Also, the complex of vegetated wetland, extensive wetland margins, and open water habitat is what could be expected in a natural wetland of this extent in lowland Bay of Plenty. At *c.*138 hectares, the proposed restoration area could potentially qualify for 137 wetland protection lots[1].

Existing vegetation within the proposed wetland restoration zones is currently dominated by exotic plant species (predominantly pasture species) and therefore does not meet the criteria for protection lots (see Table 3 above). However, when the proposed wetland areas are excavated, flooded, planted, and managed appropriately, the created areas would meet the definition of wetland habitat in the District Plan and the wetland would qualify for wetland protection lots once restoration plantings have matured. Subject to the prescriptions for indigenous revegetation in Section 11 being implemented, the proposed wetland will score highly for nine of the ten criteria: representativeness, diversity and pattern, shape, ecological viability and sustainability, naturalness, rarity and special features, ecological context, and long-term viability. Note, though, as discussed in Section 10 above, that even in the absence of indigenous planting, the excavated water-filled site will revegetate naturally with wetland species (probably a mixture of indigenous and exotic species).

In addition to the area of wetland to be protected, the District Plan states that "a buffer of a suitable width prescribed by a certifying ecologist" must be established.

Generally a buffer should, by definition, surround the entire wetland area in order to ameliorate nutrient and abiotic factors that could affect the future viability of the natural wetland. If a 10 metre buffer were to be required around the entire perimeter of the subject property, this would equate to a total of *c.*5.64 hectares of buffer. In this instance, a number of factors should be taken into account:

- The entire property is delineated by drains and bunds which separate the property, and any habitats within it, from the neighbouring properties and roads.
- A Department of Conservation marginal strip which is used for maintenance of the Pukehina Canal, angler and public access is present next to the southwestern boundary which forms a buffer on this side. Some of this could be revegetated but any revegetation programme would need to be managed so that access along the stop-bank is maintained for walkers and drain-clearing machinery.

[1] The actual number of lots 'awarded' is at the discretion of the Western Bay of Plenty District Council. The ecological suitability of a site is only one of several criteria and tests which need to be met in order to satisfy the requirements of protection lot subdivisions as per the proposed District Plan, and the above evaluation should not be construed in any way as pre-empting Council's decision should the landowner proceed with a formal application for a subdivision involving these features.

- A walking track/maintenance accessway bounded by indigenous terrestrial species is proposed to run along the entire northeastern border between the wetland habitats and the northeastern drain(s) (refer to the Landscape Plan).

- An additional 15 hectare buffer zone is proposed between the residential houses and camp ground along Pukehina Parade and the northern-most sections. Although it is concentrated in one area, this buffer is roughly three times larger than the area required for a 10 metre buffer around the entire perimeter.

Consequently, the modifications to the proposed buffer location and size are considered to be ecologically acceptable.

14. FORMAL PROTECTION AND ONGOING MANAGEMENT

Statutory Protection

The wetland and open water habits will be subject to formal protection in perpetuity using an appropriate covenant or other statutory mechanism, and subject to measures along the following lines:

- There will be three distinct areas created as "reserve" with separate legal descriptions. The most appropriate reserve status of the land will be determined, along with how it will be transferred to a management "trust".

- The wetland areas will be designed and constructed to minimise maintenance and promote fish passage and wildlife habitat. Fish and Game New Zealand and Bay of Plenty Regional Council staff will be included in the detailed design process for the wetlands following consent being granted.

- The water regime (culverts/floodgates and weirs) shall be designed to incorporate "best practice" for fish passage.

Trust

- A Trust will be established to manage the wetlands. Provisions relating to the establishment and operation of the trust may include, but are not limited to:

    - A Trust deed/document (or similar) shall be prepared and shall set out the overall purpose of the trust and its aims and objectives which are primarily to promote biodiversity on the reserves and specify the types of use within the three areas (game bird habitat, hunting, recreation, fish passage and spawning, general recreation and public access, recognition of cultural values).
    - The Trust will establish a management strategy for each of the three areas.
    - The Trust will have a structure allowing for co-funding and with a role of applying for funding from public and private sources.
    - The Trust will consist of two representatives from Fish and Game New Zealand, one from Bay of Plenty Regional Council, one from Ngāti Whakahemo, and one from the Pukehina Ratepayers Assn.
    - Trustees will be appointed by the agencies based on "skill sets".

- Funds will be managed by the Trust with options to include the payment of the Western Bay of Plenty District Council Ecological SIF ($900/lot which needs to be agreed with the District Council), and a contribution of $10,000 per lot from the developer as a "seed fund" for ongoing management.
- The Trust documents will require the trust appointments for Ngāti Whakahemo to be in consultation with the other three iwi, and for the Regional Council's appointee in consultation with Department of Conservation and Western Bay of Plenty District Council.
- The Trust documents shall also specify that the trustees have a responsibility to convey information to the community.

Wetland 'Boundary' and Private Lots

It will be necessary to delineate the edge of the wetland on each of the lots, say with bollards, so that property owners know that wetland protection provisions relate to a particular part of the property.

Monitoring and Management

The Trust will be responsible for all aspects of monitoring and ecological management. This will include:

- Regular (3-6 monthly) monitoring inspections to check for weeds, 'boundary' encroachments, rubbish dumping, and so on.
- Implementation of weed control across the wetland complex.
- Maintenance of access tracks.
- Maintenance of indigenous plantings.
- Maintenance and upkeep of the water management system.
- Establish and operation of a pest control network across the entire area, including cat control.
- Control of domestic pets.
- Reporting to the Trust and other relevant parties.

