

**Ecological Baseline Assessment
for Structure Plan Proposal
at 25 and 39 Wharekaho Road, Whitianga**

Prepared for Whitianga Waterways Ltd.



restoration
ecological potential
assessment

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7 November 2022

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Deichmann, B. 2022: Ecological Baseline Assessment for Structure Plan Proposal at 25 and 39 Wharekaho Road, Whitianga. Client report prepared for Whitianga Waterways Ltd., Ecological Potential Ltd. Project number 020/21, 44 p.

1 Introduction

This report documents the results of an ecological survey undertaken on 3 June 2022 on two adjacent properties owned by Whitianga Waterways Ltd. at 25 and 39 Wharekaho Road (SH25), Whitianga. An ecological baseline assessment is required for a proposed structure plan development on the two titles (Kuaotunu 6E1 ML block and Kuaotunu 6D2 ML block). The project is still in the design phase and this report was prepared to indicate ecological opportunities and constraints that this site might offer.

The site is situated in Wharekaho, approximately 4 km north of the Whitianga town centre. The properties have a combined size of approximately 66.16 ha. They are dissected by an Ecological District (ED) boundary with the north-western third located in the Colville ED and the remainder of the property falling into the Tairua ED (Figure 1). The site directly adjoins another recent subdivision development along the southern boundary.



Figure 1 Location of the subject properties (highlighted in yellow) at 25 and 39 Wharekaho Road, Whitianga

The majority of the site is currently held in pasture. Indigenous vegetation remaining on the properties includes small remnants of regenerating secondary small-leaved forest and scrub

and a small freshwater wetland area in the western half of the properties. A narrow strip of riparian vegetation also remains along the Tohetea Stream, which runs in a south-easterly direction through the southern property at 25 Wharekaho Road (refer to Figure 2 overleaf).

The forest and scrub areas are part of the 'Tohetea forest fragments', which are listed as a 'Likely' significant site (TC252) in the Significant Natural Area assessment undertaken for Waikato Regional Council in 2010 (Kessels *et al.*, 2010).

The aim of the site visit was to identify potential wetland areas as well as other areas of ecological value that may be impacted by the structure plan development.

The objectives of this report are therefore to:

- describe the ecological values of the property;
- assess the ecological significance and sensitivity of the natural features present;
- provide a brief assessment of potential ecological effects; and to
- present opportunities for the ecological enhancement and restoration of the natural features present on site to reduce potential adverse effects of the structure plan proposal.

According to the Decisions Version of the Thames-Coromandel District Plan the site is situated in the rural zone and approximately three-quarters of both properties are inside the 'Coastal Environment Line'. It is outside any other designations, such as 'Natural Character' or 'Outstanding Natural Features and Landscapes'. A detailed planning assessment for the structure plan proposal will be prepared by Planners Plus Ltd., Whitianga.

2 Methodology

A brief literature review was undertaken and any relevant existing ecological and other technical information was sighted. Existing databases were searched for freshwater fish usage of the Tohetea Stream, and for records of threatened flora and fauna species in the nearby area.

A site visit was undertaken on 3 June 2022 and all vascular plant and fauna species encountered during a walk-through survey were recorded, and vegetation composition and plant communities described. Photographs were taken and included in Section 3.3, and a list of vascular plant species was compiled (Appendix I).

An opportunistic bird survey was carried out during the botanical survey.

The property was searched for potential wetland areas and any sites in question were assessed according to the National Policy Statement for Freshwater Management (NPS-FM; MfE, 2020a) regulations, using the Ministry for the Environment (MfE) Wetland Delineation Protocols (MfE, 2020b).

3 Description of Natural Features

3.1 Ecological Context

The eastern two-thirds of the properties are situated within the coastal bioclimatic zone while the higher western thirds fall within the lowland bioclimatic zone. The eastern half of the southern property and the land along the Tohetea Stream is reasonably flat. The land rises gently towards the north-western corner of this property to a height of just under 70 m asl (above sea level) and includes steeper slopes rising towards a high point of just under 90 m asl in the western half of the northern property. The eastern half of the northern property comprises another steep slope rising towards the northern property boundary while the south-eastern part of this property is flat and falls below the 5 m asl mark. The soils of the subject site are mostly brown granular clay loams from the Waitakere series, which are of medium fertility, with recent Ohinemuri loamy sand to clay loam soils in the low lying areas.

The properties are dissected by an Ecological District boundary (ED) with the north-western third located in the Colville ED and the remainder falling into the Tairua ED (Figure 1, page 1). Both of these EDs are within the Coromandel Ecological Region.

The Colville ED covers an area of 77,201 ha (Leathwick *et al.*, 1995). It extends from Cape Colville at the very top of the Coromandel Peninsula down to Te Mata on the western coastline and across to Mahakirau and Waitaia Bay in the east, just excluding Whitianga and Mercury Bay. It borders Thames ED in the south-west and Tairua ED in the south-east.

The Colville ED has a history of kauri logging, burning and gold mining, but still retains extensive areas of indigenous forest and regenerating scrub, including sub-montane kauri-podocarp-hardwood forest, as well as coastal forest comprising pohutukawa, taraire and puriri and mangroves around Whangapoua Harbour. The topography of the ED ranges from steep forested ridges and the exposed summit of Mt. Moehau in the north, to rolling hills towards the coastline where some land has been converted to pasture. The hillsides further south, inland from Whangapoua and Coromandel Harbours are largely used for forestry activities.

In 1840, the entire Colville ED (100%) was covered in various types of primary forest (mostly variants of kauri forest and rimu-tawa forest; Leathwick *et al.*, 1995). By 1995, the amount of indigenous vegetation in the ED had been significantly reduced to 59.3%; primary forest types now covering a mere 7.9% of the land area. The remainder of the indigenous vegetation cover of the ED is highly modified today, comprising of secondary (16.7%) or logged (21.4%) forest types, as well as secondary scrub (13.3%). 12% of the land area has been converted to exotic forest and scrub.

The soils of the Colville ED include large areas of steepland clayey soils from andesite and sandstone origins. These steepland soils tend to be shallow to moderately deep over weathered rock. The soils on the more rolling hillslopes are deeper but often strongly leached and acid. Gleyed, but fertile alluvial soils occur in the valleys, which are often imperfectly to poorly drained (McEwen, 1987).

The Tairua ED covers an area of 90,703 ha (Leathwick *et al.*, 1995) and extends from the Coromandel Ranges in the west to the eastern coast of the Coromandel Peninsula as far north as Wharekaho and Whitianga, and as far south as Whangamatā. It meets the Hauraki ED in the south-west at the township of Puriri. The ED features extensive indigenous forest including sub-montane kauri forest, along with mangroves, for example, at Whitianga Harbour. The topography of the ED ranges from mostly forested steep ridges to the west, to rolling hills further east and north where some has been converted to pasture.

In 1840 55.2% of the Tairua ED was covered in various types of primary forest (mostly variants of kauri forest and rimu-tawa forest) and 44.8% in secondary scrub (Leathwick *et al.*, 1995). By 1995 the indigenous vegetation cover of the ED had been reduced to a total of 52.8%. The amount of primary forest remaining in the ED covers a mere 4.3% of the land area today. Secondary forest types now cover 6.7% of the ED and 17.4% are coated in logged forest. Secondary scrub has also seen a significant reduction to 23.7%. Only 0.3% of the land area comprises freshwater wetland vegetation. 16.5% of the land area has been converted to exotic forest and scrub.

The soils of Tairua ED are podsolised where there was historically extensive kauri forest, and strongly leached clays formed from weathered rhyolite and andesite occur in the steeper areas. On the more rolling slopes, the soil mostly consists of volcanic ash loam and pumice soils (McEwen, 1987).

The subject site contains remnant areas of secondary indigenous vegetation along the Tohetea Stream and covering the steeper slopes in the western half of the site. The majority of these areas was classified as 'likely' Significant Natural Area (SNA; Site number TC252 – Tohetea forest fragments) in a study undertaken by the Waikato Regional Council in 2010

(Kessels & Associates, 2010). The SNA is described as „*Secondary lowland kanuka-broadleaved forest fragments*” and was considered likely to comprise significant aquatic habitat values and to provide valuable buffering and corridor linkage functions. The property is situated less than 350 m to the south-east of the reasonably large (316 ha) DOC administered ‘Hukarahi Stewardship Area’ (site number TC224), which was classified as regionally significant, mostly for its floristic values and potential North Island brown kiwi habitat, and is linked to the internationally significant Coromandel Forest Park (TC420) through a number of other SNA sites (refer to Figure 2 below).

