



## ASSESSMENT OF ECOLOGICAL VALUES

### NGĀWHĀ INNOVATION AND ENTERPRISE PARK

Report 2022 482

Prepared for Far North Holdings Limited

**NZE Quality System:**

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Consultation

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Water Quality Monitoring

Environmental Management

Pest Reduction Advice

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## PERSONNEL

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### Tricia Scott – Project Manager / Environmental Scientist

Tricia Scott has more than 25 years of experience in environmental monitoring and management in the Far North. Tricia has seasoned experience in undertaking ecological monitoring, groundwater and surface water quality monitoring and industrial testing. Tricia has extensive experience in resource consent monitoring and compliance and is experienced in contaminated site assessment and remediation. Tricia has prepared and supervised numerous ecological assessments and environmental impact assessment reports as well as a range of management plans. Tricia has also planned and supervised a number of restoration plantings in the North and South Islands. Tricia is a Certified Environmental Practitioner (CEnvP).

### Joana Unteregger – Ecologist

Joana Unteregger is a plant ecologist, with a background in environmental science and biosecurity. She holds a BSc (in environmental science, ecology and biodiversity, 2018), and an MSc (Research) degree from the University of Waikato (Environmental Science, 2021). Her thesis investigated the flowering phenology of mānuka in Aotearoa, New Zealand. Joana conducts a variety of ecological and wetland assessments.

### Heather Windsor – Earth Scientist

Heather holds a BSc in Earth Sciences and Biology and has more than 20 years' experience work including testing for contaminants in ground and surface waters, coastal and riverine water quality sampling, hydrographic ratings, and processing data. Heather's work includes monitoring of groundwater, geothermal, lakes, springs and rivers, as well as soil and vegetation sampling for hydrocarbon, heavy metals and other contaminants. Heather has been working in the assessment and remediation of soils on HAIL or contaminated sites since the inception of the current National Environmental Standards (NES) in January 2011 undertaking assessments on a wide variety of sites, including orchards, commercial and industrial sites. Heather is a member of WasteMINZ and holds a Contaminated Sites Safety Certificate.

### Dr Gary Bramley – Ecologist

Gary holds a PhD (Biology, 1999) and an MSc (Hons) in Ecology. Since 2000 Gary has been self-employed as an Ecologist at The Ecology Company Ltd. Prior to this he lectured at the University of Waikato and tutored at Waikato Polytechnic. A northland local, Gary has a strong knowledge of New Zealand flora and fauna and has produced seven scientifically published papers. He carries out a range of ecological work including producing Assessments of Ecological Significance, Assessments of Environmental Effects, restoration plans, weed and pest management plans and provides advice on ecological matters to landowners. Gary has been a judge for the Northland Ballance Farm Environment awards and is presently chairman of the Puketi Forest Trust and Tahawai Te Kohanga Reo. In 2003 Gary received the RFBPS "Old Blue" award for contribution to Conservation in Northland and in 2007 received an award for Contribution in Conservation of Northlands Biodiversity from the Northland Biodiversity Enhancement Group.

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## EXECUTIVE SUMMARY

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Far North Holdings Limited (FNHL) owns and proposes a private plan change for approximately 256.8ha of land to enable creation of the Ngāwhā Innovation and Enterprise Park (NIEP). The land is situated on State Highway 12, opposite (north of) Kaikohe Golf Course and the Kaikohe A&P Showgrounds. This is a collation of Ecological and Wetland Assessments as requested by FNHL.

The Site is located within the Kaikohe Ecological District and Northland Ecological Region. The Kaikohe Ecological District covers approximately 62,800 ha, of which only 2,001 ha is protected, almost half at one site. Of the natural areas remaining in 2000, 51% was forest, 34% shrubland, 1.5% swamp forest and swamp shrubland, 3.5% wetland, and 10% lakes or open water. The district includes a number of unique ecological features, including Lake Omapere, the largest freshwater lake in Northland.

Ecological values at the Site include volcanic broadleaf forest, broadleaf podocarp forest, kahikatea swamp forest, tōtara-taraire-puriri dominated forest, kahikatea-maire tawaka swamp forest, natural inland flax-sedgeland wetlands, wetlands, riparian areas, individual trees and stands of trees.

Indigenous vegetation at the Site includes 18 natural inland wetlands (20.03ha) and 22.9ha of forest, some of which have been recognised as a significant natural area in the Protected Natural Area Programme surveys of the district in the early 1990s, and was remapped as Significant Natural Areas by Wildland Consultants Limited in 2019.

Wetlands are also a regional and national priority for protection on private land, and natural inland wetlands are protected from development by the National Policy Statement for Freshwater Management (NPS-FM) and accompanying National Environmental Standards (NES) for Freshwater which were enacted in 2020. An extensive Biodiversity Management and Enhancement Plan is proposed across the Site, predominantly to protect and enhance forest edges, riparian areas, buffer existing wetlands, and provide better connectivity between habitats in accordance with the NPS-FM, with a goal on achieving a 20% improvement in biodiversity values. Offset planting undertaken as part of the Matawii Reservoir project will result in additional ecological improvements.

The ecological opportunities at the Site arise from maximising the extent and quality of the indigenous vegetation, buffering sensitive habitat such as wetlands, connecting habitat fragments, allowing drains to infill naturally to improve ecological connections for fish and implementing effective pest control for protection of fauna.

Having given regard to the policies and objectives in the Far North District Plan we consider that achieving resource consent to undertake activities in any of the wetlands or any of the three largest forest blocks (including the one which forms part of Kopenui Stream Remnants as identified by Conning and Miller (2000)) would be difficult to support on ecological grounds. On that basis those areas should be avoided.

Minor works affecting areas with ecological value, such as stream crossings, surface water takes or short sections of stream removal (via culverting or other method) might be ecologically defensible provided that sufficient improvements are made to other areas of the stream within the Site to offset or compensate for any adverse effects. Activities affecting streams at the Site would need to be considered on a case by case basis.

We consider that the policies and objectives of the Far North District Plan and Northland Regional Policy Statement and the relevant National Policy Statements (particularly the National Policy Statement for Freshwater Management) would be given effect to if the following recommendations are incorporated into the proposed plan change:

- Retention of all existing wetland, forest and indigenous riparian vegetation.
- All indigenous vegetation and habitats (including newly created habitats) at the site to be formally protected either through the plan change or via covenanting.
- Retaining mature isolated indigenous trees or small groups of trees, protecting their root structures to maintain and enhance their ecological values by ensuring that cropping takes place around these trees. In the case of NIEP proposed activities conflicting with this, additional ecological surveys to identify bats, lizard or alternative options be undertaken.

- Horticultural activities, such as perennial cropping, be setback 20m from the wetlands, and the forest blocks.
- Ensure that earthworks required to form drainage on the south side of the Northern Platform which come within 10m of wetland 12 do not intrude on the wetland and do not result in any soil deposition there.
- Ensure that any works required to form the constructed wetland (Pond 5) south and uphill of wetland 9 are more than 10m away from Wetland 9 and do not result in any soil deposition there.
- Buildings, storage areas, tunnel houses, glasshouses, car parks and accessways need to be set back from identified ecological areas by at least 20m from the forest buffer, and outside the wetland exclusion zones.
- Construction, buildings, building areas, and machinery do not enter the wetlands.
- Machinery is cleaned prior to working at the site and prior to leaving the site, preventing the introduction, and spread of weeds.
- That as far as possible, earthworks be carried out during dry summer months (December to April) minimising mobilisation of sediments.
- Best practice erosion and sediment control (GD05 Guidelines) for all earthworks necessary to develop the Site be undertaken in accordance with an environmental management plan which includes protection and buffering of indigenous habitats, in order to address adverse effects.
- The keeping of domestic pets at the Site to be banned.
- A Biodiversity Management and Enhancement Plan be prepared by a suitably qualified and experienced ecologist, including:
  - Weed Management Plan, detailing weed management to protect native wildlife and habitats at the Site.
  - Pest Control Plan, detailing pest control and management to protect native wildlife and habitats at the Site, with particular emphasis on control feral cats, rats, possums and mustelids
  - Planting and Biodiversity Enhancement Plan, detailing different planting zones, planting areas, and species to be planted with the aim of restoring degraded habitat (particularly riparian habitats), buffering sensitive habitats such as wetlands and streams, connecting existing habitats and habitat fragments, particularly around Young's Kahikatea Remnant, and recreating appropriate habitats at the Site.
- Surveys and summary reports to be prepared annually for the first five years to monitor the environment, and the ecological and biodiversity gains, including:
  - Water quality surveys.
  - Freshwater fish surveys.
  - Planting monitoring and maintenance.

We have recommended additional ecological planting across the Site predominantly to protect and enhance forest edges and buffer existing wetlands in accordance with the NPS-FM. Recommendations also include re-establishment wetland planting to connect fragments and riparian buffer planting and ecological connectivity planting across the Site. However, planting areas are subject to change as the Planting and Biodiversity Enhancement Plan is still in development.

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## 1. INTRODUCTION

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### 1.1 FOREWORD

This is a collation of Ecological and Wetland Assessments as requested by Far North Holdings Limited ('**FNHL**') as part of the memorandum proposing the development of a Special Purpose Zone for the Ngāwhā Innovation and Enterprise Park ('**NIEP**') here after referred to as '**the Site**'.

Surveys and assessments included are:

- 2018 276 Assessment of Ecological Values of Land Owned by Grazing North Limited at Ngāwhā to Inform a Proposed Plan Change
- 2021 429 Assessment of Ecological Values Lot 1 DP 176274 & Lot 2 DP 176274.
- 2019 Freshwater Fish Survey, Ngāwhā Industrial and Enterprise Park
- 2021 470 Wetland Assessment

The reason that four separate Ecological and Wetland Assessments have been carried out between 2018 and 2021 is that additional land was purchased, resource consents were sought for specific areas, and policy changes have occurred during this time requiring incorporation into assessment reports. Earlier reports have since been modified and the wetlands reassessed with respect to their status in terms of the National Policy Statement – Freshwater Management ('**NPS-FM**') and accompanying National Environment Standards for Freshwater ('**NES-FW**') which took effect 3 September 2020.

The composite information in this report will serve as baseline information for future reference. Its aim is to support a plan change and identify any ecological constraints or opportunities that the Site may provide prior to establishing any enterprises at the Site. Please note ecological opportunities at the Site include ecological plantings with a goal of achieving a 20% improvement in biodiversity values. However, planting areas are subject to change as the Planting and Biodiversity Enhancement Plan is still in development.

This report contains areas of ecological value that were not assessed by NZ Environmental ('**NZE**'). These areas have since been included in the report due to their identification by Tonkin+Taylor, and by NZE on aerial imagery. Their inclusion will inform the total extent of areas of ecological value at the Site, however, will not be discussed.

### 1.2 BACKGROUND

FNHL is the owner of a property situated opposite (north of) Ngāwhā Springs Road and the existing Kaikohe Golf Course, Kaikohe (Figure 1, Appendix A, A-1). FNHL is the commercial trading and asset management arm of the Far North District Council ('**FNDC**'). Until recently the property was part of a dairy farming unit and access to the Site is off a formed driveway located at 5435 State Highway 12, Ngāwhā. Livestock had been removed since the land was purchased by FNHL but have since been reintroduced to the Site to maintain the grass.

The property (~256.8ha) is zoned Rural Production in FNDC plan. FNHL are currently constructing the NIEP at this location. The Site is divided into two main areas, the Horticultural Precinct, and the Innovation and Enterprise Precinct (Figure 1). Construction includes intensification and diversifying the cropping and productive uses of this land and includes buildings, storage areas, tunnel houses, glass houses, car parks, and accessways required to sustain these activities (Appendix A, A2 - 6).

The Horticultural Precinct is comprised of Lots legally described as Lot 1 DP 336520 (4.95 ha), Lot 2 DP 196311 (5.95 ha), Lot 1 DP 172355 (24.55 ha), Sec 15S Te Pua SETT (21.10 ha), Lot 1 DP 196320 (91.36 ha). The the Innovation and Enterprise Precinct is comprised of Lots legally described as Lot 1 DP 190387 (29.97 ha), Orauruwharo 5B2C (1.02 ha), Lot 1 DP 196319 (0.63 ha), Reihatia B1 (24.83 ha), Lot 1 DP 176274 (18.3 ha), Lot 2 DP 176274 (34.19 ha), Lot 1 DP 196320 (91.36 ha),

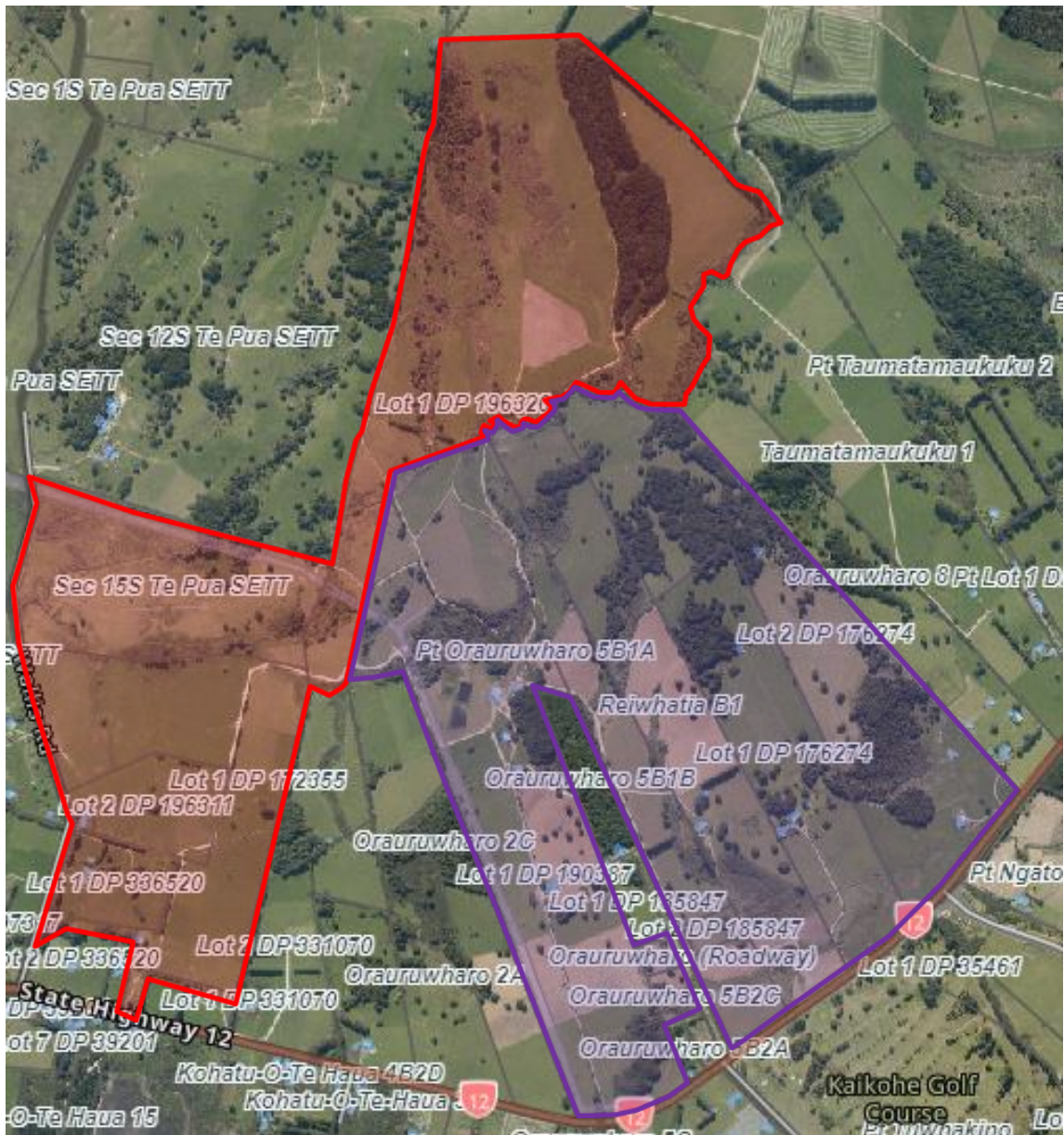


Figure 1: Map of Ngāwhā Innovation and Enterprise Park (NIEP). Horticulture Precinct (red), Innovation and Enterprise Precinct (purple).



### 1.3 ECOLOGICAL CONTEXT

The Site is located in the Kaikohe Ecological District ('ED') and Northland Ecological Region (McEwen 1987, Brook 1996). The Kaikohe Ecological District is located in the centre of the mid-north between the Bay of Islands in the east and the Hokianga Harbour in the west. The district is centred approximately on Lake Omapere and adjoins the Puketi ED to the north, the Hokianga ED to the west and north-west. Kerikeri ED to the east and Tangihua ED to the south. The district extends from the Waima River in the west to Pakaraka in the east and includes the upper catchments of the Waitangi River.

Conning and Miller (2000) mapped and briefly described most of the areas of indigenous natural vegetation within the Kaikohe ED providing an analysis of the main vegetation types, as well as information on threatened species and other taxa of scientific interest present in the district as part of the Protected Natural Areas Programme ('PNAP') in 1994 and 1995. The Kaikohe ED covers approximately 62,800ha, approximately 13,190ha (21%) of which comprises natural areas (Conning and Miller 2000). Conning and Miller (2000) identified 84 natural areas scattered across the district. Of the natural areas identified, 51% was forest, 34% shrubland, 1.5% swamp forest and swamp shrubland, 3.5% wetland, and 10% lakes or open water (Conning and Miller 2000). The protected natural areas within the Kaikohe ED cover only 2,001ha, almost half of which comprises one location (Conning & Miller, 2000).

The Kaikohe Ecological District contains several distinct features including:

- Lake Omapere, which is the largest freshwater body in Northland.
- South and east of Lake Omapere, volcanic cones and basalt lava flows have produced some of the best examples of volcanic broadleaf forest in the Northland Region. These forests are seasonally important kūkupa (*Hemiphaga novaeseelandiae*) habitat.
- Where water flow has been impeded, remnants of swamp forest and wetland sometimes occur.
- The geothermal and gumland heath area of Ngāwhā Springs is unique in the Northland Region.

