



WILD ECOLOGY

Ecological Report

Proposed Private Plan Change (PPC)
at

Cove Road,
Mangawhai
'Cove Road North Precinct'

Prepared for
The Rise Ltd

October 2022

DOCUMENT QUALITY ASSURANCE

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EXECUTIVE SUMMARY

An ecological assessment was undertaken to assist in the preliminary planning and design stages of a proposed Private Plan Change (PPC) for a site located at Cove Road, Mangawhai Heads. The PPC is seeking to rezone land within the site boundaries from 'Rural' to 'Residential' to enable the development of residential subdivision and result in the creation of The Cove Road North Precinct.

The site is primarily dominated by exotic pasture, and most terrestrial habitats within the site are highly degraded. The exception is an area of regenerating bush extending along the site's northern boundary (subject to an existing conservation covenant), and some small, scattered areas of indigenous vegetation extending primarily along the central aspect of the site and isolated areas identified as indicative wetland areas, which are of moderate ecological value in the context of the site location on the residential fringes of Mangawhai.

Aquatic habitats within the PPC area boundaries generally drain through exotic pasture within the northern and central aspects of the site and through built-up residential areas along the southern aspect. The stream and indicative wetland habitats have been degraded through a long history of rural and residential land use practices associated with stock grazing, riparian vegetation clearance, stream channelisation, culverting, realignment and continuous dredging.

Collectively the ecological significance of both terrestrial and aquatic habitats within the PPC boundaries ranges from low (exotic pasture) to moderate (northern bush area, scattered indigenous vegetation, stream and indicative wetland habitats), although the ecological condition overall is considered to be low (apart from the northern bush area which is of fair ecological condition) due to historical disturbance, land clearance and significant modification to both terrestrial and aquatic environments.

The protection of freshwater and ecological features within the proposed PPC boundaries is proposed to ensure that adverse ecological effects can be avoided, remedied or mitigated. This includes protecting all existing bush areas, natural watercourses and drainage patterns, wetlands, and if practical, connecting these features throughout the site and immediate surrounds through establishing green corridor connections.

Ecological constraints associated with terrestrial and aquatic biodiversity values within the PPC boundaries are primarily associated with constraints relating to works that may potentially result in adverse effects on existing terrestrial and aquatic habitats on site, these include:

- Potential loss of indigenous vegetation;
- Potential loss of wetland habitat;
- Potential loss of habitat for indigenous fauna;
- Potential introduction of plant pathogens;
- Potential loss and/or a change in aquatic habitat availability and condition;
- Change in flow regime due to increased site imperviousness; and
- Potential loss and/or a change in aquatic habitat connection.

In general, these effects can be appropriately avoided, remedied or mitigated through comprehensive design principles and best practice. Any future development in the PPC area should consider the above potential effects and provide measures that outline necessary avoidance of effects, mitigation, or compensation actions that are to be taken to ensure that the site development does not result in a loss of ecological value.

A number of recommendations have been made to ensure that the proposed creation of The Cove Road North Precinct and subsequent site development does not result in adverse ecological effects on the habitats contained within the boundaries of the site. It is recommended that any development within the proposed PPC area recognises the importance of protecting and enhancing natural features and ensures that any site development works within the natural confines of the land.

Some of the key ecological recommendations include:

- At the time of any proposed land development or subdivision application, a site specific Ecological and Wetland Assessment along with an Ecological Enhancement and Management Plan shall be prepared to ensure that all natural features within the respective site boundaries are appropriately delineated and assessed, and that potential effects, as well as enhancement and mitigation strategies can be developed based on site specific design detail.
- Where any subdivision within the PPC boundaries would involve a natural wetland or stream, the Applicant will be required to provide details regarding ecological protection and enhancement, including a minimum 10m riparian planting to streams and wetlands, weed and pest management controls and indigenous revegetation (where appropriate).
- Management of the riparian, wetland and bush buffer areas will comprise of appropriate indigenous planting of eco-sourced species, and ongoing weed and pest animal control.
- That the location and alignment of any potential walkways/cycleways address any effects on the ecology of the immediate area and existing trees, land contour and the practicality of constructing the walkway and the amenity that would be provided to users of the walkway. Any walkways/cycleways are to ensure they are appropriately set back from any natural wetland, bush edge and from the top of the bank of any stream, except where it crosses the stream.
- Any upgrade or establishment of new stream crossings to access the proposed new development, should take into account 'functional need' (as defined under NPSFM) for any proposed activity within stream or wetland environments. Any infrastructure should be designed and installed in accordance with and be compliant with Kaipara District Council and Northland Regional Council Environmental Engineering Standards and the New Zealand Fish Passage Guidelines (Franklin *et al.* 2018).
- Any future development within The Cove Road North Precinct should be designed in a way that maintains and enhances indigenous habitats within the PPC boundaries, i.e. avoids the removal of indigenous vegetation and habitat for indigenous fauna to ensure any proposed development does not result in a loss of ecological value.

Based on preliminary ecological surveys and high-level desktop analysis, it is considered that there are no significant constraints to the proposed rezoning of the PPC site, and the potential adverse ecological effects can be sufficiently avoided, remedied or mitigated through a combination of integrated design principles, current KDP, NRC, NESFW controls in addition to the proposed The Cove Road North Precinct provisions. Should any subsequent land development within The Cove Road North Precinct be in accordance with the applicable performance standards it would provide an opportunity to protect and enhance the current ecological features contained within the PPC boundaries and adequately deliver good ecological outcomes for the site.

1.0 INTRODUCTION

1.1. Background and project description

The Rise Ltd ('the Applicant') engaged Wild Ecology to prepare an Ecological Report for a Proposed Plan Change (PPC) at Cove Road, Mangawhai ('the site'). The Applicant proposes to lodge an application for a Private Plan Change (PPC) to Kaipara District Council (KDC) to rezone the site from 'Rural' to 'Residential,' resulting in the creation of The Cove Road North Precinct.

The PPC area is currently zoned 'Rural' under Kaipara District Plan (Operative) and is located approximately 1 km west of Mangawhai Heads town centre (Figure 1). It is abounded by 'Residential' zoning to the east and south, and rural zoning to the north and west. The site is comprised by 28 individual titles varying in size from 1,249 m² to 11.12 ha (Figure 2). The site boundaries are encompassed by Cove Road to the west and Mangawhai Heads Road to the south. The site has been identified as 'Indicative Growth Area' under KDP (OP) and 'Urban-Residential Growth Area' under Mangawhai Spatial Plan (2020).

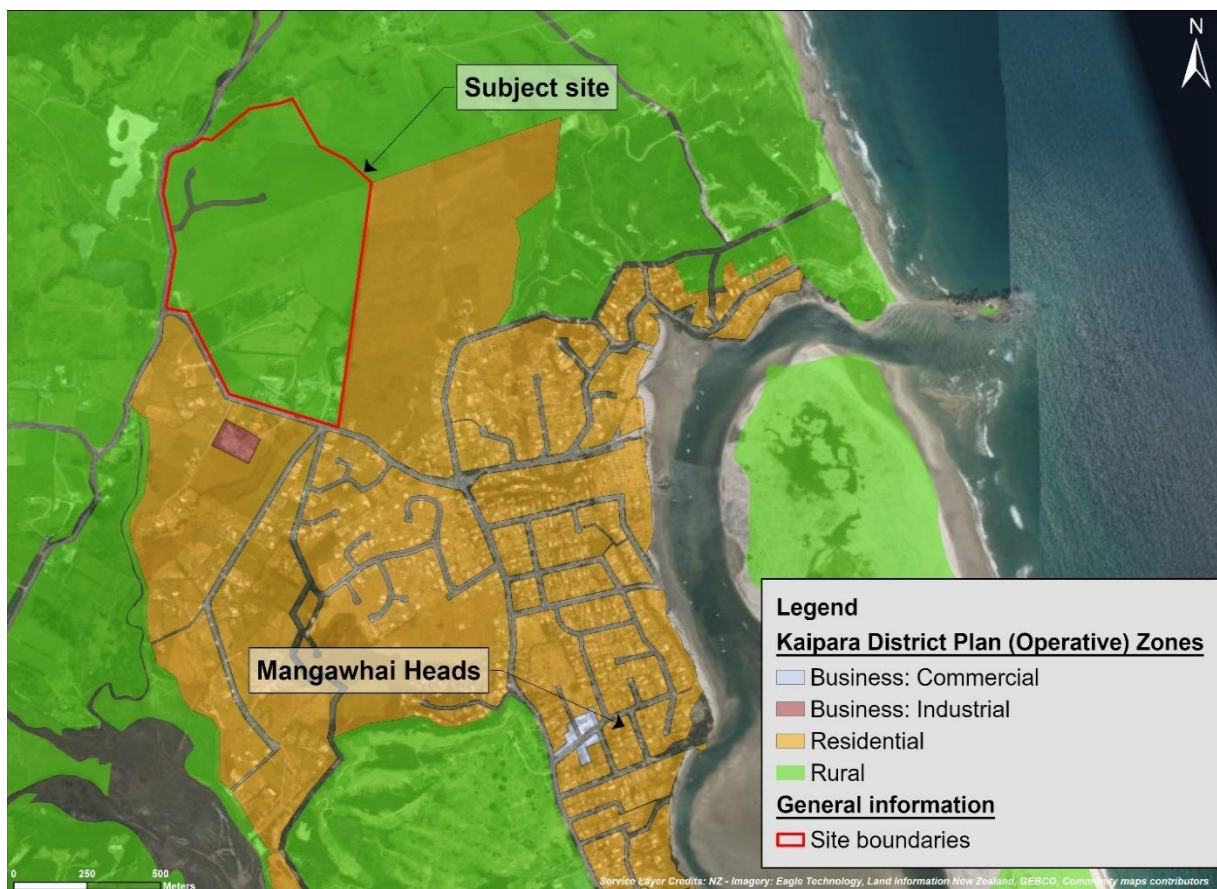


Figure 1: Showing the site's location in relation to Mangawhai Heads with an associated overlay of Kaipara District Plan (Operative) Zoning

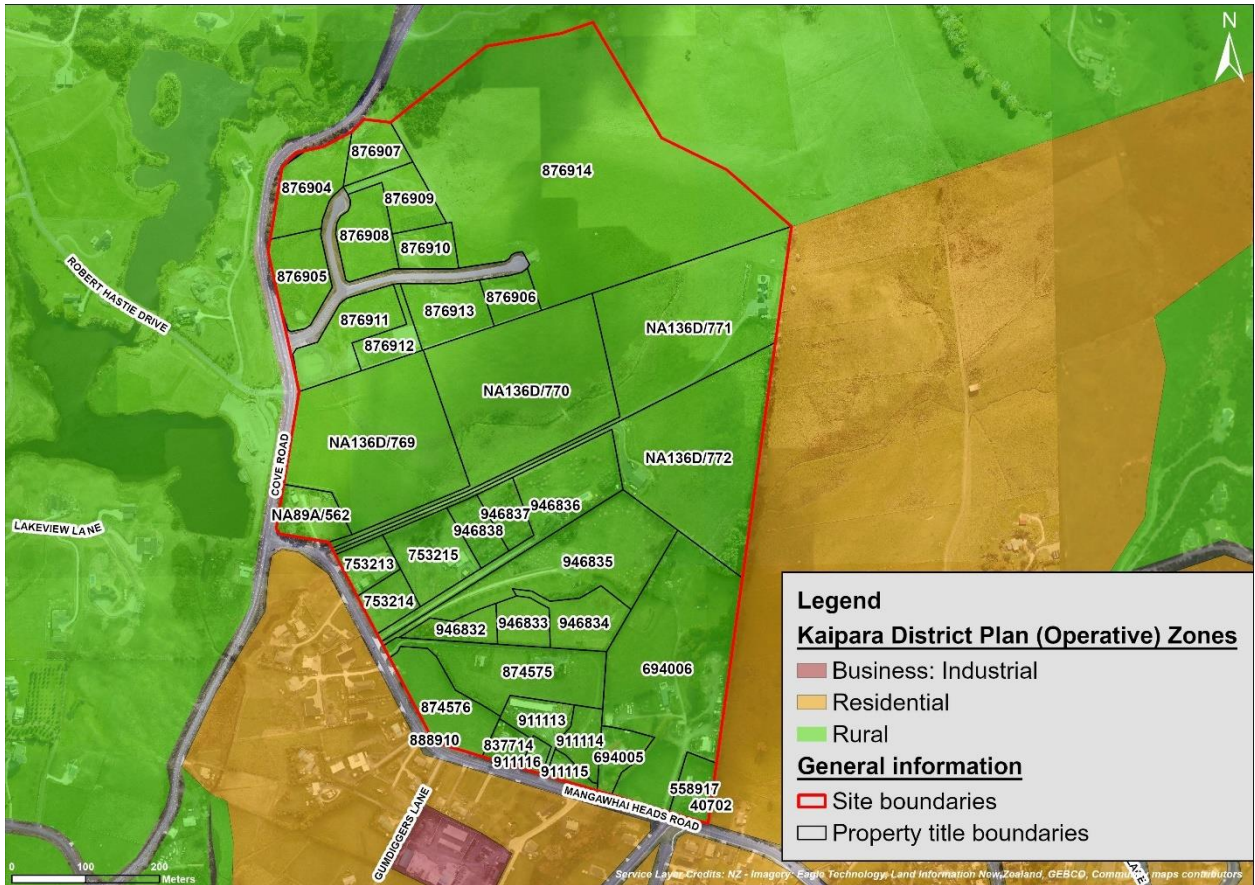


Figure 2: Showing the site boundaries and the titles contained within the PPC boundaries

1.2. Purpose and Scope

The purpose of this Report is to provide a preliminary assessment of the ecological features contained within the proposed PPC boundaries, and to assess whether the future intensified development of the Site can occur in a manner consistent with the relevant ecological provisions in relation to local, regional and national plans, policy statements and regulations associated with the preservation of indigenous habitats and mitigation of ecological effects related to potential development of the site. This will be achieved by providing a high-level assessment identifying indicative habitat types on site and providing a preliminary assessment of ecological values of vegetation and habitats within the plan change area.

This report also briefly considers the likely potential adverse effects on ecological values and the degree to which significant adverse effects can be avoided, remedied, mitigated or offset. Both constraints and opportunities relating to the PPC site’s ecological values are identified and discussed.

The preliminary constraints, considerations and recommendations of this report have been fully incorporated within The Cove Road North Precinct Provisions (prepared by Barker & Associates).

2.0 METHODOLOGY

2.1. Desktop Review

The desktop investigation included a review of scientific literature (published and unpublished), the Kaipara District Plan and associated ecological site information, and relevant websites. Ecological databases were also accessed. These included:

- Retrolens historic aerial imagery
- DOC Bio-web Herpetofauna database;
- DOC Bat database;
- iNaturalist New Zealand;
- New Zealand Freshwater Fish Database;
- LENZ Threatened Environments Classification;
- Land Use Classification;
- New Zealand Freshwater Fish Database (NZFFD).

Watercourses on site were classified in accordance with criteria outlined in the Proposed Regional Plan for Northland (Updated Appeals Version – March 2022). There was 0.5 mm of rainfall within the 48 hours prior to the 6th of May 2022 survey (NRC Environmental Data Hub).

2.1.1. Precinct Provisions and Precinct Plan

A review of The Cove Road North Precinct provisions provided by Barker & Associates (B&A) and Precinct and Concept Plan prepared by Urbanism+ was completed to determine whether the PPC Application adequately recognises the ecological values identified within this report and, and that adequate protection of indigenous terrestrial and aquatic habitats can practically be achieved following the rezoning of the site.

2.2. Site Investigation

The site and surrounding areas were visited on the 6th, 9th, 10th of May 2022 and a general walk over was conducted over the boundaries of title No 876914, with terrestrial and aquatic features identified. The natural features were surveyed and recorded using a GPS unit (Trimble DA2).

Please note that physical field surveys were only undertaken on the Rise Ltd owned title No 876914 with the remainder of the properties contained within the proposed PPC area assessed only through high-level desktop assessments (Figure 3) therefore all findings within this report should be treated as preliminary only, and further ecological assessments and surveys will be required at the time of any future land development or subdivision application.

Vegetation was recorded and classified in general accordance with Singers *et al.* (2017). A basic wetland delineation exercise was carried out during a site visit on May 9th, 2022 based partly on the Ministry for the Environment (MfE) Wetland delineation protocols

(2020) which are generally based evaluation of hydrophytic vegetation dominance, presence of hydric soils tool and wetland hydrology. Please note that only Title no 876914 was assessed using this methodology and any other 'potential wetland' areas within the wider proposed PPC boundaries were only evaluated based on aerial imagery and vantage point surveys, therefore there may be variation to the wetland abundance and extent, especially within the central and southern aspects of the PPC boundaries which were difficult to assess from vantage points given their already primarily built-up nature or intensive agricultural management regime.

The following fauna surveys were conducted:

- 5MBC surveys were conducted at various parts of the site to record avifauna (bird) present on site;
- An acoustic bat survey was undertaken using Acoustic Bat Monitors (ABMs);
- Qualitative assessment of habitat values for native lizards (skinks and geckos) was undertaken during site visits;
- Qualitative assessment of habitat values for native ichthyofauna (fish) was undertaken during site visits;
- An AR4 acoustic recorder was left on site for 48 hrs to obtain additional avifauna records.

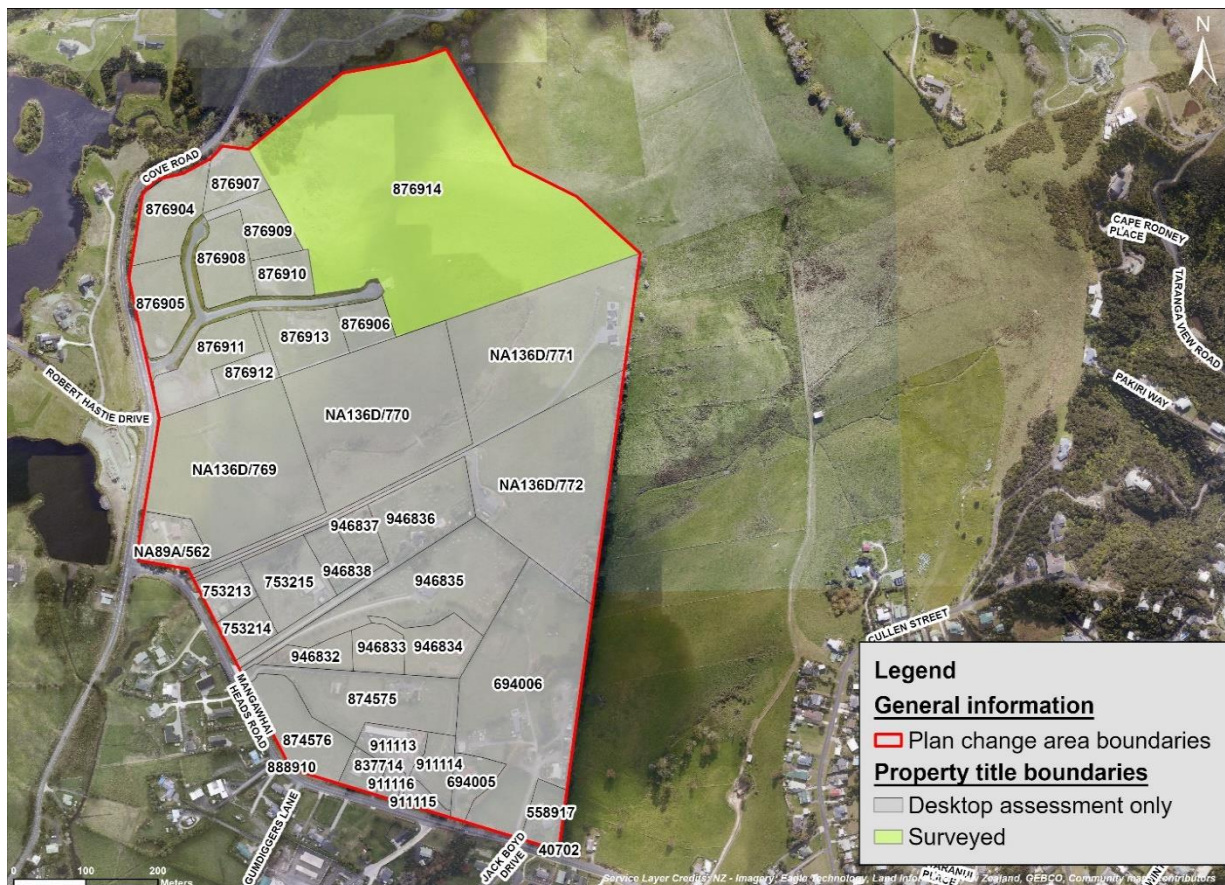


Figure 3: Plan change area showing properties and areas surveyed either through active site surveys or desktop assessment only

2.3. Evaluation of Ecological Value (Appendix 25G)

Kaipara District Plan requires that the significance of indigenous vegetation and habitats is assessed by reference Appendix 25G which requires for an assessment of the ranking of an ecological feature, assessments of significance and ranking shall be based on a certain criterion. This is further discussed and evaluated under 6.3 of this Report.

2.4. Evaluation of Ecological Effects

2.4.1. EIANZ Assessment

As a part of our ecological assessment, potential ecological effects associated with the proposed PPC and subsequent site development on both terrestrial and aquatic values on site were described and appropriately assessed. The assessment generally followed the process as described within Ecological Impact Assessment (EclA) guidelines (EIANZ 2018). The guidelines provide a process for identifying, quantifying and evaluating the potential impacts of defined actions on ecosystems or their components; and providing a scientifically defensible approach to ecosystem management.