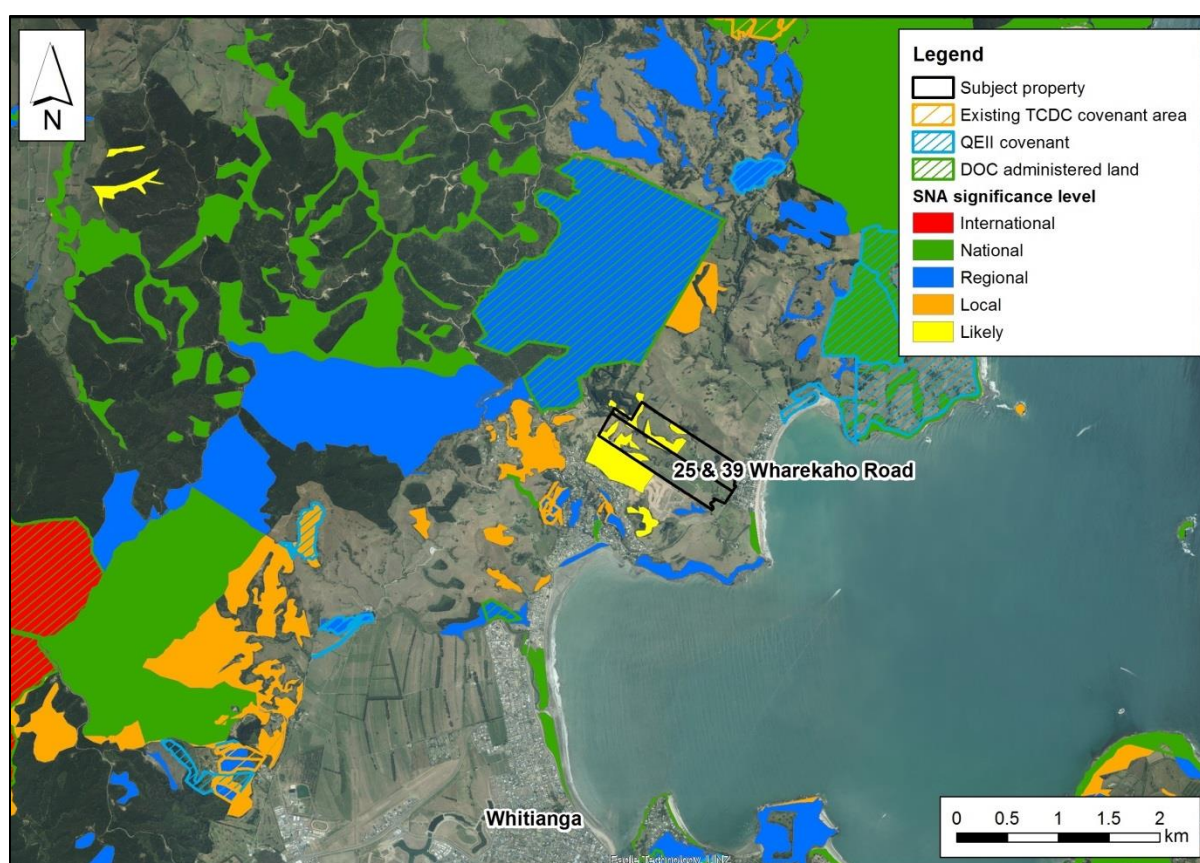


Figure 2 Landscape context showing the subject site in relation to nearby protected areas and SNAs

The large tracts of indigenous and exotic forest and scrub to the west/north-west of the subject site provide habitat for several threatened fauna species. North Island brown kiwi (*Apteryx mantelli*; recently reclassified from At Risk – Declining (Robertson *et al.*, 2017) to Not Threatened (Robertson *et al.*, 2021)), for example, has been recorded within less than 2.5 km of the site and Hochstetter’s frog (*Leiopelma hochstetteri*; At Risk - Declining) was found less than 3 km away. Another species that has been recorded in close proximity to the site (on Wharekaho and Buffalo Beaches) is the northern New Zealand dotterel (*Charadrius obscurus aquilonius*; Threatened – Nationally increasing). Highly mobile species that are able to travel long distances, such as North Island kaka (*Nestor meridionalis septentrionalis*; At Risk –

Recovering), bush falcon (*Falco novaeseelandiae ferox*, Threatened – Nationally increasing) or New Zealand long-tailed bats (*Chalinolobus tuberculatus*; Nationally Critical, O'Donnell *et al.*, 2017) may also be present in the area.

3.2 Nationally Threatened Environments

The Threatened Environment Classification (Walker *et al.*, 2015) was developed by Landcare Research with the aim to propose a threat classification for the remaining indigenous biodiversity in New Zealand's land environments. It is based on three components: how much indigenous cover remains within land environments, how much land is legally protected, and how past loss of indigenous cover and natural heritage protection are distributed across New Zealand's landscape. The Threatened Environment Classification is based on three databases. It combines the Land Environments of New Zealand (LENZ; Leathwick *et al.*, 2003), the fourth Landcover Database (LCDBv4.0) and the Protected Natural Area network. The classification includes six categories. The first five categories are referred to as 'threatened environments', in which over 70% of the original indigenous cover has been cleared and/or less than 20% of land is legally protected, whereas category six environments are considered to be less reduced and better protected.

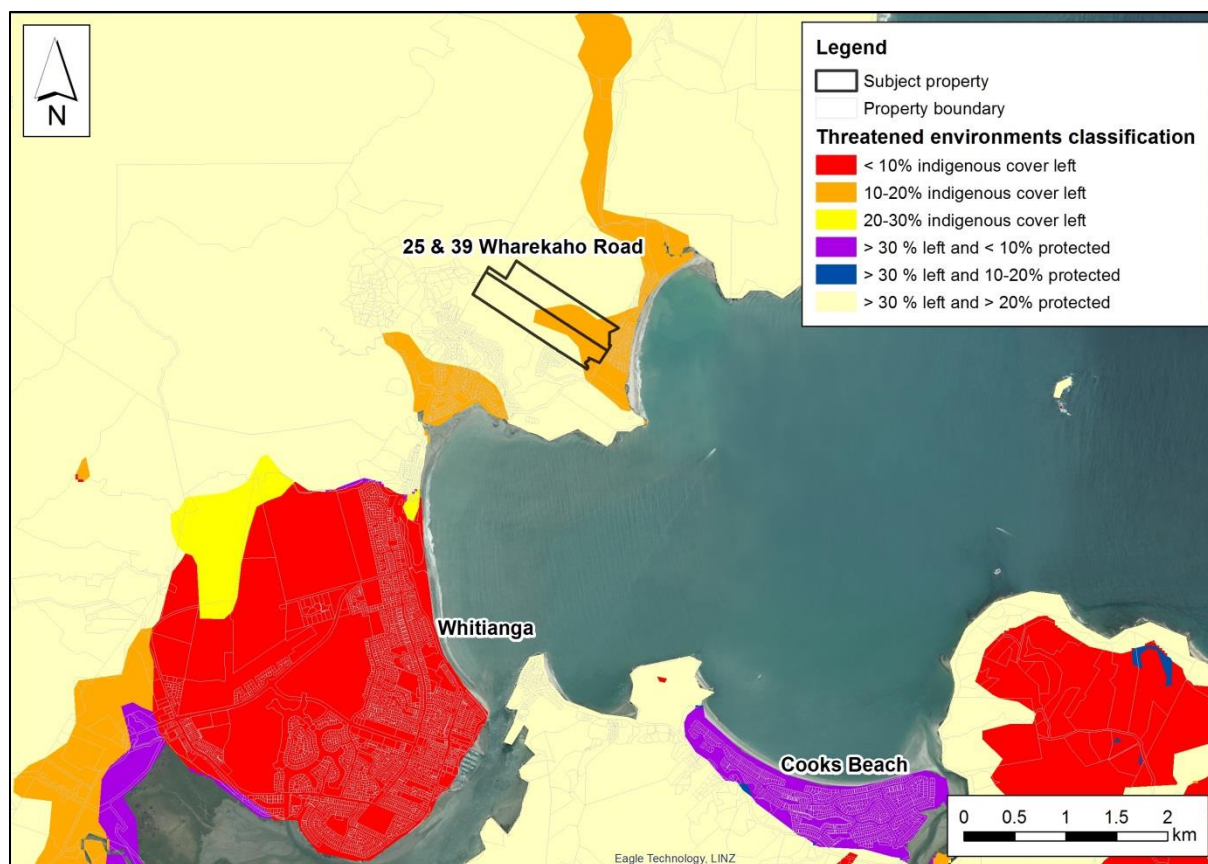


Figure 3 LENZ threatened environments classification at the subject site

As shown on Figure 3 (above) the low lying eastern areas of the subject properties are situated within a Category 2 Threatened Environment while the higher western areas are within Category 6.

Category 2 environments are highlighting areas where only 10-20% of the original indigenous vegetation cover remains while Category 6 areas are of the lowest threat category, highlighting areas where more than 30% of the original indigenous vegetation cover remains and over 20% is protected.

Land classified as Categories 1 to 5 is likely to contain some of New Zealand's most severely reduced and poorly protected indigenous biodiversity. Remnants of indigenous vegetation in these areas therefore especially benefit from legal protection and active conservation management to protect the indigenous biodiversity values from common threats, such as weed invasion, animal pests or vegetation clearance. Land classified as less reduced and better protected (Category 6) includes indigenous habitats that are more likely to have legal protection as more than 20% of the area identified is legally protected and may be under conservation management. However, the indigenous biodiversity in these areas may still be under threat and legal protection and restoration of further areas is still highly beneficial for the biodiversity values of the Thames-Coromandel District.

3.3 Vegetation Description

Common plant names are used in the following description. Refer to the plant list in Appendix I for scientific names.