The underlying geology of Mangakahia Complex sedimentary and basaltic volcanic rock types is typical of the Kaikohe ED, which contains a high diversity of vegetation types, including some which are regionally and nationally rare such as gumland, mature podocarp forest, volcanic broadleaf forest, swamp shrubland, and swamp forests. Mānuka – kānuka (*Leptospermum scoparium* – *Kunzea robusta*) shrubland, broadleaf-podocarp and secondary podocarp forest and are the most common vegetation types within the district (Conning and Miller 2000).

The majority of the vegetation within the Kaikohe ED has been cleared for farming, forestry and human settlement. Conning and Miller (2000) considered that the priority areas for protection in the Kaikohe ED included gumlands, wetlands, mature podocarp, kauri, and volcanic broadleaf forests, as well as areas of kiwi (*Apteryx mantelli*) habitat.

Having evaluated the sites with indigenous vegetation throughout the district, Conning and Miller grouped them according to two levels of ecological significance, with Level 1 sites being of the highest ecological value and Level 2 sites supporting populations of indigenous flora and fauna, but of generally lower ecological value than Level 1 sites. Areas identified by Conning and Miller (2000) located at, or close to the Site, are P05/036 Kopenui Stream Remnants and P05/035 Youngs Kahikatea Remnant.

Kopenui Stream Remnants (18.6ha) is a Level 2 site with representative vegetation of volcanic broadleaf forest with frequent pūriri (*Vitex lucens*) and occasional kahikatea (*Dacrydium dacrydioides*) and taraire (*Beilschmiedia tarairi*). This forest type was once typical of the area east of Lake Omapere but is now rare (Conning & Miller, 2000). Young's Kahikatea Remnant, P05/035 (Figure 2), was considered by Conning and Miller to be a Level 1 site due to it being an extremely rare swamp forest - maire tawake (*Syzygium maire*) was identified as Threatened – Nationally Critical and Regionally Significant, and mānuka At-Risk-Declining.

More recently Wildland Consultants Limited attempted to map ‘Significant Natural Areas’ (SNAs) in the Far North District on behalf of the FNDC. Kopenui Stream Remnants (FN172) was increased in area to 103ha, and Young’s Kahikatea Remnant (FN669) has decreased to 7.48ha (Figure 3).

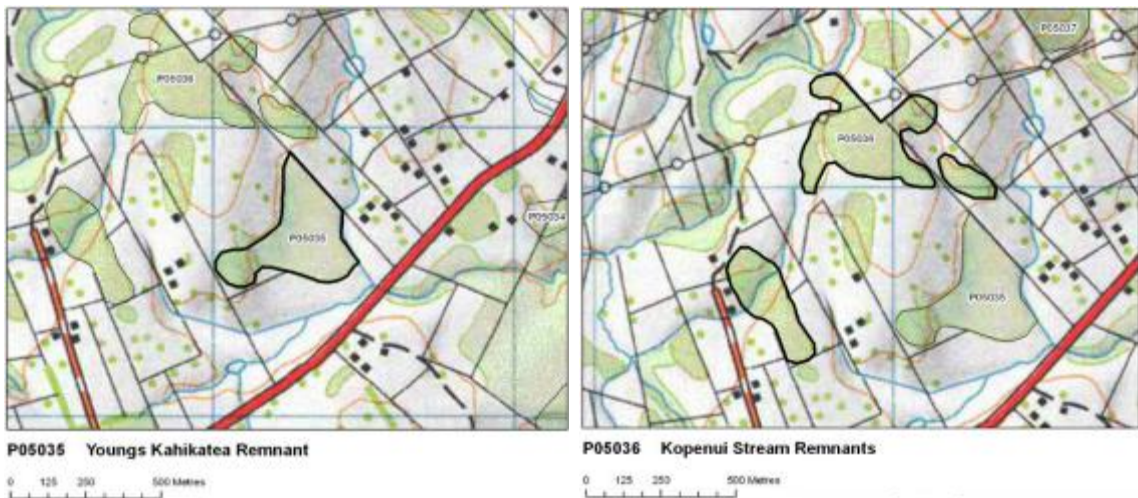


Figure 2: PNAS near or at the site. Youngs Kahikatea Remnant (P05035), and Kopenui Stream Remnants (P05036).

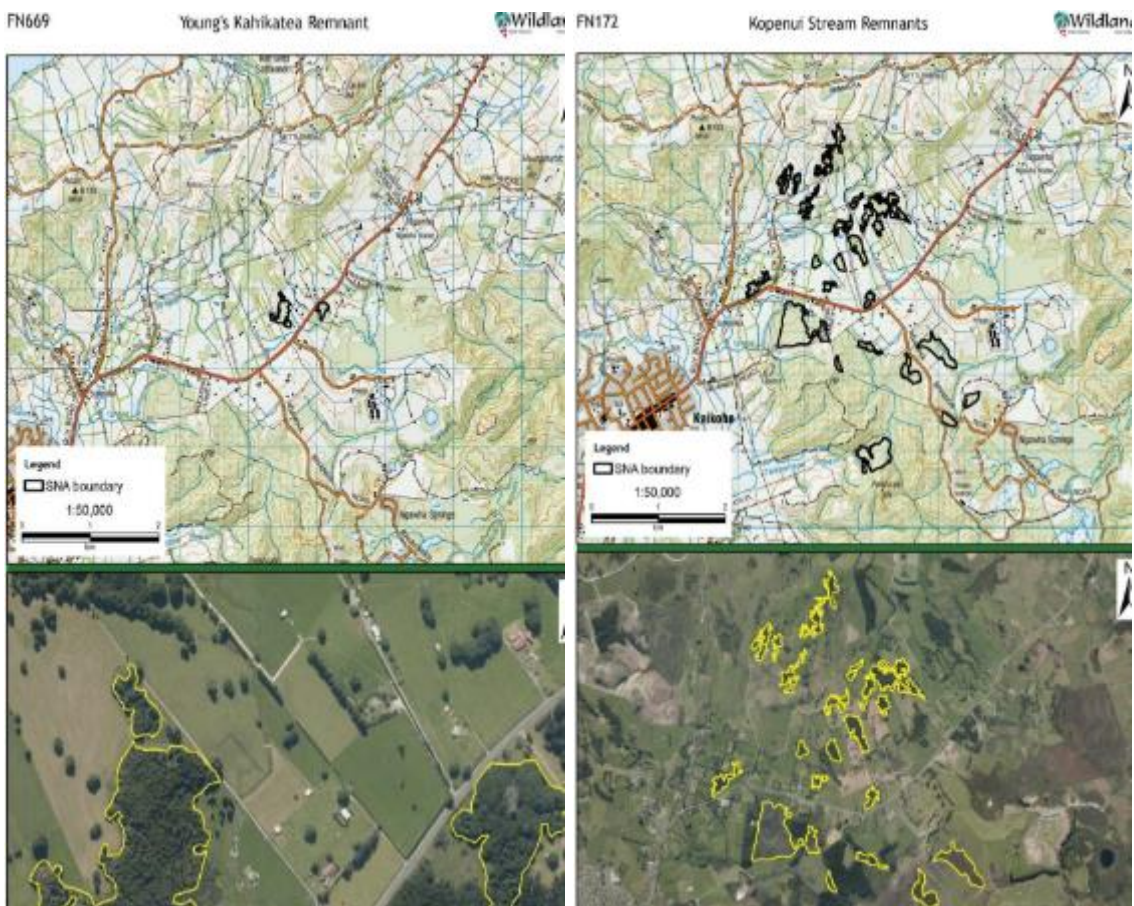


Figure 3: SNAs near or at the site. Kopenui Stream Remnants (FN172) and Young’s Kahikatea Remnant (FN669).

### 1.3.1 Climate

The district extends from sea level, at the head of the Hokianga Harbour to 360m asl and has a mild and humid climate. The winds come predominantly from the south-west and in the Kaikohe area generally average <20km/hr (Chappell, 2013).

An average rainfall of 1,550mm/year has been recorded at the Northland Regional Council ('NRC') recording station, located in near Ohaeawai, over the last 10 years (November 2011 to November 2021), with most rainfall occurring during winter. The driest months are January and November. The ED is also subject to periodic cyclonic storms in late summer and early autumn which bring heavy rainfall and may have widespread effects such as floods, slips and windfalls. Heavy rainfall also occurs when north-easterly flows arise between ridges of high pressure to the east and troughs over the Tasman Sea. The median annual average temperature is 14 – 15°C in nearby Kaikohe. The Kaikohe area has about 1800 hours of bright sunshine per year (Chappell, 2013).

### 1.3.2 Soils and Topography

The topography of the Site is generally flat to gently undulating, with few rolling hills intersected by streams. The predominant soil type at the Site is mapped as Whakapai clay loam, which is well drained. This soil is considered a young basalt volcanic soil and is naturally fertile (NRC Soil Fact Sheet 8.1.1).

The second most dominate soil type at the Site is mapped as Waiotu friable clay and its hill variant, which is well to moderately drained, and is considered a mature basalt volcanic soil. This soil is friable and is characterised by infertile topsoil. Both soils are susceptible to leaching and are drought prone (NRC Soil Fact Sheet 8.1.2).

The third soil type on the property is the Kara silt loam which is poorly to very poorly drained and has terrace alluvium parent materials (NRC Soil Fact Sheet 7.0).

## 1.4 ECOLOGICAL SETTING AND INTRODUCTION

The property comprises mostly flat to gently undulating pasture, artificial ponds and drains, native wetlands, and native forest remnants including pūriri, kahikatea, and tōtara (*Podocarpus totara*). The wetland areas are dominated by kuawa (*Schoenoplectus tabernaemontani*) and raupō (*Typha orientalis*) and were generally edged by kahikatea.

From discussions with the landowner, reference to historical photographs, and personal observation<sup>1</sup> over 30 years, the Site have historically been used for dry stock farming including beef cattle and horses. Aerial photographs show that the land was in pasture in 1957, with few stands of remnant trees, most likely pūriri, and occasional kahikatea and taraire which remain today (Appendix A, A-7). Much of the property is currently under earthworks and construction activities associated with the consented development of the NIEP.

This report mentions previous reports (Section 1.1). Therefore, a brief introduction of each assessment and a description of the location is included below:

### 1.4.1 2018 276 Assessment of Ecological Values of Land Owned by Grazing North Limited at Ngāwhā to Inform a Proposed Plan Change (2018 EA)

Far North Holdings Limited proposes a private plan change of the land previously owned by Grazing Northland Limited to enable creation of the Ngāwhā Innovation and Enterprise Park at the Site.

NZ Environmental Limited was retained in November 2018 to assess the terrestrial ecological values of the Site and identify constraints and opportunities with respect to those ecological

<sup>1</sup> Pers. Comm. Tricia Scott

values, as well as assessing the environmental effects of the proposed plan change. This information is required to inform the proposed plan change application.

The vegetation and habitats assessed in the 2018 EA report are located on 11 Lots: Lot 1 DP 172355 (24.34ha), Lot 1 DP 336520 (4.95ha), Lot 2 DP 196311 (5.96ha), Lot 1 DP 196320 (89.98ha), Pt Orauruwharo 5B1A (1.36ha), Lot 1 DP 190387 (29.74ha), Lot 1 DP 196319 (0.62ha), Orauruwharo 5B2C (1.02ha) and Reiwhatia B1 (24.55ha), Lot 2 DP 185847 (0.87ha) and Section 15S Te Pua Settlement (21.28ha) (Figure 4). This property comprises approximately 204.7ha.

#### **1.4.2 2021 429 Assessment of Ecological Values Lot 1 DP 176274 & Lot 2 DP 176274 (2021 EA)**

The proposal entails intensifying and diversifying the cropping and productive use of this land and includes buildings, storage areas, tunnel houses, glasshouses, car parks and accessways required to sustain these activities. This investigation was undertaken over two recently acquired lots: Lot 1 DP 176274 (18.31ha) and Lot 2 DP 176274 (34.19ha) (Figure 4). This investigation area has a history of being operated as pastoral grazing and for cropping. The north end of Lot 2 bounds the Site of the proposed Matawii Reservoir ('MR') and is outside the scope of this investigation.

FNHL have requested this ecological assessment to support a plan change and prior to establishing any horticulture or agricultural enterprises at the Site in order to identify any ecological constraints or opportunities that the Site may provide.

#### **1.4.3 2019 Freshwater Fish Survey, Ngāwhā Industrial and Enterprise Park (2019 FFS)**

As part of an Ecological Assessment of the NIEP, an FFS was carried out on the Kopenui Stream and on a tributary of the Ngāwhā Stream located on the same property, to determine if any fish species were present in the waterways on the property to inform site management in the future.

The 2019 FFS was conducted on the same properties as the 2018 EA.

#### **1.4.4 2021 470 Wetland Assessment (2021 WA)**

FNHL propose to construct two adjacent building platforms in the northern portion of the Innovation and Enterprise Precinct within the NIEP (Appendix A, A – 4). Works will impinge on the 10m setback distance to the wetland boundary in a small section of the western tributary wetland when forming the stormwater drain on the southern side of the platform. The proposal entails diverting water from the western tributary to a constructed wetland, below the retired dairy farm effluent ponds, which will effectively augment depleted flows to the Kopenui Stream, as detailed in the consent application and the hydrology report prepared by Adrian Tonks (Appendix C).

NZ Environmental Limited was retained to assess the ecological values of the Site. The scope specifically seeks to respond to S92(1) request to provide additional information to process the Resource Consent Application App.043181.01.01 – Far North Holdings Ltd – Earthworks for Building Platforms at State Highway 12, Ngāwhā.

The additional information requested is as follows:

- (1) An ecological site assessment to confirm the locations of natural inland wetlands on the site that may occur within 100m of the proposed building platform locations.

The extent of any wetland within 100m of the proposed works shall be clearly delineated and identified on a plan.

- (2) An analysis of the hydrology of the catchment before and after the development, an analysis of the hydrology of the catchment and an assessment of how hydrological changes resulting from the completion of the proposed development may affect the natural inland wetlands identified onsite. Particularly, the diversion of stormwater caused by the impervious surfaces (e.g. roofs and driveways) and stormwater attenuation (e.g. water tanks) on the proposed development and how that change in movement and supply of water will affect the wetlands.

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## 2. METHODS

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### 2.1 ECOLOGICAL AND WETLAND ASSESSMENTS

The field assessments were carried out by Tricia Scott, Gary Bramley, Heather Windsor, Jono More, Mike McGlynn and Joana Unteregger and over several site visits since 2018. The Site was assessed using a walk-through survey. Wetlands were identified using the method detailed in Appendix D, mapped and assessed using definition and protocols listed in Section 2.2. All species encountered were recorded and communities briefly described. A list of plant and bird species encountered is provided in Appendix B, B-1 and B-2, respectively. Photographs were taken to supplement the vegetation descriptions.

A handheld Garmin 62s GPS was carried and used to record locations and the approximate extent of the wetland.

### 2.2 WETLAND IDENTIFICATION

From a consenting perspective, one of the relevant questions will be whether the site contains wetlands, and if so what type. The various relevant definitions of wetlands and related definitions are provided in Appendix D, D-1 and D-2.

The NPS-FM refers to the Ministry for the Environment ('MfE') wetland delineation protocols (August 2020) in order to determine the status of wetlands. These protocols are included in Appendix D, D-3. We have adopted those methods for this assessment. This method relies on the presence and abundance/dominance of hydrophytes (defined in Appendix D-1) and the presence and distribution of hydric soils (i.e. soils which have been wet for sufficient time so that they develop under anoxic conditions, Fraser et al. 2018), as well as consideration of local hydrology in accordance with the recently issued guidelines (MfE, 2021).

The wetland areas were clearly located adjacent to streams, for this reason we relied on the presence of wetland vegetation to confirm the wetland. Soil cores were not taken. Application of this method was considered sufficient to allow high level mapping of wetland areas for the purposes of the assessment.

### 2.3 ASSESSMENT OF EFFECTS

The Ecological Impact Assessment (EclA) Guidelines were used to assign value to species, determine ecological effects of the proposal, consider the requirement and types of mitigation, describe the magnitude of the effect of the proposal, and to describe the overall level of ecological effects. Summaries of the EclA criteria are listed in Appendix D, D-1.

### 3. ECOLOGICAL VALUES

#### 3.1 INTRODUCTION

Ecological values are scattered across the Site, often associated with streams and riparian areas (Figure 4). The total area of ecological value across the whole Site (NIEP Site assessed by NZE and MR Site assessed by Tonkin+Taylor and included from identification by NZE on aerial imagery) was 42.9ha. The ecological values at the NIEP Site cover an area of 27.2ha. There are five main areas of ecological value as follows:

- **Forest:** There are a total of 17 small areas of forest scattered across the Site, including the part which forms a portion of the Kopenui Stream Remnants site identified by Conning and Miller (2000). There are 12 forest areas of ecological value at the NIEP Site (13.56ha) and 5 in the MR area (3.54ha) totalling 17.1ha.
- **Swamp Forest:** There are two areas of swamp forest at the south-eastern edge of the NIEP Site, which includes the Youngs Kahikatea Remnant site identified by Conning and Miller (2002). These two swamp forests cover an area of 5.80ha.
- **Wetlands:** There are a total of 18 areas where impeded drainage have caused wetlands to form. These are typically associated with the streams at locations where the gradient is low, or water movement is otherwise slowed down. There are 13 wetland areas at the NIEP Site (7.84ha) and 5 in the MR area (12.18ha) totalling 20.02ha.
- **Trees:** Isolated individual mature pūriri, tōtara, taraire trees or small stands of pūriri, tōtara, and taraire within areas of pasture. These trees provide a food source, roosting and nesting habitat for birds across the landscape, but which are of lower ecological value than areas of contiguous habitat.
- **Riparian areas:** Include varying elements of indigenous vegetation and are generally associated with streams and included in Figure 4 as wetland areas. As described in Section 1.4 above, several first order tributaries of Kopenui Stream arise in the gullies on the property and merge before exiting the Site at Wallis Road and there are terrestrial ecological values associated with these streams.