15. POTENTIAL CONSENT CONDITIONS FOR PRIVATE LOTS

Potential consent conditions relating to each of the individual 2,000 m^2 lots are set out below:

THAT the owner of Lot *(specify lot #)* shall on a continuing basis, take all reasonable steps to preserve and protect native ~~bush~~ vegetation growing within the area *(specify descriptors used in plan)* on plan *(specify survey plan #)*. In particular the respective landowners shall:

(a) Not (nor permit any other person to) fell, remove, burn or otherwise damage any native tree, shrub or plant growing in the area without the prior approval of Western Bay of Plenty District Council.

(b) Establish and maintain a closed cover of indigenous vegetation throughout the wetland and buffer zone except for permanent bodies of open water.

(c) Not (nor permit any other person to) plant, sow or scatter any trees, shrubs or plants in this area or the seed of any trees, shrubs or plants other than local indigenous plant species or introduce any substance injurious to plant life the terrain in this area except in the control of pest plants.

(d) Undertake such measures as may be appropriate from time to time in the control of pest plants or other exotic species incompatible with the ecological values of the area.

(e) Not allow any cattle, sheep, horses, pigs, goats or other livestock to enter this area.

(f) Fence the boundaries of the area with a stock-proof fence to a minimum specification of the 8-wire rural fence (or any other alternative standard approved by the Principal Administrative Officer Western Bay of Plenty District Council) described in Clause 6 of the Second Schedule to the Fencing Act 1978 and shall at all times maintain such fence in good and stock-proof order and condition.

(g) Not light, nor permit to be lit any fire within this area, or on land adjacent to this area which is occupied or controlled by the Owner at any time when there is a risk of fire spreading into this area from such adjacent land.

(h) In the event of loss or destruction for any reason of the existing indigenous vegetation or part of it, where Council is satisfied that the loss or destruction is due to a breach of the conditions of this consent notice, replant the area lost or destroyed with such indigenous trees, shrubs or grasses plants as Council may prescribe.

(i) Not (nor permit any other person to) carry out any drainage works, excavations or alterations to the topography of this area without obtaining all necessary prior resource consents from relevant consent authorities.

(j) Allow all reasonable access to and across this area by Council personnel for inspection purposes.

(k) The community Trust, or other managing body, shall provide a written ecological monitoring report to Council on a five-yearly basis, with such reporting prepared by an ecologist or suitable professional person to the satisfaction of Council.

16. CONCLUSIONS

- Most of the subject property currently has a cover of high producing pasture, subject to active drainage, high levels of nutrient inputs, and intensive grazing.

- There will be a reduction in nutrient loss to the Waihī Estuary catchment resulting from the retirement of 166 hectares of dairy farmland. This nutrient reduction will support Bay of Plenty Regional Council plans to improve water quality in the catchment of Waihī estuary.

- If the proposed subdivision goes ahead, most of the site will be retired and subject to major large-scale wetland creation and indigenous revegetation. The balance of the site will be developed into 137 2,000 m^2 lots and subject to new roading and housing (and a marked reduction in nutrient inputs).

- The wetland complex to be formed will be of regional significance because of the large scale of restoration in a heavily-depleted landscape.

- Revegetation guidelines have been provided for the proposed revegetation areas, using locally-sourced indigenous plant stock, stock fencing, and control of animal and plant pests. Opportunities for protection lots are available if the restoration process and indigenous revegetation is managed suitably.

If the property is developed in the manner set out above, the marked change in land use will result in significantly reduced nutrient losses to waterways and a significant overall improvement in the indigenous ecological state of the property and the local landscape. The wetland complex in particular will be of very considerable ecological significance.

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REFERENCES

Bay of Plenty Regional Council 2008: Bay of Plenty Regional Natural Resources Plan. *Bay of Plenty Regional Council Strategic Policy Publication 2008/06*. Bay of Plenty Regional Council, Whakatāne.

Bay of Plenty Regional Council 2011: Bay of Plenty Regional coastal environment plan. *Bay of Plenty Regional Council Environmental Publication 2003/08*, amended February 2011. Bay of Plenty Regional Council, Whakatāne. 347 pp.

Bay of Plenty Regional Council 2015a: Biodiversity Management Plan for Waihī Estuary Wildlife Management Reserve.

Bay of Plenty Regional Council 2015b: NERMN estuary water quality report 2015. *Bay of Plenty Regional Council Environmental Publication 2015/01*. Bay of Plenty Regional Council, Whakatāne. 114 pp.

Bay of Plenty Regional Council 2016: Kaituna-Maketū and Pongakawa-Waitahanui Water Management Area: current state and gap analysis. *Bay of Plenty Regional Council Environmental Publication 2016/01*. Bay of Plenty Regional Council, Whakatāne. 155 pp.

Bay of Plenty Regional Council 2015: *Biodiversity management plan for Waihī Estuary Wildlife Management Reserve.* Prepared for Maketū Ongatoro Wetland Society, Department of Conservation, Fish and Game, and Western Bay of Plenty Regional Council. Bay of Plenty Regional Council, Whakatāne. 52 pp.

Bay of Plenty Regional Council 2018: Unpublished water quality testing within the Pukehina Canal, 2016-2017.

de Lange P.J., Rolfe J.R., Barkla J.W., Courtney S.P., Champion P.D., Perrie L.R., Beadel S.M., Ford K.A., Breitwieser I.A., Schönberger I., Hindmarsh-Walls R., Heenan P.B., and Ladley K 2018: Conservation status of New Zealand indigenous vascular plants, 2017. *New Zealand Threat Classification Series 22*. Department of Conservation, Wellington. 86 pp.