The current vegetation cover of the site with an overlay of the proposed development is presented in Figure 5 on page 9.

3.3.1 Historical Vegetation Cover

According to the SNA data (Kessels & Associates, 2010), the vegetation that would have been present on the subject site around 1840 is thought to have been a 'Mixed kauri/taraire/conifer-broadleaved forest'.

By 1960 however, a large proportion of the former vegetation cover of the area had been cleared. Figure 4 overleaf shows a historical aerial image of the subject property and surrounding area (including indicative property boundaries) taken in December 1960 (sourced from <http://retrolens.nz> and licensed by LINZ CC-BY 3.00). Only a narrow stretch of trees remains along the upper reach of the Tohetea Stream and young scrub areas are visible along the side tributaries and on the steep south-facing slope along the northern property boundary. A patch of what appears to be wilding pines was present on another steep, south-

west facing slope in the western half of the northern property that forms a backdrop for an existing house today.



Figure 4 Historical image of the property taken in December 1960 (showing approximate property boundaries)

3.3.2 Current Vegetation Cover

The majority of the site is currently held in pasture. Some natural regeneration has occurred in the western-half of the site as well as on the steep, south-facing slopes on the northern property (areas marked as vegetation types 1, 2 and 3 on Figure 5, overleaf). However, the taller vegetation along the tributary streams that was still present in 1960 has been converted to pasture.

According to the classification system of Leathwick *et al.* (1995), the existing vegetation on this property can largely be classed as (advanced) regenerating secondary-small-leaved forest and scrub, which is mostly dominated by kanuka but comprises several emergent podocarp species and kauri, as well as the occasional early successional broadleaved species. A freshwater wetland area is present downstream of the westernmost forest remnant (Area 5) and smaller areas of freshwater wetland have formed as a result of stock grazing in the lower reaches of two small tributary streams (Area 6).

A more detailed description of the present vegetation types is provided on the following pages.

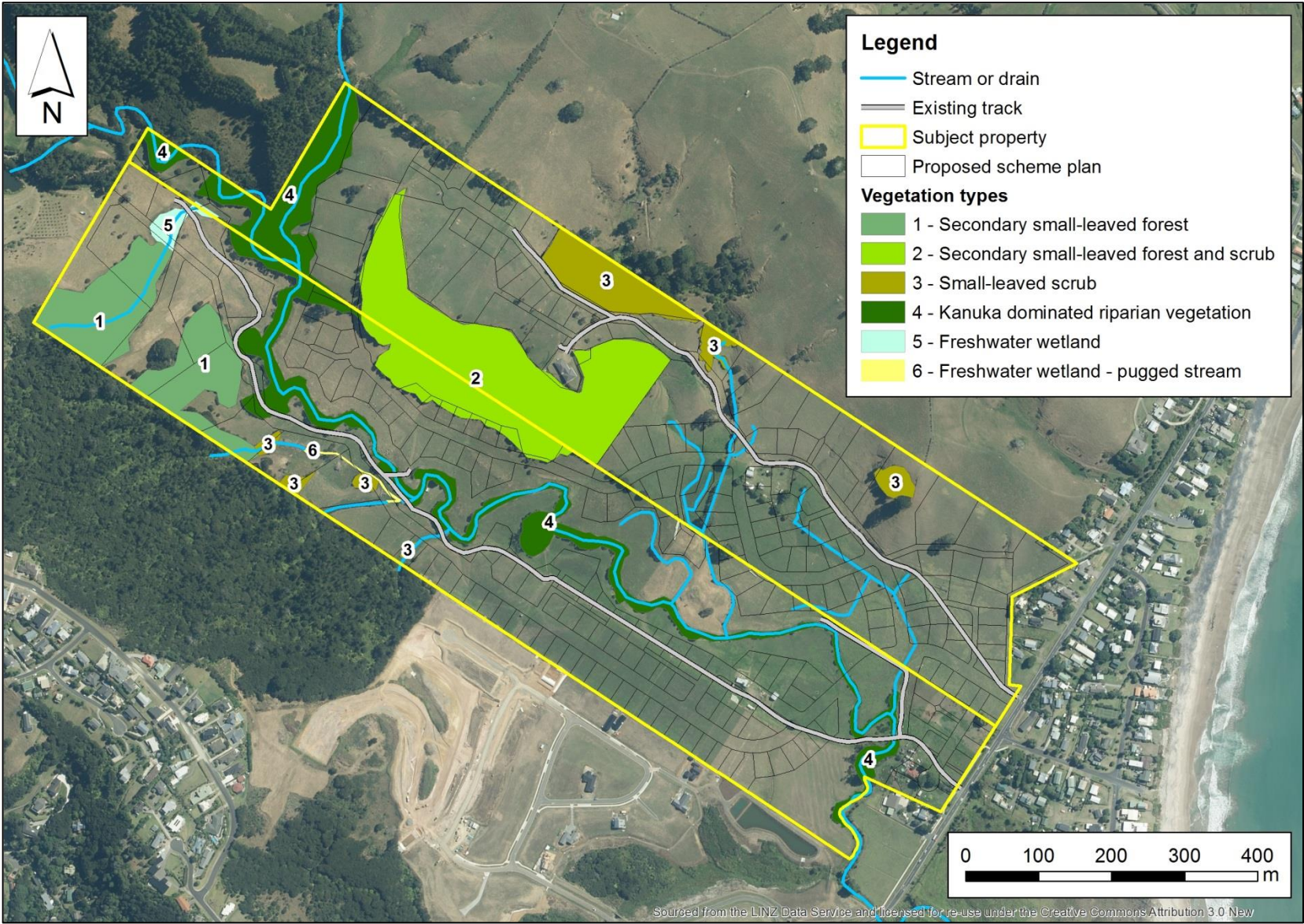


Figure 5 Property overview showing the vegetation types present and the proposed development

Vegetation type 1 – Regenerating secondary small-leaved forest – 1.62 ha and 1.43 ha

This vegetation type includes two areas of kanuka dominated forest present in the north-western corner of the southern property. The canopy trees are between 10-14 m tall (Photo 1).

The majority of the western remnant has been fenced with a single electric wire for some time, though the south-eastern corner of this remnant has only very recently been included within the fenceline. The eastern remnant is only partially fenced at present and is largely grazed.

The fenced areas have developed a dense understorey while the grazed or recently fenced parts of the remnants are highly depleted with most understorey species only present as seedlings or where the terrain hinders stock access (Photos 2 and 3 overleaf). The most dominant subcanopy species found were mahoe, mapou, five-finger and the treeferns ponga, wheki and mamaku. Common understorey species recorded include hangehange, karamu, mingimingi and twiggy coprosma. Several seedlings and saplings of tanekaha and totara are present, representing the next successional stage of these remnants.



Photo 1 View onto the canopy of the westernmost forest remnant. Note the recently added temporary fenceline in the bottom left corner of the picture.

The groundcover mostly comprises of bamboo grass, NZ blueberry, *Machaerina tenax*, hook sedge and forest sedge. Species such as kiokio, pukio and swamp sedge were mostly found in damp areas near the small tributary streams, while patches of ring fern, rasp fern and

shrubby haloragis were found where light levels were elevated. Some exotic herbs and grasses were also recorded.



Photo 2 Well-developed understorey in the fenced part of the westernmost forest remnant and highly depleted lower tiers in the recently added area



Photo 3 Fencelines hinder stock access to some parts of the easternmost forest remnant where a dense understorey has become established

Weed species found within these remnants included several woolly nightshade specimens as well as mistflower (mostly in moist areas near the stream in the western remnant). The occasional barberry and blackberry grow on the margins of the eastern remnant and a small number of pine seedlings were also noted.

Vegetation type 2 – Regenerating secondary small-leaved forest and scrub – 5.53 ha

This area of indigenous vegetation includes a mosaic of small-leaved forest and scrub on a south-facing slope. A shorter, 3-6 m tall scrub canopy is present at the western and eastern ends of this area (Photo 4) while the centre and lower slopes have reached taller canopy heights of up to 15 m. The species composition is very similar to that described for Area 1 above with kanuka forming the main canopy component and mahoe, mapou and ponga dominating the subcanopy.



Photo 4 Shorter canopy at the eastern margin of Area 2

The area has been fenced for a number of years and comprises a dense understorey of young canopy and subcanopy species, as well as hangehange, karamu, twiggy coprosma, mingimingi and a small amount of manuka and prickly mingimingi (Photo 5 overleaf). A karo seedling was also noted on the northern margin.

Leather-leaf fern was the only epiphytic species found in this area.

The groundcover includes most of the species that were found in Area 1, as well as sword sedge, gonocarpus, sickle spleenwort and bracken. A number of exotic herb species were recorded in proximity to the pasture margin, e.g. wild carrot, Scotch thistle, black nightshade and nipplewort.



Photo 5 **Dense understorey near the northern margin of Area 2**

The occasional tall pine tree emerges through the canopy and a small woodlot of eucalyptus and a single black wattle is present at the northern margin of this area. A small number of cotoneaster bushes also grow within the woodlot. An avocado and fig tree were noted near the house site and some woolly nightshade was also present. Smaller weed species found along the margin of this area include the occasional pampas, blackberry and inkweed.