These areas of ecological value are shown in Figure 4 and are described in more detail below. A table with the ecological values and associated areas is in Appendix E, E-1.

A list of the plant species recorded is provided as Appendix B, B-1. No plants of particular conservation concern were recorded, although mānuka (*Leptospermum scoparium* var. *scoparium*) and akatea (*Metrosideros perforata*) are considered to be “Threatened – Nationally Vulnerable”, and maire tawake (*Syzygium maire*) is considered to be “Threatened – Nationally Critical” (de Lange et al. 2017) as a result of myrtle rust arrival in New Zealand. The effect of myrtle rust on native species is yet to be demonstrated and all species in the Myrtaceae family are considered threatened until the effects are known.

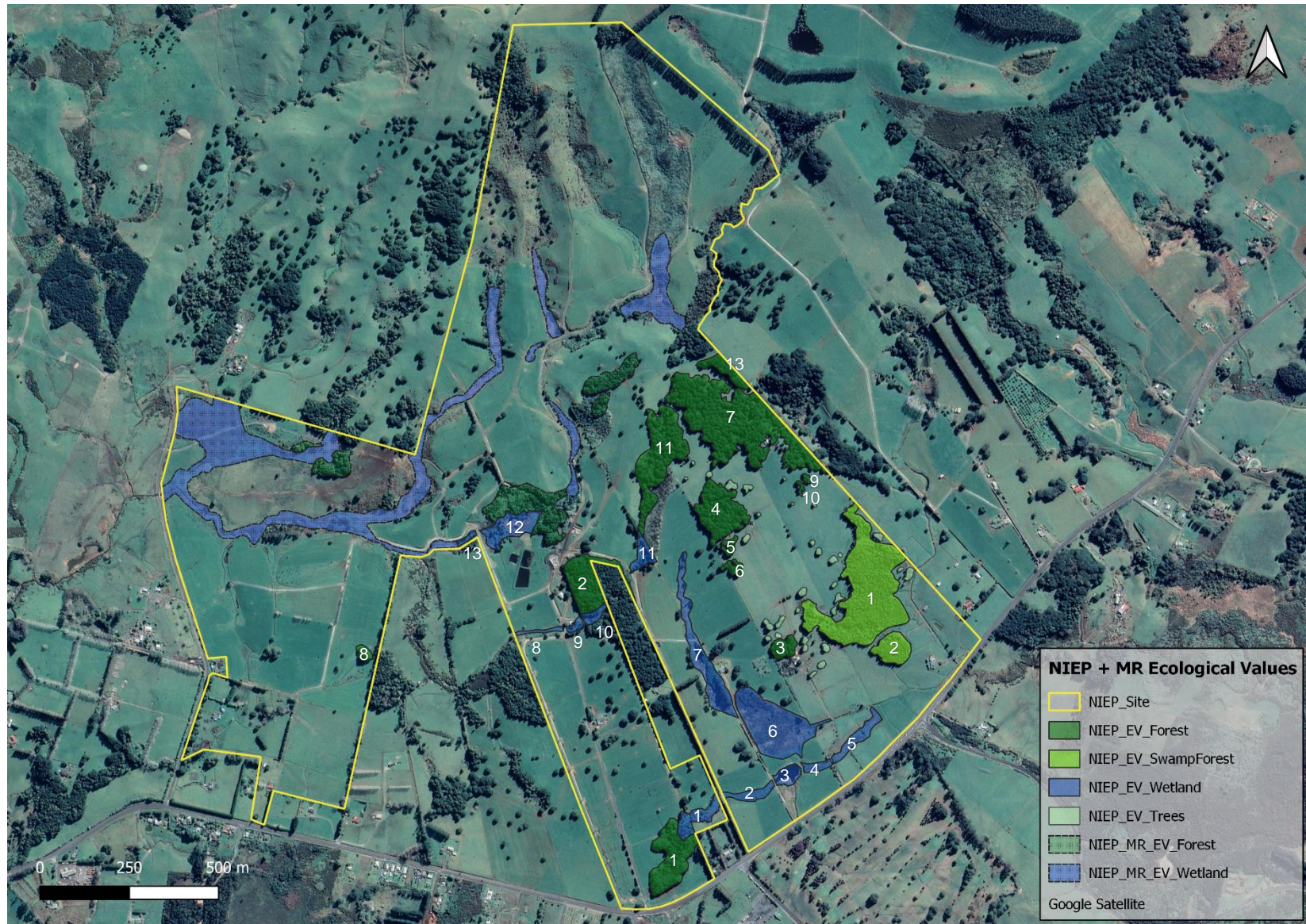


Figure 4: Extent of ecological values (EV) and their locations at the Site (NIEP and Matawii Reservoir).

### 3.2 FOREST

There are a total of 17 discrete areas of forest (17.1ha) at the Site as shown in Figure 4 (NIEP: 13.56ha; MR: 3.54ha). Dominant species at each location varies, but overall, there are two distinct forest types: volcanic broadleaf forest dominated by pūriri and taraire, and broadleaf podocarp forest dominated by tōtara with common pūriri, taraire and towai. These forest areas provide food and habitat for terrestrial flora, and fauna such as birds and lizards and, very likely long-tailed bats (*Chalinolobus tuberculatus*).

Many of the forested areas were fenced to exclude livestock, although it appears that either this fencing was ineffective, or cattle have been allowed regular access to some of the forests. The canopy vegetation was in relatively good condition, however as a result of regular livestock access, the understorey and ground layers were either largely absent or dominated by exotic species (particularly tradescantia (*Tradescantia fluminensis*)). Where present, the indigenous understorey comprises common species like hangehange (*Geniostoma ligustrifolium*), kawakawa (*Piper excelsum*), silver fern (*Cyathea dealbata*), māpou (*Myrsine australis*) and pigeonwood (porokaiwhiri, *Hedycarya arborea*). The forest areas included some large mature individuals with diameters at breast height up to 1m and heights of more than 22m. Examples of the forest vegetation at the Site are shown in Plates 3.1 – 3.3. The small area of kahikatea forest was subject to grazing and had an understorey of exotic pasture species as shown in Plate 3.4.



Plate 3.1: Understorey of broadleaf – podocarp forest at the Site, Kaikohe.





**Plate 3.2: Volcanic broadleaf forest at the Site, Kaikohe.**



**Plate 3.3: Understorey of tradescantia within volcanic broadleaf forest.**



**Plate 3.4: Kahikatea Forest remnant at the Site.**

The Kopenui Forest Remnant was predominantly podocarp forest dominated by tōtara with common pūriri (Plate 3.5). Although the main area was fenced, stock have had access to these forest areas until recently and consequently the understorey vegetation has been negatively impacted (Plate 3.6). The canopy vegetation was in relatively good condition. Because of regular livestock access, the understorey and ground layer were either largely absent or dominated by exotic species, particularly tradescantia. Where present, the indigenous understorey comprised common species such as hangehange, kawakawa, silver fern, māpou and pigeonwood. The forest areas included some large mature individuals with diameters at breast height up to 1m and heights of more than 22m.

Most of the western area of forest in the Kopenui Remnant was newly fenced and stockproof. A greywater dispersal field is located within this block.



**Plate 3.5: Tōtara forest along edge of Kopenui Stream fragment.**



**Plate 3.6: Predominantly tōtara stand with sparse understorey.**

### 3.3 SWAMP FOREST

The two swamp forests, which contain the Young's Kahikatea Forest Remnant total an area of 5.8ha. Conning and Miller (2000) describe swamp forests such as this forest remnant, as a 'rare and diminishing habitat type and containing one of only two records or maire tawake-kahikatea-tī kōuka (*Cordyline australis*) swamp forest in the Kaikohe Ecological District. It was noted that a few drains have been dug around the forest area, which has led to some drying out of the ground, especially in the southernmost part of the area identified by Conning and Miller.

Most of this forest area was fenced, but the fences were of poor quality and stock have had periodic access to this forest. Kahikatea were the dominant canopy tree with mature swamp maire (Plate 3.7), rimu (*Dacrydium cupressinum*), taraire, kohekohe (*Dysoxylum spectabile*) and pūriri scattered within. The canopy vegetation was in relatively good condition, however, as a result of regular livestock access the understorey and ground layer vegetation was sparse. Where present, the indigenous understorey vegetation comprised sedges and rushes, including kauri sedge (*Schoenus tendo*), *Carex virgata*, soft rush (*Juncus effusus* var. *effusus*), red woodrush (*Luzula rufa* var. *rufa*), fan-flowered rush (*J. sarophorus*), *Isolepis prolifera*, exotic grasses such as mercer grass (*Paspalum distichum*) and swamp millet (*Isachne globosa*), and a moderate diversity of fern species such as whekī (*Dicksonia squarrosa*), silver fern, water fern (*Histiopteris incisa*), hounds' tongue (*Zealandia pustulata* subsp. *pustulata*), thread fern (*Icarus filiformis*) swamp kiokio and kiokio (*Parablechnum novae-zelandiae*).

Within the subcanopy there were several species of shrub and saplings such as mānuka, hangehange, kawakawa, māpou and pigeonwood. The forest areas included some large mature individuals with diameters at breast height up to 1m and heights of more than 22m (Plates 3.7 – 3.10).

Approximately 1.5ha of the Young's Kahikatea Forest Remnant and surrounding bush is unfenced and consequently there was limited understorey vegetation in the unfenced sections (Plate 3.10).



Plate 3.7: North-west corner of Young's Kahikatea Remnant showing mature maire tawake.



**Plate 3.8: Young's Kahikatea Remnant understorey where there is a moderately high diversity of fern species present.**



**Plate 3.9: Young's Kahikatea Remnant understorey with flowing water.**



**Plate 3.10: Drain's from Youngs Kahikatea Remnant.**

### 3.4 WETLANDS

There are a total of 18 natural inland wetland areas at the Site, totalling 20.02ha (NIEP (12): 7.84ha; MR (7): 12.18ha). There were several small wetland areas associated with Kopenui Stream and the headwaters of Ngāwhā Stream as shown in Figure 4, these range in quality from low to high. Whilst some adjoin pasture, others are surrounded, either completely or in part, by forest. Vegetation at wetland areas contained sedges and rushes, including raupō, kuawa, *Machaerina teretifolia*, *Carex virgata*, *Cyperus ustulatus*, exotic grasses such as browntop (*Agrostis capillaris*) and swamp millet, and ferns such as whekī and swamp kiokio (*Parablechnum minus*). Examples of wetland vegetation are shown in Plates 3.11 – 3.13.



Plate 3.11: Low quality wetland at the Site.



Plate 3.12: Wetland surrounded by forest at the Site.



Plate 3.13: Headwater wetland which drains to Ngāwhā Stream, Kaikohe.

The wetlands (Wetlands 2, 3, 4, and 5) adjacent to SH12 occupy ~1.32ha. Vegetation within this wetland area included flax (*Phormium tenax*), tī kōuka, sedges and rushes including wīwī (*Juncus edgariae*), giant rush (*J. pallidus*), kuawa, *Machaerina rubiginosa*, *Carex virgata*, *Cyperus ustulatus*, *I. prolifera*, exotic grasses such as browntop and swamp millet, and ferns such as whekī and swamp kiokio. Examples of this wetland vegetation are shown in Plate 3.14.



**Plate 3.14: Wetland vegetation south-west area.**

Four wetlands were assessed due to their proximity to Building Platform 8 and Stormwater Pond 5. Wetland 8 is located west of the road and south of the proposed platform (Figure 4). Few remnant trees (kahikatea, tōtara, pūriri) and few blackwoods (*Acacia melanoxylon*) were on the margins of the narrow wetland (Plates 3.15 and 3.16). The ground layer of the margins was dominated by kikuyu grass (*Cenchrus clandestinus*), with lesser numbers of gorse (*Ulex europaeus*) and, woolly nightshade (*Solanum mauritianum*), pukio (*Carex secta*), rautahi (*C. lessoniana*), blackberry (*Rubus fruticosus* agg.), and Yorkshire fog. The wetland itself was dominated by kuawa, with water cress (*Nasturtium officinale*) occupying the majority of the flowing water.



**Plate 3.15: Wetland 8 vegetation, dominant kuawa in foreground, facing east (upstream).**



**Plate 3.16: Wetland 8 vegetation, facing west. Dominant pukio, and remnant trees surrounding.**

Wetland 9 is located east of the road and northeast of the proposed platform. At the margins of the wetland the canopy was dominated by blackwood, tōtara, and pūriri. The shrub layer included sparse numbers of gorse, woolly nightshade, red māpou, Chinese privet (*Ligustrum sinense*) and pigeonwood. The ground layer and submerged areas were dominated by kuawa and floating sweet grass (*Glyceria maxima*), while the drier areas were populated by kikuyu and Yorkshire fog (*Holcus lanatus*), creeping buttercup (*Ranunculus repens*), and cleavers (*Galium aparine*).

Examples of vegetation and Site photos are shown in Plate 3.17.



**Plate 3.17: Wetland 9 vegetation from road, looking northeast (culvert bottom left).**

Kopenui Stream wetland area east and upstream of the road (Wetland 12) was 0.93ha. The edges of the wetland were dominated by kahikatea, with multiple tree ferns; kātote (*Cyathea smithii*), whekī ponga (*Dicksonia fibrosa*), mamaku (*Cyathea medullaris*), and tōtara, pukatea (*Laurelia novae-zelandiae*), tī kōuka, māhoe (*Melicytus ramiiflorus*), and pāte (*Schefflera digitata*) (Plates 4.12 and 4.13). The margins were also occupied by pasture grasses, gorse, woolly nightshade, blackberry, haloragis (*Haloragis erecta* subsp. *erecta*), Scotch thistle (*Cirsium vulgare*), willow weed (*Persicaria maculosa*), and inkweed (*Phytolacca octandra*).

The centre of the wetland contained a tree fern island but was otherwise a raupō-dominant swamp. Closer to the road, tree ferns, bracken (*Pteridium esculentum*), gorse and tī kōuka became increasingly common (Plates 3.18 and 3.19).



**Plate 3.18: Wetland 12 vegetation, showing weeds along the edges (foreground), raupō in the centre of the wetland, and kahikatea, tōtara and tree ferns on the margins.**



**Plate 3.19: Wetland K1 vegetation, tī kōuka, gorse, tree ferns, tōtara, and kahikatea on the margins, with raupō in the centre of the wetland.**



Wetland 13 was west of the road culvert and was approximately 841m<sup>2</sup>. The northern margins were dominated by kahikatea with few pukatea (canopy height 20m) and raupō (Plate 3.20). At the western end a small area of mānuka shrubland was present. Three old indigenous passionfruit vines (kōhia, *Passiflora tetrandra*) were observed growing to the canopy in the pukatea and kahikatea trees (Plate 3.21). Several tree coprosma species (such as *Coprosma rhamnoides*, karamū, *C. tenuicaulis*) were present in the shrub layer. Vegetation in the ground layer was sparse but contained kōhia, pūriri and pukatea seedlings.



Plate 3.20: Stream from culvert (downstream from wetland K1), with kahikatea, tōtara, pāte, and woolly nightshade as dominant tree stratum, rautahi and kikuyu on the margins and raupō dominant in the wetland.



Plates 3.21: Margins of Wetland K2 containing kahikatea, tōtara, mamaku and several large kōhia, New Zealand Passionfruit to the left of the road.

### 3.5 INDIVIDUAL TREES OR SMALL STANDS OF TREES

There were several mature tōtara and pūriri located over the Site, primarily in the area west and north of the Young's Kahikatea remnant. These were predominantly single trees, but some stands of two or more trees were also present (Plate 3.22). Some taraire trees were also represented as individual trees. These trees provide a food source, roosting and nesting habitat for birds across the landscape. They also provide favourable habitat for bat roosts, especially within the hanging dead *Astelia* leaves which were particularly common in the old pūriri trees at the Site.

Several exotic *Cryptomeria japonica* were also present on the sloping pasture along the fence line – these trees do not have a significant value as habitat.



Plate 3.22: Re-grassed area with single trees on skyline (Trees felled and fence removed in 2021).

### 3.6 RIPARIAN AREAS

Most of the riparian areas on the property have been fenced to exclude cattle. Streamside vegetation included rank pasture grasses (particularly kikuyu) and common shrubs such as pāte, karamū, māhoe and tree ferns such as mamaku and whekī as well as small trees such as tōtara and kahikatea (Plate 3.23). The most common weeds present in riparian areas were gorse, woolly nightshade, but pampas (*Cortaderia selloana*) and Chinese privet were also present at some locations.

As well as providing habitat for terrestrial flora and fauna such as birds and lizards, riparian vegetation also acts to buffer aquatic habitats from adjoining land uses and improve water and aquatic habitat quality by reducing nutrient, sediment, and debris runoff, slowing water movement, moderating water flow, reducing water temperature, providing instream feeding, resting and spawning habitat (in the form of roots, fallen branches and leaves) and stabilising stream banks. The riparian vegetation at the Site varied in quality and extent but will be fulfilling all those ecological functions to varying degrees according to location.



Plate 3.23: Riparian vegetation at Kopenui Stream, Kaikohe.

### 3.7 FAUNA VALUES

#### 3.7.1 Terrestrial Fauna Values

Birds encountered during the Site visits were common native and exotic species typical of farmland and residential gardens. A list of bird species recorded is provided in Appendix B, B-2. The only species of conservation interest recorded was one New Zealand pipit (*Anthus novaeseelandiae*). Pipits are regarded as “At Risk (declining)” (Robertson et al. 2017). However, Australasian bittern (*Botaurus poiciloptilus*) and spotless crane (*Porzana tabuensis*) may well utilise the wetland areas. Bittern are secretive birds typically found in wetland habitats with dense beds of sedges and reeds. Bittern were identified in the Ngāwhā Swamps PNA (P05034) by Conning and Miller (2000).

A lizard survey was not carried out as part of this assessment. Shrubland and forest habitat is suitable for six native lizard species with threat rankings ranging from “not threatened” to “At Risk (Relict)” (DOC Herpetofauna database).