Gaskin C. 2016: Important Areas for New Zealand Seabirds: Sites on land, rivers, estuaries, coastal lagoons, and harbours. Forest and Bird, Wellington. 177 pp.

Joint Agency Research Report 2009: Microbiological quality of shellfish in estuarine areas. Retrieved from: http://www.toiteorapublichealth.govt.nz/vdb/document/57, 5 December 2017.

Kirk T.S. 1872: Notes on the Flora of the Lake District of the North Island. *Transactions and Proceedings of the Royal Society of New Zealand 5*: 322-345.

Land Air Water Aotearoa 2016: Lakes factsheet. Retrieved from: https://www.lawa.org.nz/learn/factsheets/lakes/, 11 September 2018.

Land Air Water Aotearoa 2017: Water quality data for the Pongakawa River at SH2. Retrieved from: https://www.lawa.org.nz/explore-data/bay-of-plenty-region/river-quality/pongakawa/pongakawa-at-sh2/, 5 December 2017.

Ministry for the Environment 1997: The state of New Zealand's environment 1997. Ministry for the Environment. Wellington, New Zealand.

Newnham R.M., Lowe D.J., Wigley G.N.A. 1995: Late Holocene palynology and palaeovegetation of tephra-bearing mires at Papamoa and Waihī Beach, western Bay of Plenty, North Island, New Zealand. *Journal of the Royal Society of New Zealand 25*(2): 283-300.

Opus 2010: Wetland feasibility for nutrient reduction to Lake Rotorua. Prepared for Bay of Plenty Regional Council, Whakatāne. 87 pp.

Owen K.L., Wilson T.D., Latham P.D., and Young K.D. 2006: Distribution and conservation of shorebirds in the Bay of Plenty, New Zealand, 1984-2003. *Technical Report Series 26*. Department of Conservation, Rotorua.

Robertson H.A., Baird K., Dowding J.E., Elliott G.P., Hitchmough R.A., Miskelly C.M., McArthur N., O'Donnell C.J., Sagar P.M., Scofield R.P., and Taylor G.A. 2017: Conservation status of New Zealand birds, 2016. *New Zealand Threat Classification Series 19.* Department of Conservation, Wellington. 23 pp.

Western Bay of Plenty District Council 2012: Western Bay of Plenty District Plan 2012, Western Bay of Plenty District Council, Whakatāne.

Wildland Consultants 2003: Tauranga Ecological District Phase 1 Protected natural areas programme report. *Wildland Consultants Ltd Contract Report No. 751.* Prepared for Environment Bay of Plenty. 52 pp.

Wildland Consultants 2008: Natural areas in Tauranga Ecological District. *Wildland Consultants Ltd Contract Report No. 1914.* Prepared for Bay of Plenty Regional Council. 686 pp.

VASCULAR PLANT SPECIES RECORDED 24 MAY 2018

INDIGENOUS SPECIES

Monocot. trees and shrubs

Cordyline australis	tī kōuka, cabbage tree

Dicot. trees and shrubs

Coprosma repens	taupata
Coprosma robusta	karamū, kāramuramu
Kunzea robusta	kānuka
Leptospermum scoparium agg.	mānuka
Metrosideros excelsa	pōhutukawa
Myrsine australis	māpou, matipou, māpau

Dicot. lianes

Muehlenbeckia complexa	pōhuehue

Ferns

Azolla filiculoides	retoretore
Histiopteris incisa	mātātā, water fern
Pteridium esculentum	rārahu, bracken

Sedges

Carex virgata	pūrei
Cyperus ustulatus f. *ustulatus*	toetoe upoko-tangata
Eleocharis acuta	spike sedge
Ficinia nodosa	wīwī
Machaerina juncea	
Schoenoplectus tabernaemontani	kāpūngāwhā

Rushes

Apodasmia similis	oioi
Juncus kraussii var. *australiensis*	wi, wīwī sea rush

Monocot. herbs (other than orchids, grasses, sedges, and rushes)

Lemna disperma	karearea
Phormium tenax	harakeke, flax

Composite herbs

Cotula australis	soldier's button
Senecio bipinnatisectus	Australian fireweed

NATURALISED AND EXOTIC SPECIES

Gymnosperms

Taxodium distichum	yew

Monocot. trees and shrubs

Alocasia brisbanensis	elephants ears
Yucca gloriosa	yucca

Dicot. trees and shrubs

Banksia sp.	
Berberis glaucocarpa	barberry
Datura stramonium	thorn apple
Juglans ailantifolia	Japanese walnut
Quercus robur	English oak
Rosa rubiginosa	sweet briar
Rubus sp. (*R. fruticosus* agg.)	blackberry
Salix babylonica	weeping willow
Salix cinerea	grey willow
Salix fragilis	crack willow
Salix matsudana 'Tortuosa'	tortured willow

Dicot. lianes

Lonicera japonica	Japanese honeysuckle

Grasses

Cenchrus clandestinus	kikuyu grass
Cortaderia selloana	pampas
Dactylis glomerata	cocksfoot
Eleusine indica	crowfoot grass
Glyceria maxima	reed sweetgrass
Holcus lanatus	Yorkshire fog
Lolium perenne	rye grass
Paspalum dilatatum	paspalum
Paspalum distichum	Mercer grass
Pseudosasa japonica	arrow bamboo

Rushes

Juncus effusus var. *effusus*	soft rush, leafless rush

Monocot. herbs (other than orchids, grasses, sedges, and rushes)