2.4.2. Values Assessment

Four matters were used to determine the ecological value of the ecological features present on-site, these being 'Representativeness, Rarity/distinctiveness, Diversity and Pattern, and Ecological Context' as prescribed under the EIANZ (2018) criteria. The method involves assigning ecological values under each of these four matters, an explanation on each matter and a series of attributes as outlined within Table 4 of the EIANZ guidelines (2018). A scoring system provided in the EIANZ guidelines requires the combination of these assessment values to provide an overall assignment of ecological value to each feature.

2.4.3. Magnitude of Effects Assessment

An assessment of the potential magnitude of effects was evaluated in general accordance with Roper-Lindsay et al. 2018) with the consideration of potential effects associated with potential development proposal on identified ecological values on site. The method involves assessing the magnitude of effects based on criteria outlined in Table 1 and the overall level of effect using the matrix in Table 2. This assessment framework allows for effects to be ranked on a scale from 'Net gain' to 'Very High' and provided justification for avoidance, mitigation and offsetting requirements as appropriate.

Table 1: Criteria for describing magnitude of effect (Roper-Lindsay et al. 2018)

Magnitude	Description
Very high	Total loss or very major alteration to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.

High	Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post development character/ composition/ attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns; AND/OR Having a minor effect on the known population or range of the element/feature.
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the “no change” situation; AND/OR Having negligible effect on the known population or range of the element/feature.

Table 2: Criteria for describing level of effects (Roper-Lindsay et al. 2018)

Magnitude	Level of effects				
	Very high	High	Moderate	Low	Negligible
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

3.0 SITE DESCRIPTION

3.1. Site description and location

The site is located on the residential fringes of Mangawhai Heads, approximately 1km north-west of Mangawhai Heads town centre, encapsulated by Mangawhai Heads Road to the south, Cove Road to the west, rural land to the north and residential land to the east (Figure 4). The site is situated within the Rodney Ecological District (Northern Conservancy) in the Northland Region. It is currently zoned as a ‘Rural’ under the Kaipara District Plan (Operative) (KDP). The total site area is approximately 54.25 ha and the site is predominantly comprised of exotic pastureland, residential dwellings and associated infrastructure, and scattered indigenous and exotic vegetation.



Figure 4: Showing the general characteristics of the site – primarily comprised in pasture with scattered indigenous and exotic vegetation and dwellings

3.2. Historic land use

Originally the vegetation cover on site and the surrounding area would have been a continuation of the Brynderwyn Hills Forest Complex extending to the north of the site, which is likely historically been best represented by Kauri, podocarp, broadleaved forest (WF11) along the sites northern and eastern aspects and Kahikatea, pukatea forest (WF8) along the sites southern and western aspects, as classified by Singers (2018) (Figure 5). Agricultural activities and urbanisation have highly modified the native vegetation and hydrological patterns in the area through the removal of indigenous vegetation, channelized drainage, establishment of artificial ponds and dams and intensive earthworks.

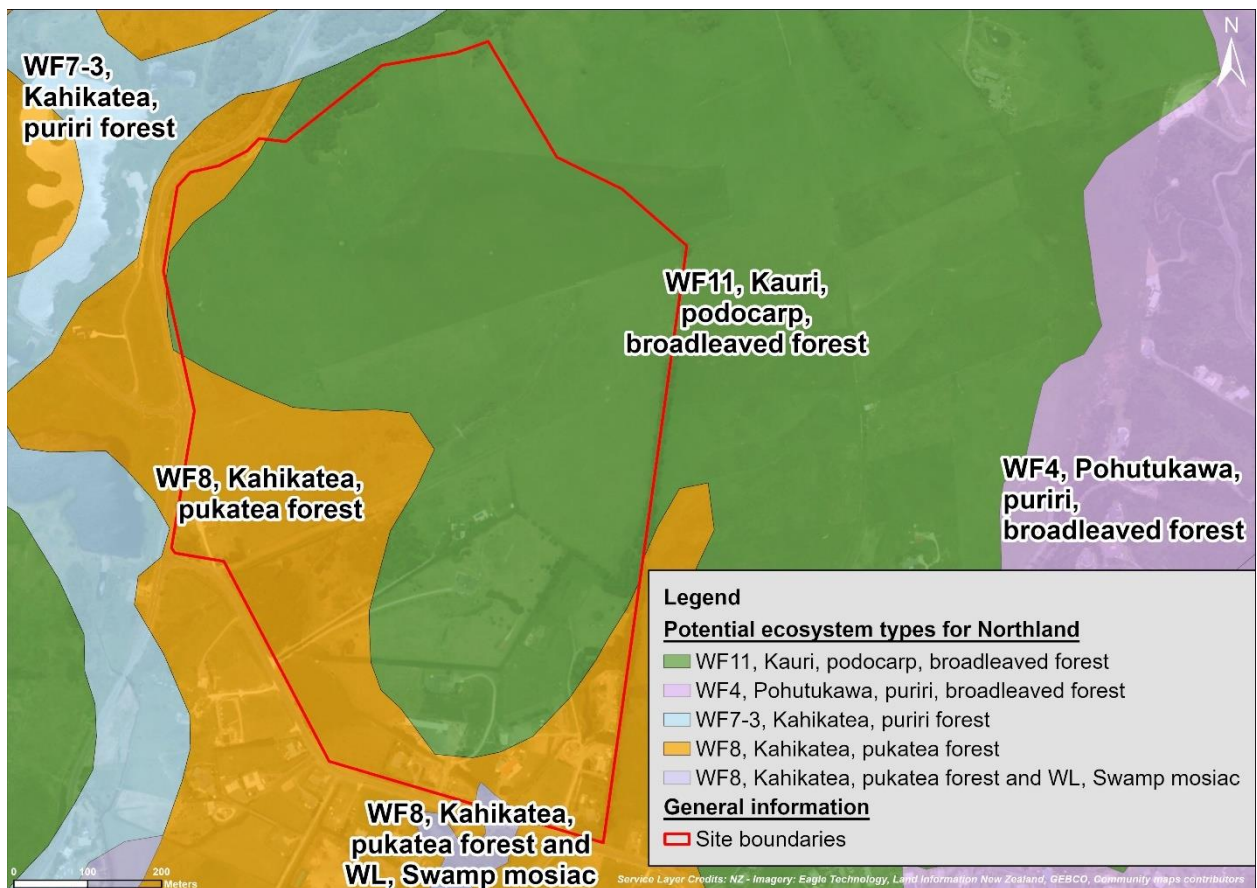


Figure 5: Northland potential ecosystem classification (Singers 2018)

By analysing historic aerial imagery from Retrolens, the site at 1963 (Figure 6) contained what appears to be indigenous vegetation extending along the central aspect of the site, with indigenous bush extending along the site’s northern aspect. An isolated pocket of indigenous vegetation is also noted along the site’s eastern boundary. The remainder of the site and surrounds have already been cleared of indigenous vegetation and it is apparent that the stream systems extending throughout the site have been straightened and channelised.

Between 1963 and 1983, it appears that vegetation clearance on site and immediate surrounds has accelerated, and the vegetation that had once extended along the central aspect of the site has been cleared almost in its entirety (Figure 7).

The most significant change in land use can be observed between 1983 and 2003 (Figure 8), with the sites southern aspect and surrounding land becoming increasingly developed for residential and lifestyle blocks. The vegetation cover on site between 2003 and most recent aerial imagery for Northland for 2018 appears to have largely remain unchanged (Figure 9) although development within the wider area has intensified further, and now also extends along the sites western boundary. The waterbodies extending throughout the site have been significantly modified, straightened and dredged which is particularly evident along the sites southern, central and eastern aspects which have been subject to intensified land development. Very little indigenous vegetation remains and is primarily contained to the sites northern boundary, with a degraded wetland habitat extending along the sites central aspect.



Figure 6: Showing the site and surrounds in 1963 (Source: Retrolens)



Figure 7: Showing the site and surrounds in 1983 (Source: Retrolens)

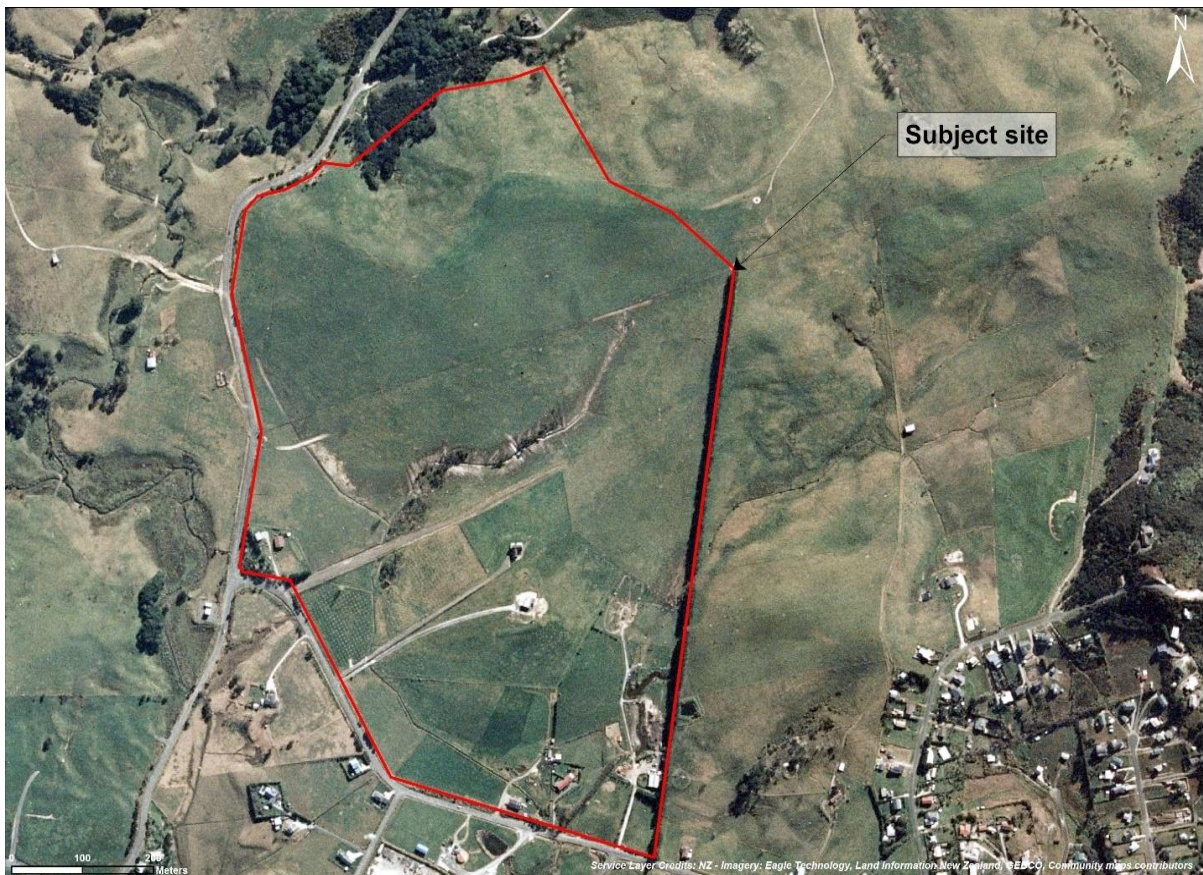


Figure 8: Showing the site and surrounds in 2003 (Source: LINZ)



Figure 9: Showing the site and surrounds in the most recent aerial imagery for Northland 2018 (Source: NRC)

At current day the site is best described as exotic pasture extending along the northern aspect of the site, rural lifestyle blocks extending along the central/eastern aspect, and larger lot residential development along the sites southern and western boundaries. The site and surrounds have been largely modified from its original ecosystem type, with large tracks of indigenous vegetation having been cleared for farming purposes pre 1963 and all of the onsite waterways having been altered through channelisation, straightening and culverting to improve the site for agricultural and development use.

3.3. Site characteristics

The site generally has a gently rolling topography and falls roughly in a southerly and westerly direction from its central ridgeline towards Cove Road and Mangawhai Heads Road (Figure 10).



Figure 10: Looking north from Mangawhai Heads Road - site is gently rolling, generally sloping in northerly and southerly direction from the central ridgeline

The geology of the site is characterised by Waitemata Group interbedded, graded sandstone and siltstone or mudstone, massive mudstone and sandstone; local intercalated volcanic grit, breccia and conglomerate, and minor bioclastic limestone along its southern boundary (GNS 2022).

Albic ultic (UE) soil extends over the northern and eastern aspects of the site (Figure 11). These soils are strongly acidic with low nutrient reserves, consisting of clayey subsoils with slow permeability which tend to have dispersible surface horizons susceptible to livestock treading damage, prone to erosion and typically have impeded drainage (Landcare Research 2022). The southern and western aspects are dominated by orthic gley (GO) soils,

which are strongly affected by waterlogging and have been chemically reduced. Waterlogging occurs in winter and spring, and some soils remain wet all year. These soils have high groundwater-tables, shallow potential rooting depth, and relatively high bulk density. Trafficability is limited when soils are wet, and drainage is necessary for most agricultural development.

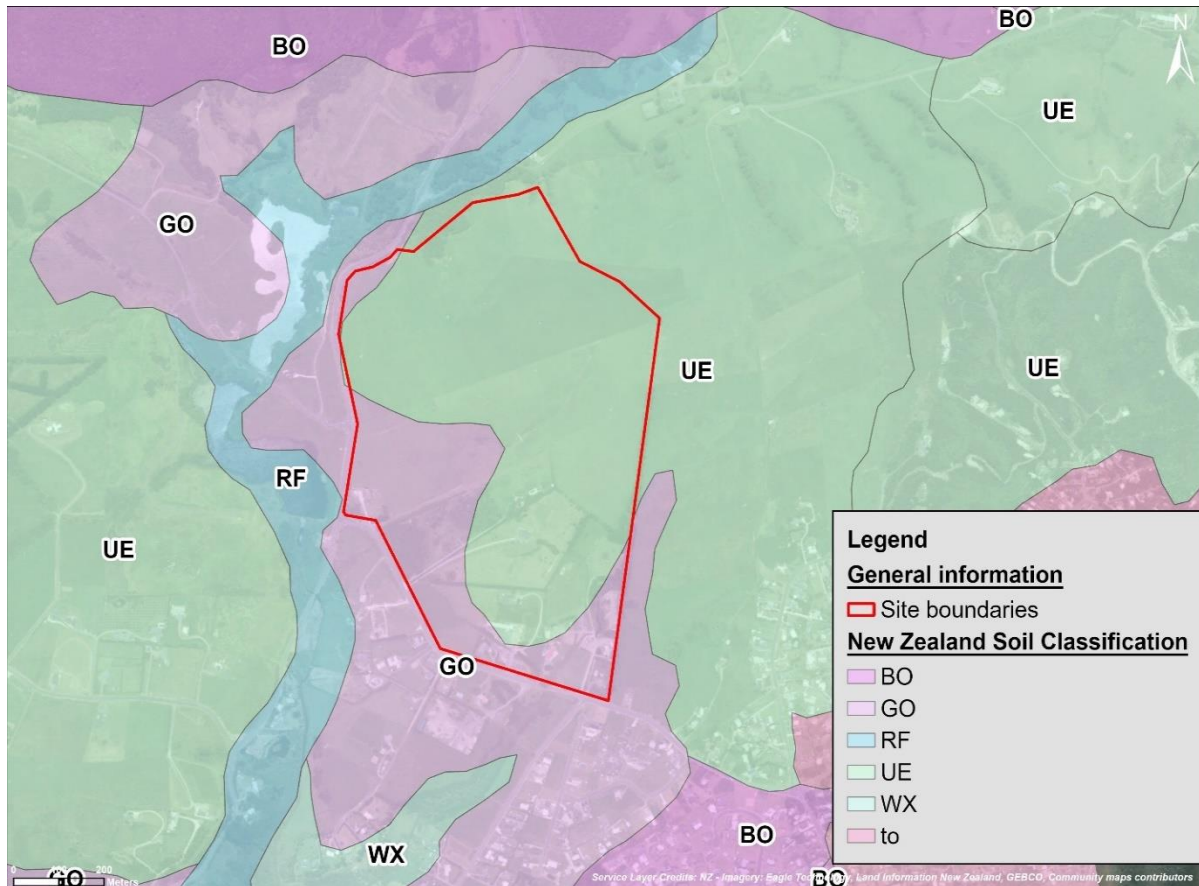


Figure 11: The site generally consists of albic ultic soils which are typically prone to erosion

To assess the site's agricultural production potential, Land Use Capability (LUC) inventory was analysed, which aims to help achieve sustainable land development and management throughout New Zealand. LUC inventory classifies land into eight classes according to its long-term capability to sustain one or more productive uses. The priority for LUC Classes 1-3 is to maintain the potential for these high-quality soils to be used for agricultural purposes, rather than activities that are not dependent on soil quality. The site is classified as LUC Class 4 land (Figure 12) with low arable cropping suitability, and moderate pastoral grazing suitability (Landcare Research 2010). No soils on the site have been identified as highly versatile, prime or elite soils.

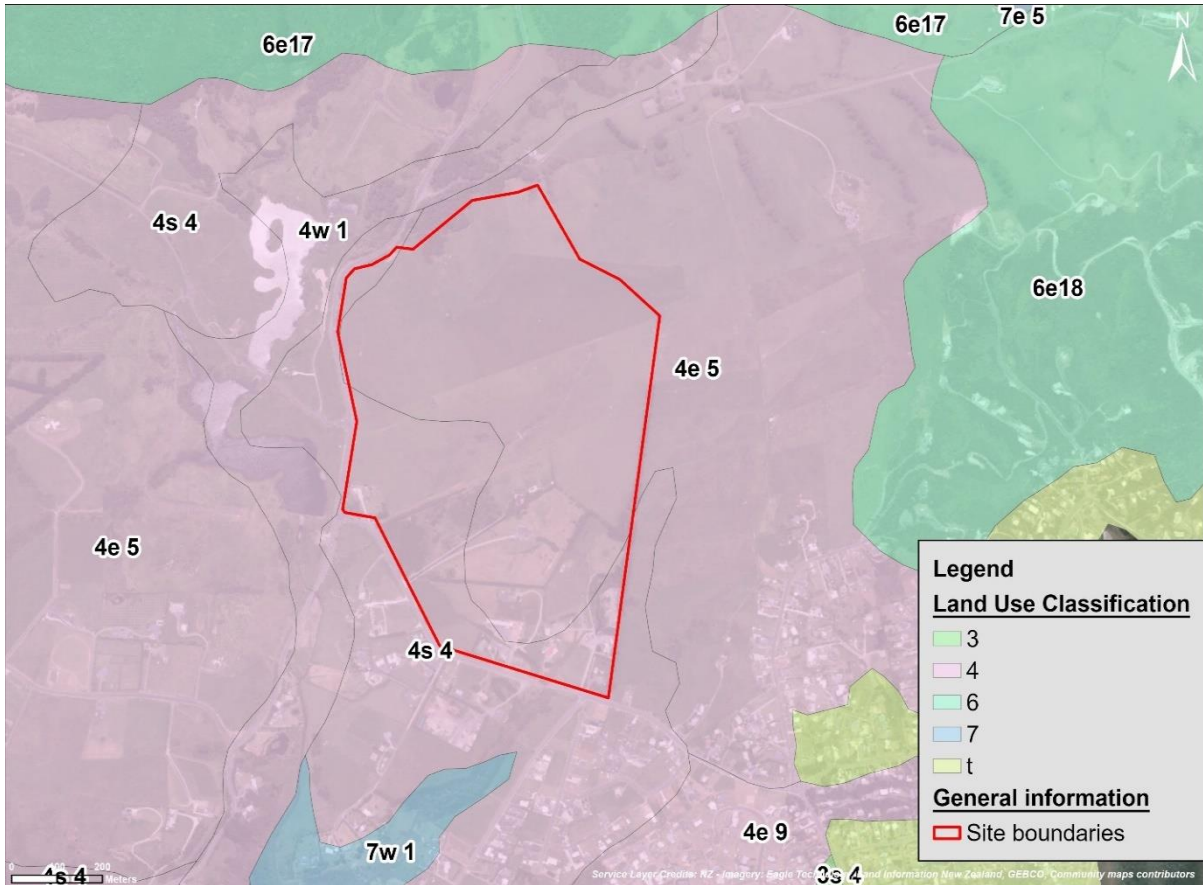


Figure 12: Showing the LUC classification for the site

The site generally forms an upper catchment area of Tara Creek and Mangawhai Harbour with two main intermittent stream features flowing through the sites central and eastern aspects southwards. The intermittent streams converge at the sites southern boundary and continue their flow in a southern direction through residential areas. The stream systems discharge into the Tara Creek which eventually flows into Mangawhai Harbour. Some smaller ephemeral and intermittent drainage patterns drain the site along its northern aspect in a northerly direction towards an intermittent stream, which discharges into the Sanctuary Lakes to the west of the site. Artificial drains were noted within the central aspect of the site, likely to channelise and divert overland flows and improve the site for agricultural production.