Vegetation type 3 – Regenerating secondary small-leaved scrub – 1.69 ha

This vegetation type was used to describe patches of vegetation in an earlier stage of regeneration where the canopy was mostly below 6 m tall. Kanuka is the dominant flora species in these areas as well, and the occasional tall pine tree may be present (Photo 6 overleaf). Other species that may be present include ponga, mamaku and wheki, as well as mahoe, mapou and karamu. The smallest of these areas are grazed and lacking an indigenous understorey.

Woolly nightshade and blackberry have been observed on the margins of some of these areas.



Photo 6 Short kanuka canopy at the northern property boundary and another patch of small-leaved scrub with an emergent pine tree on a steep slope in the background

Vegetation type 4 – Kanuka dominated riparian vegetation – 5.11 ha

This vegetation type includes the narrow strip of riparian vegetation along the Tohetea Stream, which runs in a south-easterly direction through the centre of the southern property (Photo 7 overleaf). The majority of this strip is less than 20 m wide (Photo 8 overleaf), though it reaches widths of 50-80 m at the upstream end along the north-western property boundary.

The vegetation along the stream is still predominantly comprised of mature kanuka but includes advanced secondary flora species, such as several tall podocarp specimens (i.e. up to 40 cm DBH (diameter at breast height) tanekaha, totara, rimu and kahikatea), as well as emergent kauri, rewarewa and nikau, especially at the wider upstream end. Juvenile specimens of these species (7-8 m tall) as well numerous seedlings and saplings were noted along the stream banks. Some tall exotic cypress and eucalyptus specimens as well as pine trees are also present in the canopy of this vegetation type.

The most prolific subcanopy species within this strip are mapou, mahoe and five-finger, as well as ponga and mamaku. The occasional towai and heketara and climbers such as kiekie and three climbing rata species (refer to Table 1) add to the diversity of this area.



Photo 7 View across Area 4 towards the large Area 2 in the background of the photograph. The tall pine trees in the skyline on the left mark the northern property boundary.



Photo 8 Narrow strip of riparian vegetation along Tohetea Stream

Understorey species present include very common species such as karamu, hangehange, mingimingi and twiggy coprosma but also New Zealand gloxinia and tutu.

The steep stream banks provide habitat for a variety of, groundfern, grass and sedge species, such as kiokio, common maidenhair, thread fern, hound's tongue fern, rasp fern, bush rice grass, giant umbrella sedge and gahnia (Photo 9).

Weed species noted in this area include woolly nightshade, grey willow, pampas, barberry and inkweed.



Photo 9 The steep stream banks harbour a variety of indigenous understorey and groundcover species

Vegetation type 5 – Freshwater wetland – 0.22 ha

A small, fenced off freshwater wetland area is present downstream of the westernmost forest remnant on the southern property. It is dissected by a narrow farm track.

The area downstream of the track is dominated by swamp millet and budding clubrush with only occasional water pepper and *Juncus* species dotted along the northern margin where regenerating kanuka marks the wetland boundary (Photo 10 overleaf). Common exotic herb and grass species such as lotus, white clover, narrow-leaved plantain and paspalum grow along the pasture margin where a patch of blackberry was also found.



Photo 10 Swamp millet dominating the wetland area downstream of the farm track



Photo 11 A patch of manuka over common twig rush and swamp millet in the foreground upstream of the farm track

A small number of tall kanuka also grow along the eastern wetland margin upstream of the track. The vegetation in this area includes a group of emergent manuka over common twig rush and swamp millet, which is also the most widespread species in this area of the wetland (Photo 11

above). The occasional pukio, swamp sedge, and wiwi were also present and tufts of slender clubrush were noted. Budding clubrush prevails in the waterway on either side of the track.

Weed species present in this area include blackberry as well as scattered tall woolly nightshade. Other common exotic species recorded in this area include soft rush, paspalum, lotus and hawkbit.

Vegetation type 6 – Freshwater wetland – pugged stream – 0.6 ha

Two small seepage zones were noted running from the forested area on the adjoining property to the south in a north-easterly direction towards Tohetea Stream. They comprise likely ephemeral tributary streams, though running water was present at the time of the site visit.

These areas once were bush clad waterways. Dead stems and stumps of mamaku and kanuka, as well as some regenerating young kanuka, cabbage tree, ponga and scattered, browsed twiggy coprosma are relicts of the former vegetation cover. However, these areas are unfenced and pugged by stock, which over the years has resulted in the loss of a defined stream channel (i.e. where banks and stream bed can be distinguished) and the formation of wetland areas in sections where the adjoining terrain is flat (Photo 12). A defined stream channel is still present where the stream banks are slightly steeper and no pugging has occurred (Photo 13 overleaf).



Photo 12 Stream section that has been transformed to a wetland area by removal of taller vegetation and many years of stock access and pugging. Note the dead mamaku and kanuka stems that are relicts of the former vegetation cover, as well as a number of regenerating kanuka in the background. Photo 13 was taken near the bush edge in the background of this picture.



Photo 13 A defined stream channel with steeper banks is present further upstream of the area shown in Photo 12

The vegetation in the flat areas is dominated by wetland species (>50% cover) with budding clubrush being most widespread and smaller proportions of slender knotweed and the exotic soft rush also common. Pasture grasses as well as exotic herb species, such as lotus, narrow-leaved plantain, broad-leaved dock, self-heal and dandelion, are also scattered throughout this area. The grasses, lotus and plantain are listed in the Draft National List of Exotic Pasture Species (Cosgrove *et al.*, 2022; refer to the following section for more detail).

3.3.3 Potential Wetland Areas

Both properties were searched for any other potential freshwater wetland areas (in addition to those described as Areas 5 and 6 above) that would meet the definitions of the National Policy Statement for Freshwater Management (NPS-FM) and trigger the Resource Management (National Environmental Standards for Freshwater (NES-F)) Regulations that were both published by MfE in 2020 (MfE, 2020a and MfE, 2020c).

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

- a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or*
- b) a geothermal wetland; or*

- c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling”.*

Proposed amendments to the NPS-FM and NES definitions of natural wetlands were published in May 2022 (MfE exposure draft amendments; MfE, 2022), though these amendments do not have legal effect at this stage. According to the exposure draft the term ‘natural wetland’ means “a wetland (as defined in the Act) that is not:

- a) a deliberately constructed wetland, other than a wetland constructed to offset impacts on, or to restore, an existing or former natural wetland as part of giving effect to the effects management hierarchy; or*
- b) a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body; or*
- c) a geothermal wetland; or*
- d) a wetland that:*
- (i) is within an area of pasture; and*
 - (ii) has ground cover comprising more than 50% exotic pasture species (as identified in the National List of Exotic Pasture Species (see clause 1.8)); and*
 - (iii) is not known to contain threatened species.”*

A number of unnamed tributary streams are present on the true left side of Tohetea Stream in the eastern half of the properties. These waterways were inspected and the wider headwater areas assessed according to the definitions above. The largest area found that was thought to potentially contain wetland habitat comprising hydrophytic vegetation was leading up to the eastern margin of Area 2 and is shown on Photo 14 overleaf. This area is dominated (>50%) by pasture grasses and exotic herb species that are listed in the Draft National List of Exotic Pasture Species (Cosgrove *et al*, 2022). The area is grazed and no wetland hydrology was present. It does therefore not meet the definitions of a natural wetland but is indeed “improved pasture that is being actively managed for livestock grazing”. Two smaller areas to the east of this site were inspected closer and found to be in similar condition, i.e. not meeting the wetland definitions.

Wetland species were found to be present along the lower reaches of the tributary streams (Photos 16 and 17). Despite the presence of riverine wetland vegetation, however, these areas were mapped as streams rather than wetlands, because they contained defined stream banks and beds.

The areas mapped as Areas 5 and 6 on Figure 5 (Page 9) are therefore considered to be the only wetland areas on site that meet the NPS-FM definition and would positively be assessed as wetland areas using the vegetation tool for wetland delineation presented by Clarkson (2014).



Photo 14 Upper catchment area of a small tributary stream leading up to the eastern margin of Area 2. This area is dominated by pasture species and no wetland hydrology was present.



Photo 15 Wetland species are present along the stream channel further downstream of Photo 14 above



Photo 16 One of the smaller drains where the stream channel is overgrown with wetland vegetation (in this case budding clibrush). These narrow areas were mapped as streams rather than wetland areas in Figure 5.

3.3.4 Threatened Flora Species

Due to the rapid spread of kauri dieback disease and myrtle rust, kauri as well all New Zealand Myrtaceae species have been classified as threatened plant species in the Department of Conservation's latest threat classification (de Lange *et al.*, 2018). Kauri, kanuka, manuka and several climbing rata species are present on site (refer to Table 1 for the threat categories of each species). Note that the threat classification of manuka and kanuka, as well as of the listed climbing rata species is a precautionary measure at this stage. These species are currently still widespread and are not taken into consideration for the significance assessment of natural features. Kauri, however, which is regenerating naturally and was found as several medium sized (~20 cm DBH) specimens is taken into account when assessing Criterion 3 in Section 4 below.

Table 1 Threatened flora species recorded on site (de Lange *et al.*, 2018).

