

IN THE MATTER

of the Resource
Management Act 1991

AND

IN THE MATTER

of a resource consent
application by **LIMITED
VACO INVESTMENTS
(WAIPU PROJECT) Ltd**
to the **WHANGĀREI
DISTRICT COUNCIL**
under section 88 of the
Act to construct and
operate the Waipu
Service Centre

STATEMENT OF EVIDENCE OF MADARA VILDE (ECOLOGY)

1. INTRODUCTION

Qualifications and experience

- 1.1** My full name is Madara Vilde. I am the Director and Principal Ecologist at Wild Ecology Ltd, an ecological consultancy specialising in ecological assessments and sustainable land use management. I have 6 years' professional experience as an ecologist, working primarily in ecological consulting and environmental research, with a particular focus on terrestrial and aquatic ecology and application of Geographical Information Systems (GIS). A statement of my qualifications and experience are included in Appendix 1.

Involvement in project

- 1.2** Wild Ecology Ltd was engaged by Vaco Investments (Waipu Project) Ltd ("the Applicant") in September 2024 to advise on ecological values in relation to a subdivision consent application at 47 Millbrook Road, Waipu (Part Lot 1 DP 44163) ("the Site") which forms part of the wider for resource consent application for the site ("the Proposal"). My evidence specifically addresses ecological matters related to the subdivision consent application for Stage 0 of the Proposal.
- 1.3** I am the author of the Ecological Assessment ("EA") attached under Appendix 2 and Ecological Management Plan ("EMP") attached under Appendix 3 (both dated September 2024) that were prepared in

support of the subdivision consent application for Stage 0 of the Proposal.

Purpose and scope of evidence

- 1.4** My evidence will focus on the Site's baseline ecological values, potential ecological effects associated with the Stage 0 subdivision proposal and proposed Net Environmental Benefit ("NEB") to result as part of the proposal. My evidence should be read in conjunction with the EA and EMP prepared for the Proposal (both dated September 2024) and attached under Appendix 2 and 3.
- 1.5** Specifically, my evidence will address:
- (i) my involvement with the Proposal;
 - (ii) summary of Site's values in respect to terrestrial and freshwater ecology;
 - (iii) assessment of potential effects of the Stage 0 proposal on ecological values noted on Site;
 - (iv) a summary of proposed ecological enhancement/NEB to be achieved on Site;
 - (v) a summary of key conclusions and recommendations.

Expert Witness Code of Conduct

- 1.6** I have read the Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note (2023) and I agree to comply with it. I can confirm that the issues addressed in this statement are within my area of expertise and that in preparing my evidence I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

2. SUMMARY OF EVIDENCE

Stage 0 Non-Complying 'Net Environmental Benefit' Subdivision Proposal

- 2.1** The subject site at 47 Millbrook Road, Waipu (Part Lot 1 DP 44163) is a large agricultural land block with a total site size of approximately 31.78 ha. It is zoned as a 'Rural Production Zone' (RPZ) under the operative Whangārei District Plan (WDP). The Stage 0 subdivision

proposal will create two lots – being Lot 200 (approximately 5.91 ha in size) and balance Lot 100 (25.90 ha in size).