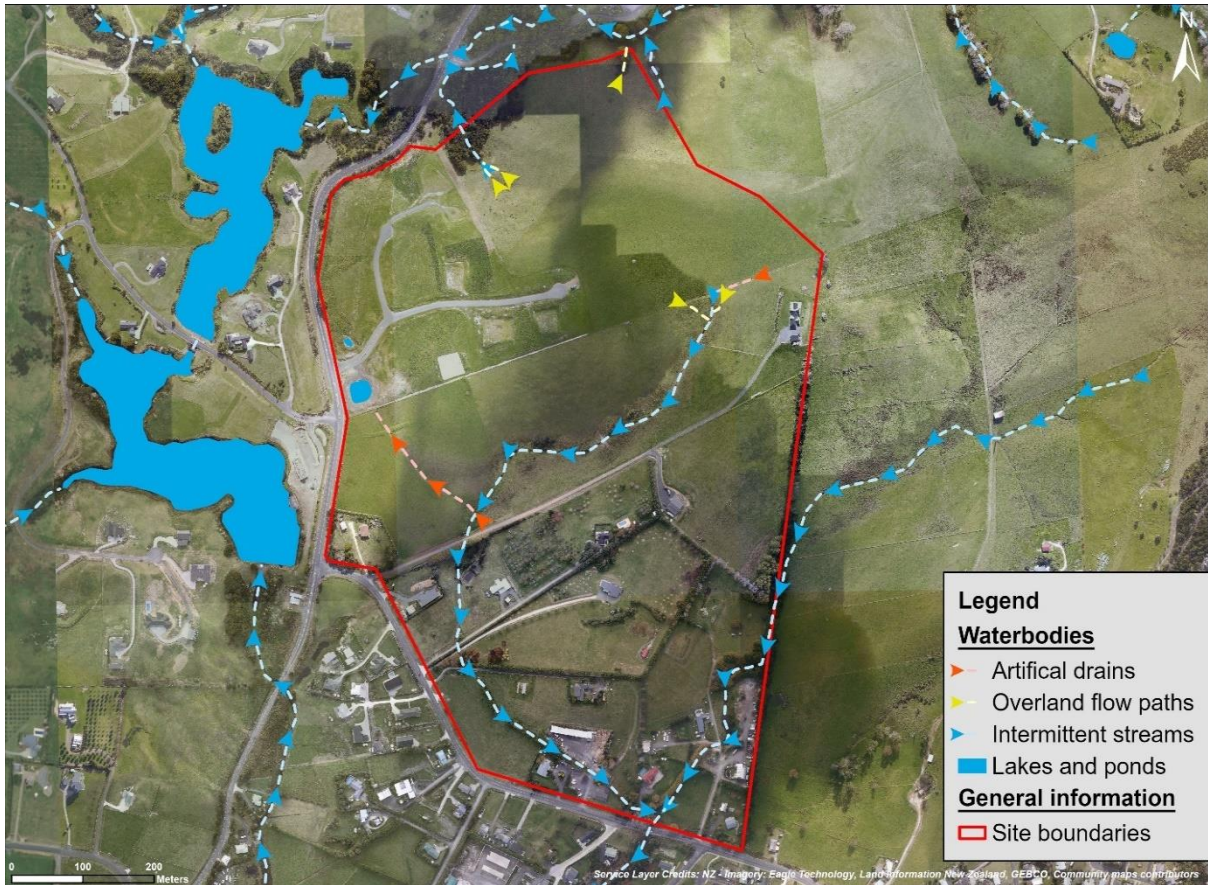


Figure 13: Showing the general hydrological patterns as observed on site during site field visits

The majority of the indigenous vegetation on site is contained within the sites northern and central aspects, with the northern bush area being subject to an existing conservation covenant. What appears to be a degraded wetland seep extends along the site’s central aspect and contains only a sliver of indigenous vegetation, with the wider indicative wetland area being open to grazing stock and managed for pasture production. Indigenous revegetation plantings (subject to an existing covenant) extend along the site’s western aspect, and numerous exotic shelterbelts and amenity plantings extend primarily along the sites built up southern aspect.



Figure 14: Showing the indigenous bush area on the northern aspect of the site which is subject to an existing conservation covenant



Figure 15: Showing the indicative degraded wetland area extending along the sites central aspect – only pockets of indigenous vegetation remain with the wider area being actively managed for pasture production

No vegetation on site is designated as a Protected Natural Area (PNA) or ONL (Outstanding Natural Landscape), albeit the site is located on the boundary between Rodney and Waipu Ecological Districts and within close proximity to the highly significant Brynderwyn Hill Forest Complex. The Brynderwyn Hill Forest Complex (Q08/225 a–j) is a mosaic of indigenous forest and radiata pine plantations spread over approximately 8,300 ha, of which approximately 5,600 ha is in Waipu ED and 2,700 ha is in Rodney ED. Collectively all the parts of the Brynderwyn Hill Forest Complex form the largest indigenous forest area in Waipu and Rodney (Northland) ED, with 60 different ecological units recorded, of which 38 are considered representative of their types. It also contains ten threatened fauna species (grey duck, North Island kaka, North Island long-tailed bat, bush falcon, elegant gecko, the land snail *Amborhytida dunniae*, long-tailed cuckoo, longfin eel, kukupa, and Hochstetter's frog) and three threatened plant species (mida, kawaka, and *Anyzbas rotundifolius*) (Lux *et al.* 2007).

Other nearby PNAs include the following:

- ROD013 'Mangawhai North Head Remnants' is located approximately 650m east of the site. ROD013 contains one of two examples of coastal shrubland in Rodney ED (Northland). The gumland area identified within this site is a relatively good example and is also one of only two gumland areas identified in Rodney ED (Northland). Gumland is a threatened and uncommon wetland type throughout Northland. The site supports at least three 'At Risk' plant species and two 'At Risk' fauna species. Within the ED, this site is the closest natural area to offshore islands such as Hen and Chickens, and is thus likely to act as a coastal–inland steppingstone for mobile fauna.
- R08/001 'Bream Tail Coastal Headland' is located approximately 900m north-east of the site and the site comprises a unique set of habitats in the Waipu Ecological District. This is because it is the only steep rocky coastal headland with extensive cliffs and steep coastland forest.
- ROD014 'Mangawhai Harbour, Sandspit and Surrounds' is located 1km south of the site. It contains key habitats for indigenous birds, supporting a disproportionately high number of 'Threatened' and 'At Risk' bird species relative to other habitats in the ED.

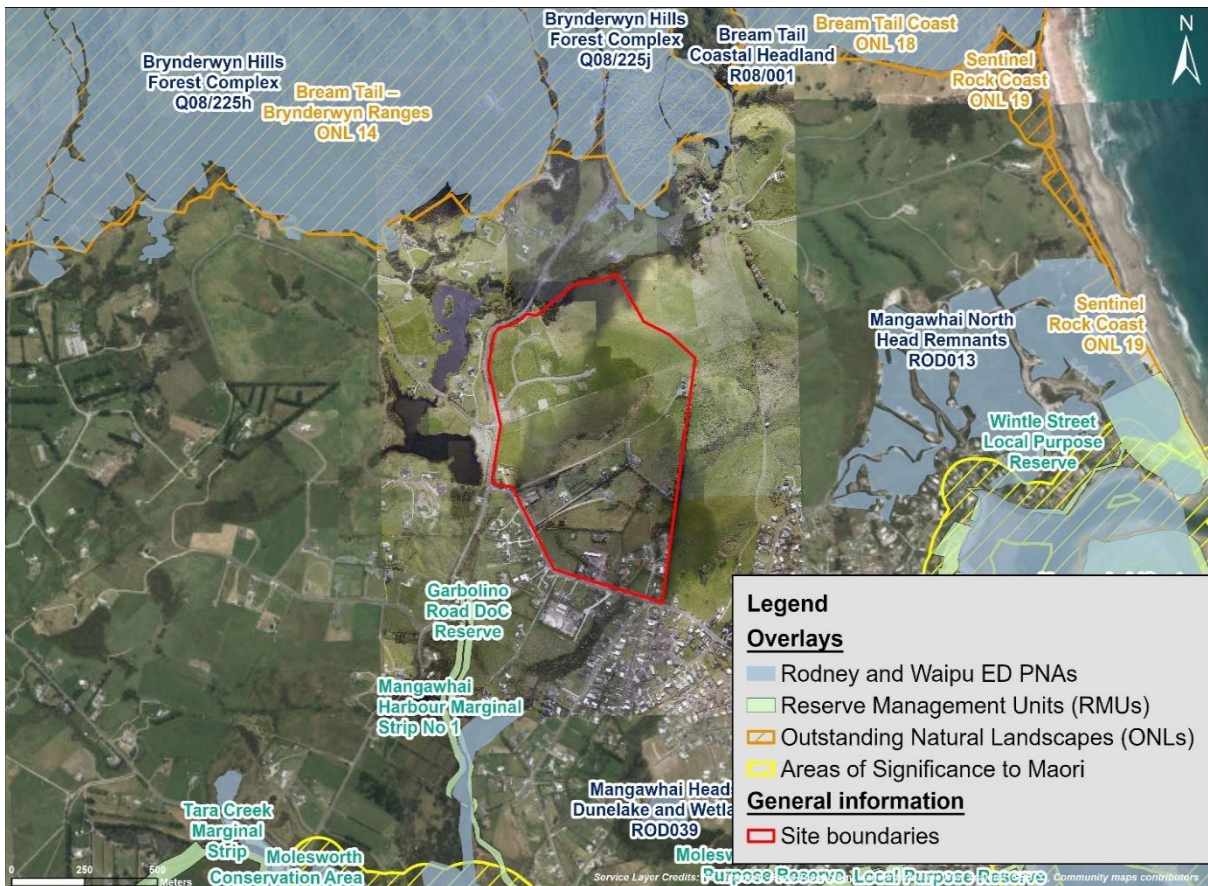


Figure 16: Map showing the site, KDP overlays, and PNAs areas as identified in Lux, Martin and Beadel (2007) and Goldwater et al. (2012)

Under Land Environments of New Zealand (LENZ) the majority of the site and immediate surrounds is contained within the 'Category 3 Threatened Land Environment', where there is 20%-30% indigenous cover left, with a smaller portion of land on the western and southern boundary being identified as 'Category 1 Threatened Land Environment' with <10% of indigenous vegetation remaining (Figure 17). Indigenous biodiversity in these 'At Risk' environments are more at risk of loss and decline if little of the environment has formal protection for natural heritage purposes.

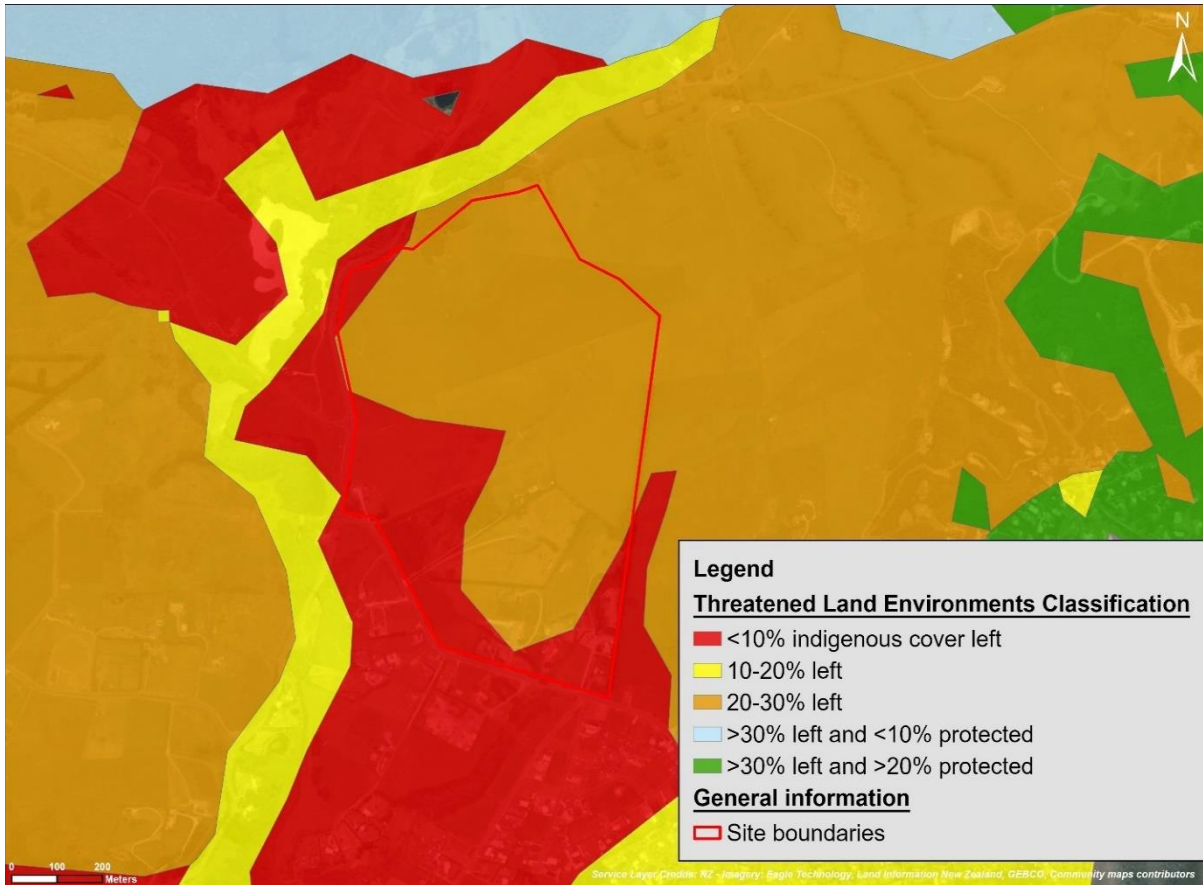


Figure 17: Showing the site and Threatened Environment Classification for New Zealand (2012)

From the analysis conducted above, it is apparent that the site and surrounds as described above have been largely modified by anthropogenic land use practices, with large tracts of indigenous vegetation cleared for agricultural production purposes. The waterways generally follow their semi-natural drainage pattern (when compared to aerial imagery from 1940s), however much of their riparian vegetation has been cleared and their stream courses altered through the establishment of farm tracks and culvert crossings. It is recognised that the remnant vegetation on site has been reduced in both ecological structure and functionality and should be appropriately enhanced and protected as a part of the overall site’s development.

4.0 ECOLOGICAL SURVEY RESULTS

4.1. Terrestrial

4.1.1. Vegetation communities

Field surveys were undertaken during May 2022. Given that the proposed PPC site boundaries extend over numerous private properties, only the property (title No 876914) where access was permitted along the northern aspect of the site was physically surveyed in the field. The remainder of the wider PPC sites vegetation cover has been assessed from a distance and via aerial imagery review. The study of historic imagery and current aerial imagery, and where possible, ground truthing was utilised to delineate the ecosystem

types and vegetation. Please note that the potential wetland areas extent as shown in this report is indicative only and given that the majority of the properties contained within the central and northern aspects of the proposed PPC area are subject to continuous agricultural improvement the 'true' wetland extent may vary depending on the ongoing intensity and improvements of land use for farming activity.

The assessment was undertaken in general accordance with the “Indigenous Terrestrial and Wetland Ecosystems of Auckland” (Singers et al. 2017) in which vegetation and habitat types were identified, mapped, and described in accordance with Atkinson (1985). An indicative list of Ecosystem Types identified on site can be seen under Figure 18 as depicted in below. Please note that this mapping is a result of preliminary assessment only, and any potential site development on each of the titles contained within the PPC boundaries following successful rezoning should be subject to a site-specific Ecological Assessment which will classify and delineate these habitats with a much higher degree of certainty.

A general description of species present within these areas is outlined in the following sections. A full flora inventory of species observed within the site’s boundaries is summarised under Appendix 3.



Figure 18: Showing general habitat types noted within the PPC site boundaries

4.1.1.1. *Regenerating WF11 forest (northern aspect)*

The vegetation partly extending along the site’s northern boundary and extending northwards is generally best described as by regenerating kauri podocarp broadleaf

forest (WF11) (Singers *et al.* 2017). The northern bush area adjacent to the site is typical of the Brynderwyn Hills Forest Complex and is protected through an existing conservation covenant instrument. The canopy on the drier ridges is generally dominated by totara (*Podocarpus totara*) with tanekaha (*Phyllocladus trichomanoides*), rimu (*Dacrydium cupressinum*), kahikatea (*Dacrycarpus dacrydioides*), and the odd specimen of kauri (*Agathis australis*) and rewarewa (*Knightia excelsa*).



Figure 19: Showing the regenerating WF11 (foreground) forming a pocket along the sites northern aspect with Brynderwyn Hills Forest Complex in the background

An understory and shrub layer was developing, dominated by species such as ponga (*Cyathea dealbata*), twiggy coprosma (*Coprosma rhamnoides*), hangehange (*Geniostoma ligustrifolium*), mahoe (*Melicactus ramiflorus*), kanuka (*Kunzea robusta*), mapou (*Myrsine australis*), putaputaweta (*Carpodetus serratus*), ti kouka (*Cordyline australis*), soft mingimingi (*Leucopogon fasciculatus*) and lancewood (*Pseudopanax crassifolius*) (Figure 20). Species such as supplejack (*Ripogonum scandens*) and bush lawyer (*Rubus cissoides*) were observed climbing along the canopy trees. *Muehlenbeckia complexa var. grandifolia* was observed along the open bush edges.

Exotic pest plants were at relatively low densities, but some individual scattered clumps could be found within the bush area and edges including willow (*Salix* sp.), tree privet (*Ligustrum lucidum*), wild ginger (*Hedychium gardnerianum*), Arum lily (*Zantedeschia aethiopica*), scattered individual maritime pine (*Pinus pinaster*) and resprouting flame trees (*Erythrina x sykesii*) were observed sparsely throughout the bush area (Figure 20).

This small bush remnant is considered to be of moderate ecological value based on the vegetation structure alone, primarily due its small size and its relative isolation from the wider Brynderwyn Hills Forest Complex.



Figure 20: Showing regenerating species within the understory of northern bush remnant



Figure 21: Showing resprouting flame trees and Arum lily in the northern bush area

4.1.1.2. *Native revegetation plantings*

The western aspect of the site forms an existing rural-residential subdivision where indigenous revegetation plantings have been established. It is understood that these plantings are subject to covenant protection. The planted species included but were not limited to kanuka (*Kunzea robusta*), manuka (*Leptospermum scoparium*), harakeke (*Phormium tenax*), ti kouka (*Cordyline australis*) and akeake (*Dodonaea viscosa*), likely approximately 5 years old (Figure 22). These generally provide for landscape amenity and visual screening in the area but are noted as providing some lower level ecological benefit through the provision of vegetated corridor linkages through the site.



Figure 22: Showing general composition of revegetation plantings extending along the sites western aspect

4.1.1.3. *Manuka, Kanuka scrub (VS3)*

A thin band of scattered regenerating manuka, kanuka scrub extends along the central aspect of the site generally encompassing the riparian margins of an intermittent stream. The vegetation composition is generally dominated by older growth kanuka interspersed with manuka, some of which appeared to be of planted origin. From a vantage point survey, it appeared that understory was largely limited to regenerating manuka, kanuka, gorse and some flax (likely of planted origin). Ground tier appeared to be dominated by a mixture of kikuyu, Vasey grass (*Paspalum urvillei*) and carpet grass (*Axonopus fissifolius*) interspersed with hydrophytic species such as soft rush (*Juncus effusus*) and Mercer grass (*Paspalum distichum*).

It is thought that historically (pre 1940s) this area is likely to have been more representative of a manuka/tangle fernland (WL12) type of ecosystem, albeit based on a vantage point survey no visible relict species such as species of *Machaerina* and

Lepidosperma, tangle fern, sphagnum and *Carex* sp. were observed within this area. This is likely due to the intensive agricultural regime the area is under associated with continuous dredging and drainage of the area and general use of the area for pastoral production purposes.



Figure 23: Showing the small band/pockets of manuka-kanuka dominated vegetation extending along the intermittent stream flowing through the central aspect of the site

4.1.1.4. *Potential wetland areas*

4.1.1.4.1 *NPS-FM 'natural wetland' definition and exclusions*

The RMA (1991) definition of a 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 conditions*”.

The National Policy Statement for Freshwater Management (NPS-FM), which sets out the policy framework for the National Environmental Standards for Freshwater (NES-FW), uses the RMA definition to describe a “natural wetland”, subject to the following exclusions:

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

(b) a geothermal wetland; or

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

A 'natural inland wetland' is further defined as a 'natural wetland' that is not in the coastal marine area.

For the purposes of this assessment, the definition of a 'natural inland wetland' as defined under NPSFM (2020) was used to classify potential wetland areas within the proposed PPC site boundaries.

Improved pasture is defined in the NPS-FM as an area of land where exotic pasture species have been deliberately sown or maintained for the purpose of pasture production, and species composition and growth has been modified and is being managed for livestock grazing. There is currently no overarching national species list that would classify specific species of grasses and herbs as 'pasture species' or as meeting the definition of 'improved pasture.' For the purpose of this assessment, species were assumed to be an improved pasture species if they have been described as pasture or forage species under the most recent publication by the New Zealand Grassland Association (Stewart *et al.* 2014).

4.1.1.4.2 NPS-FM 'natural wetland' assessment

A basic wetland delineation assessment (as per MfE 2020) was carried out on Title 876914 during a site visit on May 9th, 2022 to delineate indicative wetland areas that could meet the definition of 'natural inland wetland' as defined under NPSFM (2020). Please see full survey results under Appendix 4. Please note that due to the fluctuating nature of 'indicative wetland' areas noted on site these results are valid at the time of writing only and will require a further assessment during a resource or land use consent application process.