- Pacific gecko (*Dactylocnemis pacificus*) At Risk – Relict.
- Forest gecko (*Mokopirirakau granulatus*), Elegant gecko (*Naultinus elegans*), Northland green gecko (*Naultinus grayii*), and Ornate skink (*Oligosoma aeneum*) all At Risk – Declining.
- Copper skink (*Oligosoma aeneum*) – Not Threatened.

Long tailed bats were identified during the MR survey and can be expected to forage for insects in the forest, wetland, and stream areas at the Site and may roost in some of the larger trees such as pūriri and tōtara<sup>2</sup>.

The only mammals recorded were hedgehogs (*Erinaceus europaeus*), hares (*Lepus europaeus*) and rabbit (*Oryctolagus cuniculus*). Feral cats (*Felis catus*) were observed at the Site during an unrelated visit on the 17 February 2022. Horse and cattle sign were observed, and taraire seeds on the ground had been gnawed by rats (*Rattus norvegicus*, *R. rattus*). However, brushtail possums (*Trichosurus vulpecula*), and mustelids (*Mustela nivalis*, *M. erminea* and *M. putorius furo*) are all likely to occur at the Site or pass through it.

#### 3.7.2 Fish and Aquatic Fauna

A fish survey conducted in 2019 found gambusia (*Gambusia affinis*) in the wetland 10. In the Kopenui Stream, the survey identified three native fish, longfin eel (*Anguilla dieffenbachii*), shortfin eel (*Anguilla australis*), Cran’s bully (*Gobiomorphus basalis*) and the introduced pest fish gambusia. The native freshwater crayfish/kōura or kēwai (*Paranephrops planifrons*) was also present in the upper reaches of the Kopenui Stream. A summary of the 2019 fish survey results is in Appendix B, B-3.

The wetland environment within the Young’s Kahikatea Remnant was considered to be suitable for Northland mudfish (*Neochanna heleioides*), a “Threatened”- Nationally Vulnerable species (Dunn, N.R.; et al. 2018). Northland mudfish are only found within a 25km radius of Lake Omapere and are possibly be present in this type of habitat.

#### 3.7.3 Other

Other observed fauna included a frog (heard but not seen for identification), red (*Xanthocnemis* sp.), and blue damselfly (*Austrolestes* sp.). Tree wētā (*Hemideina* sp.) were seen on tōtara in the Kopenui fragment.

<sup>2</sup> Pers. Comm. Jono More (Bat ecologist).

### 3.8 ECOLOGICAL VALUES OF THE SITE

The ecological values of the Site ranged from low to high and are dispersed across the Site with the highest value habitats being the wetlands, remnants of volcanic forest and swamp maire forest. MR ecological values not identified by NZE are not discussed in this section.

Areas assigned low ecological value are those with a long history of grazing and cropping and depauperate of indigenous species. Areas assigned a moderate ecological value are those with indigenous species and habitat value which is degraded and vulnerable to edge weed encroachment and runoff and is isolated from other habitats – these are areas which would benefit from managed planting, weed control and protection or expansion to create linkage to higher quality habitats. High value habitats are those containing threatened plants, plant assemblages or food and roosting resource for threatened or vulnerable fauna. Indigenous forest and wetland habitat and remnant old trees scattered across the slopes provide valuable roosting, and foraging sources for threatened and at-risk species including potentially bats, lizards, bittern, spotted crane, and northland mudfish.

#### 3.8.1 Forest

The forest habitats at the Site are generally of low to high ecological value, varying with the degree of livestock access, presence of weed species, presence of native, undisturbed understorey. Mature native trees, particularly those that are in poor health and have abundant crevices and cavities, provide valuable roost sites for bats, which are known to be present in the local area. Stands of remnant podocarp hardwood forests, despite being degraded from grazing animals and pests, provide valuable habitat for native birds such as tūi and kūkupa, and invertebrates such as wētā. With respect to ecological function, kūkupa is the only landscape scale seed disperser remaining in the area, and pūriri provides food for kūkupa all year round, so even isolated trees can be important across the landscape. The only species of conservation interest recorded was one New Zealand pipit “At Risk (declining)” (Robertson et al. 2017).

#### 3.8.2 Swamp Forest

The swamp forests are considered significant habitat and were generally of high value but had areas of moderate value due to the impact of cattle grazing and drainage. Within both the Kopenui and Youngs Kahikatea Forest (swamp forest) remnants rata vine (*Akatea* sp.) was observed – a threatened plant with a ranking of Nationally Vulnerable (de Lange et al. 2017). Swamp maire is even more threatened with a ranking of Nationally Critical (Robertson et al. 2017). This is the highest level of threat classification. Habitat loss is a major threat to maire tawake as their health and vigour are in a slow decline in areas that were once riparian forest but are now partially drained farmland. *Leptospermum scoparium* var. *incanum* is also threatened – Nationally vulnerable, while mānuka is considered At Risk – Declining. In terms of the proposal, it is essential to protect and buffer areas where threatened plants occur.

#### 3.8.3 Wetlands

The wetlands at the Site range from low to high quality. Wetlands 2, 3, 4, 5, 6, 8, 9, and 13 (Figure 4) are of low quality as a result of being subject to long term grazing and drainage resulting in a lowered water table and high presence of exotic species. Wetlands 1, 7, 10, 11, and 12 are of moderate to high value, having a greater density and diversity of native species.

Wetlands 8, 9, 12, and 13 had clear, running water. The extent of wetlands 8 and 9 is expected to remain unchanged, however, an 85% catchment size reduction to wetlands 12 and 13 will occur with construction of the MR. Additional water diverted from the Northern Platform would help restore water to this area. The plan to fill in the effluent ponds and divert water from the Northern Platform into the proposed new wetland will ensure that sediments from the Northern Platform do not enter wetlands 12 and 13, thus water quality of those wetlands would be expected to improve.

The Northern Platform is within 100m of all four wetlands (wetlands 8, 9, 12, and 13), but is closest to wetlands 8 and 9, which are of negligible to low value and are not significant. Wetlands 12 and 13 contain vegetation and habitats which are considered ecologically significant with moderate to high value.

### **3.8.4 Individual Trees and Small Stands of Trees**

Individual trees and small stands of trees provide a food source, roosting and nesting habitat for birds across the landscape. They also provide favourable habitat for bat roosts, especially within the hanging dead *Astelja* leaves which were particularly common in the old pūriri trees at the Site.

### **3.8.5 Riparian**

Most of the riparian areas on the property have been fenced to exclude cattle. As well as providing habitat for terrestrial flora and fauna such as birds and lizards, riparian vegetation also acts to buffer aquatic habitats from adjoining land uses and improve water and aquatic habitat quality by reducing nutrient, sediment, and debris runoff, slowing water movement, moderating water flow, reducing water temperature, providing instream feeding, resting and spawning habitat (in the form of roots, fallen branches and leaves) and stabilising stream banks. The riparian vegetation at the Site varies in quality and extent but will be fulfilling all those ecological functions to varying degrees according to location. The riparian habitats are generally of low to moderate ecological value.

## 4. PLANNING MATTERS

### 4.1 FAR NORTH DISTRICT PLAN

The objectives of the Far North District Plan relating to indigenous flora and fauna are outlined in Section 12.2.3 of the plan. The objectives are:

12.2.3.1 To maintain and enhance the life supporting capacity of ecosystems and the extent and representativeness of the district's indigenous biological diversity.

12.2.3.2 To provide for the protection of, and to promote the active management of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

12.2.3.3 To recognise issues of wellbeing including equity for landowners in selecting methods of implementation.

12.2.3.4 To promote an ethic of stewardship.

These objectives are supported by the policies outlined in Section 12.2.4 as follows:

12.2.4.1 That areas of significant indigenous vegetation and significant habitats of indigenous fauna be protected for the purpose of promoting sustainable management with attention being given to:

- a) maintaining ecological values,
- b) maintaining quality and resilience,
- c) maintaining the variety and range of indigenous species contributing to biodiversity,
- d) maintaining ecological integrity; and
- e) maintaining tikanga Maori in the context of the above.

Note: In determining whether a subdivision, use or development is appropriate in areas containing significant indigenous vegetation and significant habitats of indigenous fauna, Council shall consider each application on a case by case basis, giving due weight to Part II of the Act as well as those matters listed above.

12.2.4.2 That the significance of areas of indigenous vegetation be evaluated by reference to the criteria listed in Appendix III of the Northland Regional Policy Statement (refer also to definition of "significant" in 12.2.5.6).

12.2.4.3 That adverse effects on areas of significant indigenous vegetation and significant habitats of indigenous fauna are avoided, remedied or mitigated by:

- a) seeking alternatives to the disturbance of habitats where practicable,
- b) managing the scale, intensity, type and location of subdivision, use and development in a way that avoids, remedies or mitigates adverse ecological effects,
- c) ensuring that where any disturbance occurs it is undertaken in a way that, as far as practicable:
  - i. minimises any edge effects,
  - ii. avoids the removal of specimen trees,
  - iii. does not result in linkages with other areas being lost,
  - iv. avoids adverse effects on threatened species,
  - v. minimises disturbance of root systems of remaining vegetation,
  - vi. does not result in the introduction of exotic weed species or pest animals.
- d) encouraging, and where appropriate, requiring active pest control and avoiding the grazing of such areas.

12.2.4.4 That clearance of limited areas of indigenous vegetation is provided for.

12.2.4.5 That the contribution of areas of indigenous vegetation and habitats of indigenous fauna to the overall biodiversity and amenity of the District be taken into account in evaluating applications for resource consents.

12.2.4.6 That support is given to programmes for weed and pest control, including support for community pest control areas established by the Northland Regional Council under the Regional Pest Management Strategies, in areas of significant indigenous vegetation and significant habitats of indigenous fauna and surrounding lands.

12.2.4.7 That community awareness of the need and reasons for protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna be promoted.

12.2.4.8 That restoration and enhancement of indigenous ecosystems is based on plants that would have occurred naturally in the locality and is sourced from local genetic stock where practicable.

12.2.4.9 That the Council will work with landowners and communities to ensure outcomes are achieved in an effective and equitable manner.

12.2.4.10 In order to protect areas of significant indigenous fauna:

- a) that dogs (excluding working dogs), cats, possums, rats, mustelids and other pest species are not introduced into areas with populations of kiwi, dotterel and brown teal,
- b) in areas where dogs, cats, possums, rats, mustelids and other pest species are having adverse effects on indigenous fauna their removal is promoted.

12.2.4.11 That when considering resource consent applications in areas identified as known high density kiwi habitat, the Council may impose conditions, in order to protect kiwi and their habitat.

12.2.4.12 That habitat restoration be promoted.

12.2.4.13 That the maintenance of riparian vegetation and habitats be recognised and provided for, and their restoration encouraged, for the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna, preservation of natural character and the maintenance of general ecosystem health and indigenous biodiversity.

12.2.4.14 That when considering an application to clear areas of significant indigenous vegetation or significant habitats of indigenous fauna, enabling Māori to provide for the sustainable management of their ancestral land will be recognised and provided for by Council.

These policies and objectives have been considered while preparing this report. In order to give full effect to these policies and objectives, we recommend the following actions:

- Retention and enhancement of all existing wetland, forest, and indigenous riparian vegetation.
- A weed management plan to be prepared for the Site by a suitably qualified and experienced ecologist and implemented effectively.
- A pest control plan for the Site to control feral cats, rats, possums, and mustelids to be developed by a suitably qualified and experienced ecologist and implemented effectively.
- The keeping of domestic pets at the Site to be banned.
- A restoration planting plan for the Site to be prepared by a suitably qualified and experienced ecologist with the aim of restoring degraded habitats, buffering sensitive habitats such as wetlands and streams, connecting existing habitats and recreating appropriate habitats at the Site.
- All indigenous vegetation and habitats (including newly created habitats) at the Site to be formally protected either through the plan change or via covenanting.

Planting recommendations will be provided in the Planting Management Plan.

## 4.2 DRAFT DISTRICT PLAN

Although the Proposed District Plan is yet to come into effect, it needs to be considered.

- Policy IB-P3 is to Avoid, remedy or mitigate adverse effects of land use and subdivision on Significant Natural Areas outside of the coastal environment.

The vegetation in the identified Kopenui Remnant Forest, and the Youngs Kahikatea Swamp Forest meet the threshold of a Significant Natural Area.

- Policy IB-P5 is to Avoid, remedy or mitigate adverse effects of land use and subdivision on indigenous biodiversity located outside the coastal environment.
- Policy IB-P7 is to Encourage active management of pest plants and pest animals.
- Policy IB-P9 is to Promote the protection of species that are endemic to Northland by:
  - a) eco-sourcing plants from within the ecological district,
  - b) avoiding the keeping of cats, dogs and mustelids in areas that have acutely or chronically threatened species,
  - c) requiring responsible pet ownership in kiwi present areas.
- Policy IB-P10 is to Protect indigenous biodiversity by considering the following matters when assessing proposals for land use and subdivision:
  - a) the temporary or permanent nature of any adverse effects,
  - b) cumulative effects of activities that may result in loss or degradation of habitats, species populations and ecosystems,
  - c) the extent of any vegetation removal,
  - d) the effects of fragmentation,
  - e) linkages between indigenous ecosystems and habitats of indigenous species,

- f) the potential for increased threats from pest plants and animals,
- g) downstream effects on wetlands, rivers, streams and lakes from hydrological change in catchments,
- h) whether the indigenous vegetation meets the criteria for a Significant Natural Area,
- i) the location, scale and design of any proposed development,
- j) the functional need of regionally significant or critical infrastructure,
- k) any positive contribution the development has on the indigenous biodiversity, where located outside of the coastal environment.

The key areas worthy of protection and enhancement from an ecological perspective, highlighted above, are the kahikatea swamp forest, the taraire-pūriri-tōtara remnant forest area (part of the Kopenui Remnant), and wetlands 12 and 13. Other areas worthy of enhancement include habitats of low – moderate value such as wetlands 2 – 9. To avoid adverse effects of land use, increased buffer planting, restoration of the ecological linkages, together with weed and pest management support these objectives.

### 4.3 NORTHLAND REGIONAL POLICY STATEMENT

Objective 3.4 of the Northland Regional Policy Statement is to:

Safeguard Northland's ecological integrity by:

- a) Protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna,
- b) Maintaining the extent and diversity of indigenous ecosystems and habitats in the region; and
- c) Where practicable, enhancing indigenous ecosystems and habitats particularly where this contributes to the reduction in the overall threat status of regionally and nationally threatened species.

Policy 3.15 is to maintain and / or improve (amongst other matters) areas of significant indigenous vegetation and significant habitats of indigenous fauna by supporting, enabling and positively recognising active management arising from the efforts of landowners, individuals, iwi, hapū and community groups.

Objective 3.4 is supported by Policy 4.4.1 relating to the maintenance and protection significant ecological areas and habitats, specifically:

3. Outside the coastal environment and where clause (1) does not apply, avoid, remedy or mitigate adverse effects of subdivision, use and development so they are not significant on any of the following:
  - a) Areas of predominantly indigenous vegetation,
  - b) Habitats of indigenous species that are important for recreational, commercial, traditional or cultural purposes,
  - c) Indigenous ecosystems and habitats that are particularly vulnerable to modification, including wetlands, dunelands, northern wet heathlands, headwater streams, floodplains and margins of freshwater bodies, spawning and nursery areas.
4. For the purposes of clause (3), when considering whether there are any adverse effects and/or any significant adverse effects:
  - a) Recognise that a minor or transitory effect may not be an adverse effect,
  - b) Recognise that where the effects are or maybe irreversible, then they are likely to be more than minor,
  - c) Recognise that there may be more than minor cumulative effects from minor or transitory effects.
5. For the purpose of clause (3) if adverse effects cannot be reasonably avoided, remedied or mitigated then it may be appropriate to consider the next steps in the mitigation hierarchy i.e. biodiversity offsetting followed by environmental biodiversity compensation, as methods to achieve Objective 3.4.

These policies would be achieved by a range of mechanisms including retaining mature native trees which have value for bat roosting and important seed dispersing avifauna such as kūkupa, buffering existing habitats from horticultural or other land use activities, improving the quality of the habitats through weed and pest control, and through covenanting or other legal protection.

In May 2016 a new Northland Regional Policy Statement became operative and the criteria in Appendix III were replaced with criteria provided in Appendix 5. Appendix 5 was used to identify SNAs in the draft District Plan. In accordance with Appendix 5, an area of indigenous vegetation or habitat(s) of indigenous fauna is significant if it meets one or more of the following criteria:



## 1. Representativeness

- a) Regardless of its size, the ecological site is largely indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity at the relevant and recognised ecological classification and scale to which the ecological site belongs:
  - i. If the ecological site comprises largely indigenous vegetation types; and
  - ii. Is typical of what would have existed circa 1840; or
  - iii. Is represented by faunal assemblages in most of the guilds expected for the habitat type; or
- b) The ecological site
  - i. Is a large example of indigenous vegetation or habitat of indigenous fauna, or
  - ii. Contains a combination of landform and indigenous vegetation and habitat of indigenous fauna, that is considered to be a good example of its type at the relevant and recognised ecological classification and scale.

The Kopenui Forest Remnant, Youngs Swamp Forest, and wetlands 12 and 13 meet the criteria as a large example of indigenous vegetation and habitat of indigenous fauna.