Agapanthus praecox	agapanthus
Hedychium gardnerianum	kahili ginger, wild ginger

Composite herbs

Achillea millefolium	yarrow
Cirsium arvense	Californian thistle
Cirsium palustre	marsh thistle
Conyza sumatrensis	broad-leaved fleabane
Crepis capillaris	hawksbeard
Hypochaeris radicata	catsear
Taraxacum officinale	dandelion

Dicot. herbs (other than composites)

Apium nodiflorum	water celery
Daucus carota	wild carrot
Galium aparine	cleavers
Lotus pedunculatus	lotus
Malva sylvestris	large-flowered mallow
Persicaria hydropiper	water pepper
Phytolacca octandra	inkweed
Plantago australis	swamp plantain
Plantago major	broad-leaved plantain
Ranunculus repens	creeping buttercup
Ranunculus sceleratus	celery-leaved buttercup
Rumex obtusifolius	broad-leaved dock
Modiola caroliniana	creeping mallow
Solanum chenopodioides	velvety nightshade
Solanum nigrum	black nightshade
Stellaria media	chickweed
Trifolium repens	white clover
Verbena bonariensis	purple-top

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(iv) A severe or substantial natural landform feature such as a cliff, ravine or the like.

(h) Protection lots

In exchange for the protection of an *Identified Significant Feature* as defined in this District Plan or other existing features of value to the community additional *lots* over and above what other rural subdivision rules provide for may be created.

(i) Application

Additional *lots* or Transferable Protection Lot credits may be created from a qualifying existing *lot* within the Rural Zone in conjunction with the legal protection in perpetuity of a significant natural or other existing feature of value to the community as follows:

- On-site Protection Lots within the Rural Zone – maximum of 5 additional *lots*. The feature to be protected must be within the land being subdivided.

- One or more Transferable Protection Lot credits to be used in conjunction with the subdivision of land within the Lifestyle Zone, subject to compliance with the requirements for subdivision in that Zone (refer Section 17).

35.16

In both the foregoing clauses, clause (vi) of this rule shall apply where the additional *lots* or credits are being created in conjunction with the protection of an ecological feature.

In the context of this rule a "feature of value to the community" is deemed to be:

1. An *Identified Significant Feature* as specified in the District Plan (see Appendices 1, 2, and 3).

2. Other cultural heritage or ecological features subject to clause (iv) of this rule. In the case of ecological features, this may include previously degraded ecological sites that through enhancement or restoration can at the time of application be proven to meet the requirements of clause (iv).

In the case of cultural heritage features, these are items of historic heritage (as defined in section 2 of the *RMA*) which are of cultural significance to Maori, including wahi tapu.

3. Land for expansion of, or access to, reserves.

Explanatory Note:
Enhancement means improving the existing qualities and values of an area that are ecological, cultural, and/or related to amenity. Restoration will have a corresponding meaning.

Enhancement or restoration means improvement to a level which meets the qualifying criteria for ecological features set out in section 18.4.2(h)(iv)(1)(b).

(ii) Qualifying standards for controlled onsite protection lot subdivision

Up to two additional *lots* may be created through an on-site Protection Lot subdivision within the Rural Zone, subject to each *lot* complying with the following:

1. Vehicle access shall be to an existing sealed road, excluding a State Highway;

2. Maximum *lot* size shall be 1ha.

(iii) Qualifying features

1. This rule shall apply to features according to their respective *lot* boundaries as existed at 1 August 1992.

2. Within the subject title, where an ecological feature exceeds the size criteria in (iv)1(b) or (vi) below then the entire feature shall be protected under this rule.

2. Where the feature being protected is capable of realising more than one protection lot, credits will be given for additional *lots*. These credits are able to be used in the Lifestyle Zone only.

(a) For credits created on or after 30 January 2010, the credits will expire five years from the date of issue of the consent or five years after the date that the Minden Lifestyle Zone Structure Plan becomes operative, whichever is the later.

(b) For credits created prior to 30 January 2010 the following applies:

(i) The credit will expire ten years from the date of the Minden Lifestyle Zone Structure Plan being made operative (16 June 2012).

(ii) Thirty percent of the total credits (calculated per donor lot) may be used in conjunction with Rule 18.4.2(f).

(iv) Certification

1. **Ecological Features**

(a) In the case of those *Identified Significant Ecological Features* referred to in Appendix 1 of the District Plan or of other ecological features, certification from an appropriately qualified independent person that the feature in question meets the criteria in 1(b) below shall be submitted with the application for subdivision consent.

Such certification shall be accompanied by a report prepared by the certifier detailing the attributes of the feature recommended for preservation and include a management plan specifying any protective or enhancement measures deemed necessary.

(b) Criteria for ecological features

The feature must be assessed in the context of the relevant ecological district, bioclimatic zone and landform type. Each feature is required to rank highly on three or more of the following criteria:

(i) Representativeness - the extent to which an area is characteristic or representative of natural diversity;

(ii) Diversity and pattern - the diversity of species and community types;

(iii) Shape - larger areas with a compact shape are more likely to be ecologically viable;

(iv) Ecological viability and sustainability - the likelihood of an area remaining ecologically viable and the management input necessary for long term sustainability;

(v) Naturalness - degree of modification as compared with likely original unmodified character.

(vi) Rarity and special features - presence of rare community types, species or other rare features;

(viii) Fragility and threat - threat processes or agents (actual or potential) that are likely to destroy or substantially modify the feature, and the vulnerability of the feature to damage;

(ix) Ecological context – the extent to which an area is buffered from modifying influences, or provides a key buffer for other ecological areas, or the connectivity role that site provides for the wider landscape;

(x) Long term viability – the extent to which the features of the area will maintain themselves in the long term.