A number of small, isolated exotic species dominated areas containing a proportion of hydrophytic species are scattered throughout the site primarily encompassing ephemeral and intermittent stream margins (identified as W1, W2 and W3 under Figure 24). Please note that due to the 'non-normal' circumstances during which the wetland delineation took place, i.e. the site being actively grazed and managed for pastoral production the 'true' wetland extent is inconclusive given that the hydrophytic species presence or absence is largely influenced by the current land use regime (grazing, mowing, resowing). Therefore, these results should be treated with caution as it only provides a snapshot of the site as of 9th May 2022, and further assessments in relation to the wetland extent and location within the PPC site boundaries will be required as part of a resource or land use consent application for the individual sites contained within the proposed PPC areas in the future.

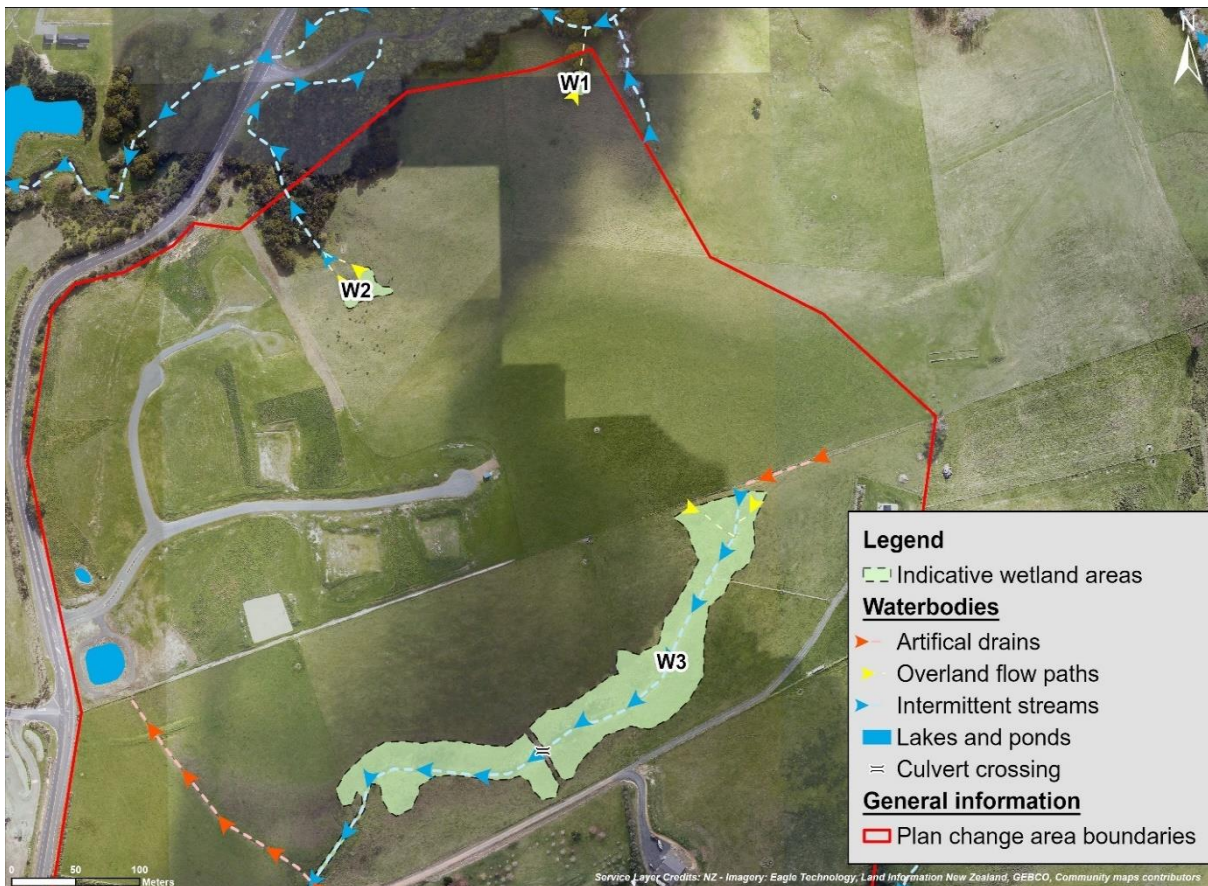


Figure 24: Showing the indicative wetland areas on site (please note this may not be reflective of all wetland areas within the proposed Plan Change area boundaries)

Two potential ‘wetland’ areas that were observed as containing some hydrophytic vegetation during a site walkover on May 9th 2022, were identified within the northern aspect of the site, being W1 which is approximately 235 m² in size, and W2 which is approximately 613 m² in size. Both areas are located within gentle depressions in the land and are generally encompassed by improved actively grazed pasture. They contained a high proportion of both exotic pasture species and exotic hydrophytic species. These areas are considered to be of low existing ecological value, and were not observed to support any ‘Threatened’ or ‘Regionally significant’ species.

3 vegetation plots were established within W1 (Figure 25), which revealed a relatively uniform vegetation structure dominated by exotic grassland/rushland species including the ‘facultative wetland’ soft rush (*Juncus effusus*) along with common exotic pastoral species such as ‘facultative wetland’ creeping bent (*Agrostis stolonifera*), mercer grass (*Paspalum distichum*), and ‘facultative’ Yorkshire fog (*Holcus lanatus*), Lotus (*Lotus pedunculatus*), and buttercup (*Ranunculus repens*). A high proportion of ‘upland’ species were also noted growing within W1 being kikuyu (*Cenchrus clandestinus*), dallas grass (*Paspalum dilatatum*), Vasey crass (*Paspalum urvillei*), cocksfoot (*Dactylis glomerata*) and clover (*Trifolium repens*), which is reflective of the exotic pasture area the wetland area is encompassed by. Based on the shape and location of the potential ‘wetland’, it is possible that this area has once been a historic stock pond which has been disused and has become overgrown with hydrophytic species. W1 passed both the hydrophytic vegetation, hydric soils and hydrology tests, and therefore at the time of the assessment was treated as a ‘natural inland wetland,’ albeit a degree of uncertainty remains given that the site is

actively grazed and the vegetation structure and overall dominance within this small 'wetland area is likely to fluctuate throughout the year.



Figure 25: Showing W1 extending over a natural depression in land historically planted with willows – wetland extent is inconclusive given that the entire farm is grazed and actively improved

The key vegetation type across W2 (Figure 26) was relatively uniform, dominated by exotic grassland/rushland species including 'upland' kikuyu (*Cenchrus clandestinus*), sparsely dispersed with 'facultative wetland' soft rush (*Juncus effusus*), 'facultative' creeping buttercup (*Ranunculus repens*) and Lotus (*Lotus pedunculatus*). 5 vegetation plots were carried out in this area, revealing the dominance of kikuyu (>50%) which is an improved pasture species and therefore this area is considered to meet the NPSFM 'natural inland wetland' exclusion criteria (c) any area of improved pasture that, at the commencement date, is dominated (that is more than 50% of) exotic pasture species and is subject to temporary rain derived water pooling.



Figure 26: Showing a section of W2 located on the northern aspect of the site – wetland delineation results in May 2022 found improved pasture species dominance and therefore this area is excluded from NPSFM ‘natural inland wetland’ definition

In regard to W3 (Figure 27) which extends along the central aspect of the site, vantage point surveys suggested that generally the immediate margins of the intermittent stream are dominated by a mixture of manuka, kanuka, flax and gorse with the wider margins grading into pasture areas dominated by soft rush and mercer grass (both ‘facultative wetland’ species). The total approximate area of the W3 is approximately 1.66 ha (based on basic mapping based on aerial photography/vantage point survey observations carried out in May 2022). Please note that W3 extent as mapped under Figure 24 is highly indicative, and the true extent of this area has not been established through a field-based wetland delineation, therefore this area should be further assessed during a full ecological and wetland assessment to be submitted as a part of resource or land use consent.



Figure 27: Showing indicative wetland area W3 – note the distinctive dominance of hydrophytic vegetation extending into the pasture areas – the ‘true’ wetland extent will largely be influenced by the surrounding land use activities (grazing, resowing, pasture production)

Due to the non-normal circumstances (i.e. site being actively grazed) a number of test soil pits were established within W1, W2 and the wider pasture area. All test soil pits (irrespective of the location) passed both the hydric soil and wetland hydrology tests. In the context of the site, it is deemed that these indicators are not useful in deciding as to whether or not any of these areas should be considered a ‘natural inland wetland.’ This is due to large parts of Northland (including the land contained within the proposed PPC boundaries) being dominated by clay soils displaying typical hydric soil characteristics. It is proposed that all indicative wetland areas are monitored in the future in the absence of grazing animals on site to observe the typical conditions of these areas in the absence of external land use pressures, to provide a robust wetland assessment.

Therefore, it is difficult to establish the ‘true’ extent of the wetland areas across the entire proposed PPC site boundaries given that they are currently contained within actively improved pasture (i.e. not ‘normal circumstances’) – the areas overlay clay soils with typical hydric soil characteristics, which has influenced the hydrophytic species presence within the area. It should also be noted that the overall wetland assessment on site is indicative only and given that the northern and central aspects of the proposed PPC boundaries are currently actively farmed and likely to continue being farmed until such a time the site may be developed, these results should be treated with extreme caution. The ‘indicative wetland areas’ as shown within Figure 24 are highly indicative, and long-term monitoring and survey effort would be required to classify these areas as a ‘natural inland wetlands’ with confidence. It is proposed that a comprehensive wetland assessment is carried out at the time of a resource or land use consent application for

each of the sites contained within the PPC boundaries to ensure that all wetland areas are appropriately recognised and assessed as part of any site development.

It is deemed that overall, intensified site development is generally possible without significance adverse effects on the potential wetland areas through comprehensive planning and design principles.

4.1.1.5. *Exotic pasture and exotic treeland*

Much of the site is dominated by improved pasture (Figure 28) with a typical composition of kikuyu (*Cenchrus clandestinus*), dispersed with *Agrostis* sp., sweet grass (*Anthoxanthum odoratum*), carpet grass Vasey grass (*Paspalum urvillei*), scotch thistle (*Cirsium vulgare*), ragwort (*Jacobaea vulgaris*), dock (*Rumex* sp.), *Lotus* spp., *Sonchus* spp., hawksbeard (*Crepis capillaris*) and Brazilian fireweed (*Erechtites valerianifolia*). While the northern aspects of the site are maintained under agricultural regime of grazing and pasture production, the southern, more built-up areas are likely managed through intensive mowing.



Figure 28: Majority of the site is in exotic pasture

Exotic treeland is present along the southern aspects of the site within the more intensively built-up areas, primarily extending along private lot boundaries (Figure 29). The species composition is variable but primarily consist of willow (*Salix* sp.), poplar (*Populus* sp.), Magnolia (*Magnolia grandiflora*), bamboo (*Pseudosasa japonica*), Phoenix palm (*Phoenix canariensis*), Casuarina (*Casuarina glauca*), and Monterey pine (*Pinus radiata*) among some other younger specimen plantings and hedgerows. Overall they

contain low ecological values with some of the exotic species noted within this area being considered pest plants within Northland Region.



Figure 29: Exotic treeland present on the site's southern aspect adjacent to Mangawhai Heads Road

4.2. Aquatic

4.2.1. Freshwater habitats

The site generally forms an upper catchment area of Tara Creek and Mangawhai Harbour with two main intermittent stream features flowing through the sites central (identified as Catchment B in Figure 30) and eastern (identified as Catchment C in Figure 30) aspects southwards. The intermittent streams converge at the sites southern boundary and continue their flow in a southerly direction through built-up residential areas. The stream system discharges into the Tara Creek which eventually flows into Mangawhai Harbour. Some smaller drainage patterns drain the site along its northern aspect (identified as Catchment A in Figure 30) in a northerly direction towards an intermittent stream, which discharges into the Sanctuary Lakes to the west of the site.

Given that only the sites northern aspect was able to be physically surveyed in the field, please note that the description of the waterbodies provided in the sections is indicative only, and other drainage patterns may potentially be present (especially along the site's more built-up southern aspect). Any additional drainage patterns are likely to be artificial in origin.

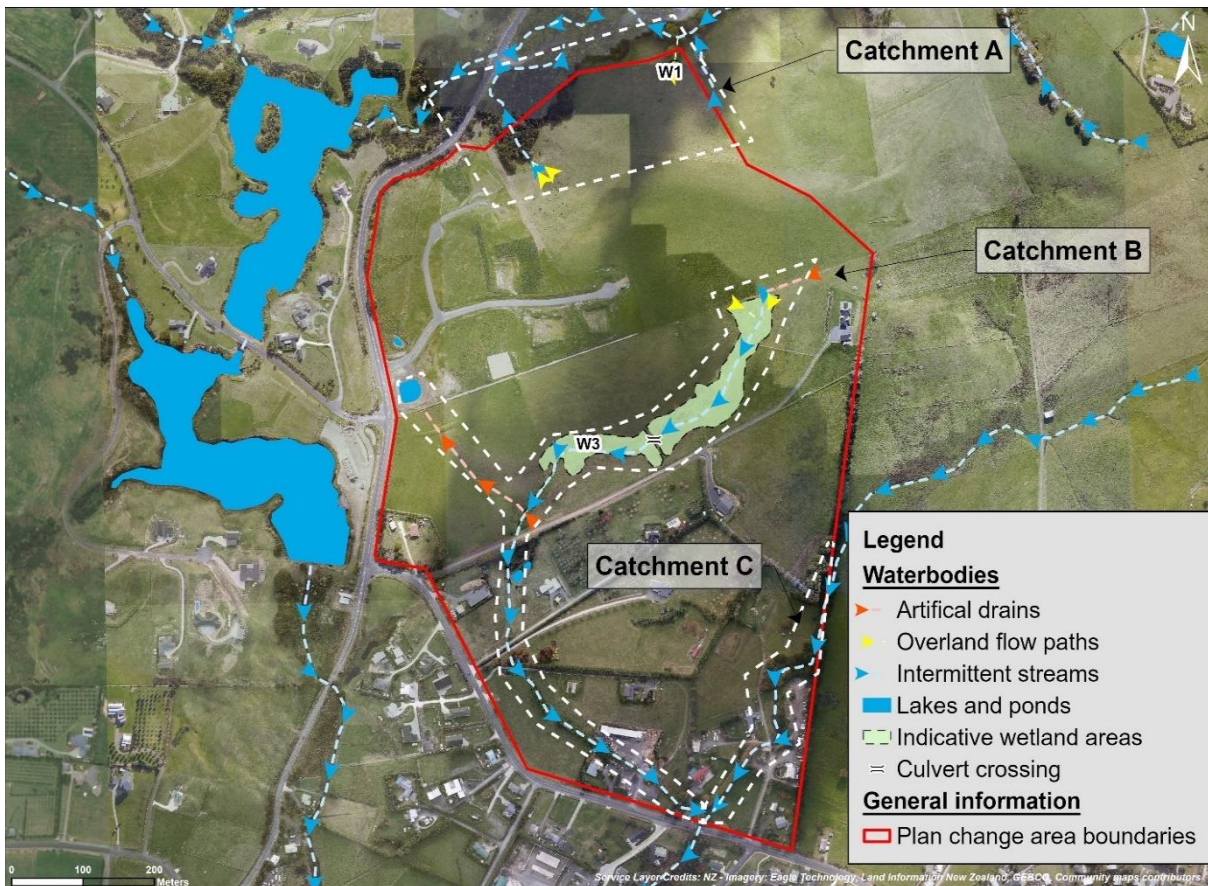


Figure 30: Showing the general hydrological patterns of the plan change area boundaries separated into Catchment A, B and C

4.2.1.1. Catchment A

Catchment A drains the sites northern boundary and comprises of small overland flow paths (Figure 31) generally sloping towards the northern aspect of the site seeping into an intermittent stream (Figure 32), which flows under Cove Road and discharges into Sanctuary Lakes to the west of the site. The flow paths on the eastern aspect of catchment A merge approximately at the bush covenant fence line where they become more representative of an intermittent stream with defined banks and visible pooling water.

The flow paths in catchment A are generally ill-defined in nature, contained within wider pasture, unfenced, and are likely to only be conductive of overland flows during periods of heavy rainfall. Generally, all overland flow channels are overgrown with common exotic pastoral grasses with some scattered *Juncus* sp. dotted throughout.



Figure 31: Confluence of overland flow paths on site merging into an intermittent stream upon entering the northern bush area



Figure 32: Intermittent stream flowing to the north of the site

4.2.1.2. *Catchment B*

Catchment B is deemed to be the main watershed within the proposed PPC boundaries draining the site through its central aspect in a roughly southerly direction. Please note that this catchment has been observed and classified from a vantage point only, therefore the results should be treated with caution.

The main watershed contained within Catchment B is deemed to be intermittent in nature while flowing through the central aspect of the site and is likely <1m wide, with an unknown depth, albeit visual observations suggest that this stream is likely to be periodically dredged and straightened. Parts of the stream have been fenced with 1-2 wire fencing with natural regeneration (likely supplemented by planting) of manuka and kanuka evident along the immediate margins, albeit large swathes of the stream are contained within pasture. Some stream crossings are present within the pasture dominated areas along the central aspect of the site.



Figure 33: Showing the upper catchment of intermittent stream contained within catchment B

Southernmost aspect of Catchment B, where it enters the more built-up areas along Mangawhai Heads Road, was not surveyed as the stream flows through numerous private properties, however general site knowledge suggests that the management regime of the stream in this area is likely more representative of an artificial drainage channel – with the stream being at parts piped, culverted and diverted into artificial pond areas, and is likely subject to continuous dredging, straightening and modification as part of land development in this area. It is also understood that the stream while flowing through this southern aspect is subject to various existing drainage easements in favour of KDC.

An artificial drainage channel (Figure 34) extends north-eastwards from the intermittent stream and generally diverts some flows towards an existing stormwater pond. The artificial drain was observed to be managed on a regular basis through dredging and spraying the channel of weedy species.



Figure 34: Showing the artificial drainage channel diverting some flows from the intermittent stream towards an existing stormwater pond

4.2.1.3. *Catchment C*

Catchment C was not surveyed during this assessment as it traverses numerous private properties along the proposed PPC site eastern/southern aspect. From analysing available aerial imagery, Catchment C contains an intermittently flowing stream which flows into the site along its eastern boundary. The stream, as observed from Mangawhai Heads Road appeared to follow distinctively straightened pattern and as with catchment B, is likely to be subject to existing drainage easements and/or existing land covenant provisions. The stream is likely periodically maintained to alleviate flooding pressures (in particular where it flows below Mangawhai Heads Road) and lacks indigenous vegetation cover.



Figure 35: Intermittent stream contained within Catchment C as viewed from Mangawhai Heads Road

4.2.2. Aquatic diversity

An instream fish survey was outside the scope of the assessment, as no streams containing sufficient water levels for a fish survey were able to be accessed during the site field visits in May 2022.

A quantitative search of the New Zealand Freshwater Fish Database (NZFFD, accessed May 2022, revealed records of six fish and three native invertebrate species (Table 3) as being present within the wider Mangawhai Harbour catchment.

Table 3: Freshwater fish and invertebrate species recorded within the wider Mangawhai Harbour catchment

Scientific name	Common name	Conservation status
<i>Anguilla australis</i>	Shortfin eel	Endemic and Not Threatened
<i>Anguilla dieffenbachii</i> *	Longfin eel	Native & Declining (At risk)
<i>Galaxias fasciatus</i> *	Banded kokopu	Endemic and Not Threatened
<i>Galaxias maculatus</i>	Inanga	Native & Declining (At risk)
<i>Gobiomorphus cotidianus</i>	Common bully	Native and Not Threatened
<i>Gobiomorphus huttoni</i>	Redfin bully	Native and Not Threatened
<i>Echyridella menziesii</i>	Freshwater mussel	Native & Declining (At risk)
<i>Paranephrops</i> spp.	Koura	Native & Declining (At risk)
<i>Paratya curvirostris</i>	Freshwater shrimp	Native and Not Threatened

* Regionally significant species in Rodney ED

The records show that 3 Native & Declining (At risk) aquatic fauna species have been previously recorded within the wider Mangawhai Harbour catchment, including long-fin eel (*Anguilla australis*) and northern koura (*Paranephrops planifrons*) as well as the 'Regionally Significant' banded kokopu (*Galaxias fasciatus*), and some of these species may also periodically be present within the onsite waterbodies.

The overall quality of the aquatic habitats within the proposed PPC boundaries is considered as low/moderate and is further limited by

- a. Within the **northern aspect** of the site – lack of riparian vegetation cover and associated wider agricultural use of the site with associated effects from grazing, fertiliser and pesticide inputs to the land and subsequently into the freshwater habitats.
- b. Within the **southern built-up aspect** of the site – lack of riparian cover, significant modifications to the stream channel (culverting, piping, diversion), inputs of common fertilisers and pesticides commonly used for lawn maintenance.

While no ichthyofauna survey was undertaken as part of this assessment, it is possible that some fish fauna are present within the streams contained within the proposed PPC boundaries (likely more disturbance tolerant climbing species such as banded kokopu and shortfin eel). Both banded kokopu and shortfin eel are diadromous and must move between the freshwater and marine environments to complete their life cycle, catchment access to downstream and upstream habitats is important for these species so that localised populations can be maintained. It is important that fish passage and connectivity to aquatic habitats within this upper catchment area of the Tara Creek/Mangawhai Harbour is maintained as these fish species may move between these habitats throughout the year.

As a part of the site development works following successful rezoning, both the hydrological and ecological function of these stream habitats needs to be recognised, and these features should be protected and enhanced. This may involve establishment of vegetated riparian yards that will act as multipurpose corridor features in the landscape. Comprehensive sediment reduction plans should be prepared for any proposed development within the proposed PPC boundaries to ensure appropriate sediment controls are in place and adverse effects on stream systems on site can be avoided. Should there be any requirements for the upgrade or establishment of new stream crossings to access the proposed new development, their design should take into consideration of 'functional need' (as defined under NPSFM 2020) and be compliant with Kaipara District Council and Northland Regional Council Environmental Engineering Standards and the New Zealand Fish Passage Guidelines (Franklin *et al.* 2018).