## 2. Rarity / distinctiveness

- a) The ecological site comprises indigenous ecosystems or indigenous vegetation types that:
  - i. Are either Acutely or Chronically Threatened land environments associated with LENZ Level 4); or
  - ii. Excluding wetlands, are now less than 20% of their original extent; or
  - iii. Excluding man made wetlands, are examples of the wetland classes that either otherwise trigger Appendix 5 criteria or exceed any of the following area thresholds (boundaries defined by Landcare delineation tool);
    - a) Saltmarsh greater than 0.5 hectare in area; or
    - b) Shallow water (lake margins and rivers) greater than 0.5 hectare in area; or
    - c) Swamp greater than 0.4 hectare in area; or
    - d) Bog greater than 0.2 hectare in area; or
    - e) Wet Heathlands greater than 0.2 hectare in area; or
    - f) Marsh; Fen; Ephemeral wetlands or Seepage / flush greater than 0.05 hectares in area.
- b) Indigenous vegetation or habitat of indigenous fauna that supports one or more indigenous taxa that are threatened, at risk, data deficient or uncommon, either nationally or at the relevant ecological scale.
- c) The ecological site contains indigenous vegetation or an indigenous taxon that is:
  - i. Endemic to the Northland-Auckland region; or
  - ii. At its distributional limit within the Northland region;
- d) The ecological site contains indigenous vegetation or an association of indigenous taxa that:
  - i. Is distinctive of a restricted occurrence; or
  - ii. Is part of an ecological unit that occurs on an originally rare ecosystem; or
  - iii. Is an indigenous ecosystem and vegetation type that is naturally rare or has developed as a result of an unusual environmental factor(s) that occur or are likely to occur in Northland; or
  - iv. Is an example of nationally or regionally rare habitat as recognised in the New Zealand Marine Protected Areas Policy.

Young's Swamp Forest contains a mature stand of maire tawake which is Threatened – Nationally Critical and a distinctive association of indigenous vegetation (maire tawake-kahikatea-tī kōuka) which is rare in the Kaikohe ED).

The Kopenui Forest meets the rarity criteria because it contains representative taraire-pūiri-tōtara volcanic broadleaf forest which is now acutely threatened and this forest type has been reduced to less than 20% of their original extent in Northland.

## 3. Diversity and pattern

- a) Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of:
  - i. Indigenous ecosystem or habitat types;

- ii. Indigenous taxa;
- b) Changes in taxon composition reflecting the existence of diverse natural features or ecological gradients; or
- c) Intact ecological sequences

The vegetation and habitats did not meet the criteria for diversity and pattern.

#### 4. Ecological context

- a) Indigenous vegetation or habitat of indigenous fauna is present that provides or contributes to an important ecological linkage or network, or provides an important buffering function; or
- b) The ecological site plays an important hydrological, biological, or ecological role in the natural functioning of riverine, lacustrine, palustrine, estuarine, plutonic (including karst), geothermal or marine system; or
- c) The ecological site is an important habitat for critical life history stages of indigenous fauna including breeding / spawning, roosting, nesting, resting, feeding, moulting, refugia or migration staging point (as used seasonally, temporarily, or permanently).

The indigenous vegetation at Wetlands K1 and K2 creates an important ecological linkage between the forest remnants. The ecological context may also be important for kūkupa, bat roosting sites and mudfish habitat.

#### 4.4 NATIONAL POLICY STATEMENT FOR FRESHWATER MANAGEMENT (2020)

The National Policy Statement for Freshwater Management (2020) (NPSFW) came into effect on 3 September 2020 and required a new transitional policy to be inserted into the Water and Soil Plan to guide resource consent decision-making in relation to freshwater resources.

The objective of the NPSFW is to ensure that natural and physical resources are managed in a way that prioritises:

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

The NPSFW sets out 15 national policies as follows:

1. Freshwater is managed in a way that gives effect to Te Mana o te Wai.
2. Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.
3. Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.
4. Freshwater is managed as part of New Zealand's integrated response to climate change.
5. Freshwater is managed through a National Objectives Framework to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.
6. There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.
7. The loss of river extent and values is avoided to the extent practicable.
8. The significant values of outstanding water bodies are protected.
9. The habitats of indigenous freshwater species are protected.
10. The habitat of trout and salmon is protected, insofar as this is consistent with Policy 9.
11. Freshwater is allocated and used efficiently, all existing over-allocation is phased out, and future over-allocation is avoided.
12. The national target (as set out in Appendix 3) for water quality improvement is achieved.
13. The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends.
14. Information (including monitoring data) about the state of water bodies and freshwater ecosystems, and the challenges to their health and well-being, is regularly reported on and published.
15. Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that is consistent with this National Policy Statement.

Of particular relevance to this proposal are policies 3, 6, 7, 9, and 12.

With respect to Policy 6, identification, and mapping of the wetlands on the property is informing the planning of the land use. The wetland areas will all be avoided and given a protective buffer zone of a minimum of 10m to ensure that they are not compromised by the proposed new land uses.

With respect to Policy 9, habitats of indigenous freshwater species will be protected by implementation of targeted weed and pest control.

Specific requirement 3.22 of the NPSFW relates to natural inland wetlands and includes the following:

6. Every regional council must include the following policy (or words to the same effect) in its regional plan(s): “The loss of extent of natural inland wetlands is avoided, their values are protected, and their restoration is promoted, except where:
  - a) the loss of extent or values arises from any of the following:
    - i. the customary harvest of food or resources undertaken in accordance with tikanga Māori
    - ii. restoration activities
    - iii. scientific research
    - iv. the sustainable harvest of sphagnum moss
    - v. the construction or maintenance of wetland utility structures (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020<sup>3</sup>)
    - vi. the maintenance or operation of specified infrastructure, or other infrastructure (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020)
    - vii. natural hazard works (as defined in the Resource Management (National Environmental Standards for Freshwater) Regulations 2020); or
  - b) the regional council is satisfied that:
    - i. the activity is necessary for the construction or upgrade of specified infrastructure; and
    - ii. the specified infrastructure will provide significant national or regional benefits; and
    - iii. there is a functional need for the specified infrastructure in that location; and
    - iv. the effects of the activity are managed through applying the effects management hierarchy.”
7. Subclause (3) applies to an application for a consent for an activity:
  - a) that falls within any exception referred to in paragraph (a)(ii) to (vii) or (b) of the policy in subclause (1); and
  - b) would result (directly or indirectly) in the loss of extent or values of a natural inland wetland.
8. Every regional council must make or change its regional plan(s) to ensure that an application referred to in subclause (2) is not granted unless:
  - a) the council is satisfied that the applicant has demonstrated how each step of the effects management hierarchy will be applied to any loss of extent or values of the wetland (including cumulative effects and loss of potential value), particularly (without limitation) in relation to the values of: ecosystem health, indigenous biodiversity, hydrological functioning, Māori freshwater values, and amenity value; and
  - b) any consent is granted subject to:
    - i. conditions that apply the effects management hierarchy; and
    - ii. a condition requiring monitoring of the wetland at a scale commensurate with the risk of the loss of extent or values of the wetland.
9. Every regional council must make or change its regional plan(s) to include objectives, policies, and methods that provide for and promote the restoration of natural inland wetlands in its region, with a particular focus on restoring the values of ecosystem health, indigenous biodiversity, hydrological functioning, Māori freshwater values, and amenity value.

The habitat enhancement, together with management and protection of wetlands is consistent with the NPS and contributes to catchment wide improvements.

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<sup>3</sup> A wetland utility structure is a structure placed in or adjacent to a wetland whose purpose, in relation to the wetland, is recreation, education, conservation, restoration, or monitoring; and for example, includes the following structures that are placed in or adjacent to a wetland for a purpose described in paragraph (a): jetties, boardwalks and bridges connecting them, walking tracks and bridges connecting them, signs, bird-watching hides, monitoring devices and maimai.

#### 4.5 STOCK EXCLUSION REGULATIONS (FROM 3 SEPTEMBER 2020)

The south-eastern areas of the Site are covered by the “low altitude land maps” which are defined as part of the regulation<sup>4</sup>. The mapped areas show low altitude land where beef cattle and deer must be excluded from lakes and rivers over one metre wide from 1 July 2025. The mapped areas also show where all cattle, pigs and deer must be excluded from natural wetlands with an area more than 500m<sup>2</sup> from 1 July 2025.

Stock must be excluded from the beds of lakes, rivers, and wetlands, and must not be on land closer than three metres to the bed of rivers and lakes. However, stock need not be excluded from land within three metres of the bed if there is a permanent fence in place on 3 September 2020. Current plans are to continue stock grazing in the south-eastern areas of the Site to maintain the grass.

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<sup>4</sup> [Stock exclusion regulations | Ministry for the Environment](#)

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## 5. ECOLOGICAL OPPORTUNITIES

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### 5.1 BACKGROUND

The proposal to apply for a private plan change affecting the Site creates an opportunity to achieve ecological and other outcomes that would not accrue under the status quo. These outcomes would be achieved by way of rules and other mechanisms put forward as part of the plan change and provided for as part of any future development. The Site currently includes a range of habitat types which are of varying ecological value, some of which (e.g. wetlands) are a regional and national priority for protection on private land (Department of Conservation and Ministry for the Environment 2007). The ecological opportunities at the site arise from the following:

- Maximising indigenous vegetation and providing habitat linkages
- Restoring degraded areas
- Buffering sensitive habitats
- Implementing effective pest control for fauna
- Protecting threatened and endangered species

The ecological opportunities listed above and described in greater detail below entail plans of ecological plantings to achieve greater ecological outcomes. Please note that the planting areas described below are preliminary estimates and are likely subject to change as the Planting and Biodiversity Enhancement Plan and associated planting areas are still being developed.

### 5.2 MAXIMISING INDIGENOUS VEGETATION & PROVIDING LINKAGES

Maximising the extent of indigenous vegetation would be achieved by avoiding indigenous vegetation clearance in the first instance. We recommend that all the areas of indigenous vegetation identified in Figure 4 be retained for that purpose. In addition to retaining vegetation, the buffering of sensitive habitats, connection of habitat fragments and restoring of degraded areas will require a programme of native species planting.

Many species (such as kūkupa and tūi (*Prothemadera novaeseelandiae*) travel widely throughout the landscape on a seasonal and annual basis and make use of a variety of habitat types throughout the year. Other, more poorly mobile species, such as large invertebrates (e.g. kauri snails *Paryphanta* spp.) or lizards, will not move through the landscape unless there is continuous suitable habitat. This restricts their populations and can result in ongoing declines. Figure 5 outlines areas around the Young's Kahikatea Remnant, which, if planted, would enhance the ecological connections between the existing remnants, particularly for such poorly mobile species. By replanting key areas and establishing habitat connectivity across the Site, the potential for biodiversity enhancement will be maximised and a wider range of species will be catered for than would otherwise be the case.

Because the Young's Kahikatea Remnant is a type of natural inland wetland, we recommend an additional 10 to 20 metre buffer zone to protect ecosystem health. We note that the NPS-FW prohibits activities which is likely to or would result in the drainage or partial drainage of a natural inland wetland from within 10m of any wetland and this has informed our recommendation in this respect. Figure 5 shows the proposed buffer zone which, considering wetland areas which have been drained and grazed, would result in an additional 1.5ha of planting being required around Young's Kahikatea Remnant. Some natural regeneration will also occur in this area now that livestock have been excluded.

Given its identification as a site with high ecological value by both Conning and Miller and Wildland Consultants Limited, we recommend all the trees within Kopenui Stream Remnant be retained to

maintain those existing ecological values and contribute to ecological resilience and sustainability of the forest remnant.

Section 4 above refers to the District Plan which states that: removal of habitats of indigenous fauna are to be avoided including by limiting the removal of specimen trees. Agriculture has taken place on these pieces of land for decades with the trees in place and we consider that horticulture could continue on these areas without necessitating any removal of aged trees.



Figure 5: Proposed area for covenanting or other long-term protection, (outlined in blue), which includes a 10 to 20m buffer zone and restoration of retired wetland areas particularly on the eastern side of the forest. The key planting areas around Young's Kahikatea Remnant shown in yellow. Drains in red which will be left to fill in naturally.

### 5.3 RESTORING DEGRADED AREAS

The forest, wetland and riparian areas at the Site have been subjected to livestock grazing and have a substantial weed presence. If the parts of the property outside the forest areas are to be grazed in the future, we recommend that adequate fences are established and maintained to prevent any further livestock damage to the forest. With respect to individual trees, we also recommend protecting their root structures from heavy animals such as cattle and horses.

The area which was formerly pine plantation also has a substantial weed presence which will require addressing in order to maximise the ecological benefits of any development at the Site. Restoring these areas by effective weed control and supplementary planting (if required) would restore indigenous dominance to the natural areas of the Site and allow for natural ecological succession and other processes which are currently compromised by the abundance of weeds, and lack of suitable seed sources and pollinators/seed dispersers.

Some of the single pūriri trees were in poor health because of possums, grazing animals, and possibly also from the impact of heavy machinery, on the root system. Recent and planned land use which keeps livestock off these areas will help restore the degraded areas. By isolating trees behind appropriate fencing (if necessary) and removing possums, the health of the trees should recover.

We recommend replanting approximately 2.4ha at the margins around the Young's Kahikatea Remnant Swamp Forest to restore ecological connection, buffer the forest wetland areas and improve the overall health of this rare ecosystem (Figure 6). The supplementary planting plan should be prepared and supervised by a suitably qualified and experienced ecologist.



Figure 6: Proposed wetland buffer planting around wetland 5 of 0.4ha is shown in red and is contiguous with an additional wetland planting forming an ecological buffer zone between the swamp forest and wetland 5. Swamp forest buffer planting around Youngs Kahikatea Remnant of 1.8ha is shown in yellow.

## 5.4 BUFFERING SENSITIVE HABITATS

The National Policy Statement for Freshwater Management (NPSFM, 2020) requires that we all:

- Manage freshwater in a way that ‘gives effect’ to Te Mana o te Wai:
  - through involving tangata whenua.
  - working with tangata whenua and communities to set out long-term visions in the regional policy statement.
  - prioritising the health and wellbeing of water bodies, then the essential needs of people, followed by other uses.
- Improve degraded water bodies and maintain or improve all others using bottom lines defined in the Freshwater NPS.
- An expanded national objectives framework:
  - two additional values - threatened species and mahinga kai - join ecosystem health and human health for recreation, as compulsory values.
  - councils must develop plan objectives that describe the environmental outcome sought for all values (including an objective for each of the five individual components of ecosystem health).
  - new attributes, aimed specifically at providing for ecosystem health, include fish index of biotic integrity (IBI), sediment, macroinvertebrates (MCI and QMCI), dissolved oxygen, ecosystem metabolism and submerged plants in lakes; councils will have to develop action plans and/or set limits on resource use to achieve these attributes.
  - tougher national bottom lines for the ammonia and nitrate toxicity attributes to protect 95% of species from toxic effects (up from 80%).
- Avoid any further loss or degradation of wetlands and streams, map existing wetlands and encourage their restoration.
- Identify and work towards target outcomes for fish abundance, diversity and passage and address in-stream barriers to fish passage over time.
- Set an aquatic life objective for fish and address in-stream barriers to fish passage over time.
- Monitor and report annually on freshwater (including the data used); publish a synthesis report every five years containing a single ecosystem health score and respond to any deterioration.

Additional planting around wetlands and streams where indigenous vegetation is lacking would serve to buffer those habitats more effectively from adjacent land-uses and protect the ecological values they contain. It is proposed to establish buffers of between 5m and 20m in width (depending on local topography) to maximise any ecological benefits. Figure 7 shows an additional 0.5ha of wetland buffer planting within already fenced bounds. We have also proposed planting around the small area of kahikatea forest to improve the ecological viability and sustainability and increase the extent of this rare habitat type. These areas would be planted with appropriate, locally sourced species according to a planting plan prepared by a suitably qualified and experienced ecologist. The appointed ecologist would also oversee and monitor the planting to achieve restoration of appropriate vegetation types typical of the Kaikohe ED. This would have ecological benefits at the Site but would also positively affect downstream habitats in the Waitangi catchment and provide additional connectivity across the wider Kaikohe ED.





**Figure 7: Wetland area outlined in yellow, with minimum 10m buffer planting in red. An existing drain connects the two wetland areas (green). The large wetland (W5) is connected to more extensive wetlands to the west as is the smaller one demarcated (W6).**

## 5.5 IMPLEMENTING EFFECTIVE PEST CONTROL

In order to protect indigenous fauna and forest health at the Site, pest mammals including possums, cats, rats, hedgehogs, mice and mustelids require control. Herbivores such as rabbits and hares might require control until plantings are established but are unlikely to pose a long-term threat to the ecological values at the Site.

We recommend a control programme be designed by a suitably qualified and experienced ecologist and implemented to protect native wildlife and habitats at the Site. Ideally any control would be integrated with existing operations being undertaken in the surrounding areas (e.g. Top Energy land).

## 5.6 PROTECTING THREATENED AND ENDANGERED SPECIES

Protecting threatened and endangered plants would best be achieved by demarcating the habitat areas where these plants are present and creating a buffer zone around these. This is particularly relevant to the wetland and swamp forest habitats which have been reduced in extent by drainage, grazing and removal of plants. Indigenous vegetation clearance should be avoided as far as possible and land use options should look for ways of optimising productivity without degrading the nearby habitats. We recommend that if a plan change is considered, that the Kopenui Forest and Young's Kahikatea Forest areas, as delineated in Figure 4, be covenanted to ensure long-term protection in accordance with the relevant policies and objectives in the Operative District Plan (12.2.3.1 & 12.2.3.2). Water levels will need to be maintained within the identified habitat zones by avoiding water diversion or drainage within 100m of the wetlands.

To protect vulnerable fauna, cats should be banned from the Site. A Biodiversity Management Plan (including a weed and pest management plan) focusing on the site as a whole, should be prepared by a suitably qualified ecologist and implemented effectively so as to improve the quality of the vegetation stands and provide safe habitat for the threatened species present or likely to be so.

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## 6. ECOLOGICAL CONSTRAINTS

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### 6.1 BACKGROUND

Horticulture is a permitted activity on the Site. Subject to confirmation of any proposal the methods set out in this report are generally good ecological practice and would likely address any effects. The constraints outlined below take into account the rules and objectives within the District and Regional Plans and the National Policy Statements to provide informed direction for FNHL when deciding the optimal use of specific areas within the Site. Despite the permitted activity status, the presence of ecological values at the Site poses constraints on any development undertaken there. In particular Chapter 12 of the Far North District Plan<sup>5</sup> outlines rules relating to clearance of indigenous vegetation throughout the district. The nature of the vegetation at the Site means that beyond the permitted activity thresholds, vegetation clearance at the Site would require resource consent as either a restricted discretionary or discretionary activity (depending on the specific circumstances). The District Plan also contains policies, objectives and rules relating to effects on lakes, rivers and wetlands (including riparian areas).