Scientific name	Common name	Threat status in 2017
<i>Agathis australis</i>	Kauri	Threatened – Nationally Vulnerable
<i>Kunzea robusta</i>	Kanuka	Threatened – Nationally Vulnerable
<i>Leptospermum scoparium</i> var. <i>scoparium</i>	Manuka	At Risk – Declining
<i>Metrosideros diffusa</i>	White rata	Threatened – Nationally Vulnerable
<i>Metrosideros fulgens</i>	Climbing rata	Threatened – Nationally Vulnerable
<i>Metrosideros perforata</i>	Akatea	Threatened – Nationally Vulnerable

3.4 Fauna

3.4.1 Avifauna

Common forest and open country birds were recorded during the site visit, including New Zealand kingfisher (*Todiramphus sanctus vagans*), North Island fantail (*Rhipidura fuliginosa placabilis*), grey warbler (*Gerygone igata*), silvereye (*Zosterops lateralis lateralis*), welcome swallow (*Hirundo neoxena neoxena*), paradise shelduck (*Tadorna variegata*) and Australasian harrier (*Circus approximans*).

Introduced species noted include Australian magpie (*Gymnorhina tibicen*), blackbird (*Turdus merula*), ring-necked pheasant (*Phasianus colchicus*) and mallard (*Anas platyrhynchos*).

No threatened bird species that are listed in the latest threat classification by Robertson *et al.* (2021) were observed utilising the subject property during the site visit. However, bird species that are able to travel long distances, such as North Island kaka (*Nestor meridionalis septentrionalis*; At Risk – Recovering) and bush falcon (*Falco novaeseelandiae ferox*; Threatened – Nationally vulnerable), may occasionally visit the site. North Island brown kiwi have also been recorded within less than 2.5 km of the site and may explore the subject from time to time.

3.4.2 Bats

No specific site survey was conducted to determine if nationally threatened New Zealand long-tailed bats (*Chalinolobus tuberculatus*; Nationally Critical, O'Donnell *et al.*, 2017) are present on the properties and no records of long-tailed bats were found within a 10 km radius of the site within the DOC database. A site survey of the adjoining property to the south was carried out in November 2014 by Kessels Ecology but no bats were detected at that time (van der Zwan, 2014).

However, the survey on the neighbouring property was carried out during "sub-optimal to marginal" weather conditions and bats have recently (2021) been found just to the south of Whitianga, approximately 6 km away from the subject site (Paddy Stewart, Red Admiral Ecology, pers. comm.).

The tall exotic trees in combination with the stream habitat and nearby large indigenous and exotic forest areas would provide suitable habitat for bats at this site. Bats are also known to be present in the Coromandel Forest Park and can travel long distances in one night. Even if they are not roosting on the subject site they may utilise the area for foraging activities.

3.4.3 Herpetofauna

No specific site survey was conducted for native lizards or frogs, however the vegetation on the subject site may provide suitable habitat for skink and gecko species such as Raukawa gecko (*Woodworthia maculata* – Not threatened; Hitchmough *et al.*, 2021) or forest gecko (*Mokopirirakau granulatus* – At Risk – Declining).

Hochstetter's frogs (*Leiopelma hochstetteri* – At Risk – Declining; Newman *et al.*, 2013) have been recorded less than 3 km to the west of the site. They are usually found along streams below 400 m and are considered widespread on the Coromandel Peninsula. It is therefore considered possible that the streams and adjacent vegetation on the subject property may provide habitat for Hochstetter's frog. Archey's frog (*Leiopelma archeyi* – Nationally Vulnerable) is generally found in forests above 400 m and unlikely to be found at this site.

While frogs and lizards may be present on site, the habitats used by these species will largely be unaffected by the proposal (i.e. only minimal clearance of indigenous vegetation is anticipated and constructions works for houses and driveways will mostly occur away from the waterways). However, detailed searches of any vegetation to be removed should be undertaken.

3.4.4 Terrestrial Invertebrates

A wide range of indigenous terrestrial invertebrate species is likely to be present on site, but the majority of species will be found in the remnant vegetation which is retained and will not be significantly affected by the proposal.

3.4.5 Fish

The Tohetea Stream flows through the centre of the southern property and is joined by several small unnamed side tributaries before exiting the property in the south-eastern corner of the site. The Tohetea Stream continues to flow underneath nearby Wharekaho Road before draining into the sea at Wharekaho Beach some 760 m downstream of the site.

No data is currently available for the Tohetea Stream in the NIWA Freshwater Fish Database (Crow, 2017); however, entries include data for the nearby Tarapatiki Stream, which flows through the neighbouring catchment to the south of the site.

Stream surveys were undertaken for a tributary of the Tohetea Stream as part of the ecological assessment for the subdivision of the property directly adjacent to the south of the subject site (Price & Hasenbank, 2014).

The NIWA database as well as the 2014 ecological assessment show that the nearby streams provide habitat for a good range of freshwater species, including four nationally threatened (At risk) fish species (according to Dunn *et al.*, 2018), i.e.:

- longfin and shortfin eels (*Anguilla dieffenbachii* – At Risk - Declining and *A. australis* – Not threatened),
- common bully (*Gobiomorphus cotidianus* – Not threatened),
- the galaxiids koaro and inanga (*Galaxias brevipinnis* and *G. maculatus* – both At Risk – Declining), as well as banded kokopu (*G. fasciatus* – Not threatened), and
- torrentfish (*Cheimarrichthys fosteri* – At Risk – Declining).

The only exotic fish species found in the area was gambusia (*Gambusia affinis*), while the only freshwater invertebrate species recorded was freshwater shrimp (*Paratya curvirostris* – Not threatened according to Grainger *et al.*, 2018).

The 2014 ecological assessment attributed the Tohetea Stream tributary an 'excellent' fish assemblage and ranked the stream within the top 75th percentile of all Waikato sites at that time.

The Tohetea Stream section on the subject site appeared to provide good fish and macroinvertebrate habitat (Photo 17), and as long as no permanent fish barriers are present between the subject site and the surveyed tributary on the neighbouring property, it is considered highly likely that the Tohetea Stream is inhabited by the same or at least a similar range of species, including the threatened species.



Photo 17 A section of the Tohetea Stream flowing through the subject site

There was evidence that the Tohetea Stream had recently flooded and reached (and in some areas breached) the top of the steep, approximately 2 m high stream banks.

Some of the smaller unnamed tributaries on site are likely to be ephemeral but the larger streams in the western extent of the site would also provide year round habitat for freshwater species (Photo 18).



Photo 18 One of the larger Tohetea Stream tributaries flowing through the westernmost forest remnant of the subject site (Area 1 on Figure 5)

3.5 Threats

3.5.1 Livestock

The majority of the larger natural areas at this site have been fenced from stock (mostly with single electric wires) and are in good condition. However, those areas that are currently unfenced are severely damaged by stock grazing, i.e. the forest and scrub areas lack an indigenous understorey and groundcover and some of the small tributary streams have been pugged by livestock to the point that they no longer have a defined stream channel.

3.5.2 Weeds

Weed presence at this site is currently low. Exotic flora species noted during the site visit include a small number of mature radiata pines as well as pine seedlings, tall macrocarpa and eucalypts, the occasional woolly nightshade, barberry, pampas, blackberry, bindweed and inkweed. One young grey willow was also noted along Tohetea Stream and mistflower was fairly common in the westernmost kanuka forest remnant. One black wattle and some cotoneaster were found on the

northern margin of the largest area of forest and scrub behind the existing house on the northern property. An avocado and fig tree were also noted near the house on the margin of this remnant. Smaller weed species present on site include ragwort, Scotch thistle and black nightshade.

The majority of these species would be reasonably easy to eradicate, though regular maintenance checks and follow-up control would be required to prevent reinvasion.

3.5.3 Animal Pests

It appears that no animal pest control is currently carried out at this site, and it is expected that the usual range of small mammalian pest species is present (i.e. brushtail possums (*Trichosorus vulpecula*), ship rats (*Rattus rattus*), Norway rats (*Rattus norvegicus*), mice (*Mus musculus*), stoats (*Mustela erminea*) and weasels (*Mustela nivalis vulgaris*), as well as hares (*Lepus europaeus occidentalis*) and rabbits (*Oryctolagus cuniculus cuniculus*), hedgehogs (*Erinaceus europaeus*) and potentially feral cats (*Felis catus*)). Though, no obvious signs of animal pest presence or damage on palatable plant species were noted (i.e. runs, droppings, scratch or bite marks or fresh browsing) during the site visit.

Wild pigs (*Sus scrofa*) may also be present in the wider area and occasionally visit the subject site. An old pig trap was noted near the Tohetea Stream, however, no signs of pig rooting were found on site. Pigs have been shown to be potential carriers of kauri dieback disease (Bassett *et al.*, 2017) and will therefore need to be controlled if noted to be present.

4 Ecological Significance Assessment

The larger areas of indigenous vegetation on the subject properties were classified as 'Likely significant' (site number TC252 – Tohetea forest fragments) in the Thames-Coromandel Significant Natural Areas (SNA) report prepared by Kessels *et al.* for the Waikato Regional Council in 2010.