4.3. Avifauna

Avifauna species were observed on the site via three formal bird counts, a passive acoustic recorder and opportunistic observations during site visits on May 6th and 9th 2022, with a comprehensive bird species list outlined in Table 4. The full survey results can be found under Appendix 5, with bird survey locations shown under Appendix 6.

The birds observed on site are representative of the modified and fragmented nature of indigenous habitats contained within the interface of rural and residential land, with some common introduced and native bird species such as house sparrow (*Passer domesticus*) and welcome swallow (*Carduelis carduelis*) observed in abundance throughout the pastoral areas. Several New Zealand fantails (*Rhipidura fuliginosa*) were observed within the northern bush remnant. Sacred kingfishers (*Todiramphus sanctus*) were observed perched on fenceposts within pasture areas. Pukeko (*Porphyrio melanotus*), paradise shelduck (*Tadorna variegata*) and mallard (*Anas platyrhynchos*) were observed foraging within pasture areas. Flocks of eastern rosella (*Platycercus eximius*) and a single swamp harrier (*Circus approximans*) were observed flying overhead. Overall, the diversity of birds observed was low, with 8 native/endemic and 5 introduced species.

Table 4: Bird species recorded on the site during site visits in May 2022

Scientific name	Common name	Conservation status
<i>Acridotheres tristis</i>	Myna	Introduced & Naturalised
<i>Anas platyrhynchos</i>	Mallard	Introduced & Naturalised
<i>Carduelis carduelis</i>	European goldfinch	Introduced & Naturalised
<i>Circus approximans</i>	Swamp harrier	Native & Not Threatened
<i>Gerygone igata</i>	Grey warbler	Endemic & Not Threatened
<i>Hirundo neoxena</i>	Welcome swallow	Native & Not Threatened
<i>Passer domesticus</i>	House sparrow	Introduced & Naturalised
<i>Platycercus eximius</i>	Eastern rosella	Introduced & Naturalised
<i>Porphyrio melanotus</i>	Pukeko	Native & Not threatened
<i>Rhipidura fuliginosa</i>	New Zealand fantail	Endemic & Not Threatened
<i>Tadorna variegata</i>	Paradise shelduck	Endemic & Not Threatened
<i>Todiramphus sanctus</i>	Sacred kingfisher	Native & Not Threatened
<i>Vanellus miles</i>	Spur-winged plover	Native & Not Threatened
<i>Zosterops lateralis</i>	Silvereye	Native & Not Threatened



Figure 36: New Zealand fantail were the most abundant endemic species recorded on site

Other notable avifauna previously recorded within 1 km of the site based on data within the Rodney ED PNAP Report include the 'Nationally Critical' Australasian bittern (*Botaurus poiciloptilus*) and the 'At Risk- Declining' North Island fernbird (*Bowdleria punctata vealeae*) as being present within Mangawhai Harbour, Sandspit and Surrounds (ROD014) (Goldwater *et al.* 2012). While we note that the site is located within 1km from ROD014, the presence of bittern and fernbird within the boundaries of the site is unlikely given the lack of suitable habitat.

4.4. Herpetofauna

A diurnal habitat search inspecting areas likely to be utilized by native lizards for sheltering or foraging (e.g., beneath dense vegetation, logs, boulders, and manmade objects) was conducted during site visits in May 2022. The habitat quality for lizards throughout the site is generally poor due to historical vegetation removal and high modification of the area. Nonetheless, habitat suitable for the native copper skink (*Oligosoma aeneum*) (At Risk - Declining) is present at some isolated locations across the site, in particular the bush area on the northern aspect of the site and potentially along the manuka-kanuka treeland along the central aspect of the site. It is also likely that rainbow skinks (*Lampropholis delicata*) are present on the site and surrounds. Rainbow skinks arrived in New Zealand in the late 1960s, but only became classified as an 'Unwanted Organism' in recent years and removed from the Wildlife Act in 2010 (DoC 2015). Table 5 below outlines the species likely to occur on-site and their corresponding conservation status.

Although no native lizard species were recorded during the site walkover, the nearby Brynderwyn Hills Complex is known (Figure 37) to provide suitable habitat for copper skink (*Oligosoma aeneum*), forest gecko (*Mokopirirakau granulatus*), Elegant gecko (*Naultinus elegans elegans*) and Hochstetter's frog (*Leiopelma hochstetteri*).

Table 5: Herpetofauna likely to be present with the surrounding area, inbuilding latest Threat Status (Hitchmough et al. 2021)

Common name	Latin name	Threat status	Suitable habitat on site or adjacent
Rainbow/plague skink (non-native 'Unwanted' organism)	<i>Lampropholis delicata</i>	Unwanted organism	Likely present on site and surrounds
Hochstetter's frog	<i>Leiopelma hochstetteri</i>	At Risk - Declining	Recorded 1km north of the site within Brynderwyn Hills Forest Complex
Green and golden bell frog	<i>Ranoidea aurea</i>	Exotic species	Likely present on site and surrounds
Forest gecko	<i>Mokopirirakau granulatus</i>	At Risk - Declining	Recorded 3km north of the site within Brynderwyn Hills Forest Complex
Elegant gecko	<i>Naultinus elegans</i>	At Risk - Declining	Recorded 2km north of the site within Brynderwyn Hills Forest Complex
Copper skink	<i>Oligosoma aeneum</i>	At Risk - Declining	Likely present on site and surrounds
Ornate skink	<i>Oligosoma ornatum</i>	At Risk - Declining	No suitable habitat on site and surrounds
Shore skink	<i>Oligosoma smithi</i>	At Risk - Declining	Recorded 3km north of the site within Brynderwyn Hills Forest Complex



Figure 37: Showing DoC database records for herpetofauna within a 5 km radius from the site

The current ecological value for native herpetofauna is therefore considered to be low. This is associated with a long history of disturbance, land clearance, predation by common pest animals and habitat fragmentation.

4.5. Chiroptera (Bats)

New Zealand has two extant native bat species, the long-tailed bat (*Chalinolobus tuberculatus*) and the lesser short-tailed bat (*Mystacina tuberculata*), both of which are endemic microbat species. Long-tailed bat is listed as “Nationally Critical” (Donnell *et al.* 2017). The site lies within vicinity (<10km) from confirmed recent records of long-tailed bats at Brynderwyn Hills Forest Complex.

During the site visits, some suitable habitat for bat commuting (forest edges and riparian habitats) was noted along the northern aspect of site (covenanted bush area), therefore a preliminary presence/absence survey using the SongMeter MiniBat was undertaken. No suitable roosting trees were noted within the initial site visits, however this may require further assessment should any tree removal be proposed as part of any future site development proposal.

The SongMeter MiniBat Acoustic Sound Recorder was set on the site overnight between the 6th and 10th of May 2022. The sound recorder was also set up to record bats with a sampling time of 8 hours, set to start 15 minutes before dusk, set on setting “Bat”. The overnight weather was cool (minimum 10°C).

No long-tailed bat activity was recorded during the survey period which indicates that it is unlikely the northern covenanted bush area is currently utilized as a commuting route within the wider landscape. It is considered that bat presence on site and immediate surrounds is limited by the abundance of common pest animals including possum, rats, and mustelids.

4.6. Summary of values

In assigning ecological value to identified terrestrial and aquatic features and species noted across the site, the ecological matters of Representativeness, Rarity/Distinctiveness, Diversity and Pattern, and Ecological Context have been considered, based on the EIANZ 2018 guidelines. Table 6 below outlines the ecological values assigned to the identified ecological features of aquatic and terrestrial vegetation, ichthyofauna (fish), chiroptera (bats), avifauna (birds), and herpetofauna (lizards).

The overall existing ecological values of the site are generally low-moderate and associated with long history of indigenous vegetation clearance on site along with modification to aquatic habitats. The site's general agricultural use (northern and central aspects) have resulted in adverse effects on natural habitats and species through continuous land management through application of fertiliser, resowing and insecticides/pesticides, while the southern aspect of the PPC site is largely of built nature, retaining minimal indigenous vegetation cover, with stream systems having been significantly modified to a level were their management regime is reflective of those of artificial drainage channels (straightened, culverted, diverted and subject to continuous dredging).

The highest ecological value on site is generally assigned to the northern bush remnant which is subject to a conservation covenant and was observed to be utilised by common avifauna species. The lowest ecological values are associated with the exotic pasture and built-up areas, which contain minimal indigenous flora and fauna values.

Table 6: Summary of terrestrial and aquatic ecological values across the proposed PPC area boundaries

Feature	Representativeness, Rarity/distinctiveness, Diversity and Pattern, Ecological Context:	Value
Terrestrial habitat/vegetation	<p>Moderate diversity of native vegetation present within the northern bush remnant including some remnant trees such as kauri, matai and tanekaha.</p> <p>Central aspect of site contains regenerating manuka/kanuka type ecosystem encompassed by degraded exotic species dominated wetland areas.</p> <p>Some revegetation plantings are present within the site boundaries primarily as amenity and screen plantings.</p>	<p>Moderate</p>

	High proportion of scattered exotic vegetation is contained within the southern built-up areas.	
Aquatic habitat/vegetation	<p>The site contains a network of modified watercourses including overland flow paths, intermittent streams and artificial drainage channels.</p> <p>Some areas encompassing the margins of these waterbodies are likely to meet the definition of a 'natural inland wetland' as defined under NPSFM (2020). These are dominated by a mixture of common exotic and to a lower extent indigenous species. According to the EIANZ criteria, their overall ecological values are deemed as low, however we recognise the intent of NPSFM policies to avoid adverse effects on any 'natural inland wetland' areas.</p>	Low/moderate
Avifauna	No 'Threatened' or 'At Risk' avifauna was recorded at the site, and only low numbers and diversity of native species was recorded. Site primarily used by common opportunistic and pastoral bird species.	Low
Herpetofauna	No indigenous herpetofauna was recorded on site. Some optimal habitat for herpetofauna is present on site contained to the northern bush area, however their presence is likely limited by habitat isolation within landscape and pest animal presence.	Low
Bats	<p>Potential foraging habitat present on site, but no suitable roosting habitat for short-tailed or long-tailed bats noted on site or immediate area.</p> <p>No bat presence recorded on site during site survey period in May 2022. Long tailed bats (Nationally Threatened – Critical) were not recorded within 10 km of the site.</p>	Low
Ichthyofauna	<p>A detailed survey of indigenous fish species presence was deemed outside the scope of this assessment.</p> <p>Some potential habitat is available for indigenous fish, likely limited to highly adaptable species such as banded kokopu and shortfin eel.</p>	Low/moderate
Overall		Low-Moderate

5.0 ASSESSMENT OF ECOLOGICAL EFFECTS AND OPPORTUNITIES

5.1. Potential Ecological Effects

As this application is for a plan change, to change the zoning from rural to residential, physical site development associated with the PPC is unlikely to happen in the immediately foreseeable future. Furthermore, at this stage it is not known exactly how any future subdivision/lot layout, and potential infrastructure provision would occur and hence the potential ecological effects cannot be accurately assessed at this stage. From an ecological perspective, comprehensive design considerations will be key to not only ensure that the site development following rezoning does not result in adverse effects, but also that it provides an opportunity to preserve and enhance existing indigenous vegetation and habitats noted within the site boundaries, and also expand on these features to provide for amenity, landscape and social benefits.

Any potential adverse ecological effects cannot be assessed with a high degree of certainty at this stage and any potential ecological effects associated with the wider site development, following the successful rezoning of the site, will need to be re-assessed and re-evaluated as part of site-specific subdivision or land use consent application.

At this stage, we can only assess potential adverse effects associated with the site re-development on terrestrial and aquatic biodiversity values which can be further divided into:

- Potential loss of indigenous vegetation;
- Potential loss of wetland habitat;
- Potential loss of habitat for indigenous fauna;
- Potential introduction of plant pathogens;
- Potential loss and/or a change in aquatic habitat availability and condition;
- Change in flow regime due to increased site imperviousness; and
- Potential loss and/or a change in aquatic habitat connection.

Any future development in the PPC area should consider the above potential effects and provide measures that outline necessary avoidance, remedy, mitigation, offset or compensation actions that are to be taken to ensure that the site development does not result in adverse ecological effects or a net loss of ecological value. Examples of possible avoidance can include comprehensive site design, while mitigation, offset or compensation actions can include indigenous planting, pest plant control, pest animal control, and formal protection of identified indigenous habitats across the site.

In regard to freshwater ecology - any future development of the site will have to align with the objectives and intent of the NPSFM and NESFW. Where any development effects on stream or wetland habitats may result in a change of flow regime, loss of aquatic habitat and connection, the developer will need to demonstrate that there is a functional need for these effects. Should this be proven, effects management hierarchy to avoid and

minimise, and if necessary, mitigate or offset actions will need to be implemented to the satisfaction of the Council.

Generally, most terrestrial and aquatic habitats within the site are considered to be of low-moderate ecological value, with the exception of the northern bush area extending along the sites' northern boundary (which is subject to an existing conservation covenant). The site is drained by modified natural watercourses with some of their margins forming scattered degraded wetland areas.

Initiatives to enhance the overall ecological value of the existing habitats on site is a key recommendation to ensure that the natural features are appropriately protected and enhanced as a part of the development proposal. This involves protecting and enhancing all terrestrial and aquatic habitats noted on site, and if practical, connecting these features to form a multipurpose ecological and landscape corridor feature extending throughout the site.

Given that the overall potential subdivision or development layout following the PPC is unknown, we can only briefly assess the potential ecological effects and potential mitigation measures as per below. Please note that this is a general assessment only and any site-specific assessment will require additional ecological assessments. A general overview of ecological values, magnitude of effect, potential remediation, mitigation or offsetting measures and overall level of effect for each of the proposed activities that have the potential to impact the terrestrial or freshwater environment in general accordance with EIANZ (Roper-Lindsay et al. 2018) is provided under Table 7. Freshwater and terrestrial ecological values were assessed as low-moderate based on field survey visits and analysis of previous data from the site and immediate areas. The before-mitigation level of effect for proposed activities were assessed as ranging between 'high and low', but with proposed mitigation measure in place, the overall level of effect can be reduced to between 'low and very-low' (Table 7).

5.2. Summary of Effects

Table 7: Magnitude and level of potential effects associated with the site development before and after potential mitigation

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
Earthworks and sedimentation, smothering bed	Terrestrial and aquatic	Moderate	High	Moderate	Earthworks associated with the active development of the site will have the potential to result in sediment runoff into the on-site waterways that eventually discharge in the Tara Creek/Mangawhai Harbour catchment.	<ul style="list-style-type: none"> To mitigate the risk of sediment entering the onsite streams during site development works, and contaminating the downstream catchment, erosion and sediment control plans should be prepared and implemented in accordance with Northland Regional Council's Erosion and Sediment Control Guidelines. 	Low
Vegetation clearance	Terrestrial and aquatic	Moderate	Moderate	Moderate	<p>It is possible that some of the vegetation (both indigenous and exotic) is to be removed to facilitate development on site.</p> <p>Given that areas outside the existing northern bush area (subject to an existing covenant) are considered to generally be of generally</p>	<ul style="list-style-type: none"> Sensitive development design, guiding development away from indigenous terrestrial and aquatic habitats. If vegetation clearance is proposed, a Vegetation Clearance Protocol should be prepared, which includes procedures for 	Low

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
					<p>low ecological quality, we do not consider that the development of the site would result in the loss of vegetation of high botanical or ecological significance. Should any indigenous vegetation clearance be proposed elsewhere on site this should be appropriately mitigated or off-set on site.</p> <p>If vegetation clearance is proposed this may require additional consents.</p> <p>Earthworks within and nearby (20 m) stream habitats may require a separate Resource Consent.</p>	<p>minimising the area and duration of soil exposure from vegetation clearance, minimising the volume of vegetation to be mulched, locating wood residue piles with an appropriate separation distance from any waterways, and minimising potential leachate from the machinery used.</p> <ul style="list-style-type: none"> • Implementation of appropriate sediment and earthworks controls during vegetation clearance to avoid potential sedimentation. • Vegetation clearance to take place using low impact machinery suited for site specific condition. • Vegetation removal to take place outside of the peak bird breeding season (October to February, inclusive), where practicable. • Implementation of pre-vegetation clearance ecological surveys to 	

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
						<p>ensure that development footprint is clear of species with lesser mobility.</p> <ul style="list-style-type: none"> Implementation of appropriate ecological supervision (and species relocation where necessary) during vegetation clearance to ensure that no indigenous fauna is killed during the clearance process Protect and enhance all other indigenous vegetation outside the immediate development footprint 	
<p>Stormwater and wastewater infrastructure and management</p>	<p>Stream habitats</p>	<p>Moderate</p>	<p>High</p>	<p>Moderate</p>	<p>The development of pasture into residential housing areas can result in alteration to natural drainage patterns and increased catchment imperviousness that can alter hydrology and water quality in the downstream environment.</p>	<ul style="list-style-type: none"> All stormwater infrastructure should be designed to maintain natural drainage and landform where possible will help to reduce a reduction in overland flow. Onsite detention and retention of stormwater should be considered as should the treatment of 	<p>Low</p>

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
					All stormwater and wastewater management are to follow expert reporting and recommendations prepared for each specific site to be developed.	<p>stormwater (i.e., swales, raingardens and offline wetlands). Stormwater treatment devices (i.e. stormwater wetlands or ponds) should be kept offline if possible.</p> <ul style="list-style-type: none"> To address the potential effects associated with the establishment and ongoing maintenance of stormwater and wastewater infrastructure and associated discharges, appropriate stormwater and wastewater management plans are to be prepared for the development proposal by a suitably qualified person. 	
Reclamation of aquatic habitats resulting in permanent loss	Aquatic habitats	Moderate	High	Moderate	All watercourses on site are either ephemeral, intermittent or artificial in nature, and have been subject to long history of artificial modification. Overall ecological values are assessed as low-moderate. Some	<ul style="list-style-type: none"> No reclamation of 'natural wetlands' – these are to be enhanced and protected as part of any future site development works. Infrastructure design should be guided to be located outside a 	Low

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
					<p>reclamation of streams, artificial drains may be required to facilitate the development of the site. This will require further ecological assessments to be carried out at the time of a land use or subdivision application.</p> <p>No 'natural wetland' habitats are to be reclaimed during site development process. Wetland delineation following best practice requirements is to be carried out as part of any land use or subdivision consent application.</p>	<p>minimum of 10m setback of any natural wetland or stream reaches.</p> <ul style="list-style-type: none"> • An inspection of impact reaches will be carried out prior to any stream works. • In any stream sections are proposed to be reclaimed or modified, these works should be subject to additional ecological assessments. • If stream reclamation is to take place, these works are to be carried out during a period where streams and drains are dry, or only hold small amounts of surface water, so are unlikely to support native fish when works will be carried out. • Native fish salvage and relocation plan to address the potential effects reclamation of streams. • Best practice and erosion control measures to mitigate the potential 	

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
						<p>effects of sediment and contaminants entering nearby waterways.</p> <ul style="list-style-type: none"> Development must achieve 'no-net-loss' of overall ecological function and values. 	
Establishment of walkways/cycleways	Terrestrial and aquatic	Moderate	High	High	The proposal includes the establishment of a network of cycleways and walkways proposed nearby sensitive terrestrial and aquatic habitats such as existing bush, stream and wetland areas	<ul style="list-style-type: none"> Any walkways/cycleways are designed to be appropriately set back from any natural wetlands, bush areas and streams, except where it crosses the stream. Any walkway/cycleway successfully manages potential stream/wetland erosion and sedimentation effects and is planted in indigenous vegetation to the edge of the walkway/cycleway. The location and alignment of the walkway/cycleway addresses any effects on the ecology of the immediate area and existing trees, land contour and the 	

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
						<p>practicality of constructing the walkway and the amenity that would be provided to users of the walkway.</p> <ul style="list-style-type: none"> All natural features to be protected and enhanced as part of any subdivision proposal within The Cove Road North Precinct will contain appropriate signage outlining the ecological values present on site and the overall goals of the habitat enhancement ton site. 	
Introduction of pathogens and pest plants	Terrestrial and aquatic habitats	Moderate	High	High	<p>Potential risk associated with primarily development stage of works using dirty earthmoving machinery introducing potential risk of spreading spores and plant material.</p> <p>Some risk associated with garden areas becoming a source of pest weed invasion into the natural habitats noted within site boundaries.</p>	<ul style="list-style-type: none"> All machinery entering the site will have to be appropriately disinfected and cleaned regularly (if taken offsite). Footwear is to be cleaned regularly to avoid potential introduction of kauri dieback into the site. A hygiene protocol should be drawn up to address regular 	Low

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
						<p>disinfection of tools brought to site.</p> <ul style="list-style-type: none"> That a list of invasive weed species in the National Pest Plant Accord (NPPA) are attached to the certificate of title 	
Avifauna	Terrestrial habitat	Low	Moderate	Moderate	<p>Only common and mobile avifauna noted on site. No 'At Risk' or 'Threatened' avifauna noted on site, however, works should be minimized to reduce disturbance.</p>	<ul style="list-style-type: none"> Sensitive development design focused on the protection and enhancement of all terrestrial features which avoids, where practicable, any removal of indigenous vegetation. Vegetation removal (if any) is to take place outside of the peak bird breeding season (October to February, inclusive), as far as practicable, to avoid disturbance to active native bird nests or mortality of eggs/chicks. Where vegetation clearance cannot be achieved outside of this period, a pre-vegetation bird nesting survey 	Low

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
						should be carried out by a qualified ecologist.	
Herpetofauna	Terrestrial habitat	Low	Low	Very low	<p>Some potential habitat for lizards was noted within the northern bush area on site. This area is to remain protected through a conservation covenant and no effect on any likely lizard population in the bush is anticipated.</p> <p>The wider site does not contain optimal habitat for indigenous herpetofauna and as such, any associated site development works, and vegetation clearance is unlikely to have a direct impact on indigenous herpetofauna.</p>	<ul style="list-style-type: none"> All vegetation clearance works (if any proposed) are to be supervised by an appropriated qualified ecologist. Conduct vegetation clearance activities during warmer months, when lizards are active (October – April). 	Low
Fish	Aquatic habitat	Low/moderate	Moderate	Low	Site contains some potential habitat for indigenous fish. Species present within site	<ul style="list-style-type: none"> Establish vegetated riparian yards that will act as multipurpose 	Low

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
					<p>boundaries likely limited to disturbance tolerant climbing species such as banded kokopu and short-fin eel.</p>	<p>corridor features in the landscape.</p> <ul style="list-style-type: none"> • Comprehensive sediment reduction plans should be prepared for any proposed development within the proposed PPC boundaries. • Any requirements for the upgrade or establishment of new stream crossings to access the proposed new development should consider their 'functional need' and be designed and installed in accordance with and be compliant with Kaipara District Council and Northland Regional Council Environmental Engineering Standards and the New Zealand Fish Passage Guidelines (Franklin <i>et al.</i> 2018). • Prepare freshwater fish recovery protocol that outlines how fish capture and relocation will be undertaken prior to any 	

Effect/activity	Potential habitat impacted	Ecological value	Magnitude of effect)	Level of effect (no mitigation)	Comment	Potential mitigation measures	Level of effect (with potential mitigation)
						instream disturbance (should any in-stream works be proposed)	
Bats	Terrestrial	Low	Low	Very low	No bat presence recorded on site and no suitable habitat present on site.	<ul style="list-style-type: none"> Should any mature vegetation (indigenous or exotic) be proposed to be cleared as part of site development works, these are to be inspected by a suitably qualified ecologist to ensure that no potential bat roost trees are removed. 	Very low
Overall assessment		Low/moderate	High				Low

5.3. Opportunities

While the subsequent development of the proposed PPC site following rezoning has the potential to result in adverse ecological effects (prior to controls and mitigation actions) through the modification of the existing baseline environment, it also provides opportunities for habitat enhancement and restoration. Given that the northern aspect of the site is currently actively maintained in agricultural production while the southern aspect of the site is largely of built form, there are opportunities to enhance ecological connectivity throughout the proposed PPC boundaries through establishment of riparian and wetland corridor features and establishing green habitat networks connecting these areas to the existing bush remnant to the north of the site. These networks would act as multipurpose reserves facilitating both indigenous fauna movement as well as enabling public access and enjoyment of these areas.