Explanatory Note:
Riparian areas only need to meet criteria (v) and (ix) above to qualify.

The following table shows minimum feature size dependent on whether the feature is listed in the District Plan as significant or whether it can be identified as an 'other feature' subject to 18.4.2(h), (i) and (iv).

Features smaller than the minimums below shall be considered as Non-Complying Activities:

Habitat Type	Minimum Size for significant ecological features	Minimum size for 'other features'
Tall Forest	3ha	5ha
Regenerating Forest	4ha	8ha
Secondary Shrub Land	5ha	10ha
*Riparian margins (*above *MHWS)*	500m in length and 20m wide	
*Wetlands (*above *MHWS)*	0.5ha surrounded by a 10m indigenous buffer	

Explanatory Note:
Riparian areas are measured from 20m landward of the stream edge on one side. When a stream is wholly contained within one title this can be measured on each side.

2. **Viewshafts**

(a) In the case of *Viewshafts* referred to in Appendix 2 certification from an appropriately qualified independent person that the feature in question still exists in terms of the description as provided in Appendix 2 shall be submitted with the application for subdivision consent.

3. **Cultural Heritage Features**

(a) In the case of Identified Significant Historic Heritage Features referred to in Appendix 3 certification from an appropriately qualified independent person that the feature in question still exists in terms of the description as provided in Appendix 3 shall be submitted with the application for subdivision consent.

(b) With respect to cultural heritage features not listed in Appendix 3, the feature in question shall be certified by an appropriately qualified and experienced person as being of such cultural or archaeological significance as to warrant preservation in perpetuity. Such certification shall be accompanied by a report prepared by the certifier detailing the attributes of the feature recommended for preservation and shall include:

(i) Endorsement from an authorised representative of the recognised tangata whenua for the area in question;

(ii) A management plan specifying any protective or enhancement measures deemed necessary.

4. **Land for expansion of, or access to, reserves**

(a) In the case of land for expansion of, or access to, reserves, certification from an appropriately qualified independent person that the feature in question meets the criteria below shall be submitted with the application for subdivision consent.

(i) The land must provide for expansion of an existing reserve, or access (not otherwise shown in the District Plan) to an existing or proposed reserve or esplanade reserve. The acceptance of such applications is at *Council's* sole discretion.

(ii) The minimum size and multiple *lot* entitlement is the same as for the following ecological features:

- Access equates to *Riparian Margins*
- Expansion of reserves equates to *Wetlands*.

(v) Buffering on Wetlands

(i) *Wetlands* less than 2ha require a minimum of 10m indigenous buffer (larger areas may be required where topography dictates). This buffer must be established prior to being eligible for a protection *lot*;

(ii) *Wetlands* greater than or equal to 2ha require a buffer area of a suitable width prescribed by the certifying ecologist and must be established prior to obtaining Section 224 consent.

(vi) Number of lots

One *lot* for every separate feature type as set out in clauses (i) and (iv) of this rule. Multiple *lots* will be allowed based on feature type, whether the feature is listed as significant or as an 'other feature', and the feature size. The following tables show the feature sizes required in hectares and the total number of corresponding multiple protection *lots* that can be obtained.

Multiple Lots Features listed as significant in the District Plan:

Feature Type	Feature Size Requirement per *lot*
Tall Forest	6ha
Regenerating Forest	8ha
Secondary Shrubland	10ha
Riparian Margins	1km
Wetlands	1ha

Multiple Lots for Features not listed as significant in the District Plan:

Feature Type	Feature Size Requirement per lot
Tall Forest	10ha
Regenerating Forest	16ha
Secondary Shrubland	20ha
Riparian Margins	1km
Wetlands	1ha

(vii) Legal protection

Legal protection of the feature shall be achieved by way of a condition imposed on the subdivision consent requiring a Consent Notice, Memorandum of Encumbrance or similar legal instrument such as a QEII Covenant, Heritage Covenant, or the vesting of land into crown or territorial authority ownership. The type of instrument and the level of protection provided by it must be to the satisfaction of the *Council* and where relevant is to be registered on the title of the land containing the feature to be protected. All costs associated with compliance with this requirement shall be met by the applicant;

(viii) Exclusions

This rule shall not apply to any land that has been designated in the District Plan (for any purpose), or is classified under the Reserves Act 1997, or is subject to the Conservation Act 1987.