In this report the ecological significance of the remaining natural areas in the Thames-Coromandel District was assessed using the Criteria for Determining Significance of Indigenous Biodiversity as listed in Chapter 11A of the Waikato Regional Policy Statement (RPS). These criteria relate not only to the quality of the sites' vegetation itself, but also to the habitat functions it provides for indigenous fauna. It is therefore possible for a site to be classed regionally or even nationally significant, because of the habitat it provides for a species classified as threatened while the vegetation is still in an earlier stage of regeneration.

The SNA report was mostly prepared as a desktop exercise and the significance criteria have undergone minor amendments since 2010. The natural features on the subject site have therefore been reassessed using the latest set of criteria (refer to Table 2).

Natural features only have to comply with one of the following criteria to be considered at least locally significant.

The described vegetation and habitat of indigenous fauna on the subject property complies with six significance criteria in total with each of the mapped areas meeting at least one of the criteria. Except for the smallest Areas 3, which are too fragmented and modified to be termed significant, as well as Area 6, which contains too many exotic pasture species (though still meeting the NPS-FM wetland definition), all areas mapped on Figure 5 (page 9) and Figure 6 (page 32) are thus considered to be ecologically significant in terms of section 6(c) of the Resource Management Act 1991.

Table 2 Assessment of the natural areas on site against the WRC RPS (2016) criteria

<i>Previously Assessed Site</i>
1. <i>It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11. – NO.</i>
<i>Ecological Values</i>
2. <i>In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened. – NO.</i>
3. <i>It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are:</i> • <i>threatened with extinction; or</i> • <i>endemic to the Waikato Region, or</i> • <i>at the limit of their natural range. – YES, the vegetation on site contains several threatened plant species including kauri (in Areas 2 and 4), as well as still common Myrtaceae species such kanuka, manuka and climbing rata species which are not relevant for this criterion (refer to Section 3.3.4 for more detail). The Tohetea Stream that runs through the southern property also provides habitat for four threatened freshwater fish species (Area 4).</i>

4. *It is indigenous vegetation or habitat type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally. – YES, secondary small-leaved forest (Areas 1 and 2) is under-represented in both the Colville and Tairua EDs with only 16.7% of the land area covered in this vegetation type in Colville ED and 17.4% in Tairua ED. Secondary small-leaved scrub (Areas 3) is also under-represented in Colville ED (13.3% remaining) but not in Tairua ED (23.7% remaining); however, the smallest fragments present are not considered ecologically viable and therefore do not meet this criterion. Any type of freshwater wetland (Area 5) is also severely under-represented in both EDs as well as nationally. Only 0.3% of the land area of the Tairua ED is covered in any type of freshwater wetland today and even less in the Colville ED at 0.1% (Leathwick *et al.*, 1995). Area 6 does not contain a high enough percentage of indigenous species to meet his criterion.*

5. *It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, Chenier plain, or kaarst ecosystems, hydrothermal vents or cold seeps. – NO.*

6. *It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with:*

- *waste treatment;*
- *wastewater renovation;*
- *hydroelectric power lakes (excluding Lake Taupō);*
- *water storage for irrigation; or*
- *water supply storage;*

*unless in those instances they meet the criteria in Whaley *et al.* (1995). – YES, although small in size the wetland area mapped as Area 5 is considered to meet this criterion. Area 6 is highly modified and comprises a reasonably large proportion of exotic flora species (~40%). It does therefore not meet this criterion, despite meeting the NPS-FM definition.*

7. *It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato Region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. This criterion is not intended to select the largest example only in the Waikato Region of any habitat type. – NO.*

8. *It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented*

activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self-sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats. – YES, the Tohetea Stream section on the subject site provides good quality aquatic habitat that is essential for several threatened indigenous freshwater fish species (Area 4).

9. *It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because:*

- *its structure, composition, and ecological processes are largely intact; and*
- *if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time. - YES, the fenced parts of Areas 1, 2, 3 and 5 are healthy and representative examples of the respective vegetation type. However, the areas will require some weed control and ongoing animal pest control in order to be ecologically sustainable. The grazed and only recently fenced areas do not meet this criterion.*

10. *It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato Region or an ecological district, or is an exceptional, representative example of its type. – NO.*

Role in Protecting Ecologically Significant Area

11. *It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under Criteria 1-10 from external adverse effects. – YES, the areas mapped as vegetation type 1 provide buffering for an ecologically significant area of secondary forest on the adjoining property to the south and Area 2 represents a valuable stepping stone habitat and provides linkage functions for the larger forest remnants to the north-west of the site. Area 4 may also provide a corridor linkage to Wharekaho Beach.*

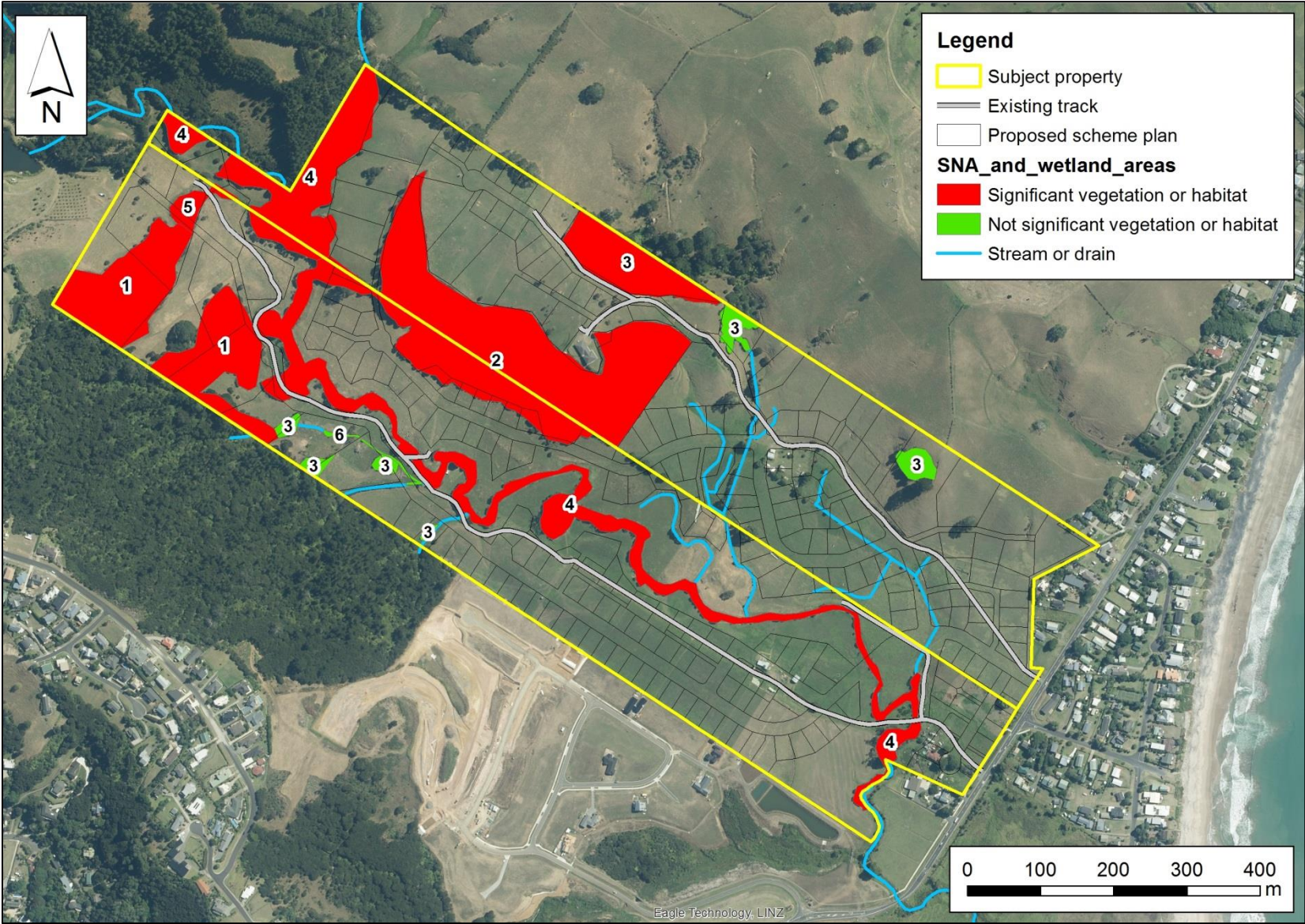


Figure 6 Overview of ecologically significant areas of indigenous vegetation. The numbering refers to the vegetation types described in Section 3.3.2.

5 Description of the Proposed Development

The currently proposed structure plan design is shown on Figure 7 overleaf. It includes a total of 246 sections with a range of lot sizes between 600 and 15,034 m².

36 large lots (>2,000 m², shown in light green) are proposed to be nestled amongst the bush areas in the western part of the site, as well as on the slightly steeper slopes along the north-eastern property boundary.

210 smaller, high-density lots (600-2,000 m², shown in light blue) are proposed on the low-lying and fairly flat terrain in the eastern half of the site as well as below Area 2, and to the west and south of the largest Area 3 at the northern property boundary (Figure 7).