- 2.2** The Site is predominantly comprised of cropping and grazing land (pasture), with the site's northernmost boundary containing a band of terrestrial mature bush forming the riparian margin of the Ahuroa River. The terrestrial vegetation encompassing the Ahuroa River is classified as Ahuroa River Forest Remnants (Q08/235), which is a designated Protected Natural Area (PNA) in the Natural Areas of Waipu Ecological District Reconnaissance Survey Report¹.
- 2.3** According to the Land Environments of New Zealand (LENZ)² classification, the riparian margins along the Ahuroa River are categorized as 'Chronically Threatened,' with only 10-20% of their original indigenous cover remaining, and 'Acutely Threatened,' with less than 10% of indigenous cover remaining.
- 2.4** Based on these findings, the site's key ecological features, particularly the Ahuroa River and its associated riparian margins, present an opportunity to apply for subdivision consent under the Net Environmental Benefit (NEB) subdivision provisions, specifically SUB-R16(3) of the Whangārei District Plan (oWDP)³. However, full compliance with SUB-R16(3) Table 1 cannot be achieved, rendering the proposal a non-complying activity under SUB-R16(4). In particular, the requirement to protect both banks of the river cannot be met, as the site's cadastral boundaries only encompass the southern bank of the Ahuroa River.
- 2.5** The non-complying subdivision proposal under SUB-R16(4) seeks to create 1 additional lot through the protection and enhancement of the riparian margin of Ahuroa River. In summary, the Applicant proposes to protect and enhance 2.28 ha of riparian margin partly comprising of existing PNA bush area (Category A) and partly comprising of proposed revegetation plantings (Category C) protecting and enhancing the Ahuroa River margin. The proposed riparian protection area will be protected in perpetuity through a conservation covenant and require enhancement through a combination of stock exclusion,

¹ Lux, Martin and Beadel (2007) Natural areas of Waipu Ecological District Reconnaissance Survey Report for the Protected Natural Areas Programme

² Ministry for the Environment (2002) Land environments of New Zealand (LENZ)

³ Whangārei District Council (last updated May 23, 2024) Whangārei District Plan - Rural Production Zone.

fencing, pest animal and pest weed control and native revegetation planting.

2.6 Overall, it is my professional opinion that the Stage 0 NEB riparian margin protection proposal for the site:

- (i) Was informed by a thorough review of submissions, including issues raised by Patuharakeke Te Iwi Trust Board in the Cultural Effects Assessment (CVA)⁴, and considers the landscape holistically. The Applicant has explored ways to recognise, manage, and protect the site's ecological and wider landscape values.
- (ii) Has been developed using a design-led approach that ensures the protection and enhancement of the Ahuroa River riparian corridor within the site boundaries.
- (iii) Illustrates how rural subdivision and growth can be balanced with ecological enhancement through enhancement and protection of riparian margins.
- (iv) Adopts the effects management hierarchy in relation to ecological matters.
- (v) Will enhance the ecological health, structure, and function of the Ahuroa River and its riparian margins through permanent stock exclusion, riparian revegetation, pest and weed control, and the creation of new habitats and buffer zones. These actions will strengthen ecological networks, improve ecosystem services, and provide significant benefits to indigenous habitats and wildlife within the site and surrounding areas.
- (vi) Will result in negligible ecological effects and will deliver an overall positive ecological benefit to Ahuroa River and its riparian margins should the recommendations relating to best practice integrated design, erosion and sediment control guidelines provided in the associated expert reporting prepared for the Proposal are followed.

⁴ Patuharakeke Te Iwi Trust Board (June 2023) Draft/Interim Cultural Effects Assessment (CVA).