APPENDIX 3

SITE PHOTOGRAPHS

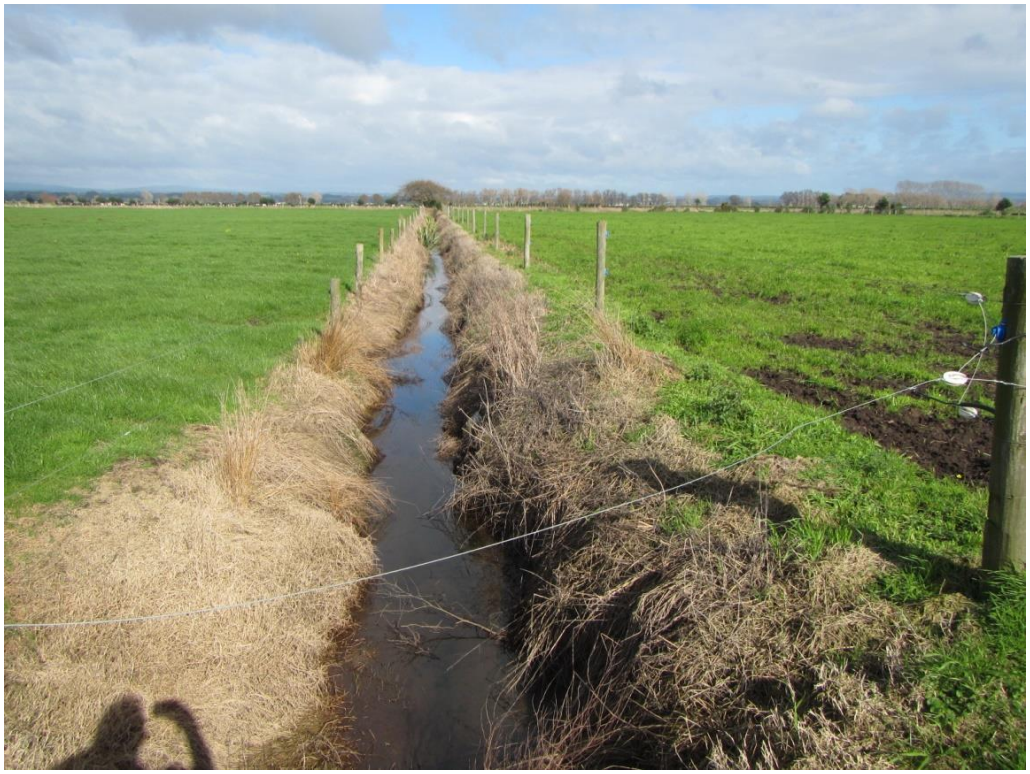

Plate 1: Most of the site comprises grazed pasture with each paddock generally separated from the next by fences and narrow ditches with sprayed margins.

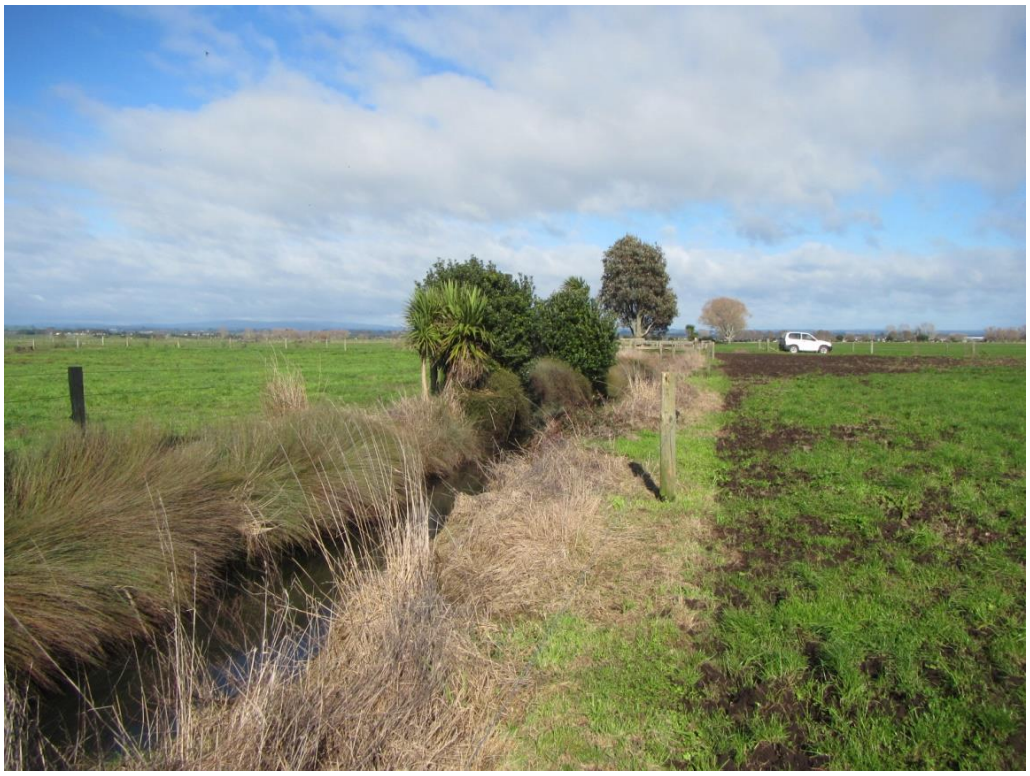

Plate 2: Drain margins in the northern part of the site often support diverse indigenous species with areas of sprayed exotic grasses and occasional exotic weed species. In this photograph *Machaerina juncea* and sea rush dominate the first half of the drain on the left-hand side with woody indigenous species (tī kōuka, pōhutukawa, and pōhuehue) dominating the second half.