- The NPS-FM (2020) imposes limits to areas where any activity must be avoided such that earthworks and the taking, damming, diversion, or discharge of water within 100m of a wetland is not permitted if any detrimental effect on the wetland is likely. The NPS-FM regulations prevent clearance of vegetation, earthworks, or the taking, damming, diversion, or discharge of water within 10m of the mapped wetlands. Earthworks and any other activities related to the horticultural development would necessarily have to meet the 100m setback rules from the wetlands to ensure that the wetlands are maintained and improved over the long-term.
- In relation to the individual trees or smaller groves, retention, reconnection (where practicable) and protection of these is recommended. If removal or modification of mature indigenous trees is proposed, this would need to be supported by additional surveys to determine the potential effects and any mitigating actions sufficient to address the adverse effects on those habitats.
- The management actions detailed in Section 5 should be implemented to avoid and mitigate any detrimental ecological effects such as loss of trees/ vegetation, drainage of wetlands, spread of weeds, nutrient enrichment and sedimentation of waterways, and to enhance the ecological values on the land recommended to be set aside from development. Noting that planting areas mentioned in Section 5 are subject to change as the Planting Plan is still under development.
- Habitat within the Youngs Kahikatea Forest contains wetland areas suitable for Northland mudfish. There is a possibility that mudfish would be present here due to their abundance in the nearby Ngāwhā swamps. If mudfish were found, monitoring and maintenance of this population would be required because of their Threatened – Nationally Vulnerable (2018) conservation status (Dunn et al., 2017).

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<sup>5</sup> Chapter 12.1 of the Far North District Plan relates to indigenous vegetation in Outstanding Landscapes and Chapter 12.2 relates to other indigenous vegetation clearance throughout the district. Chapter 12.7 provides for activities in lakes, rivers and wetlands.

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## 6.2 RECOMMENDATIONS

It is recommended that:

- Retention of all existing wetland, forest and indigenous riparian vegetation.
- All indigenous vegetation and habitats (including newly created habitats) at the site to be formally protected either through the plan change or via covenanting.
- Retaining mature isolated indigenous trees or small groups of trees, protecting their root structures to maintain and enhance their ecological values by ensuring that cropping takes place around these trees. In the case of NIEP proposed activities conflicting with this, additional ecological surveys to identify bats, lizard or alternative options be undertaken.
- Horticultural activities, such as perennial cropping, be setback 20m from the wetlands, and the forest blocks.
- Ensure that earthworks required to form drainage on the south side of the Northern Platform which come within 10m of wetland 12 do not intrude on the wetland and do not result in any soil deposition there.
- Ensure that any works required to form the constructed wetland (Pond 5) south and uphill of wetland 9 are more than 10m away from Wetland 9 and do not result in any soil deposition there.
- Buildings, storage areas, tunnel houses, glasshouses, car parks and accessways need to be set back from identified ecological areas by at least 20m from the forest buffer, and outside the wetland exclusion zones.
- Construction, buildings, building areas, and machinery do not enter the wetlands.
- Machinery is cleaned prior to working at the site and prior to leaving the site, preventing the introduction, and spread of weeds.
- That as far as possible, earthworks be carried out during dry summer months (December to April) minimising mobilisation of sediments.
- Best practice erosion and sediment control (GD05 Guidelines) for all earthworks necessary to develop the Site be undertaken in accordance with an environmental management plan which includes protection and buffering of indigenous habitats, in order to address adverse effects.
- The keeping of domestic pets at the Site to be banned.
- A Biodiversity Management and Enhancement Plan be prepared by a suitably qualified and experienced ecologist, including:
  - Weed Management Plan, detailing weed management to protect native wildlife and habitats at the Site.
  - Pest Control Plan, detailing pest control and management to protect native wildlife and habitats at the Site, with particular emphasis on control feral cats, rats, possums and mustelids
  - Planting and Biodiversity Enhancement Plan, detailing different planting zones, planting areas, and species to be planted with the aim of restoring degraded habitat (particularly riparian habitats), buffering sensitive habitats such as wetlands and streams, connecting existing habitats and habitat fragments,

particularly around Young's Kahikatea Remnant, and recreating appropriate habitats at the Site.

- Surveys and summary reports to be prepared annually for the first five years to monitor the environment, and the ecological and biodiversity gains, including:
  - Water quality surveys.
  - Freshwater fish surveys.
  - Planting monitoring and maintenance.

We have recommended additional ecological planting across the Site predominantly to protect and enhance forest edges and buffer existing wetlands in accordance with the NPS-FM. Recommendations also include re-establishment wetland planting to connect fragments and riparian buffer planting and ecological connectivity planting across the Site. However, planting areas are subject to change as the Planting and Biodiversity Enhancement Plan is still in development

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## 7. REFERENCES

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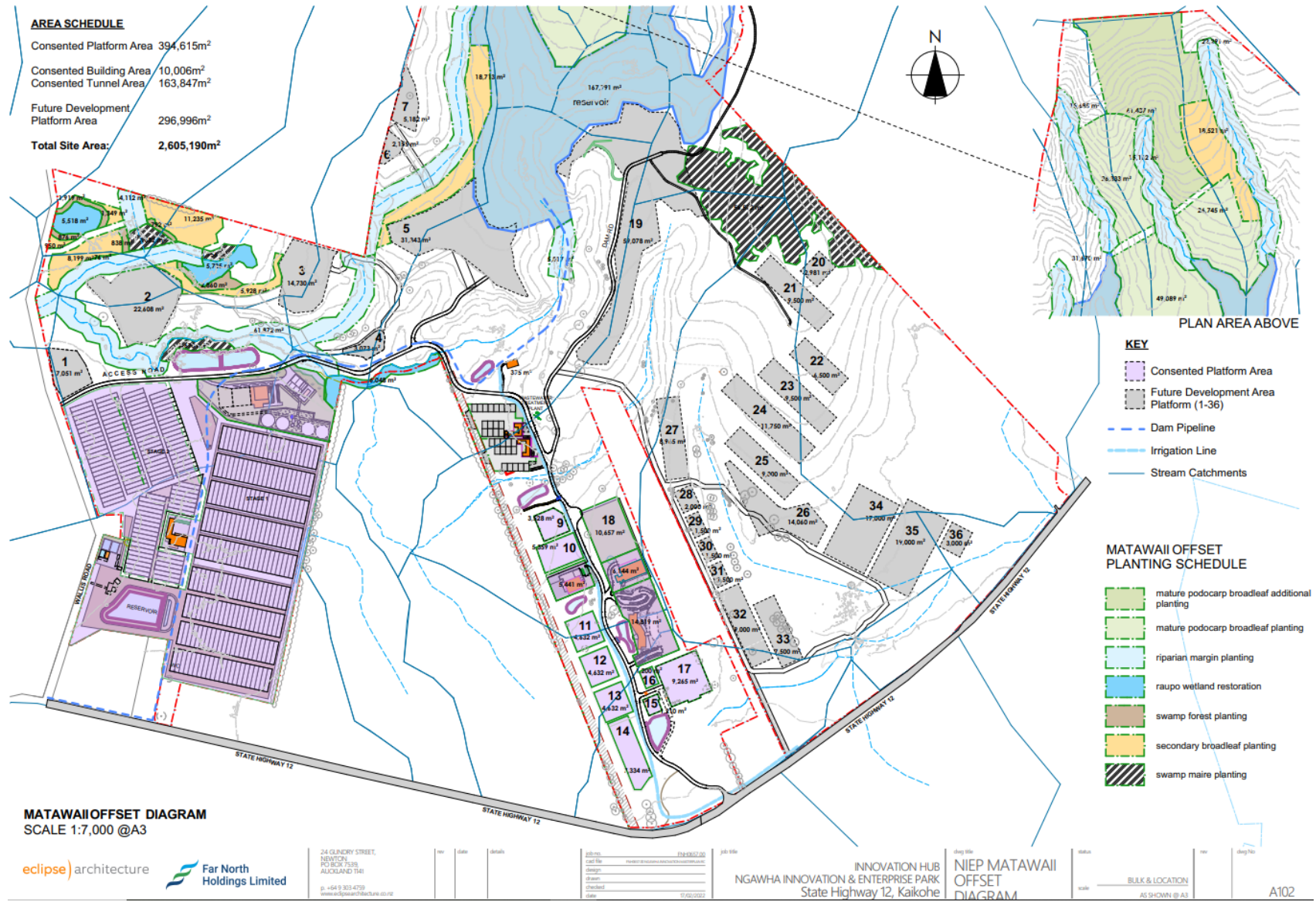
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APPENDIX A

Maps and Aerials



Appendix A-1: Topographic map showing the location of the Site and wetland assessments (purple dots) in relation to Kaikohe.

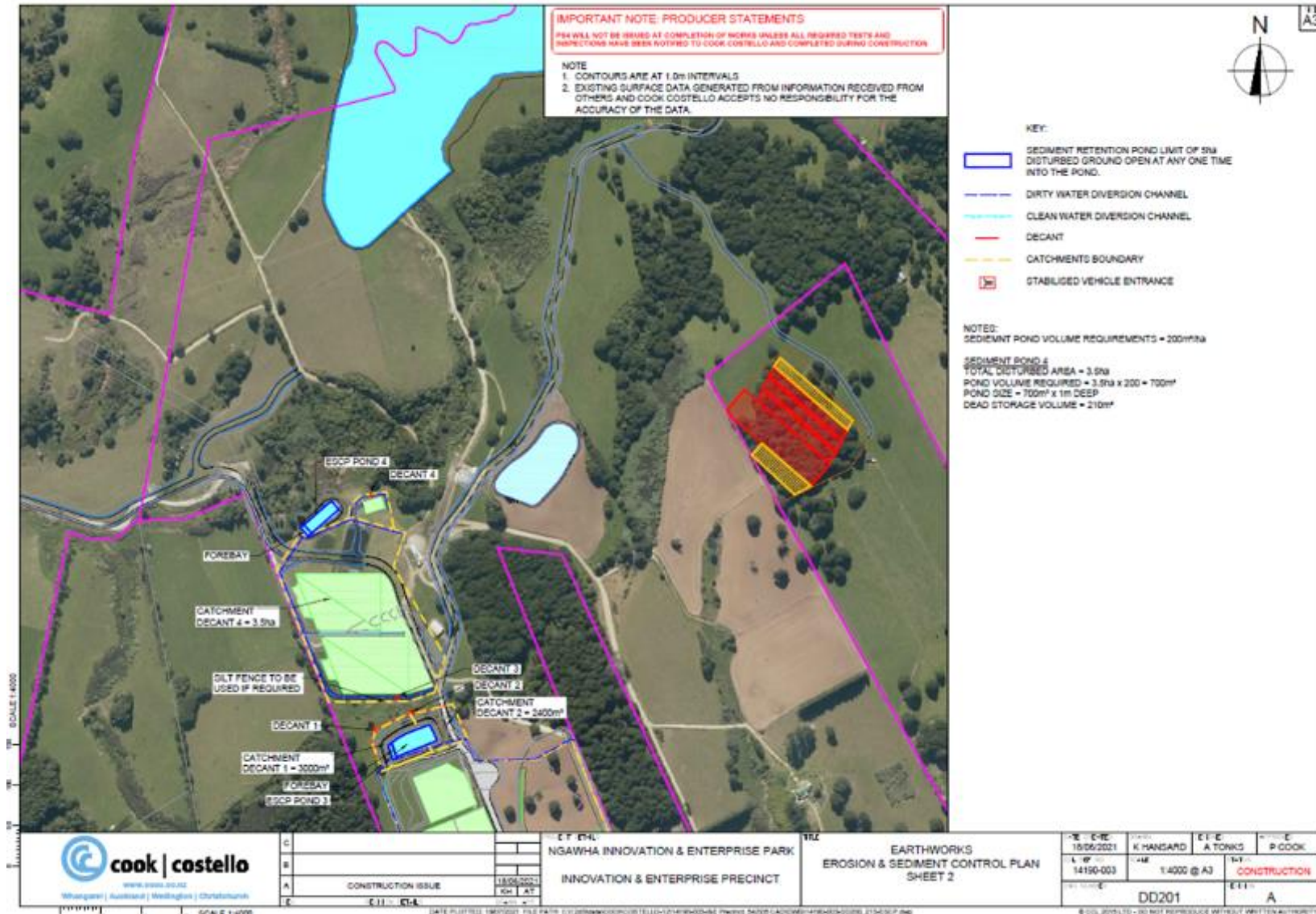


Appendix A, A-2: Scheme plan (note that platforms 20 to 36 may have changed and the planner's report will provide current proposed platforms).

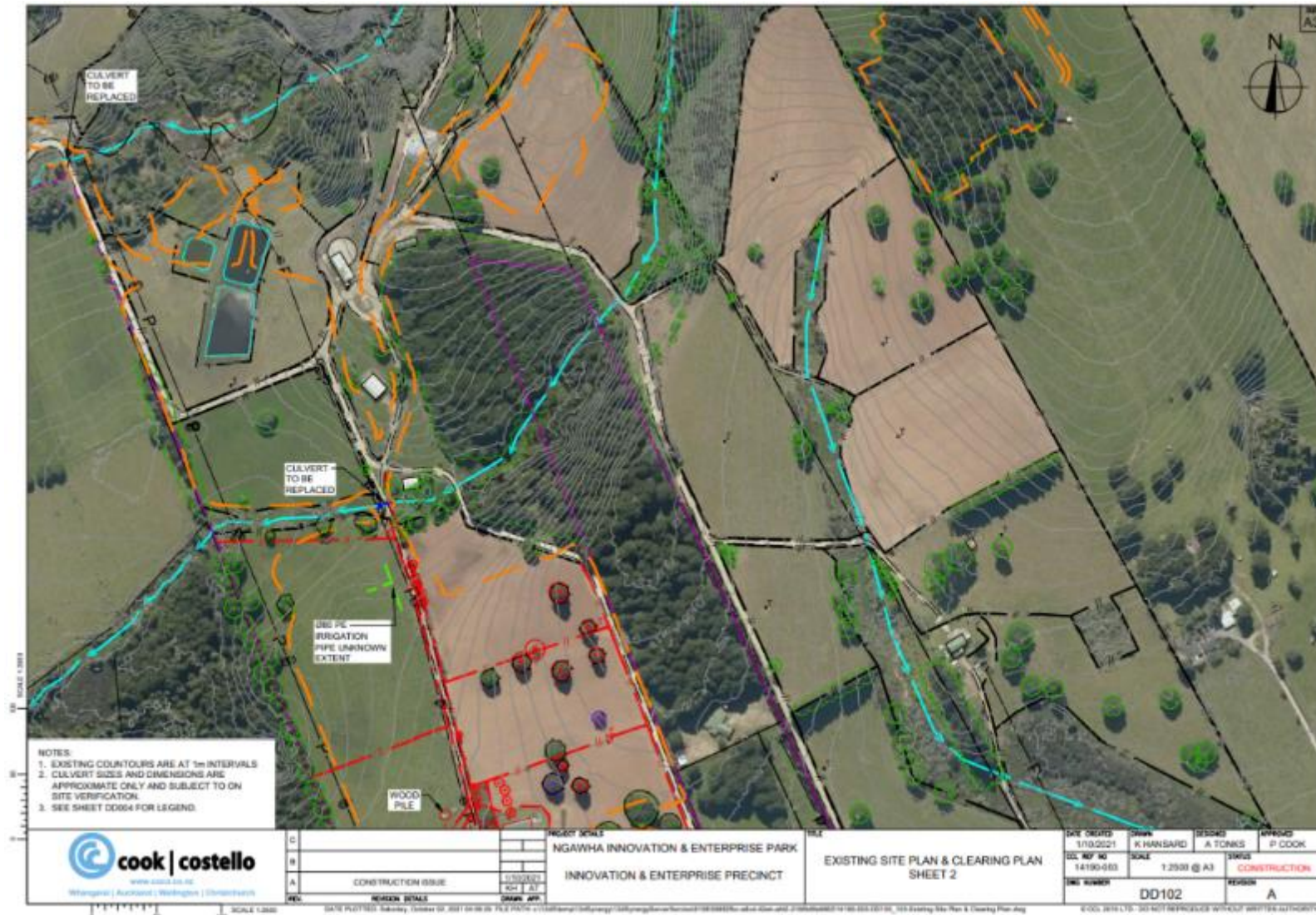


Appendix A, A-3: Scheme Plan with ecological map and proposed offset planting for the Matawii Reservoir.





Appendix A, A-4: Scheme plan (legend: Appendix A-6).



Appendix A-5: Scheme plan (legend: Appendix A-6)



Appendix A-6: Legend for scheme plans (Appendix A-3 - A-5).



Appendix A-7: Aerial photograph taken in 1957 showing pastoral land use with remnant trees.