3. ECOLOGICAL SUMMARY

Site description

- 3.1** The site is located on the outskirts of Waipu township, located on the intersection between State Highway 1 and Millbrook Road. The site is legally described as Part Lot 1 DP 44163 with a total site size of approximately 31.78 ha.
- 3.2** The site is generally flat to gently sloping and is predominantly comprised of cropping and grazing land (pasture), with the site's northernmost boundary containing a band of terrestrial mature bush forming the riparian margin of the lower catchment of Ahuroa River which eventually flows into Bream Bay. The majority of the riparian margins along the Ahuroa River are categorized as 'Chronically Threatened,' with only 10-20% of their original indigenous cover remaining, and 'Acutely Threatened,' with less than 10% of indigenous cover remaining.
- 3.3** The bush area along the Ahuroa River margins is identified as Ahuroa River Forest Remnants (Q08/235). This area is classified as a Protected Natural Area (PNA) in the Natural Areas of Waipu Ecological District Reconnaissance Survey Report. The bush area is representative for secondary riverine podocarp forest (totara forest and totara-kahikatea forest) - one of only two examples in the Ecological District of the latter - with some plant species which are only found in riparian situations, e.g. lowland ribbonwood (*Plagianthus regius subsp. regius*). It is considered to be an uncommon and diminishing forest type which is likely to perform riparian functions such as riverbank stabilisation, lowering water temperature and providing habitat for other riparian species.
- 3.4** A small, exotic species dominated wetland area is present along the sites north-eastern boundary forming a floodplain of the Ahuroa River.
- 3.5** Much of the remainder of the site is comprised in exotic pasture. Some scattered mature totara, with the odd kahikatea are dotted throughout, primarily lining existing farm tracks and/or farm drains.
- 3.6** Ahuroa River, which meanders along the site's northern boundary, is about 5 to 7 meters wide with banks ranging from 1 to 3 meters high and a depth of 2 to 3 meters. The river has a soft bottom, is influenced by tides, and exhibits signs of stream bank erosion and periodic

flooding affecting the stream and adjacent floodplain, as observed during a September 2024 site visit.

- 3.7** The wider site also contains a series of artificial watercourses (farm drainage channels). These are considered to be fully artificial in nature (human-made) and were not assessed further as part of this assessment.

Ecological significance assessment

- 3.8** RPROZ-P9 subclause (1) of oWDP determine whether a Net Environmental Benefit (NEB) can be achieved from a subdivision proposal. RPROZ-P9 requires that the significance of indigenous vegetation and habitats is assessed by reference to policy 4.4.1 and the significance criteria as outlined under Appendix 5 of the Northland Regional Policy Statement (2016) (NRPS)⁵ when processing applications for resource consent for land use or subdivision.
- 3.9** Under Appendix 5 of NRPS, an area of indigenous vegetation or habitats of indigenous fauna is deemed significant if it meets one or more of the following criteria: representativeness, rarity/distinctiveness, diversity and pattern, or ecological context.
- 3.10** Collectively the site survey results coupled with desktop analysis of other relevant ecological records indicate that the Ahuroa River and Q08/235 support a range of terrestrial flora and fauna that is of high ecological value, including but not limited to, species such as lowland ribbonwood (*Plagianthus regius subsp. regius*; Regionally significant), kūkupa (*Hemiphaga novaeseelandiae*; Regionally significant), torrentfish (*Cheimarrichthys fosteri*; At Risk-Declining), inanga (*Galaxias maculatus*; At Risk-Declining), banded kōkopu (*Galaxius fasciatus*; Regionally significant), long-fin eel (*Anguilla dieffenbachii*; At Risk-Declining), koura (*Paranephrops spp.*; At Risk-Declining) and 'At Risk-Declining' kakahi (*Echyridella menziesii*; At Risk-Declining).
- 3.11** Based on the above the Ahuroa River and its terrestrial margins classified as PNA Ahuroa River Forest Remnants (Q08/235) are considered to be of high ecological significance in reference to Appendix 5 of NRPS.

⁵ Northland Regional Policy Statement (2016) Appendix 5 Areas of significant indigenous vegetation and significant habitats of indigenous fauna in terrestrial, freshwater and marine environments.