Access to the lots on the northern property will largely follow the existing farm tracks. A larger crescent is proposed to access high density lots near the site entrance and six smaller right-of-ways are currently shown to access rear sections.

The main accessway to the southern property will differ from the existing farm tracks in the eastern half of the site. The design shows a road connecting to the main access on the northern title which curves southwards to run parallel to the southern property boundary through the high density lot area. In closer proximity to Tohetea Stream in the western half of the title the currently shown access design on Figure 7 is likely to be redrawn to follow the existing farm track (D. Lamason, pers. comm.). An intrusion into wetland Area 6 will thereby be avoided or at least minimised.

The structure plan design also includes several green spaces. A wide recreation reserve (between 50-130 m wide) is proposed along the Tohetea Stream corridor and further reserves spaces include the areas of indigenous vegetation on the northern property (Areas 2 and 3). Areas 1 and 5 on the southern property were flagged as suggested reserve spaces during the site visit and were subsequently surveyed to be brought forward in the next design stage. The proposed reserve areas are generously drawn away from the current bush edges and would present opportunities for ecological restoration, as well as providing sufficient room for stormwater retention facilities and recreational activities.

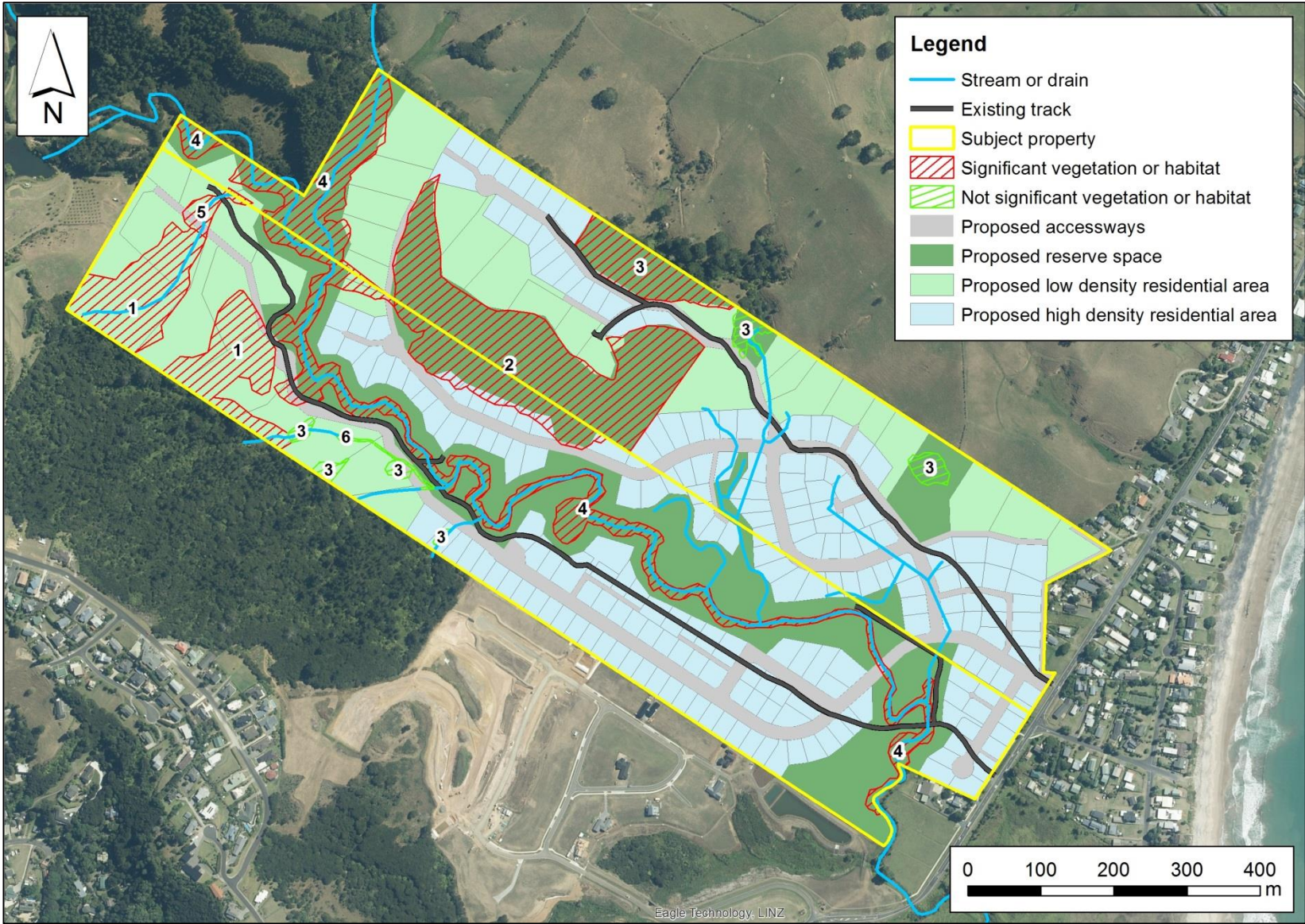


Figure 7 Areas of indigenous vegetation overlaid over the proposed structure plan design. The numbering refers to the vegetation types described in Section 3.3.2.

6 Potential Ecological Effects

6.1 Vegetation Clearance and Loss of Habitat

The vast majority of the indigenous vegetation on site will be retained and protected within the proposed reserve spaces. Only minimal vegetation clearance is likely to be required for the upgrading of the accessway between Areas 1 and 4 on the southern property. Area 5 is also currently proposed to be dissected by a new accessway. The utilisation of the existing track crossing over the wetland area would be preferable and should be seriously considered in the next design stage.

The forest remnants mapped as Areas 1 are currently proposed to be situated within the new lot boundaries. Each lot allows sufficient room (i.e. pasture area) for a future house site and no vegetation clearance would be required for the residential development of these lots. However, to ease future management of these remnants and to avoid 'dissecting' them with property boundaries it is recommended to revisit the structure plan design in this area and to create additional reserve spaces for remnants while reducing the size of the adjacent lots.

The effects of establishing the proposed house sites and accessways on indigenous vegetation are therefore considered minor. They can be mitigated for on-site via restoration plantings within the reserve spaces in conjunction with legal protection and ongoing restoration management of the forest and scrub remnants (refer to Section 7 for more detail).

Construction noise may also result in disturbance of avifauna species, but this effect is considered to be temporary and minor given the sensitivity of bird species found on site.

The presence and dealings with the small tributary streams in the eastern half of the northern property will need to be assessed in more detail in the next stage of the project to minimise freshwater habitat loss.

6.2 Increase of Impermeable Surfaces

The proposed development will lead to a great increase of impermeable surfaces (i.e. roofs and accessways) on the two properties. Given the likelihood of an increased occurrence of major storm events due to the effects of climate change, the effects of strong stormwater surges on the waterways on site as well as downstream of the site will need to be considered in the final structure plan design. State-of-the-art on-site stormwater treatment facilities will need to be thought-out to minimise these effects. The pasture area in the south-eastern

corner of the site would present itself for the construction of a large stormwater treatment wetland similar to the one built on the adjoining property to the south of the site.

6.3 Introduction of Further Pest Plant Species

The establishment of new house sites and associated gardens near indigenous vegetation always provides opportunities for exotic plant species to invade a site. This effect can often be seen along driveways in the Coromandel where woolly nightshade, pampas, gorse, blackberry and other weed species can easily establish on fresh cut faces or batter slopes. The creation of new house sites also usually poses a potential threat of new residents introducing invasive plant species into their gardens.

Controls should be put in place to avoid the future use of potentially invasive plant species and to ensure the correct disposal of green waste.

6.4 Erosion due to Earthworks

Standard sediment control measures will need to be put in place for any earthworks required for the construction of major accessways, driveways and house sites, especially where works are carried out on or near the slightly steeper slopes. Provided that good standard practices are followed there should be no adverse effects on aquatic habitats.

6.5 Predation of Indigenous Fauna by Domestic Pets

The creation of new house sites often increases the risk of potential predation of indigenous fauna by domestic pets (for example cats and dogs in kiwi areas). Given that threatened Hochstetter's frog are found within less than 3 km of the subject property and that the eastern boundary of the site is only between 170-320 m away from Wharekaho Beach where nationally threatened Northern New Zealand dotterel reside a cat ban should be considered. The site may also occasionally be visited by kiwi, in which case kiwi aversion training for dogs would be essential.

The risk of predating domestic animals should be mitigated for through the implementation of an ongoing animal pest control programme on site.

6.6 Increased Risk of Fire

With any residential area there is a risk of residents lighting fires in their gardens and that these could spread into the nearby vegetation. To minimise this risk the new house sites should ideally be placed at least 20 m away from any existing vegetation or proposed planting areas.

A ban of open fires on all lots or a fire exclusion buffer (incorporating fire retardant plant species such as taupata) planted around the margins of the bush areas could be considered.

6.7 Overall Effects

While the majority of the site is currently used as pasture, the Tohetea Stream and the remaining areas of forest and scrub, as well as the wetland habitat are ecologically significant. Any potential impacts on the stream and its tributaries as well as on the significant natural areas will need to be addressed.

The current design of the structure plan aims to minimise the potential impacts on the receiving environment; however, small improvements should still be considered.