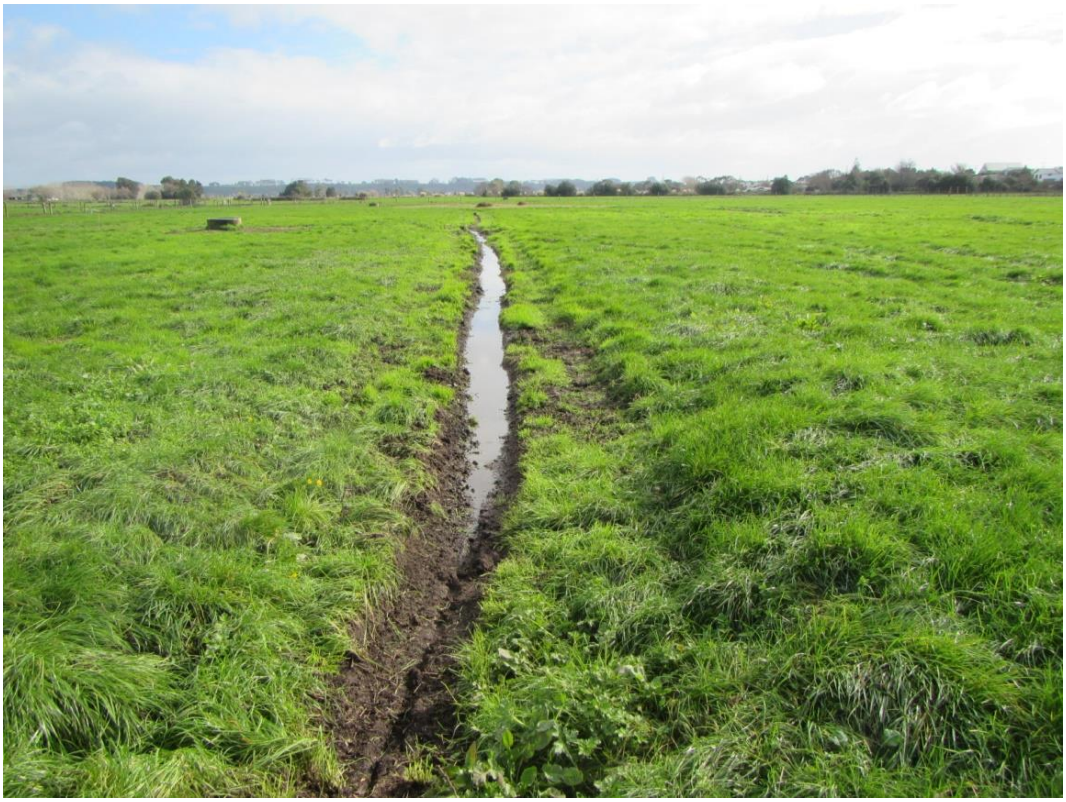

Plate 3: Paddocks in the southwestern part of the site often have shallow furrows dug within them. These shallow furrows usually support standing water.

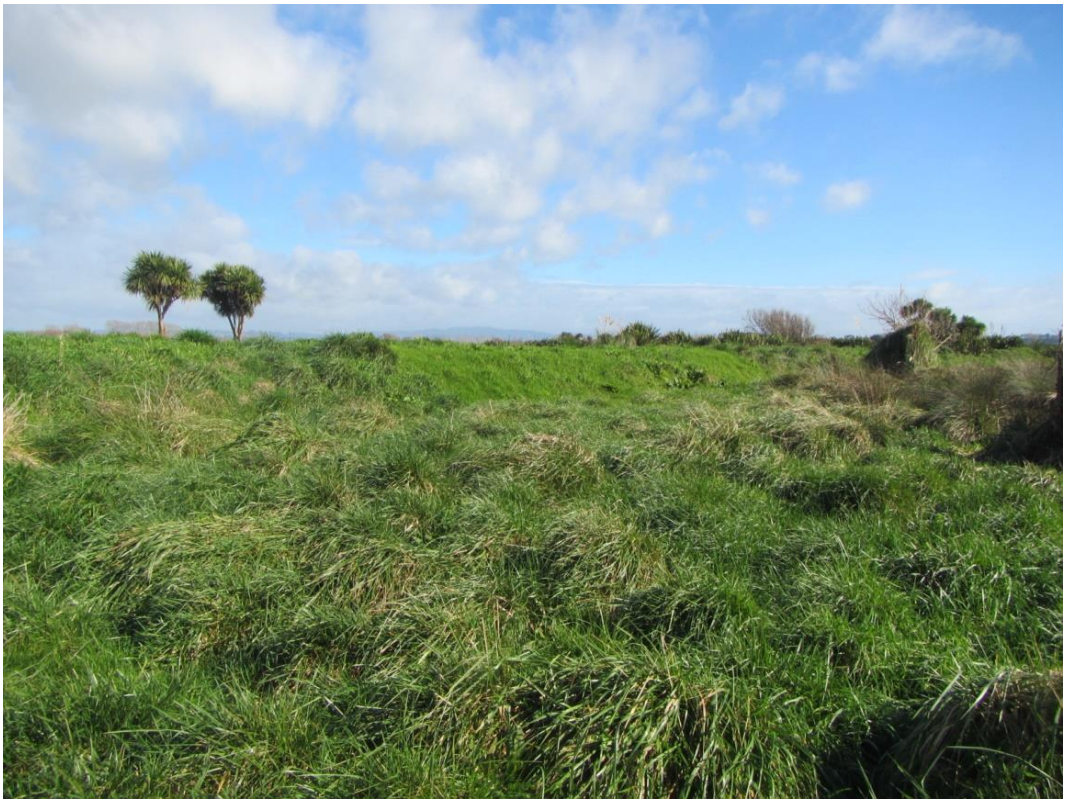

Plate 4: Rough grassland dominated by cocksfoot with patches of indigenous sedgeland and pampas is present around an effluent pond in the north of the site.