It is recommended that the small forest remnant (subject to a conservation covenant) identified as WF11 under Figure 18 and Appendix 1 within the proposed PPC area is retained and further enhanced through a weed and animal pest control program and through buffer planting where required. It is proposed that a minimum 10m wide buffer planting around the bush margins is implemented to help reduce edge effects, light penetration and protect kauri rootzones from any potential site development. This recommendation is subject to further assessment and will largely be based on the proposed setbacks of residential infrastructure in relation to the bush edge.

It is also proposed that where any given site contains stream and wetland habitats, these are enhanced through revegetation planting, which will improve ecosystem diversity within the site boundaries and at least partly restore some of the valuable ecosystem functions these habitats offer, such as flood water attenuation, sustaining and balancing base flow rates, increase the filtration and removal of sediment, nutrients and other pollutants. It is recommended that as a part of site development sufficient riparian and wetland buffer areas (riparian yards) are established to create green corridors (facilitating the movement of flora and fauna) while also providing additional benefits for aquatic habitats. It is also recommended that any potential roading and pedestrian cycleways/pathways are situated where they surround vegetated areas rather than dissecting them.

It is recommended that all other native vegetation within the site (including singular native trees) are retained where practicable, and if possible incorporated into landscaping plans and linked together through native planting, which should be protected in perpetuity through covenant or consent notice.

6.0 RELEVANT PLANNING CONSIDERATIONS

The following section summarises the ecological considerations in relation to local, regional and national policy statements and regulations associated with the preservation and mitigation of effects related to potential development of the site. In respect to the proposal, we consider the following to be applicable:

- National Policy Statement for Freshwater Management 2020
- Resource Management (National Environmental Standards for Freshwater) Regulations 2020
- The Operative Kaipara District Plan 2013
- Proposed Regional Plan for Northland March 2022 - Appeals Version
- Mangawhai Spatial Plan (Draft) 2020

Policies and regulations relating to each of the specific plans are further outlined in sections below.

6.1. National Policy Statement for Freshwater Management 2020

New Zealand has historically lost most of its wetland extent. Those remaining are rare and valuable ecosystems. The Essential Freshwater package, including the National Environmental Standards for Freshwater (NESFW), Freshwater National Policy Statement for Freshwater Management (NPSFM) and Stock Exclusion Regulations, that came into force in September 2020 introduced strong new policies and regulations to protect natural wetlands on a national scale.

The NPSFM sets out the objectives and policies for freshwater management under the Resource Management Act 1991. It came in effect on 3 September 2020 and replaces the National Policy Statement for Freshwater Management 2014 (amended 2017).

The NPSFM directs regional councils, in consultation with their communities to set objectives for the state of freshwater bodies in their regions and to set limits on resource use to meet these objectives. The core intent of the policies in the NPS-FM is to provide stronger protection for freshwater bodies and wetlands. It also places a statutory responsibility on territorial and consenting authorities to give effect to Te Mana o te Wai by prioritizing the health and wellbeing of our waterways. With respect to Te Mana o te Wai, the hierarchy of obligations for consenting authorities are;

1. first, to prioritise the health and well-being of water bodies and freshwater ecosystems;
2. second, the health needs of people (such as drinking water); and
3. third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.

In relation to the proposed PPC of the site, it is considered that in order to give full effect to the objectives and policies of the NPSFM the entirety of natural and semi-natural aquatic features including natural drainage patterns, intermittent and permanent streams, and 'natural wetland' areas within the boundaries of the proposed PPC should be enhanced and protected as part of any site development works. Noting that in order to ensure that all aquatic habitats have been protected as part any individual site development works a comprehensive Ecological and Wetland Assessment should be produced further refining the findings outlined in this report and assessing any adverse effects in a site specific context. The provisions outlined under the proposed The Cove Road North Precinct policies and objectives prepared by B&A outline that where any subdivision within the PPC boundaries would involve a natural wetland or stream,

the Applicant will be required to provide details regarding ecological protection and enhancement, including a minimum 10m riparian planting to streams and wetlands, weed and pest management controls and indigenous revegetation (where appropriate).

Any potential adverse effects on freshwater environments to result as part of potential site development works should be appropriately avoided, remedied or mitigated as per the effects management hierarchy. It is possible that increased development on site following the PPC could have an adverse effect on the freshwater quantity and quality both on site and within the wider Tara Creek/Mangawhai Harbour catchment, therefore best practice integrated design principles, erosion and sediment control guidelines should be appropriately designed (taking into account effects related to climate change) and followed for each of the individual sites contained within the PPC.

It is generally recommended that physical works within a 10m setback from any riparian or wetland areas are avoided, except where it can be shown that there is a functional need (as defined under NPSFM 2020) for the specific activity to take place in this location. Under the NPSFM a 'functional need' is defined as

the need for a proposal or activity to traverse, locate or operate in a particular environment because the activity can only occur in that environment.

Therefore, any land development or subdivision application should provide sufficient detail regarding the functional need for the activity to take place in sensitive aquatic environments to ensure that stream and wetland habitats and values are preserved by avoiding activities that may result in these losses except:

- For streams, where there is a functional need for the activity to occur at that location and the effects are managed via the Effects Management Hierarchy;
- For wetlands, where the loss is related to specific activities, or where the loss is related to construction of specified infrastructure, there is also a functional need for the activity to occur at that location.

This should ensure that appropriate design and mitigation strategies to avoid adverse effects on stream and wetland features contained within the PPC boundaries can be developed at the time of a subdivision or land use consent application, when a detailed design of the any associated proposals is available.

It is considered that the Cove Road North Precinct Provisions give sufficient consideration to NPSFM and that all development within the proposed PPC boundaries will be appropriately guided (through Precinct specific rules, objectives and policies) to work with the natural patterns of the land and halt the degradation of aquatic habitats and thus give effect to NPSFM policies and objectives.

6.2. National Environmental Standards for Freshwater Regulations 2020

Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NESFW 2020) set the standards for regulating activities that pose risks to the health of

freshwater and freshwater ecosystems. Anyone seeking to undertake those activities will need to seek consent under the NESFW 2020, as well as under any relevant rules under the applicable Regional and District Plan.

Should the PPC be approved, the individual titles contained within the PPC boundaries are likely to be developed into residential lots with associated infrastructure requirements that will fall within a 100m setback from the indicative wetland features and associated stream systems on site, therefore the development proposal will trigger the requirement for consents under the National Environmental Standards for Freshwater (2020), Kaipara District Plan (Operative) and the Proposed Regional Plan for Northland (Appeals) in relation to works within a 100 m setback from natural inland wetland features.

Based on field work and observations made during site visits in May 2022, some indicative wetland areas that could meet the definition of a 'natural wetland' as defined under NPSFM (2020) were identified within the PPC area boundaries. The results of this assessment are provided under 4.1.1.4. Please note that these areas are indicative only as assessed during a site visit on May 9th 2022 and will require a further Wetland Assessment to be prepared at the time of a land use or resource consent application for each specific site contained within The Cove Road North Precinct to ensure that all wetland and stream areas contained within the development area are appropriately captured and delineated with site specific effects assessed as part of the site development.

It is thought that sufficient controls to avoid adverse effects on the 'natural wetland' features noted on site have been outlined under the proposed The Cove Road North Precinct Provisions, which require that an Ecological Assessment and Wetland Assessment is to be submitted as part of any land use consent or subdivision proposal within the PPC boundaries, and that appropriate setbacks from 'natural wetland' areas are established and these areas are protected and enhanced.

6.3. Kaipara District Plan (Operative)

This section addresses the following objectives and policies relating to the proposed development and any associated ecological or environmental effects under the Kaipara District Plan (Operative):

- Chapter 4 – Overlays (Mangawhai Harbour Overlay)
- Chapter 6 – Ecological Areas
- Chapter 12 – Rural
- Chapter 13 – Residential
- Chapter 25B - Integrated Development Guide
- Chapter 25G - Assessment of Ecological Significance

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
Chapter 4 – Overlays – Mangawhai Harbour Overlay		
<p>4.4.1 To promote the preservation, restoration, rehabilitation and enhancement of the natural character of the coastal environment.</p> <p>4.4.2 To enable subdivision, land use and development in the Overlays, where it recognises and provides for:</p> <ul style="list-style-type: none"> • The protection of natural character; and • Maintenance or enhancement of the water quality of receiving environments; and • Maintenance or enhancement of amenity values; and • Any other specific values identified in an Overlay. <p>4.4.11 To recognise and provide for the protection of habitats and ecological values.</p>	<p>4.5.2 By managing the location, scale and design of subdivision, use and development to minimise the potential adverse effects on the natural character of the coastal environment.</p> <p>4.5.16 By requiring careful management of subdivision, land use activities including their location, design and operational arrangements (including wastewater and stormwater systems) so as to avoid, remedy or mitigate adverse effects (including discharges) arising from these activities on sensitive receiving environments.</p> <p>4.5.19 By requiring the identification and mapping of areas of valued natural environment at the time of subdivision and development.</p>	<p>The proposal specifically recognises and promotes the preservation and enhancement of key natural features, including streams, wetlands and existing areas of indigenous vegetation, and any subsequent land use/subdivision consent application will have to ensure that development of the site does not adversely affect any natural features identified within the proposed PPC boundaries.</p> <p>While no specific design of stormwater and wastewater infrastructure has been provided, any development within the PPC boundaries will need to ensure that the proposed infrastructure to service the site (i.e. wastewater and stormwater) can appropriately avoid, remedy or mitigate adverse effects arising from such activities on the sensitive receiving environments. All infrastructure on site will have to be in compliance with the relevant KDC Engineering Standards and the Northland Regional Plan rules.</p> <p>Main natural features within the boundaries of the site have been mapped either through field work (where access allowed) or through a desktop-based exercise by analysing aerial imagery. Please note that the habitats mapped in this report are indicative only and further habitat delineation and mapping will be required at the time of specific subdivision or land use</p>

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
<p>4.4.12 To recognise and where appropriate protect cultural, heritage and amenity values, including the special sense of place of land within the Mangawhai Harbour Overlay.</p> <p>4.4.13 To enable growth in the Mangawhai Harbour Overlay in a manner that protects and enhances the identified valued natural environments which includes:</p> <ul style="list-style-type: none"> • Coastal dune systems and coastal edge; • Estuarine wetland and saltmarsh systems; • Terrestrial wetland systems and associated riparian corridors; • Significant areas of contiguous bush remnants and regenerating bush shrubland areas; • Visually prominent ridgelines; • Significant wildlife habitats and corridors; and • The Brynderwyn Range. 	<p>4.5.20 By protecting those areas identified as valued natural environments from inappropriate use and development, particularly by:</p> <ul style="list-style-type: none"> • Locating those activities which have the potential to discharge contaminants and adversely impact on waterways and the sensitive receiving harbours out of these areas; <p>Carefully managing the scale, location, operation and design of activities, particularly in respect to built form and vegetation.</p>	<p>consent applications of each site/title contained within the proposed PPC area.</p> <p>Key natural features of the site include areas of indigenous vegetation, streams, and wetland areas as identified within the body of this report. Suitable measures have been included in The Cove Road North Precinct Provisions to ensure their appropriate protection and enhancement of natural features can be achieved, and that the proposed site development (should the provisions be adopted) will not undermine or adversely affect the natural environments on site.</p>

RELEVANT (ECOLOGY)	OBJECTIVES	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
Chapter 6 – Ecological Areas			
<p>6.5.1 To maintain and enhance the life supporting capacity of ecosystems, and the extent and representativeness of the District’s indigenous biological diversity.</p> <p>6.5.2 To maintain ecological values through the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna while allowing appropriate subdivision, use and development.</p> <p>6.5.3 To promote active management of areas of significant indigenous vegetation and significant habitats of indigenous fauna.</p>	<p>6.6.1 By progressively improving the level and accuracy of information on Significant Ecological Areas, so that it can be effectively used for information, education, non-regulatory and regulatory methods and monitoring.</p>	<p>Site contains some low-moderate ecological value terrestrial and aquatic ecological values.</p> <p>No Significant Ecological Areas present on site or directly adjoining. The site contains a regenerating bush area extending along the northern aspect of the site which is subject to a conservation covenant but has not been scheduled as a PNA.</p>	

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
<p>6.5.4 To protect the natural character of the coast, rivers and lakes and their margins within the District by avoiding, remedying or mitigating the adverse effects of surface water activities.</p>		
	<p>6.6.2 By managing the scale, intensity, and location of subdivision and land development activities in areas of significant indigenous vegetation or significant habitats of indigenous fauna.</p>	<p>The only significant vegetation noted within the site boundaries is sparse kauri (listed as 'Threatened') which in their entirety are contained to the northern bush area, subject to a conservation covenant. The proposal would not undermine the quality of the bush area and would in fact allow for an opportunity to enhance this area through further pest weed and pest animal control, and buffer planting.</p>
	<p>6.6.2b Where disturbance of significant indigenous vegetation and significant habitats of indigenous fauna cannot be avoided, it should be undertaken in a way that, minimises and/or mitigates adverse effects as far as practicable, by:</p> <ul style="list-style-type: none"> • Ensuring that any disturbance: <ul style="list-style-type: none"> a) minimises any edge effects; b) avoids the removal of specimen trees; c) does not result in linkages with other areas being lost; d) avoids adverse effects on threatened species; e) minimises disturbance of root systems of remaining vegetation; f) does not result in the introduction of exotic weed species or pest animals; and 	<p>It is understood that no disturbance to significant indigenous vegetation or flora is proposed. The manuka/kanuka scrub and associated indicative degraded wetland areas extending along the central aspect of the site may be appropriately controlled for weeds and pests and incorporated into a wider landscape/ecological/public access feature, and this is likely to enhance the area. The location and alignment of any road networks/walkways/cycleways should ensure that any effects on the ecology of the immediate area and existing trees, land contour and the practicality of constructing the infrastructure are appropriately considered.</p>

RELEVANT (ECOLOGY)	OBJECTIVES	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
	<p>g) does not result in the intentional or unintentional release of weeds or pest animals or the abandonment of domestic pets;</p> <ul style="list-style-type: none"> • Encouraging and where appropriate requiring the exclusion of domestic cats and dogs (except for working dogs as defined in the Dog Control Act 1996) in areas of high kiwi density (Appendix F to the Maps); • Encouraging and where appropriate requiring active pest control and removal and the provision of stock proof fencing to avoid the grazing of such areas; and <p>Encouraging planting and restoration. Eco-sourcing is preferred practice when planting indigenous plants and in particular, when undertaking revegetation or restorative planting. It serves to maintain genetic diversity and increase plant survival because plants are accustomed to their local environment.</p>	<p>Appropriate enhancement and restoration of natural habitats on site is proposed to be a requirement when a proposed development site contains indigenous vegetation or habitats (streams, wetlands, bush).</p>	
	<p>6.6.3 By managing earthworks and vegetation clearance in all areas of the District in order to avoid, remedy or mitigate adverse effects on significant ecological areas, recognising there is complete information on the exact geographic location of all these valued areas may not be available.</p>	<p>The site contains some scattered indigenous habitats of generally low-moderate ecological value, which are either already subject to conservation covenant provisions (northern bush area) or subject to stringent protections under NESFW ('natural wetland' areas) and therefore any site development works will be subject to stringent controls relating to earthworks, discharges and vegetation clearance in proximity of these habitats.</p> <p>Any potential adverse effects associated with vegetation clearance and/or earthworks in relation to ecological values can be avoided, minimised or mitigated through best practice sediment and erosion control measures, comprehensive</p>	

RELEVANT (ECOLOGY)	OBJECTIVES	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
		<p>ecological and landscape design principles, as well as appropriate planning and development controls.</p> <p>Each subdivision or land use consent within The Cove Road North Precinct will require a site specific Ecological and Wetland Assessment to be prepared which will further assess the ecological values, potential effects and identification of an appropriate effects management hierarchy at the time of a subdivision consent application.</p>	
	<p>6.6.4 By evaluating the significance of areas of indigenous vegetation and habitats of indigenous fauna by reference to the criteria listed in Appendix III of the Northland Regional Policy Statement</p>	<p>The northern bush area as described within the body of this report is likely to meet a minimum of one of the significance criteria as described under Appendix III of the Northland Regional Policy Statement.</p>	
	<p>6.6.5 By providing incentives in the Plan which encourage measures to protect and enhance indigenous vegetation and habitats of indigenous species.</p>	<p>The Cove Road North Precinct provisions outline a number of policies and objectives that aim to strike a balance between protecting and enhancing areas of existing or potential ecological values, while concentrating the site's development on areas with low existing ecological values or functionality.</p>	
Chapter 12 - Rural			
<p>12.5.1 To maintain and enable public access to the coast, rivers and lakes as a result of land use and subdivision development.</p>	<p>12.6.1 Subdivision adjoining the coast, rivers and lakes is generally only acceptable when it provides public access (by the vesting of public access roads, reserves and pedestrian access ways and access strips) and provides Esplanade Reserves and/or Strips.</p>	<p>The site does not abound coast, rivers (>3m wide) or lakes. Some waterbodies are present on site, but these are largely intermittent in nature and no more than 1m wide at their widest point.</p>	

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
<p>12.5.2 To maintain the rural character and amenity, including the:</p> <ul style="list-style-type: none"> • Sense of openness; • Low dominance of built form; • Pasture and Commercial Forest Areas; • Areas of indigenous vegetation and significant fauna; and • Unmodified natural landforms <p>12.5.3 To protect areas of significant indigenous vegetation and significant habitats of indigenous fauna so as to avoid, remedy or mitigate the decline of indigenous vegetation and fauna.</p> <p>12.5.4 To ensure that the servicing of new subdivision and development does not adversely affect the environment, in particular sensitive receiving environments.</p>	<p>12.6.2 By encouraging growth in areas identified in Chapter 3, (Dargaville, Maungaturoto, Mangawhai and Kaiwaka).</p>	<p>It is considered that the proposal is in general accordance with objectives and policies under Chapter 12.</p>
	<p>12.6.3a By allowing greater intensity of subdivision, or development in the Rural Zone where this is offset by protection, restoration, enhancement or establishment of natural features, vegetation and open space, where they significantly contribute to the natural environment values, natural character of the coastal environment, and rural character and amenity.</p>	<p>All natural features (including natural drainage patterns and intermittent streams, 'natural inland wetlands,' indigenous vegetation) on site are to be protected and enhanced as part of any subdivision or land use proposal within The Cove Road North Precinct.</p> <p>The Proposal would allow to enhance and protect ecological features on site and thus positively contribute to biodiversity enhancement and protection within the site boundaries.</p>
	<p>12.6.3c By providing for more intensive and innovative site-specific subdivision and development where this results in better environmental outcomes.</p>	<p>It is considered that the proposal will result in the rehabilitation, enhancement and ongoing protection of natural features noted on site and seeks to improve the overall quality of freshwater and terrestrial values noted on site.</p>
	<p>12.6.5 By avoiding, remedying or mitigating the adverse effects of subdivision and development (including ribbon development) on the natural environment values of the rural area.</p>	<p>Any potential adverse ecological effects associated with the potential site development following the rezoning can be avoided, minimised or mitigated through integrated development design, best practice sediment and erosion control measures, comprehensive ecological and landscape design principles, as well as appropriate planning and development controls.</p>