## APPENDIX B

## Site Plant and Bird Species List

## Appendix B-1: Plant Species List:

Latin Name	Common name	Ecological Assessment			Wetland Assessment			
		2021 429	2018 276	2021 470	KT1	KT2	K1	K2
		Kopenui	Kahikatea	Wetland				
<b>Gymnosperm trees and shrubs</b>								
<i>Cryptomeria japonica</i> *	Japanese cedar				Y			
<i>Cupressus macrocarpa</i> *	macrocarpa				Y			Y
<i>Dacrycarpus dacrydioides</i>	kahikatea		Y	Y	Y	Y	Y	Y
<i>Dacrydium cupressinum</i>	rimu		Y	Y	Y			
<i>Phyllocladus trichomanoides</i>	tanekaha, celery pine		Y					
<i>Pinus radiata</i> *	radiata pine				Y			
<i>Podocarpus totara</i>	tōtara	Y	Y	Y	Y	Y	Y	Y
<b>Dicotyledon trees and shrubs</b>								
<i>Acacia melanoxylon</i> *	blackwood				Y	Y		
<i>Acca sellowiana</i> *	feijoa				Y	Y		
<i>Ackama rosifolia</i>	makamaka		Y					
<i>Aristotelia serrata</i>	makomako, wineberry		Y					
<i>Beilschmiedia tarairi</i>	taraire	Y	Y		Y			
<i>Berberis vulgaris</i> *	European barbery				Y			Y
<i>Carpodetus serratus</i>	putaputaweta	Y	Y	Y				
<i>Casuarina glauca</i> *	river oak				Y			
<i>Coprosma arborea</i>	mamangi, tree coprosma	Y						Y
<i>Coprosma areolata</i>	thin leaved coprosma		Y		Y			
<i>Coprosma autumnalis</i>	Coprosma grandifolia				Y	Y		
<i>Coprosma parviflora</i>	leafy coprosma							Y
<i>Coprosma rhamnoides</i>		Y	Y		Y			Y
<i>Coprosma robusta</i>	karamū, glossy karamū		Y		Y			Y
<i>Coprosma spathulata</i> subsp. <i>spathulata</i>			Y		Y			
<i>Coprosma tenuicaulis</i>	swamp coprosma, hukihuki					Y		Y
<i>Dysoxylum spectabile</i>	kohekohe	Y	Y		Y			Y
<i>Ficus carica</i> *	fig				Y			
<i>Geniostoma ligustrifolium</i> var. <i>ligustrifolium</i>	hangehange	Y	Y		Y			Y
<i>Hedycarya arborea</i>	porokaiwhiri, pigeonwood	Y	Y		Y	Y		Y

<i>Hoheria populnea</i>	lacebark			Y					
<i>Knightia excelsa</i>	rewarewa	Y			Y				
<i>Laurelia novae-zelandiae</i>	pukatea				Y			Y	Y
<i>Leptecophylla juniperina</i> subsp. <i>juniperina</i>	prickly mingimingi			Y					
<i>Leptospermum scoparium</i> agg.	mānuka			Y	Y			Y	Y
<i>Leptospermum scoparium</i> var. <i>incanum</i>	mānuka							Y	
<i>Ligustrum sinense</i> *	small-leaf privet, Chinese privet				Y	Y		Y	
<i>Leucopogon fasciculatus</i>	mingimingi			Y					
<i>Melicytus ramiflorus</i>	māhoe, whitey wood	Y			Y	Y		Y	Y
<i>Myrsine australis</i>	red māpou, red matipo	Y	Y	Y	Y	Y			Y
<i>Paraserianthes lophantha</i> *	brush wattle					Y			
<i>Piper excelsum</i>	kawakawa	Y	Y		Y				
<i>Pittosporum tenuifolium</i>	kohuhu				Y				
<i>Populus deltoides</i> *	necklace poplar				Y				
<i>Prunus persica</i> *	peach						Y		
<i>Pseudopanax arboreus</i>	whauwhaupaku, fivefinger			Y					
<i>Pyrus communis</i> *	pear				Y				
<i>Salix fragilis</i> *	Crack willow				Y				
<i>Schefflera digitata</i>	patē, seven-finger				Y			Y	Y
<i>Solanum aviculare</i> var. <i>aviculare</i>	poroporo	Y	Y						
<i>Solanum mauritianum</i> *	woolly nightshade		Y	Y	Y	Y	Y	Y	Y
<i>Syzygium maire</i>	tawake, swamp maire		Y						
<i>Ulex europaeus</i> *	gorse		Y		Y	Y	Y	Y	Y
<i>Veronica</i> sp.	hebe		Y						
<i>Vitex lucens</i>	pūriri		Y	Y	Y	Y	Y		
<i>Weinmannia silvicola</i>	towai	Y	Y		Y				
<b>Herbaceous monocots</b>									
<i>Agapanthus praecox</i> subsp. <i>orientalis</i> *	agapanthus				Y				
<i>Astelia hastata</i>	tank lily	Y	Y		Y		Y	Y	Y
<i>Astelia microsperma</i>			Y						
<i>Crocasmia x crocosmiiflora</i>	montbretia				Y				
<i>Earina mucronata</i>	peka-a-waka, bamboo orchid	Y	Y						
<i>Lemna disperma</i>	common duckweed		Y		Y				
<i>Myriophyllum</i> sp.	water milfoil					Y			
<i>Potamogeton cheesemanii</i>	red pondweed				Y				
<i>Potamogeton suboblongus</i>	mud pondweed					Y			
<i>Solanum nigrum</i> *	black nightshade	Y							
<i>Tradescantia fluminensis</i> *	wandering dew, tradescantia				Y				

<i>Typha orientalis</i>	raupō, bullrush			Y		Y	Y
<i>Zantedeschia aethiopica</i> *	arum lily			Y			
<b>Monocot trees and shrubs</b>							
<i>Bambusa oldhamii</i> *	Oldham's bamboo			Y			
<i>Cordyline australis</i>	tī kōuka, cabbage tree	Y	Y	Y		Y	Y
<i>Phormium tenax</i>	flax, harakeke	Y	Y	Y		Y	
<i>Phyllostachus aurea</i> *	walking stick bamboo			Y			
<i>Rhopalostylis sapida</i>	nīkau			Y			
<b>Dicot herbs</b>							
<i>Ageratina adenophora</i> *	Mexican devil	Y					
<i>Anthemis cotula</i> *	stinking mayweed		Y	Y			
<i>Apium nodiflorum</i> *	water celery			Y			
<i>Arum italicum</i> subsp. <i>italicum</i> 'Marmoratum'	Italian arum				Y		
<i>Bellis perennis</i> *	lawn daisy		Y	Y			
<i>Brassica rapa</i> var. <i>oleifera</i>	rape, wild turnip			Y			
<i>Callitriche stagnalis</i> *	water starwort				Y	Y	
<i>Cardamine hirsuta</i> *	bitter cress	Y					
<i>Carduus tenuiflorus</i> *	winged thistle			Y			
<i>Cerastium fontanum</i> *	mouse-ear chickweed		Y				
<i>Centella uniflora</i>	centella	Y	Y				Y
<i>Chenopodium album</i> *	fathen			Y			
<i>Cirsium vulgare</i> *	Scotch thistle	Y	Y	Y		Y	
<i>Coriandrum sativum</i> *	coriander			Y			
<i>Daucus carota</i> *	wild carrot			Y			
<i>Digitalis purpurea</i> *	foxglove	Y				Y	
<i>Epilobium chionanthum</i>	marsh willowherb		Y				
<i>Erigeron bonariensis</i> *	wavey-leaved fleabane			Y		Y	
<i>Erigeron sumatrensis</i> *	broad-leaved fleabane	Y	Y	Y			
<i>Erythranthe guttata</i> *	monkey musk		Y				
<i>Foeniculum vulgare</i> *	fennel					Y	
<i>Fumaria muralis</i> subsp. <i>muralis</i> *	scrambling fumitory		Y				
<i>Galium aparine</i> *	cleavers		Y			Y	Y
<i>Gamochoaeta coarctata</i>	purple cudweed		Y				
<i>Geranium molle</i>	doves foot cranesbill		Y				
<i>Haloragis erecta</i> subsp. <i>erecta</i>	haloragis					Y	Y
<i>Helminthotheca echioides</i> *	oxtonge		Y				
<i>Hydrocotyle heteromeria</i>	waxweed			Y			
<i>Hydrocotyle moschata</i> var. <i>parvifolia</i>			Y				

<i>Hypochaeris radicata</i>	catsear			Y				
<i>Jacobaea vulgaris</i> *	ragwort		Y	Y				Y
<i>Leontodon saxatilis</i>				Y				
<i>Leontodon taraxacoides</i> *	dandelion				Y			
<i>Leucanthemum vulgare</i> *	oxeye daisy			Y	Y			
<i>Lotus pedunculatus</i> *	lotus		Y	Y	Y	Y		
<i>Ludwigia palustris</i> *	water purslane, marsh ludwigia						Y	
<i>Lysimachia arvensis</i> subsp. <i>arvensis</i> var. <i>arvensis</i> *	pimpernel			Y	Y			
<i>Modiola caroliniana</i> *	creeping mallow						Y	
<i>Myosotis arvensis</i>	field forget-me-not			Y				
<i>Nasturtium officinale</i> *	watercress						Y	Y
<i>Nertera balfouriana</i>			Y					
<i>Oenanthe pimpinelloides</i> *	parsley dropwort			Y	Y	Y	Y	
<i>Ottelia ovalifolia</i> *	swamp lily							Y
<i>Oxalis brasiliensis</i>	Brazilian oxalis			Y				
<i>Persicaria decipiens</i>					Y			
<i>Persicaria hydropiper</i> *	water pepper			Y				
<i>Persicaria lapathifolia</i> *					Y			
<i>Persicaria maculosa</i>	willow weed		Y	Y	Y	Y	Y	Y
<i>Phytolacca octandra</i> *	inkweed			Y	Y	Y	Y	Y
<i>Plantago lanceolata</i> *	narrow-leaved plantain			Y	Y	Y	Y	Y
<i>Plantago major</i> *	broad-leaved plantain			Y	Y	Y		
<i>Portulaca oleracea</i> *	purslane				Y			
<i>Prunella vulgaris</i> *	selfheal			Y	Y			
<i>Ranunculus repens</i> *	creeping buttercup		Y	Y	Y	Y	Y	
<i>Ranunculus</i> sp.			Y	Y				
<i>Rubus fruticosus</i> agg.*	blackberry	Y	Y	Y	Y		Y	Y
<i>Rumex acetosella</i> *	sheep's sorrel			Y			Y	
<i>Rumex obtusifolius</i> *	broad leaved doc			Y	Y			
<i>Rumex crispus</i> *	narrow leaved doc			Y				
<i>Rumex pulcher</i>	fiddle doc			Y				
<i>Senecio bipinnatisectus</i> *	Australian fireweed				Y			
<i>Senecio jacobaea</i> *	ragwort				Y			
<i>Senecio vulgaris</i> *	groundsel				Y			
<i>Silybum marianum</i> *	variegated thistle			Y				
<i>Solanum nigrum</i> *	deadly nightshade		Y	Y	Y			
<i>Solanum pseudocapsicum</i> *	Jerusalem cherry				Y			
<i>Solanum tuberosum</i> *	potato						Y	

<i>Sonchus arvensis</i> *	sow thistle		Y						
<i>Sonchus asper</i> *	prickly sow thistle			Y					
<i>Sonchus kirkii</i>	puha, New Zealand sow thistle					Y			
<i>Sonchus oleraceus</i> *	sow thistle			Y					
<i>Stachys sylvatica</i> *	hedge woundwort	Y		Y					
<i>Taraxacum officinale</i> agg.*	dandelion	Y	Y						
<i>Trifolium pratense</i> *	red clover		Y	Y					
<i>Trifolium repens</i> *	white clover		Y	Y			Y		
<i>Verbena bonariensis</i> *	purple top	Y		Y					
<i>Veronica persica</i> *	scrambling speedwell			Y					
<i>Veronica serpyllifolia</i>	turf speedweed		Y						
<i>Viola odorata</i> *	violet			Y					
<b>Grasses, sedges, and rushes</b>									
<i>Agrostis capillaris</i> *	brown top		Y	Y			Y		
<i>Anthoxanthum odoratum</i> *	sweet vernal					Y			
<i>Bromus willdenowii</i> *	prairie grass			Y					
<i>Carex dissita</i>	forest sedge							Y	
<i>Carex geminata</i>	rautahi	Y		Y					
<i>Carex lessoniana</i>	rautahi, cutty grass					Y		Y	
<i>Carex secta</i>	purei, pukio	Y			Y	Y	Y		
<i>Carex uncinata</i>	hook sedge			Y					
<i>Carex virgata</i>	pukio, swamp sedge	Y		Y			Y		
<i>Cenchrus clandestinus</i> *	kikuyu		Y	Y		Y	Y		
<i>Cortaderia selloana</i> *	pampas			Y					
<i>Cyperus brevifolius</i> *		Y							
<i>Cyperus eragrostis</i> *	umbrella sedge					Y		Y	
<i>Cyperus ustulatus</i>	giant umbrella sedge		Y	Y					
<i>Dactylis glomerata</i> *	cocksfoot		Y	Y		Y	Y		
<i>Digitaria sanguinalis</i> *	summer grass	Y		Y					
<i>Echinochloa crus-galli</i> *	barnyard grass			Y					
<i>Ehrharta erecta</i> *	veldt grass			Y					
<i>Eleocharis spaciolata</i>	kutakuta		Y						
<i>Eleusine indica</i> *	crow's foot grass			Y					
<i>Glyceria maxima</i> *	floating sweet grass					Y	Y	Y	
<i>Holcus lanatus</i> *	Yorkshire fog			Y		Y	Y	Y	
<i>Isachne globosa</i> *	swamp millet	Y	Y	Y					
<i>Isolepis aucklandica</i>		Y							
<i>Isolepis prolifera</i>		Y	Y			Y			



<i>Juncus acuminatus</i>	sharp-fruited rush		Y	Y				
<i>Juncus articulatus*</i>	jointed rush		Y					
<i>Juncus dichotomus</i>						Y		
<i>Juncus edgariae</i>	wīwī					Y		
<i>Juncus effusus</i> var. <i>effusus*</i>	soft rush		Y		Y			Y
<i>Juncus pallidus</i>	leafless rush		Y		Y			
<i>Juncus planifolius</i>	grass leaved rush					Y		
<i>Juncus sarophorus</i>	broom rush, fan-flowered rush						Y	
<i>Juncus tenuis</i> subsp. <i>tenuis</i>	track rush						Y	
<i>Lolium perenne*</i>	perennial rye grass				Y		Y	
<i>Lolium rigium*</i>	annual rye grass						Y	
<i>Luzula rafa</i> var. <i>rafa</i>	red woodrush		Y					
<i>Machaerina teretifolia</i>			Y		Y			
<i>Oplismenus hirtellus</i> var. <i>imbecilis</i>		Y	Y		Y	Y		Y
<i>Paspalum dilatatum*</i>	paspalum				Y			
<i>Paspalum distichum*</i>	mercer grass		Y		Y		Y	
<i>Phleum pratense*</i>	timothy				Y			
<i>Poa annua*</i>	annual poa				Y			
<i>Sagina procumbens</i>	procumbent pearlwort						Y	
<i>Schoenus tendo</i>	kauri sedge, kauri schoenus		Y					
<i>Schoenoplectus tabernaemontani</i>	kuawa				Y	Y	Y	
<i>Uncinia</i> sp.			Y					
<i>Zea mays*</i>	maize				Y			
<b>Ferns and Fern Allies</b>								
<i>Arthropteris tenella</i>	jointed fern		Y					
<i>Asplenium flaccidum</i>	hanging spleenwort	Y	Y		Y			Y
<i>Asplenium oblongifolium</i>	huruhuruwhenua, shining spleenwort	Y	Y		Y			Y
<i>Asplenium polyodon</i>	sickle spleenwort		Y		Y		Y	Y
<i>Azolla pinnata</i>	ferry azolla				Y			
<i>Azolla rubra</i>	red azolla				Y			
<i>Cyathea dealbata</i>	ponga, silver fern	Y			Y			Y
<i>Cyathea medullaris</i>	mamaku		Y		Y		Y	Y
<i>Cyathea smithii</i>	kātote, smiths tree fern, soft tree fern					Y		Y
<i>Dicksonia fibrosa</i>	ponga, whekī-ponga						Y	Y
<i>Dicksonia squarrosa</i>	rough tree fern, harsh tree fern, whekī		Y		Y	Y		Y
<i>Diplazium australe</i>	ring fern	Y						
<i>Dendroconche scandens</i>	mokimoki, fragrant fern				Y			
<i>Doodia australis</i>	rasp fern				Y			Y

<i>Histiopteris incisa</i>	mata, water fern	Y	Y	Y		Y?	Y	Y	Y
<i>Hymenophyllum demissum</i>	drooping filmy fern	Y	Y						
<i>Icarus filiformis</i>	thread fern, climbing hard fern	Y	Y						
<i>Lygodium articulatum</i>	mangemange, bushmans mattress		Y						
<i>Notogrammitis billardierei</i>	common strap fern, mangemange	Y	Y		Y				
<i>Notogrammitis</i> sp.	strap fern		Y						
<i>Paesia scaberula</i>	ring fern	Y	Y	Y	Y				Y
<i>Parablechnum minus</i>	swamp kiokio		Y	Y	Y	Y	Y		
<i>Parablechnum novae-zelandiae</i>	kiokio		Y	Y	Y	Y		Y	Y
<i>Parablechnum procerum</i>	small kiokio	Y	Y						
<i>Parapolytichum microsorium</i> subsp. <i>pentangulare</i>	smooth shield fern	Y		Y					
<i>Polystichum vestitum</i>	punui, prickly shield fern			Y					
<i>Pneumatopteris pennigera</i>	gully fern	Y	Y	Y					
<i>Pteridium esculentum</i>	rārahu, bracken fern			Y	Y			Y	Y
<i>Pteris carsei</i>	nettledbrake								
<i>Pyrosia eleagnifolia</i>	ngārara wehi, leather-leaf fern	Y	Y	Y	Y	Y		Y	Y
<i>Pyrosia scaberaella</i>		Y							
<i>Selaginella kraussiana</i> *	African club moss	Y	Y					Y	Y
<i>Zealandia pustulata</i> subsp. <i>pustulata</i>	kōwaowao, hounds tongue	Y	Y		Y			Y	
<b>Lianes and climbers</b>									
<i>Calystegia silvatica</i> subsp. <i>disjuncta</i>	great bindweed			Y	Y		Y	Y	
<i>Calystegia sepium</i> subsp. <i>roseata</i>	pink bindweed								
<i>Freycinetia banksii</i>	kiekie	Y	Y		Y				
<i>Metrosideros perforata</i>	akatea	Y	Y		Y				Y
<i>Muehlenbeckia australis</i>	pohuehue, large-leaved muehlenbeckia			Y	Y			Y	
<i>Passiflora tetrandra</i>	kōhīa, NZ passionflower, NZ passionfruit								Y
<i>Ripogonum scandens</i>	supplejack	Y	Y		Y				
<i>Rubus fruticosus</i> agg.*	blackberry				Y				
<i>Tecomeria capensis</i> *	cape honeysuckle				Y				