Fauna assessment

- 3.12** Rapid fauna surveys were conducted during a site visit in September 2024 to record the presence of avifauna and assess the potential habitat for ichthyofauna (fish), herpetofauna (lizards) and bat fauna. An additional environmental DNA ("eDNA") survey was carried out within Ahuroa River to quantify fish fauna that is present within the River.
- 3.13** Only common mobile avifauna and domestic avifauna was noted during the site surveys in September 2024, apart from the sighting of the 'Regionally significant' kūkupa (*Hemiphaga novaeseelandiae*) which was observed roosting within the onsite bush area.
- 3.14** No bat activity was recorded on site, which is about 10 km from recent long-tailed bat (*Chalinolobus tuberculatus*) records at Brynderwyn Hills. Although no bats were observed, the old-growth trees in the Ahuroa River Forest Remnants (Q08/235) and the riparian corridor may offer roosting potential. The possibility of bats using the Ahuroa River's riparian corridor for commuting cannot be ruled out.
- 3.15** No indigenous lizard fauna was recorded on site. The habitat along the Ahuroa River margins and in the adjacent bush area is sub-optimal for lizards, largely due to historical grazing that has reduced ground and shrub layer vegetation, crucial for lizard shelter. The ecological value of this habitat for native herpetofauna is low, owing to past disturbances, habitat degradation, land clearance, pest predation, and habitat fragmentation.
- 3.16** The nature of the subdivision proposal is unlikely to have any adverse effect on any potential lizard, fish, bird or bat populations utilising the area. It is deemed that fauna habitat will in fact be enhanced (i.e. positive benefit) through the protection and enhancement of the onsite bush areas and riparian features associated with Ahuroa River and its margins.

Freshwater values

- 3.17** Site surveys and observations indicate that the Ahuroa River serves as a crucial marine-freshwater interface, a transitional zone essential for supporting a diverse range of aquatic life. This river provides vital habitat for several key species, including the 'At Risk-Declining'

torrentfish (*Cheimarrichthys fosteri*)⁶, which depends on clean, fast-flowing waters; inanga (*Galaxias maculatus*), a critical species in the freshwater ecosystem; longfin eel (*Anguilla dieffenbachii*), known for its migratory lifecycle; koura (*Paranephrops* spp.), a native freshwater crayfish; and kakahi (*Echyridella menziesii*), a native freshwater mussel. Additionally, the river supports the 'Regionally Significant' banded kokopu (*Galaxias fasciatus*). The presence of these species highlights the high ecological value of the Ahuroa River and underscores the need for ongoing conservation efforts to protect this vital marine-freshwater interface.

4. NET ENVIRONMENTAL BENEFIT PROPOSAL

- 4.1** The ecological assessment confirms that the Ahuroa River and its surrounding bush areas on Site are of significant ecological value. To protect and enhance these areas, it is proposed to safeguard and improve 2.28 hectares of riparian margins and existing riverine bush through revegetation planting, permanent stock exclusion through fencing, and comprehensive pest weed and pest animal control. This is described in more detail under the EA and EMP prepared for the subdivision application.
- 4.2** The riparian enhancement proposal aims to establish a significant, interconnected ecological protection area, spanning approximately 550 meters along the Ahuroa River. Where feasible, it will extend at least 15 meters from the riverbank, creating a buffer to enhance the river's ecological integrity. The plan will also incorporate all existing vegetation within the Protected Natural Area (PNA) Ahuroa River Forest Remnants (Q08/235), integrating these habitats into larger restoration efforts to promote the long-term health and resilience of the riparian ecosystem.
- 4.3** The riparian enhancement proposal will strengthen ecological values within the local area which is vitally important to provide further functional and structural ecological connectivity for flora and fauna already present on the Site and immediate surrounds. The riparian enhancement area proposal has been designed to protect and enhance the Ahuroa River and its margins thus improving the overall ecological structure, composition and functions of the Site through

⁶ Dunn N.R., Allibone R.M., Closs G.P., Crow S. K., David B. O., Goodman J.M., Griffiths M., Jack D.C., Ling N., Waters J. M, Rolfe J.R. (2017) Conservation status of New Zealand freshwater fishes.

providing appropriate vegetated buffer areas, and improving the services provided by ecosystems.