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
<p>12.5.5 To avoid, remedy or mitigate adverse effects on the quality of the rural environment without unduly restricting productive rural activities e.g. farming and forestry.</p>	<p>12.6.6 By promoting the integration of subdivision, use or development with the protection, enhancement or establishment of natural features, vegetation and open space.</p>	<p>It is considered that The Cove Road North Precinct provisions promote an integrated development approach for the site aimed at preserving and enhancing ecological values of the site, and where required, providing sufficient setbacks between the immediate development footprint encompassing sensitive aquatic and/or terrestrial environments.</p>
<p>12.5.6 To provide for a range of activities in the Rural Zone which are located, designed and operated in such a way as to avoid, remedy or mitigate reverse sensitivity effects on existing land uses in the vicinity.</p>	<p>12.6.7 By avoiding, remedying or mitigating the adverse effects of activities which pose the greatest threat to remaining areas of significant indigenous vegetation and significant habitats of indigenous fauna), and rural amenity (e.g. vegetation clearance, excavation and fill, the bulk and location of buildings and structures).</p>	<p>The only significant vegetation noted within the site boundaries is sparse kauri (listed as 'Threatened') which in their entirety are contained to the northern bush area which is already subject to a conservation covenant. The proposal would not undermine the quality of the bush area, and would in fact allow for an opportunity to enhance this area through pest weed and pest animal control and appropriate revegetation planting.</p>
<p>12.5.7 To recognise farming, forestry, mineral extraction and processing, renewable energy generation, industrial and commercial activities and network utilities that enable people and communities to provide for their social, economic and cultural wellbeing.</p>	<p>12.6.8 By providing assistance and information to rural landowners and residents regarding:</p> <ul style="list-style-type: none"> • Methods to protect and enhance areas of indigenous vegetation, significant habitats of indigenous fauna and ecological corridors; • The levels of service for infrastructure expected in rural areas of the District. 	<p>It is proposed that all natural features to be protected and enhanced as part of any development or subdivision proposal within The Cove Road North Precinct will contain appropriate signage outlining the ecological values present on site and the overall goals of the habitat enhancement ton site.</p> <p>The signage should describe the existing ecological baseline conditions of the area (including susceptible species presence), the significance of the restoration works carried out on site, overall goals of the habitat enhancement programme and any</p>
<p>12.5.8 To provide for development of land with a range of allotment sizes that is appropriate to the</p>		

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
<p>character of the surrounding rural environment.</p> <p>12.5.9 To maintain sites and buildings during development to avoid adverse visual amenity effects.</p> <p>12.5.10 To encourage innovative development and integrated management of effects between subdivision and land use which results in better environmental outcomes than more conventional or traditional subdivision, use and development.</p>		<p>other information that is deemed of importance to preserve the biodiversity values on site and immediate surrounds.</p>
	<p>12.6.9 By avoiding, remedying, or mitigating adverse effects on the environment by requiring the landowner or developer to provide roading and on-site services for water supply, wastewater disposal or stormwater disposal for sites in the Rural areas, unless the provision of reticulated services is identified as an alternative to on-site systems.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
	<p>12.6.13 By ensuring that where sites are not connected to a public water supply, wastewater disposal or stormwater disposal system, suitable provision can be made on each site for an alternative water supply or method of wastewater disposal or stormwater disposal, which can protect the health and safety of residents and can avoid any significant adverse effects on sensitive receiving environments.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
	<p>12.6.14 By providing flexibility for subdivision and development density, as well as for a range of activities (industrial, commercial and residential etc.) that can be appropriately located in the Rural Zone and meet the environmental conditions appropriate to that Zone.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
	<p>12.6.20 By requiring the establishment of Esplanade Reserves and Strips when land is subdivided into lots less than 4ha.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
<p>Chapter 13 – Residential</p>		
<p>13.5.1 To maintain and where appropriate enhance the</p>	<p>13.6.1 By requiring subdivision and development to avoid adverse effects on the outlook and privacy of adjoining properties,</p>	<p>It is considered that the development is compatible with the overall ecological character of the wider land use.</p>

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
amenity values of the residential environment.	while being compatible with the character and amenity of the surrounding environment.	
<p>13.5.2 To ensure that the servicing of new subdivision and development does not adversely affect the environment, particularly sensitive receiving environments.</p>	<p>13.6.4 By encouraging, where practicable, the use of integrated catchment management design solutions for stormwater and wastewater infrastructure.</p>	This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.
<p>13.5.3</p>	<p>13.6.5 Subdivision adjoining the coast, rivers and lakes is generally only acceptable when it maintains or enhances public access (by the vesting of public access roads, reserves and pedestrian access ways and access strips) and esplanade reserves and / or strips.</p>	It is understood that public access within the site is to be enhanced as a part of the Proposal.
<p>To maintain and enhance public access to the coast, rivers and lakes as a result of land use and subdivision development.</p>	<p>13.6.7 By requiring subdivision and development to demonstrate how the effects of earthworks and vegetation clearance can be avoided, remedied or mitigated.</p>	It is considered that the objectives, policies and rules as described within the proposed This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A provide sufficient detail and guidance for the preservation and enhancement of natural features (aquatic and terrestrial) present on site.
<p>13.5.4 By managing the effects of those activities which have the potential to adversely affect residential amenity (e.g. building location, earthworks and vegetation clearance).</p>		At the time of land development/subdivision within The Cove Road North Precinct, a comprehensive Ecological and Wetland Assessment as well Ecological Enhancement and Management Plan will be required to be submitted as part of a Resource Consent application. This will ensure that any potential adverse ecological effects associated with subsequent subdivision/development on site can be avoided, minimised or mitigated through best practice development design, sediment and erosion control measures,
<p>13.5.5 To enhance linkages (e.g. pedestrian, vehicular, open space) between adjoining residential uses.</p>		
<p>13.5.6</p>		

RELEVANT OBJECTIVES (ECOLOGY)	RELEVANT POLICIES (ECOLOGY)	DISCUSSION
<p>To maintain sites and buildings during development to avoid adverse visual amenity effects.</p>		<p>comprehensive ecological and landscape design principles, as well as appropriate planning and development controls.</p> <p>Provided that they are implemented successfully during construction and operational phases of the development, adverse effects on the environment are expected to be no more than minor, and the Proposal would, in fact, allow for the enhancement of functional and structural connectivity of the ecological values identified on Site and immediate surrounds.</p>
<p>13.5.7 To recognise business and economic activity that enables people and communities of the District to provide for their social, economic and cultural wellbeing, while avoiding adverse effects (including reverse sensitivity effects) on the environment.</p>	<p>13.6.12 By ensuring that where sites are not connected to a public water supply, wastewater disposal or stormwater disposal system, suitable provision can be made on each site for an alternative water supply or method of wastewater disposal or stormwater disposal, which can protect the health and safety of residents and can avoid any significant adverse effects on sensitive receiving environments.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
	<p>13.6.16 By requiring the establishment of esplanade reserves and strips when land is subdivided in the Residential and Business Zones of the District.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
	<p>13.6.17 By facilitating the provision of public access to existing esplanade reserves and strips in the District which are currently land locked or isolated from other public access areas.</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>

In addition, we have also considered the provisions under Appendix 25B Integrated Development Guidelines and Appendix 25G Assessment of Ecological Significance.

Appendix 25B – Integrated Development Guidelines

Overview	Requirements	Discussion
<p>Integrated Development subdivision allows for subdivision and development to occur where the location, form and scale of the proposal complement sustainable environmental management and is consistent with the protection of natural character, landscape, amenity, heritage, and cultural values.</p>	<p>(a) Description of the Proposal</p> <ul style="list-style-type: none"> (v) requirements for vegetation clearance; (vi) stormwater and effluent disposal systems; (ix) how sustainable management is to be achieved including the management objectives, details of what is to happen and where, and how this is to be monitored and reviewed. (x) measures to maintain open space in order to retain coastal and/or rural character; (xi) measures to protect the life-supporting capacity of soils. 	<p>It is considered that sufficient detail has been provided within the body of this report as to the ecological baseline and features noted on site.</p> <p>Appropriate policies, objectives and rules to promote the protection and enhancement of these features has been provided under The Cove Road North Precinct provisions.</p> <p>The proposal will encourage the development of integrated open space areas facilitating both access and enhancement of ecological values.</p> <p>The development is to take place over primarily Class 4 soils which are not considered 'elite' or 'prime' soils within the Kaipara District.</p>
	<p>(b) Existing Site Characteristics</p> <ul style="list-style-type: none"> (i) a description of the location of the property in relation to its wider geographic context and local setting; (ii) topography and geography of the property; (iv) presence of natural hazards (such as flood prone land or land liable to erosion or any fire hazard); (v) the property history including past uses and management and any implications for future management; (vi) soil types and their classification on the NZ Land Inventory worksheets; (viii) areas of indigenous vegetation and habitats of indigenous fauna with identification of any such areas which are significant, with reference to Sites of Ecological Significance identified by the Department of Conservation 	<p>This has been described in detail under Section 3 and Section 4 of this report and other relevant reporting prepared for the PPC proposal.</p>

	<p>and criteria contained in Appendix 25G, and any Notable Trees;</p> <p>(x) relevant information regarding adjoining properties;</p> <p>(xi) the location and purpose of any public reserve land in the vicinity of the site;</p> <p>(xii) any known areas in the vicinity which are being actively managed for pest control or protected or enhanced for conservation benefit;</p>	
	<p>(c) Proposed Integrated Development Measures</p> <p>(i) measures to protect, manage and enhance indigenous vegetation and habitats, landscapes and natural features, heritage resources and riparian margins, including appropriate means of controlling dogs, cats, animal pests and the means of controlling pest plants;</p> <p>(iii) measures for the ongoing control and management of stormwater and effluent disposal;</p> <p>(iv) measures to promote and achieve integrated catchment management;</p> <p>(vi) any other measures to internalise adverse effects including measures to avoid reverse sensitivity on existing activities or uses;</p>	<p>This is fully addressed under the proposed The Cove Road North Precinct provisions prepared by B&A.</p>
	<p>(d) Draft Integrated Development Management Plan The proposal must include a Draft Integrated Development Management Plan (to be finalised in accordance with the conditions of consent) setting out, the extent relevant to the proposal:</p> <p>(i) the objectives of the proposal;</p> <p>(ii) the mechanisms to ensure that the Integrated Development Management Plan applies to and binds future owners;</p> <p>(iii) where restoration planting and/or other natural resource management works are to be undertaken, performance may be secured by a Council bond (a cash bond in favour of Council, refer to Chapter 22; Financial Contributions) on the following basis:</p>	<p>It is expected that as a part of any 'enhancement' works on site, pest weed and animal control, and revegetation planting may be required. These are to be addressed at the time of a land use or resource consent application within a site specific Ecological Enhancement and Management Plan.</p>

	<ul style="list-style-type: none"> • bonded work is to be completed within 4 years of the subdivision Section 224(c) certificate issuing; • access to bonding will not be available until one year after planting, where there is evidence to Council's satisfaction of the successful initial implementation of an approved Integrated Development Management Plan; • the Integrated Development Management Plan is to include matters of the following type. Named species appropriate to the location,(i.e. eco-sourced species) size at planting, density (for example 7,000 stems/ha), seed source, weed clearance/release, pest control, fertiliser application and, at Council's discretion, a requirement for irrigation should conditions require; • legally effective post Section 224 certificate arrangements are required which secure the retention of re-planted vegetation; establish responsibility for continued execution of the Integrated Development Management Plan until its objectives (be they tree height, percentage canopy cover or both) and/or term are satisfied (this may require a community owned management structure depending on the number of subsequent owners); and ensure Council access to the land in the event the bond is to be executed. These requirements may necessitate a bond to be complemented by covenants or other legal instruments; • Council retains the discretion not to accept bonding where there is a potentially harsh environment or other factor(s), which present a significant risk in its assessment to successful re-establishment or Integrated Development Management Plan implementation. Evidence of the degree of risk should be included in the information required 	
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Assessment 25G – Assessment of Ecological Significance

<p>An assessment of the ranking of an ecological feature, assessments of significance and ranking shall be based on the following criteria:</p>	<p>1. Contain critical, endangered, vulnerable, or rare taxa, taxa of indeterminate threatened status (sensu International Union for Conservation of Nature definitions).</p>	<p>Based on flora and fauna survey results carried out on site during May 2022 the northern bush area contains sparse kauri (<i>Agathis australis</i>) which are listed as 'Threatened.' The remainder of the site does not contain any critical, endangered, vulnerable, or rare taxa, taxa of indeterminate threatened status.</p>
	<p>2. Contain indigenous or endemic taxa that are threatened or rare in Northland.</p>	<p>Based on flora and fauna survey results carried out on site during May 2022 the only 'Threatened' species apart from manuka and kanuka which due to the recent updates in the threat status (de Lange <i>et al.</i> 2017) have been listed as 'Threatened,' the only other 'Threatened' species noted within the site boundaries included sparse kauri (<i>Agathis australis</i>) growing within the onsite northern bush area.</p>
	<p>3. Contain the best representative examples in an ecological district of a particular habitat type.</p>	<p>The northern bush remnant is representative of regenerating podocarp forest and contains some typical remnant species including kauri, rimu, and tanekaha. While historically it likely formed part of the wider Brynderwyn Hills Forest Complex its now somewhat isolated nature in the landscape can not be considered as one of the best representative examples of its particular habitat type.</p>
	<p>4. Have high density of taxa or habitat types for the ecological district.</p>	<p>Site does not contain high density of taxa or habitat types for the ecological district.</p>
	<p>5. Form ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.</p>	<p>Northern bush area on site forms part of a bush feature extending to the north of the site. Manuka/kanuka scrub and</p>

		associated degraded wetland area form a riparian corridor through the central aspect of the site, however, is notably isolated within the wider landscape. Collectively all indigenous habitats on site can be considered only as a low ecological functionality 'stepping stone' features within the wider landscape matrix.
	6. Contain habitat types that are rare in the ecological district.	The site does not contain any habitat types that are considered rare in the ecological district; however, it contains some potential degraded wetland areas extending along the central aspect of the site which has a high restoration potential.
	7. Support good populations of taxa which are endemic to the Northland or Northland-Auckland regions.	The only real taxa that is 'endemic' to Northland or Auckland is kauri, which, prior to land clearance, would have dominated the site, with some sparse remnant trees observed within the bush area extending along the sites northern boundary.
	8. Are important for indigenous or endemic migratory taxa.	During site visits in May 2022 no indigenous or endemic migratory taxa was observed on site. The northern bush area on site may periodically be visited by migratory avifauna such as NI kaka and shinning cuckoo moving within the landscape.
	9. Support viable populations of species, which are typical of that habitat type within an ecological district and retain a high degree of naturalness.	Supports a range of common introduced and indigenous fauna species. No habitat contained within the site contains a high degree of naturalness.

6.4. Proposed Regional Plan for Northland March 2022 - Appeals Version

Proposed Regional Plan for Northland (Appeals Version March 2022) applies to air, water and coastal resources in the whole of the Northland region. In relation to the Proposal the rules and regulations that are most applicable to the site are likely to include provisions relating to placing structures within watercourses and works nearby 'natural wetland' areas. Should subsequent site development works not meet the permitted activity standards as per the PRPN provisions, additional consents will be required, and should be subject to further ecological assessments and reporting (as applicable). This should be assessed at the time of a subdivision or land use consent application within each title contained within The Cove Road North Precinct.

6.5. Mangawhai Spatial Plan

The Mangawhai Spatial Plan (MSP) (2020) provides a strategic direction for Mangawhai to develop into. The purpose of the MSP is to provide a high-level development strategy that provides a framework for Mangawhai to accommodate growth over the next 20 to 25 years. The strategy addresses the environmental, social, cultural and economic needs that are important to the community, while recognising the implication of natural and physical constraints for the future development of the area.

The MSP has identified the extent of the site to be within an 'urban expansion area' suitable for residential growth.

In respect to ecological matters and natural environment the MSP specifically envisions:

- Enhance and protect the ecological corridors from the hills to the sea.
- Improve connectivity and public access to the local natural environment.
- Provide blue-green infrastructure to enhance biodiversity, environmental health and stormwater management.

This is recognised and provided for in the PPC which embraces this vision and aims to protect and enhance the existing terrestrial and aquatic values and habitats within the PPC boundaries (including 'natural wetlands,' permanent and intermittent streams and indigenous bush areas) as part of the overall site development proposal.

The proposal also aims to integrate ecological/landscape and public access provisions throughout the site by establishing a pedestrian walkway/cycleway along the central aspect of the site encompassing the intermittent stream and wetland feature. This presents an excellent opportunity for public access and recreation opportunities between the proposed development area and the wider Mangawhai Heads urban areas, as well as an opportunity to appropriately enhance natural features and provide for outdoor education.

7.0 CONCLUSIONS

A Private Plan Change (PPC) request from the Applicant seeks the rezoning of the site from 'Rural' to 'Residential' resulting in the creation of The Cove Road North Precinct that would enable residential development for a range of allotment sizes at a density where a high level of urban design ecological enhancement and pedestrian and transport connectivity are achieved. The Cove Road Precinct proposes to provide for a variety of residential intensities that promote housing and living choices whilst recognising the landscape, natural features and characteristics of the area.

This report provides a preliminary overview of the baseline ecological values of the site, and outlines ecological opportunities, constraints and potential mitigation strategies associated with the Proposal, noting that any subsequent development following the successful rezoning of the site will be subject to further ecological surveys and reporting to ensure that all natural features are recognised and assessed at the time of land use or subdivision consent.

The majority of terrestrial habitats within the site are generally degraded through a long history of land clearance and modification for agricultural or residential development purposes. The exception is an area of regenerating bush extending along the site's northern boundary (subject to an existing conservation covenant), and some small, scattered areas of indigenous vegetation extending along the central aspect of the site and isolated areas identified as indicative wetland areas.

Aquatic habitats within the PPC area boundaries generally drain through exotic pasture within the northern and central aspects of the site and through built-up residential areas along the southern aspect. The stream and wetland habitats have been degraded through a long history of rural and urban land use practices associated with stock grazing pressures, riparian vegetation clearance, stream channelisation, culverting, realignment and periodic dredging.

Collectively the ecological significance of both terrestrial and aquatic habitats within the PPC boundaries is assessed from low (exotic pasture) to moderate (small northern bush remnant, scattered indigenous vegetation, stream and wetland habitats), although the ecological condition overall is considered to be low (apart from the northern bush area which is of fair ecological condition) due to historical disturbance, land clearance and significant modification to both terrestrial and aquatic environments.

The protection of freshwater and terrestrial values on site are proposed and have been discussed in detail within the body of this report and The Cove Road North Precinct Provisions. This includes protecting all terrestrial and aquatic habitats within the PPC boundaries and if practical, connecting these through establishment of green corridor networks through the site.

Potential ecological effects on terrestrial and aquatic values associated with the Proposal and subsequent subdivision and development of the site, before and after the implementation of recommended mitigation and management actions have been briefly assessed. The subsequent level of ecological effects (with mitigation measures

implemented) is considered to be low in accordance with the EINAZ (2018). It should be noted that at the time of any proposed land development subdivision application, a site specific Ecological and Wetland Assessment along with an Ecological Enhancement and Management Plan shall be prepared to ensure that the potential effects, as well as enhancement and mitigation strategies can be assessed based on site specific design detail.

The Cove Road North Precinct provisions prepared by B&A, where they relate to protection and enhancement of ecological features on site, provide detail on how adverse ecological effects following the PPC associated with land subdivision/development can be sufficiently avoided, remedied or mitigated. The provisions have been focused on setting policies and objectives that would in fact result in enhancement and permanent protection of these features.

Therefore, it is considered that there are no significant constraints to the proposed rezoning of the site, and the potential adverse ecological effects can be sufficiently avoided, remedied or mitigated through a combination of low impact integrated design principles, current KDP, NRC, NESFW controls in addition to the proposed The Cove Road North Precinct provisions. Should any subsequent land development within the Cove Road North Precinct be in accordance with the applicable performance standards, it would provide an opportunity to protect and enhance the ecological features contained within the PPC boundaries.