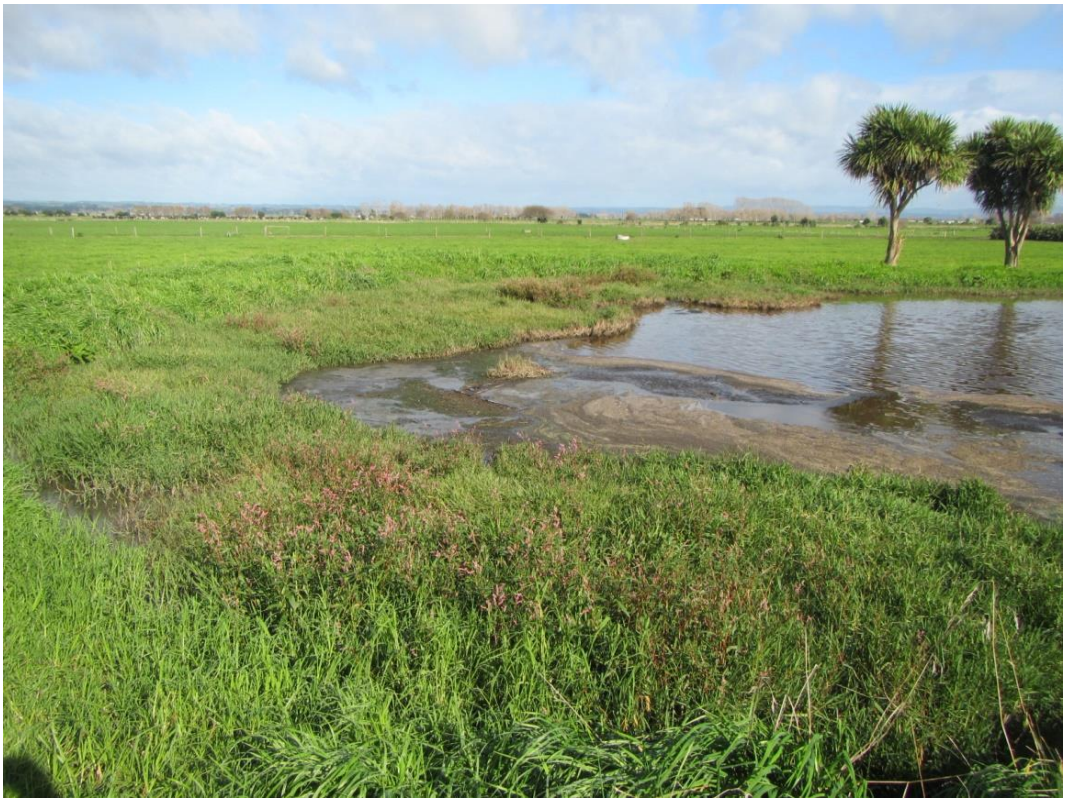

Plate 5: Mercer grass and water pepper are present around the margin of the water within the effluent pond. Occasional tī kōuka, harakeke, and pampas are present on the raised earth around the pond.

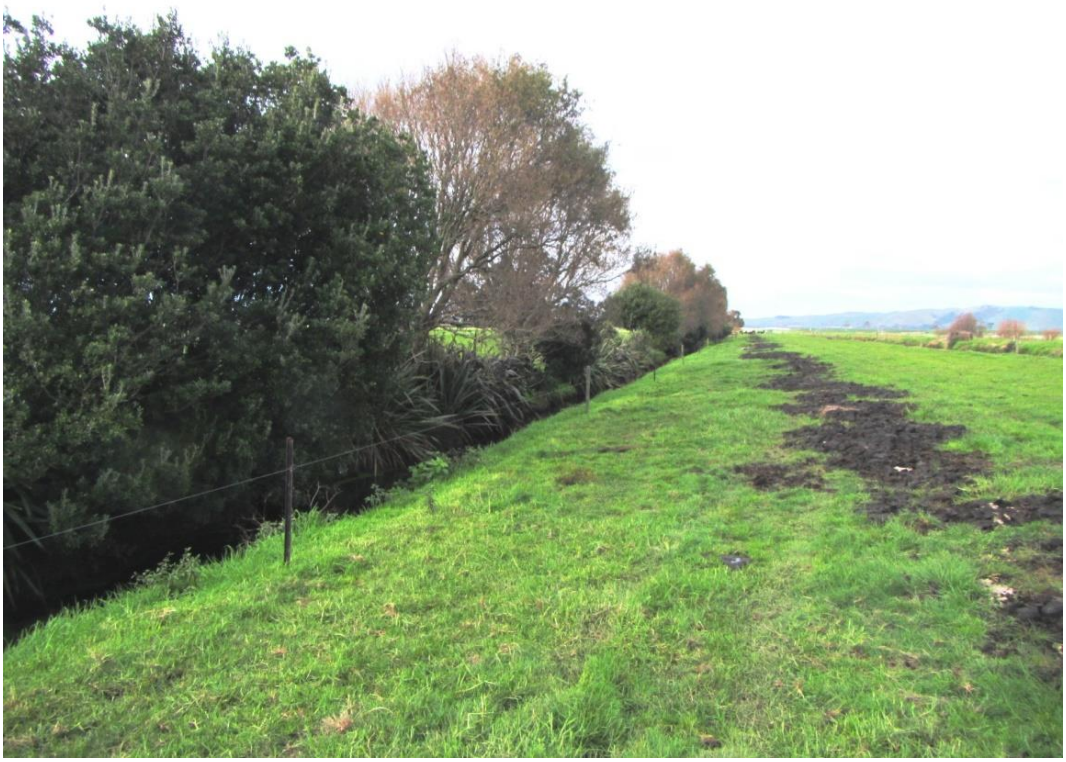

Plate 6: The drain located on the southwestern boundary is deep and wide and the margins support dense vegetation comprising a mixture of indigenous and exotic species including pōhutukawa, harakeke, tī kōuka, arrow bamboo, and crack willow.

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