\*Denotes introduced/non-native species

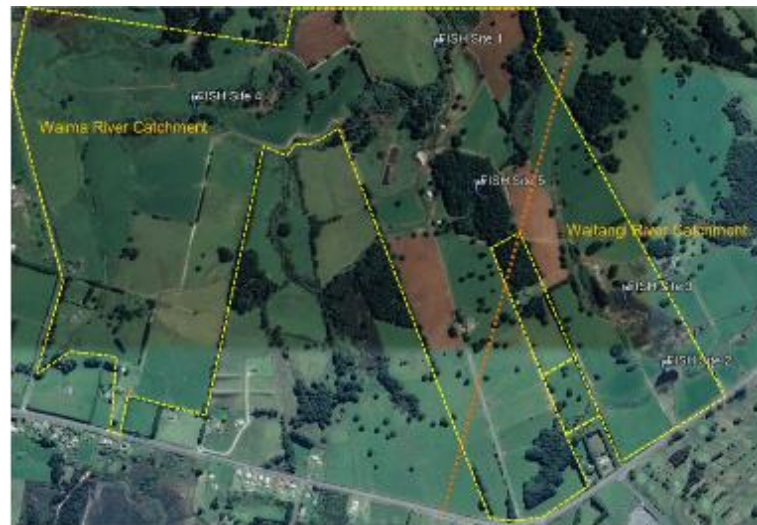
**Appendix B-2: Site Bird Species List**

Latin Name	Common name	Ecological Assessment		Wetland Assessment			
		2021 429	2018 276	KT1	KT2	K1	K2
<i>Acridotheres tristis</i> *	myna		Y				
<i>Alauda arvensis</i> *	skylark	Y	Y			Y	
<i>Anthus novaeseelandiae</i>	New Zealand pipit		Y				
<i>Carduelis carduelis</i> *	European goldfinch		Y				
<i>Chrysococcyx lucidus</i>	shining cuckoo, pīpīwharauoa						Y
<i>Circus approximans</i>	harrier hawk, kāhu	Y	Y			y	
<i>Gerygone igata</i>	grey warbler		Y				
<i>Gymnorhina tibicen</i> *	Australian magpie		Y				
<i>Hemiphaga novaeseelandiae</i>	kūkupa kererū			Y			
<i>Hirundo neoxena</i> *	welcome swallow	Y					Y
<i>Passer domesticus</i>	sparrow		Y	Y		Y	
<i>Phalacrocorax melanoleucos</i>	little shag				Y		
<i>Phasianus colchicus</i> *	ring-necked pheasant	Y	Y	Y		Y	Y
<i>Platycercus eximius</i> *	Eastern rosella	Y					
<i>Porphyrio melanotus</i>	pūkeko	Y	Y				Y
<i>Prothemadera novaeseelandiae</i>	tūī	Y	Y			Y	
<i>Rhipidura fuliginosa</i>	pīwakawaka, fantail	Y	Y	Y		Y	
<i>Tadorna variegata</i>	paradise shelduck	Y			Y	Y	Y
<i>Todiramphus sanctus</i>	kingfisher	Y	Y				
<i>Turdus philomelos</i> *	song thrush	Y	Y				
<i>Turdus merula</i> *	blackbird	Y			Y		

\*Denotes introduced/non-native species

**Appendix B-3.1: Summary of results from a fish survey conducted in 2019**

Catchment	Waima	Waitangi	Waitangi	Waima	Waima
	u/s Kopenui Str	Irrigation pond	Wetland Remnant	d/s Kopenui Str	Forest swamp
17/10/2019	Fish Site 1	Fish Site 2	Fish Site 3	Fish Site 4	Fish Site 5
short fin eel	0	0	0	1 (500 mm)	0
long fin eel	0	0	0	1 (550mm)	0
Cran's bully	2 (54 & 37 mm)	0	0	20 (25-80 mm)	0
Gambuzia	0	0	0	117	10
koura	2	0	0	0	0
other	snails	damselfly nymph and diving beetles			



**Appendix B-3.2: Location of freshwater fish survey sites with property boundary outlined in yellow (incomplete). Approximate catchment boundary indicated by orange line.**

APPENDIX C

Hydrology Report Koperui Stream Wetlands



**Far North Holdings Limited**

Opuā Marine Park  
P.O. Box 7  
Opuā, 0241  
Bay of Islands, New Zealand

10 December 2021

Northland Regional Council  
Attention: Mujahid Musa

Re: RC Application APP.043181.01.01 – s92(1)

Far North Holdings propose to construct two adjacent building platforms in the northern portion of the Innovation & Enterprise Precinct within the Ngāwhā Innovation & Enterprise Park. A resource consent with Northland Regional Council has been applied for and subsequently the applicant has received a s92 further information request. The s92 relates to the wetlands in respect to the National Environmental Standard Freshwater Management Regulations 2020. This memo addresses the requested catchment hydrology assessment and refers to the ecological site assessment by NZ Environmental 'Wetland Assessment 5435 SH12, Ngāwhā', dated 2<sup>nd</sup> December 2021.



Figure 1: Building platform (solid red), 10m and 100m platform offset (red dashed), Koperui Stream wetland west (blue) (K1), Koperui Stream wetland west (green) (K2), Koperui Tributary wetland east (K1) (cyan), Koperui Tributary wetland west (orange) (K2), Constructed wetlands (light blue)

Figure 1 identifies the building platform in solid red outline, with the Koperui Stream to the north and a tributary of the Koperui Stream to the south. Both the stream and tributary flow to the west. The building platforms 10m and 100m offset is shown in red dash and shows that the offset takes in a portion of the wetlands on Koperui Stream and as well as wetlands on the stream tributary. For the

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purposes of this memo these wetlands are referred to as the K1 (Kopenui East wetland - 9095m<sup>2</sup>), K2 (Kopenui West wetland - 1797m<sup>2</sup>), KT1 (Tributary East - 1367m<sup>2</sup>), and KT2 (Tributary West - 1367m<sup>2</sup>) respectively.

Also shown in Figure 1 are two constructed wetlands. The southern constructed wetland is the final element of the Innovation & Enterprise Precinct green infrastructure which comprises of a series of rain gardens and constructed wetlands that are connected by vegetated swales. The Innovation & Enterprise Precinct green infrastructure provides groundwater recharge, water quality, stormwater conveyance and flow mitigation functions. The southern constructed wetland discharges to the upstream portion of the KT2.

The proposed northern constructed wetland will receive stormwater runoff from the proposed building platforms, the adjacent road, and run-on from permeable surfaces. For reasons discussed below, unlike the southern constructed wetland this device is only for water quality and surface water recharge to the K1 wetland and is not used for flow mitigation. Runoff from low order events would pass through the constructed wetland prior to discharging to the upstream portion of K1. Extreme event stormwater runoff bypasses the constructed wetland and discharges to K2 within the Kopenui Stream to the west and downstream of the K1 wetland.

The dairy effluent ponds visible in the aerial image have been remediated and are in the process of being filled in as part of the dairy farm decommissioning works.



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Catchment Hydrology Assessment

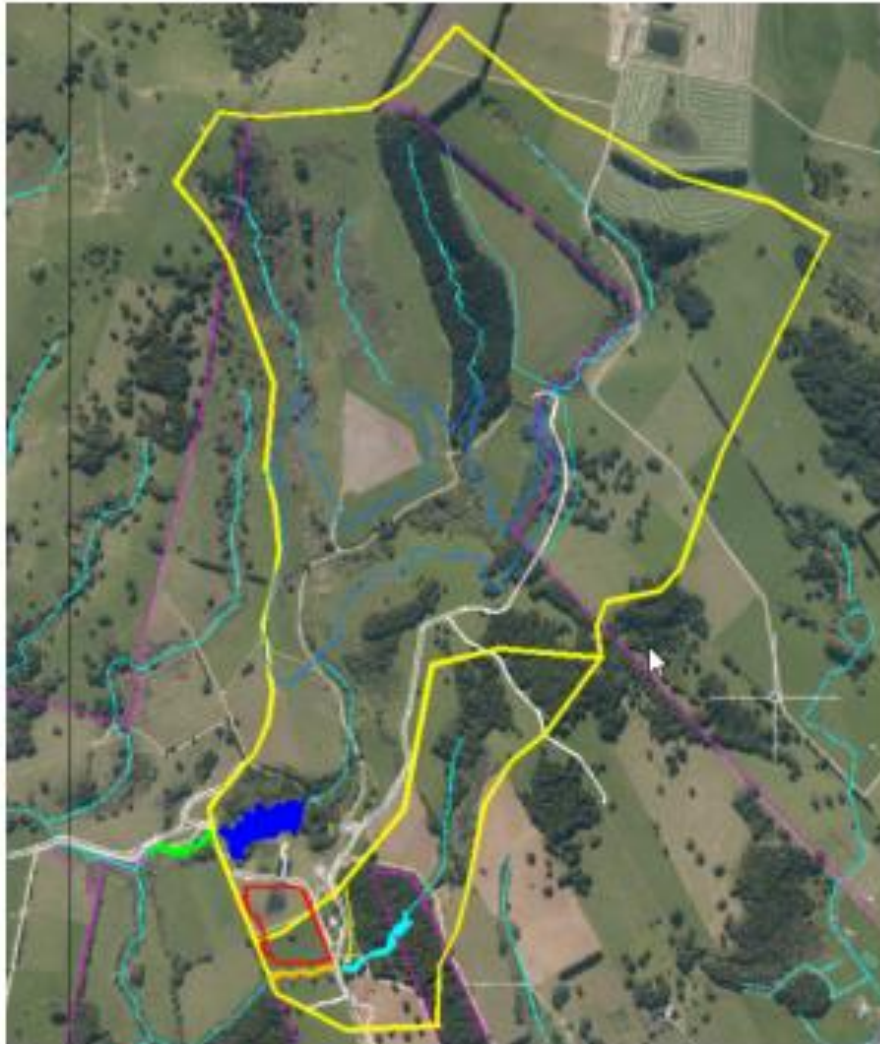


Figure 2: Pre Matawii Dam catchments. Koperua Stream 116.9ha, Koperua Tributary 18,90ha, Matawii Dam wetland footprint (blue outline) with spillway west to neighbouring catchment

Figure 2 shows the 116.9ha K1 catchment prior to the Te Tai Tokerau Water Trust Matawii Dam construction. The Matawii Dam is located within the NIEP property but is not a Ngawha Innovation & Enterprise Park project and is independent from the Parks consented works. The Matawii Dam is presently in construction, with completion due this earthworks season. When complete, the dam spillway will discharge west to a neighbouring catchment and the K1 (and K2) wetland catchment is reduced by 85% to 17.45ha, shown in Figure 3 below.

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The marked reduction in the K1 wetland catchment and the opportunity to mitigate this, in part by directing the north platform runoff to this wetland, was the key reason for the design approach. The stormwater design involves seeding treated stormwater to the wetland, and providing stream flushing flows by bypassing extreme event runoff downstream of this. Periodic stream flushing flow releases are a consent conditions of the Matawii Dam.



Figure 3: Preddevelopment<sup>1</sup> catchments. Kopena Stream 17.45ha. Kopena Tributary 18.96ha.

Figure 4 below shows the proposed post development catchment with the K1 (and K2) wetlands increasing by 9.2% from 17.45ha to 19.06ha, K1 wetland catchment is unchanged, and the K2 wetland reducing by 8.5% from 18.96ha to 17.36ha.

While a lot of attention has been paid to matching hydrology within the Innovation & Enterprise precinct to the south through water sensitive design, the K2 wetland inflow will be augmented by inflow from the green infrastructure discharge point at its upper reach.

<sup>1</sup> Post Matawii Dam development.



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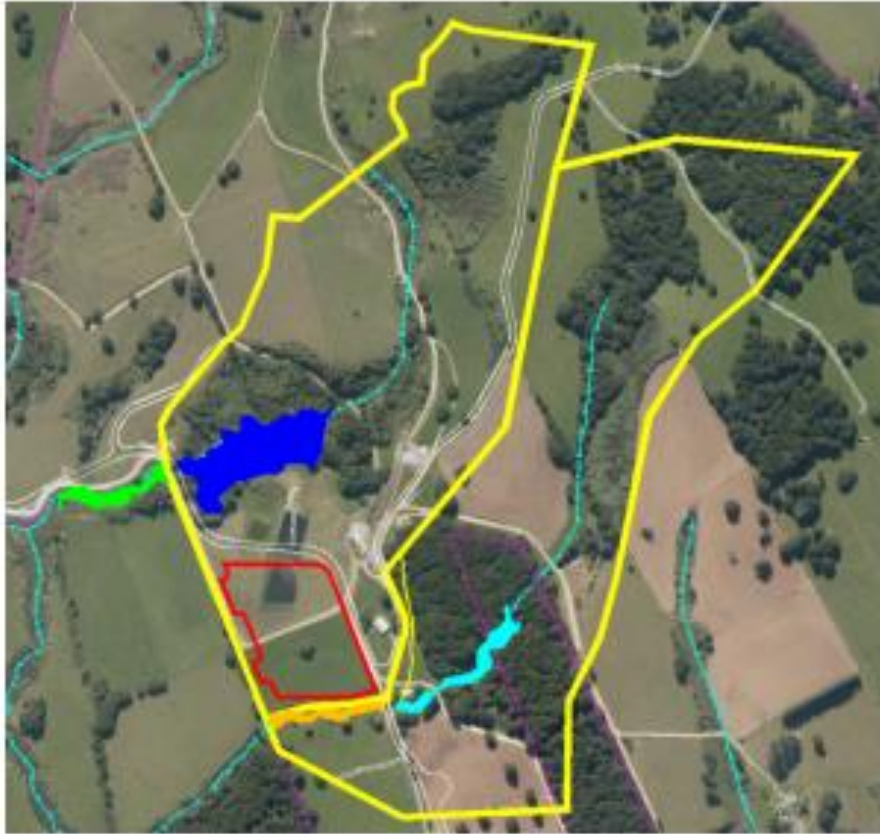


Figure 4: Post development catchments. Kapehu Stream 19,06ha. Kapehu Tributary 27,26ha.

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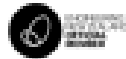


## Far North Holdings Limited

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### Activity Status

The southern edge of the building platform is beyond the 10m wetland setback however the channel between it and the KT2 wetland, which conveys runoff clockwise around the platform to the constructed wetland in the north, is within the 10m setback. All works are located outside of the wetland. It is proposed this activity is considered a NES-FW Permitted Activity under condition 38.2 earthwork or land disturbance within a 10m setback due to part (a) as it is for the purpose of restoring flow to the K1 wetland. Similarly, it is proposed the activity is considered A NES-FW Permitted Activity under condition 38.3 diversion of water within 100m setback for the same reason.



Adrian Tonks

**General Manager Engineering**  
BE (Lic), MEng2

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## APPENDIX D

## Assessment of Ecological Effects

**Appendix D-1: Assessment of Effects Methodology**

The Ecological Impact Assessment (EclA) guidelines consider the factors set out in Table 1 when assigning value to species.

Once the overall level of ecological effects is determined the requirement and types of mitigation can be considered.

**Table 1: Assigning value to species according to the EclA guidelines.**

Determining Factors	Value Ascribed
Nationally threatened species found within the project's zone of influence, either permanently or seasonally	Very high
Species listed as threatened or at risk (declining) found within the project's zone of influence, either permanently or seasonally	High
Species listed as any other category of "at risk" found in the project's zone of influence either permanently or seasonally	Moderate
Locally uncommon (within the ecological district) or distinctive species present	Moderate
Nationally and locally common indigenous species present	Low
Exotic species, including pest species present, having recreational value	Negligible

The EclA criteria for describing the magnitude of effect are set out in Table 2.

**Table 2: Descriptors for the magnitude of ecological effects according to EclA guidelines.**

Magnitude	Description
Very high	Total loss of, or very major alteration to, key elements or features of the existing baseline conditions, such that the post-development character, composition and/or 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 existing baseline conditions such that the post-development character, composition and/or 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 existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; and/or Loss of a moderate proportion of the known population or range of the element or feature
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes will be similar to pre-development circumstances or patterns; and/or Having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing 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

The EclA criteria for describing the overall level of ecological effects is set out in Table 3.

**Table 3: EclA criteria for describing the overall level of ecological effects.**

Ecological value	Very high	High	Moderate	Low	Negligible
<b>Magnitude</b>					
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

**APPENDIX E**

**Areas of Ecological Value**

**Appendix E, E-1: Areas of Ecological Value**

NIEP Ecological Values			NIEP/MR Ecological Values		
NIEP_EV_Forest	id	Area (ha)	NIEP_MR_EV_Forest	id	Area (ha)
	1	1.54834		1	1.9419792
	2	1.392608		2	0.5512481
	3	0.340448		3	0.1325968
	4	1.555453		4	0.7120268
	5	0.155577		5	0.2075568
	6	0.140474		<b>Total</b>	<b>3.5454077</b>
	7	5.416151	<b>NIEP_MR_EV_Wetland</b>	1	9.2954714
	8	0.14556		2	0.1077079
	9	0.044058		3	0.5632665
	10	0.049441		4	1.6834584
	11	2.315005		5	0.5356454
	12	0.458254		<b>Total</b>	<b>12.1855496</b>
	<b>Total</b>	<b>13.56</b>			
<b>NIEP_EV_SwampForest</b>	1	0.695444	<b>Total NIEP/MR EV: 15.73</b>		
	2	5.100603			
	<b>Total</b>	<b>5.796047</b>			
<b>NIEP_EV_Wetland</b>	1	0.560761			
	2	0.3302904			
	3	0.3225701			
	4	0.1893353			
	5	0.4800436			
	6	2.6008983			
	7	1.5546727			
	8	0.1219005			
	9	0.1106514			
	10	0.2029373			
	11	0.3548815			
	12	0.9330961			
	13	0.084186			
	<b>Total</b>	<b>7.8462242</b>			
<b>Total NIEP EV:</b>		<b>27.2</b>			