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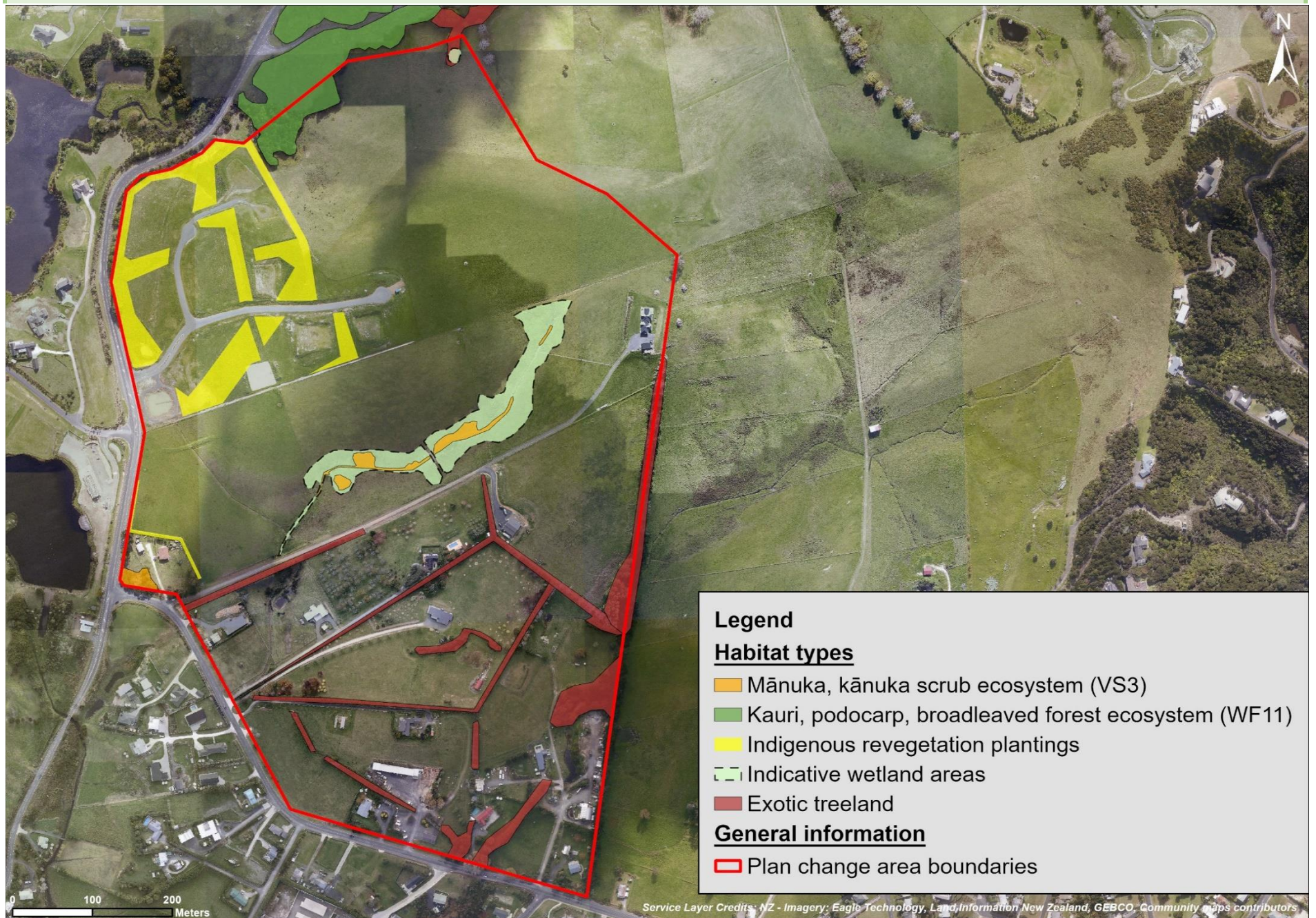
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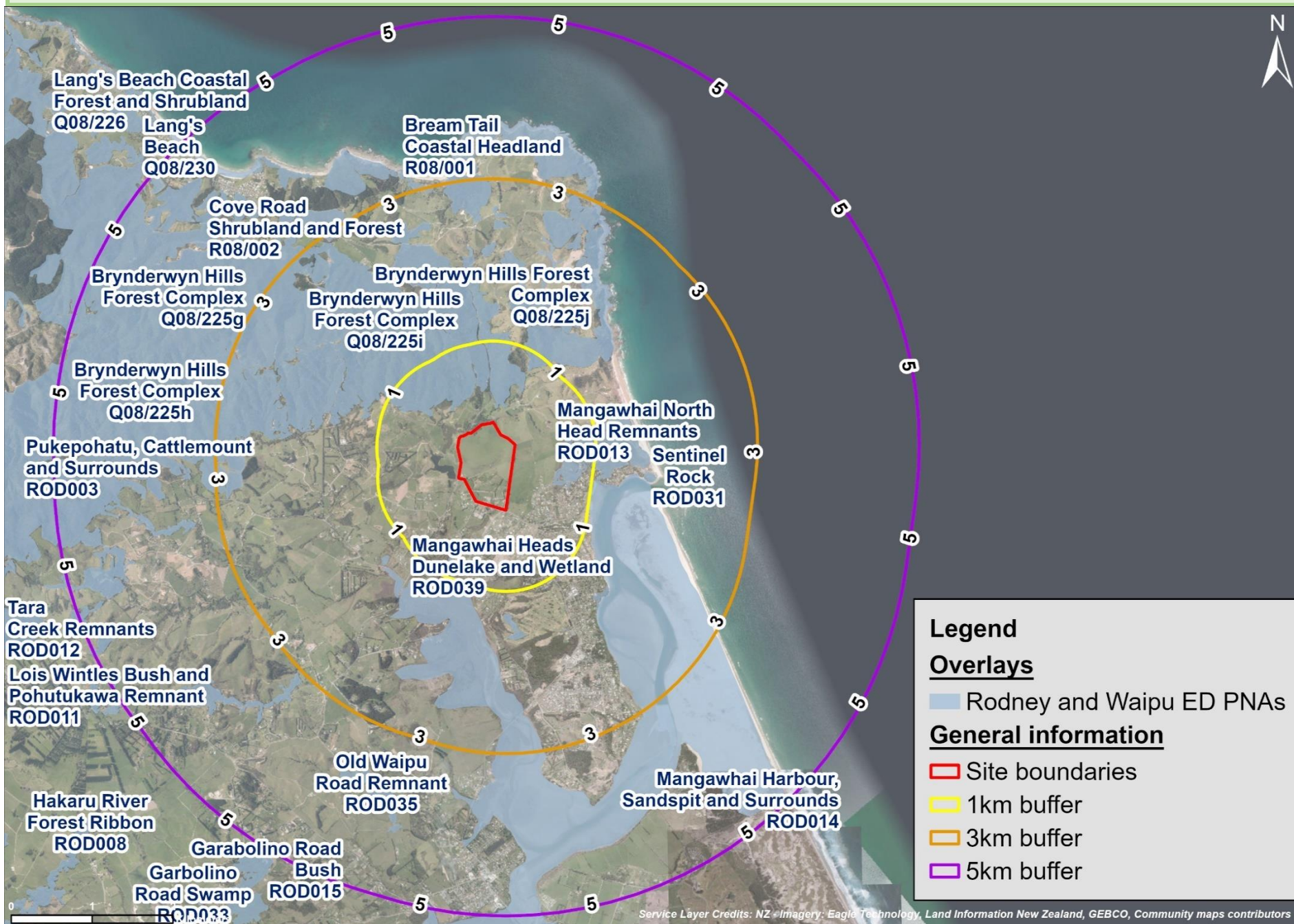
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APPENDIX 1 – TERRESTRIAL AND AQUATIC HABITATS (INDICATIVE)



APPENDIX 2 – MAP SHOWING NEARBY PROTECTED NATURAL AREAS (PNAS)



APPENDIX 3 – FLORA INVENTORY

*- Indicate exotic plant species

** - Indicate exotic pest plants

+ - Threatened species (de Lange *et al.* 2017)

Botanical + Common Name

FERNS & ALLIES

Adiantum cunninghamii common maidenhair
Adiantum hispidulum rosy maidenhair fern
Asplenium oblongifolium shining spleenwort
Blechnum filiforme (*Icarus filiformis*) threadfern
Blechnum novae-zelandiae (*Parablechnum novae-zelandiae*) kiokio
Cyathea dealbata ponga
Cyathea medullaris mamaku
Deparia petersenii subsp. *congrua*
Dicksonia squarrosa wheki
Diplazium australe
Doodia australis (*Blechnum parrisiae*) rasp fern
Hymenophyllum flexuosum filmy fern
Hymenophyllum nephrophyllum kidney fern
Paesia scaberula sweet fern
Pakau pennigera gully fern
Parapolystichum glabellum smooth shield fern
Pteridium esculentum bracken
Pteris macilenta sweet fern
Pteris tremula shaking break
Zelandia pustulata subsp. *pustulata* hound's tongue

CONIFERS

Agathis australis kauri + - Nationally vulnerable
Dacrydium cupressinum rimu
Dacrycarpus dacrydioides kahikatea
Pectinopitys ferruginea miro
Phyllocladus trichomanoides Tanekaha
*Pinus pinaster*** maritime pine
Podocarpus totara var. *totara* totara
Prumnopitys taxifolia matai

DICOT TREES, SHRUBS & CLIMBERS

Beilschmiedia tarairi taraire
Carpodetus serratus putaputaweta
Coprosma aerolata thin leaved coprosma
Coprosma arborea mamangi
Coprosma robusta karamu
Coprosma rhamnoides twiggy coprosma
*Erythrina x sykesii*** flame tree
Geniostoma ligustrifolium hangehange

Griselinia lucida akapuka
Hedycarya arborea pigeonwood
Hoheria populnea houhere
Knightia excelsus rewarewa
Kunzea robusta kanuka + - *Nationally vulnerable*
Laurelia novae-zelandiae pukatea
Leucopogon fasciculatus mingimingi
*Ligustrum lucidum***tree privet
Meliccytus ramiflorus mahoe
Myrsine australis mapou
Muehlenbeckia complexa var. grandifolia
Piper excelsum kawakawa
Pseudopanax crassifolius lancewood
Rubus cissoides bush lawyer
Salix sp.**willow
Schefflera digitata pate
*Ulex europaeus*** gorse

DICOT HERBS

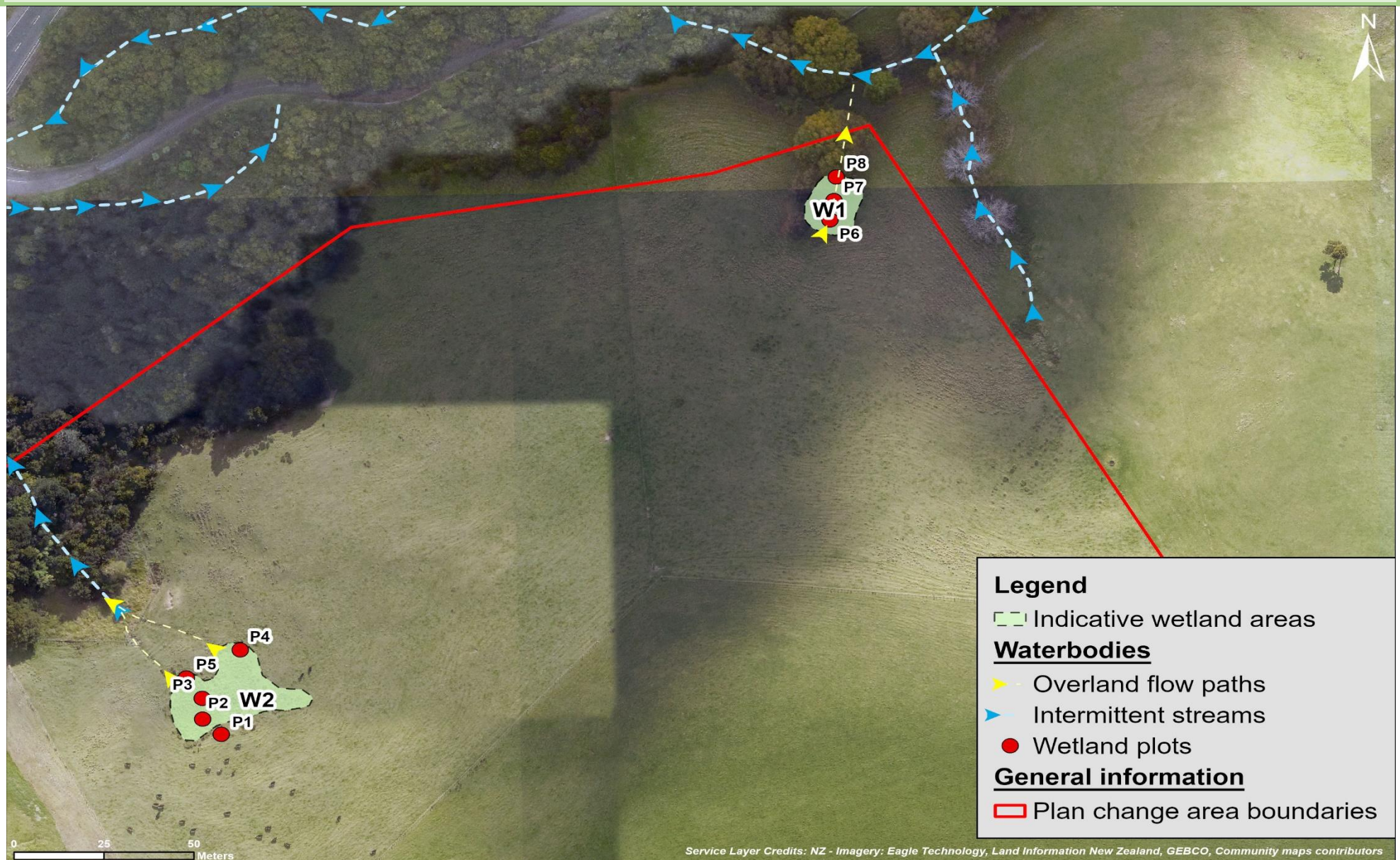
Centella uniflora
*Cirsium vulgare**
*Erechtites valerianifolia***Brazilian fireweed
*Galium aparine**
Haloragis erecta
*Jacobaea vulgaris*** ragwort
Lobelia anceps
Lotus sp.*
Nertera villosa
Phytolacca octandra *
Plantago sp.*
Prunella vulgaris *
Ranunculus repens creeping buttercup
Senecio esleri Esler's fireweed
*Solanum nigrum**
*Sonchus asper**
*Sonchus oleraceus**sow thistle

MONOCOTS

Carex lessoniana rautahi
Carex solandri forest sedge
Carex uncinata bastard grass
Carex virgata pukio
*Cortaderia selloana*** pampas grass
Cordyline australis ti kouka
Dianella nigra ink berry
Eleocharis acuta sharp spike sedge
Freycinetia banksii kiekie
Gahnia lacera cutty grass
*Hedychium gardnerianum*** wild ginger
Oplismenus hirtellus subsp. *imbecillis* basket grass
Rhopalostylis sapida nikau

Ripogonum scandens supplejack
*Zantedeschia aethiopica***arum lily

APPENDIX 5 – WETLAND PLOT RESULTS



Site	Cove Rd – Title no 876914													
Date	09/05/2022													
Common name	Species	Biostatus	Pasture sp.	Weighing factor (B)	Status (Clarkson et. al 2021) or based on ecologist expertise	Pasture composition plot					W1			
						P1	P2	P3	P4	P5	P6	P7	P8	
Creeping bent	<i>Agrostis stolonifera</i>	Exotic		2	FACW								5%	
Kikuyu	<i>Cenchrus clandestinus</i>	Exotic	Yes	4	FACU	100%	60%	40%	80%	70%	40%	5%	10%	
Globe sedge	<i>Cyperus brevifolius</i>	Exotic		2	FACW		5%					3%		
Cocksfoot	<i>Dactylis glomerata</i>	Exotic	Yes	4	FACU			2%					5%	
Yorkshire fog	<i>Holcus lanatus</i>	Exotic	Yes	3	FAC			3%				2%		
Lotus	<i>Lotus pedunculatus</i>	Exotic	Yes	3	FAC	7%	10%	7%	5%	5%	10%		3%	
Soft rush	<i>Juncus effusus</i>	Exotic		2	FACW		25%	45%		25%	40%	2%	3%	
	<i>Juncus sarophorus</i>	Non-Endemic		2	FACW				5%	1%	25%	25%	3%	
Dallas grass	<i>Paspalum dilatatum</i>	Exotic		4	FACU		5%	3%	10%				5%	
Mercer grass	<i>Paspalum distichum</i>	Exotic		2	FACW				3%			70%	2%	
Creeping buttercup	<i>Ranunculus repens</i>	Exotic		3	FAC		5%	5%		7%	10%		70%	
White clover	<i>Trifolium repens</i>	Exotic	Yes	4	FACU	2%	3%	5%		3%				
Total cover						109%	113%	110%	103%	113%	125%	112%	3.1	
% pasture species (Stewart et al. 2014)						109%	73%	55%	85%	80%	90%	9%	21%	
Excluded from NPSFM - artificial or improved pasture species >50%?						Yes	Yes	Yes	Yes	Yes	Yes	No	No	
Rapid test						No	No	No	No	No	No	Yes	No	
Dominance test						No	No	No	No	No	No	Yes	Yes	
PI						3.93	3.36	3.0	3.66	3.41	3.12	2.12	3.14	
Hydric soil present (Yes or No)						Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Wetland hydrology present (Yes or No)						Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
NPSFM wetland (Yes or No)						No	No but non-normal conditions	No but non-normal conditions	No but non-normal conditions	No but non-normal conditions	No but non-normal conditions	Yes	Yes	

REPRESENTATIVE PLOT PHOTOS

Potential Wetland 2 (W2)

Plot 1



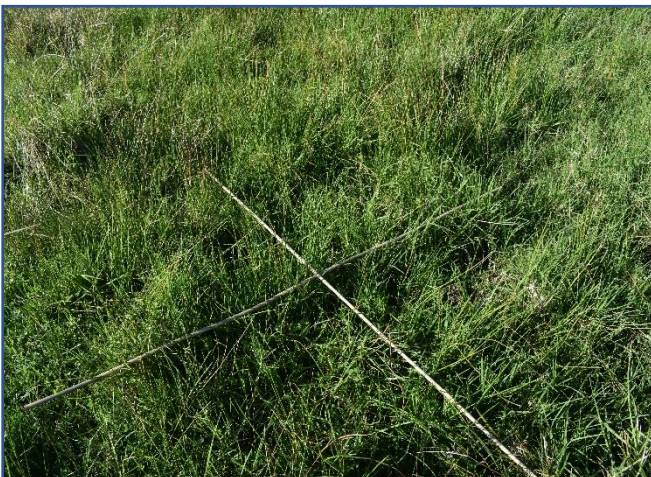
Plot 2



Plot 3



Plot 4



Plot 5



Potential Wetland 1 (W1)

Plot 6



Plot 7



Plot 8



Potential Wetland 3 (W3) – Vantage point and Aerial Imagery Analysis only

Photo 1



Photo 2



Photo 3



APPENDIX 6 – BIRD SURVEY RESULTS

Observer	MV	Date	06/05/2022 and 09/05/2022	General location	Cove Road (Northern aspect of site)	Specific location	S1 – pasture looking south S2 – within northern bush S3 – built up area near Mangawhai Heads Rd SongMeter Recorder – northern bush (site boundary)	
Station number					S1	S2	S3	
Start time (24 hour)					09:30	14:00	08:30	
Temperature (1-6)					4	4	3	
Wind (0-3)					0	0	1	
Other noise (0-2)					1	1	0	
Sun (minutes)					5	5	5	
Precipitation type (N, M, R, H, S)					N	N	N	
Precipitation value (0-5)					0	0	0	
Common name	Scientific name	New Zealand Status	Seen	Heard	Seen	Heard	Seen	Heard
<i>Acridotheres tristis</i>	Myna	Introduced & Naturalised	2				2	
<i>Anas platyrhynchos</i>	Mallard	Introduced & Naturalised	2		1			
<i>Carduelis carduelis</i>	European goldfinch	Introduced & Naturalised	5				1	
<i>Circus approximans</i>	Swamp harrier	Native & Not Threatened	1				1	
<i>Gerygone igata</i>	Grey warbler	Endemic & Not Threatened				1		
<i>Hirundo neoxena</i>	Welcome swallow	Native & Not Threatened	10+				3	
<i>Passer domesticus</i>	House sparrow	Introduced & Naturalised	10+				10+	
<i>Platycercus eximius</i>	Eastern rosella	Introduced & Naturalised	5			1		
<i>Porphyrio melanotus</i>	Pukeko	Native & Not threatened	3		1		1	
<i>Rhipidura fuliginosa</i>	New Zealand fantail	Endemic & Not Threatened	3		2			
<i>Tadorna variegata</i>	Paradise shelduck	Endemic & Not Threatened	3		2			
<i>Todiramphus sanctus</i>	Sacred kingfisher	Native & Not Threatened		1	1	1		
<i>Vanellus miles</i>	Spur-winged plover	Native & Not Threatened	5			1		2
<i>Zosterops lateralis</i>	Silvereeye	Native & Not Threatened			1			
Sun (0-5)	Record approximate duration, in minutes, of bright sun on the canopy immediately overhead			Seen and Heard Birds that are first heard should be entered under H (even if they are later seen), birds that are first seen should be entered under S. Adding H and S should give the total number of birds observed				
Time	24-hour clock, at the beginning of each count			Unbounded Counts are unbounded				
Temperature	Wind	Other Noise	Precipitation type	Precipitation value				
1 freezing < 0°C	The average for each five-minute count on a modified Beaufort scale:	i.e. Other than wind the average for the five minutes	Average for each count	0 None				
2 cold 0-5 °C	0 Leaves still or move without noise (Beaufort 0 and 1)	0 not important	N None	1 Dripping foliage				
3 cool 6-10 °C	1 Leaves rustle (Beaufort 2)	1 moderate	M Mist	2 Drizzle				
4 mild 11-15 °C	2 Leaves and branches in constant motion (Beaufort 3 and 4)	2 loud	R Rain	3 Light				
5 warm 16-22 °C	3 Branches or trees sway (Beaufort 5, 6 and 7)		H Hail	4 Moderate				
6 hot > 22 °C			S Snow	5 Heavy				

APPENDIX 7 – SURVEY LOCATIONS