All required earthworks for the construction of buildings and accessways should be kept to a practical minimum and appropriate stormwater controls will need to be put in place to ensure that no sediment is washed into the streams during high rainfall events.

Provided that best practice measures are followed during the construction phase, the overall potential adverse effects of the development could be balanced against a range of positive effects achieved through various mitigation measures on site.

7 Potential Mitigation Measures

To mitigate for any adverse effects of the structure plan proposal the preparation of a detailed Ecological Management Plan covering the following points would be required:

Legal Protection

All natural areas present on site should be covenanted and managed in perpetuity as part of the proposal.

Fencing

The natural areas should all be fenced with seven wire post and batten fencelines to permanently exclude any livestock that may be held on the larger sections following the development, as well to deter new residents from dumping garden waste into the reserve spaces. As all fences are subject to damage over time, they will need to be checked and repaired if required as part of a routine maintenance programme.

Weed Control

All weed species currently present on site shall be removed and the natural areas monitored for regrowth. The introduction of new weed species should be prevented by educating all

future residents about the effects of weed species on the indigenous biodiversity and on species to avoid in the gardens.

Animal Pest Control

An ongoing animal pest control programme at least for possums, rats and mustelids, but ideally also including feral cats and pigs, should be designed and implemented to further improve the biodiversity values of this site.

Restoration Plantings

To quickly restore the natural areas on site to fully functioning and self-sustaining ecosystems that are representative of the vegetation types found in the local area, the recently fenced and still grazed areas should be loosely underplanted with suitable indigenous understorey and future canopy species. Dense buffer plantings of suitable indigenous and fast growing plant species should be placed along the margins of these areas. The corridor along the Tohetea Stream should also be planted out with indigenous flora species (allowing for walkways and picnic areas).

Ongoing Maintenance

A programme for ongoing routine monitoring and maintenance measures should be developed. It should detail the frequencies of required maintenance visits for weed and animal pest control and potentially the setup of permanent photopoints to monitor the progress of natural regeneration and overall health of the canopies.

8 Conclusions

The current design of the structure proposal would result in only minimal vegetation clearance for the widening and construction of accessways. The natural areas present on the subject site would mostly be avoided and are proposed to be permanently set aside as reserve spaces.

The low lying areas of the properties are situated in a threatened environment where restoration plantings should be welcomed and encouraged (refer to Section 3.2). From an ecological point of view the potential adverse effects of the proposal could therefore be adequately offset by the increase of indigenous vegetation on the property.

The restoration of the wide corridor along the Tohetea Stream as well as the ongoing management of the existing forest and scrub areas (i.e. ongoing weed and animal pest control) provide an excellent opportunity to improve the biodiversity values at this site which ultimately links to the Coromandel Forest Park. Legal protection of these natural areas would

secure them for the future and represent a positive addition to the Protected Natural Areas Network in the Thames-Coromandel District.

The design of stormwater retention and treatment wetland areas would help minimise the adverse effects of the development and could result in a valuable addition of indigenous wetland habitat at this site. A stormwater treatment wetland in the south-eastern corner of the site would also tie in well with the wetland area created on the neighbouring property.

Some minor amendments to the current design should be considered to further minimise the effects of the proposal, i.e. adding the forest remnants mapped as Areas 1 as reserve spaces while reducing the adjacent lot sizes and avoidance of the wetland areas marked as Areas 5 and 6. Earthworks within or near these wetland areas would trigger the regulations of the National Environmental Standards for freshwater (NES-F), specifically Regulation 54 (i.e. vegetation clearance and earthworks are prohibited within or within a 10 m setback from a natural wetland and any discharges will need to be located >100 m from a natural wetland if *"there is a hydrological connection between the discharge of water and the wetland"* and if *"there are likely to be adverse effects from the discharge on the hydrological functioning or the habitat or the biodiversity values of a natural wetland"*).

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Appendix I

Flora Species List

25 and 29 Wharekaho Road, Whitianga

Recorded on 3 June 2022

Indigenous Species

Gymnosperms

<i>Agathis australis</i>	Kauri
<i>Dacrycarpus dacydioides</i>	Kahikatea
<i>Dacrydium cupressinum</i>	Rimu
<i>Phyllocladus trichomanoides</i>	Tanekaha
<i>Podocarpus totara</i>	Totara

Flowering Trees and Shrubs

<i>Coprosma rhamnoides</i>	Twiggy coprosma
<i>Coprosma robusta</i>	Karamu
<i>Cordyline australis</i>	Cabbage tree, ti kouka
<i>Coriaria arborea</i> var. <i>arborea</i>	Tutu
<i>Geniostoma rupestre</i> var. <i>ligustrifolium</i>	Hangehange
<i>Knightia excelsa</i>	Rewarewa
<i>Kunzea robusta</i>	Kanuka
<i>Leptecophylla juniperina</i> subsp. <i>juniperina</i>	Prickly mingimingi
<i>Leptospermum scoparium</i> var. <i>scoparium</i>	Manuka
<i>Leucopogon fasciculatus</i>	Mingimingi
<i>Melicytus ramiflorus</i>	Mahoe
<i>Myrsine australis</i>	Mapou, red matipo
<i>Pittosporum crassifolium</i>	Karo
<i>Pseudopanax arboreus</i>	Five-finger
<i>Rhabdothamnus solandri</i>	New Zealand gloxinia, taurepo
<i>Rhopalostylis sapida</i>	Nikau

Climbers

<i>Freycinetia banksii</i>	Kiekie
<i>Metrosideros diffusa</i>	White rata
<i>Metrosideros fulgens</i>	Climbing rata
<i>Metrosideros perforata</i>	Akatea

Ferns

<i>Adiantum cunninghamii</i>	Common maidenhair fern
<i>Asplenium polyodon</i>	Sickle spleenwort
<i>Cyathea dealbata</i>	Ponga
<i>Cyathea medullaris</i>	Mamaku
<i>Dicksonia squarrosa</i>	Wheki
<i>Doodia australis</i>	Rasp fern
<i>Icarus filiformis</i>	Thread fern
<i>Paesia scaberula</i>	Ring fern
<i>Parablechnum novae-zelandiae</i>	Kiokio

Ferns continued

Pteridium esculentum

Pyrrosia elaeagnifolia

Zealandia pustulata subsp. *pustulata*

Bracken

Leather-leaf fern

Hound's tongue fern

Herbs, Grasses, Rushes and Sedges

Carex banksiana

Carex dissita

Carex secta

Carex uncinata

Carex virgata

Centella uniflora

Cyperus ustulatus

Dianella nigra

Gonocarpus incanus

Haloragis erecta subsp. *erecta*

Isachne globosa

Isolepis cernua var. *cernua*

Isolepis prolifera

Juncus edgariae

Lepidosperma laterale

Machaerina rubiginosa

Machaerina tenax

Microlaena avenacea

Oplismenus hirtellus subsp. *hirtellus*

Persicaria decipiens

Fine-leaved bastard grass

Forest sedge

Pukio, purei

Hook sedge

Swamp sedge, pukio

Centella

Giant umbrella sedge

New Zealand blueberry, turutu

Gonocarpus

Shrubby haloragis

Swamp millet

Slender clubrush

Budding clubrush

Wiwi, Edgar's rush

Sword sedge

Baumea, common twig rush

Baumea

Bush rice grass

Bamboo grass

Slender knotweed

*Adventive Species

Trees, Shrubs and Climbers

Acacia mearnsii

Berberis glaucocarpa

Calystegia silvatica subsp. *disjuncta*

Chamaecyparis lawsoniana

Cotoneaster coriaceus

Eucalyptus sp.

Ficus carica

Hesperocyparis macrocarpa

Persea americana

Phytolacca octandra

Pinus radiata

Rubus fruticosus agg.

Solanum mauritianum

Black wattle

Barberry

Great bindweed

Lawson's Cypress

Cotoneaster

Eucalypt

Fig

Macrocarpa

Avocado

Inkweed

Radiata pine

Blackberry

Woolly nightshade

Rushes, Herbs and Grasses

Ageratina adenophora

Cenchrus clandestinus

Cirsium vulgare

Cortaderia selloana

Dactylis glomerata

Mexican devil

Kikuyu grass

Scotch thistle

Pampas grass

Cocksfoot

Rushes, Herbs and Grasses continued

<i>Daucus carota</i>	Wild carrot
<i>Holcus lanatus</i>	Yorkshire fog
<i>Jacobaea vulgaris</i>	Ragwort
<i>Juncus effusus</i> var. <i>effusus</i>	Soft rush
<i>Lapsana communis</i>	Nipplewort
<i>Leontodon saxatilis</i>	Hawkbit
<i>Lotus pedunculatus</i>	Lotus, greater bird's-foot trefoil
<i>Paspalum distichum</i>	Paspalum
<i>Persicaria hydropiper</i>	Water pepper
<i>Plantago lanceolata</i>	Narrow-leaved plantain
<i>Prunella vulgaris</i>	Self-heal
<i>Rumex obtusifolius</i>	Broad-leaved dock
<i>Solanum nigrum</i>	Black nightshade
<i>Taraxacum officinale</i>	Dandelion
<i>Trifolium repens</i>	White clover