5. POTENTIAL ECOLOGICAL EFFECTS ASSESSMENT

- 5.1** The proposed subdivision is not expected to have significant adverse effects on the ecological values or features noted on Site, provided that appropriate standard development controls are implemented, including appropriate construction, and erosion and sediment control plans, prepared in line with best practice guidelines.
- 5.2** It is unlikely that the subdivision proposal will require for any indigenous vegetation clearance to be carried out. Should any vegetation clearance be required to facilitate development on Lot 200, it will be restricted to single individual trees or small clusters of trees, which have minimal ecological value. Habitat disturbance should be minimized by avoiding vegetation clearance, where possible.
- 5.3** Additionally, the construction of stormwater and wastewater infrastructure, if appropriately designed and maintained by suitably qualified and experienced professionals, is unlikely to negatively impact the hydrology or habitat quality of the aquatic environments on site.
- 5.4** Potential impacts on fauna will be negligible or positive. Given that the potentially suitable habitat is restricted to Ahuroa River and its margins which will be retained within the farm balance Lot 100, the subdivision proposal will not directly impact any fauna which are present on site. To further protect and enhance fauna habitat, the proposal includes habitat improvements through revegetation planting, pest control, and restrictions on domestic pets, alongside permanent stock exclusion from indigenous habitats.
- 5.5** On the basis that the recommendations relating to best practice integrated design, erosion and sediment control guidelines provided in the associated expert reporting prepared for the Proposal will be implemented, in my opinion the potential effects on ecology can be appropriately reduced or mitigated to a negligible or very low level of overall effect.
- 5.6** Overall, it is my opinion that the subdivision proposal will result in a positive ecological benefit to the water quality and condition of the Ahuroa River and its margins where it abounds the Site boundaries. I

consider that the proposed development controls and ecological management principles described within the EA and associated EMP will ensure that the health and well-being of the section of the Ahuroa River flowing along the Site's boundaries will be improved from its existing degraded ecological state.

6. PROPOSED CONSENT CONDITIONS

6.1 Section 10.0 of the EA outlines a range of recommended conditions of consent to ensure that a comprehensive and robust Net Environmental Benefit can be achieved as part of the sites subdivision Application and that potential adverse ecological effects of the proposed development are avoided or minimised (mitigated) to the extent practicably feasible.

6.2 In summary, the recommended conditions commit the consent holder to:

- (i) Implement the Ecological Management Plan (EMP) to ensure the successful restoration of riparian protection areas, delivering a Net Environmental Benefit. Maintenance, including weed control and plant replacement, is to occur bi-annually for the first three years and annually for the subsequent two, aiming for 85% canopy closure within five years. A qualified ecologist will submit a report to the Council upon completion of these works, confirming fencing, planting, and pest control, with Council inspections ensuring compliance.
- (ii) Prohibit the keeping of certain pet animals, including cats, mustelids, and exotic fish, bird and reptile species, while ensuring that dogs are securely contained when not performing farming related activities.
- (iii) Register conservation covenants on the proposed riparian enhancement areas and install fencing to permanently exclude livestock from the riparian protection areas.
- (iv) Comply with pest management regulations, prohibiting the planting of pest species and the dumping of garden waste in the riparian enhancement protection area.

- (v) Conduct monitoring and maintenance for five years, with annual reports documenting pest presence, adherence to pet restrictions, and any ecological breaches.

6.3 In conclusion, I believe the proposal will result in a Net Environmental Benefit, and any potential adverse ecological effects can be effectively avoided, minimized, or mitigated if the recommended consent conditions outlined in Section 10.0 of the Ecological Assessment, and summarized above, are fully adopted and implemented.

7. CONCLUSION

7.1 The provision of the Ecological Reporting and Ecological Management Plan prepared by Stage 0 subdivision proposal was informed by a thorough review of submissions, including issues raised by Patuharakeke Te Iwi Trust Board in the CVA, and considers the landscape holistically. The Applicant has explored ways to recognise, manage, and protect the site's ecological and wider landscape values.

7.2 In my opinion, the Stage 0 subdivision proposal has been designed in a manner that recognises the existing ecological and environmental values of the Site, notably the Ahuroa River and its associated riparian margins.

7.3 The Stage 0 subdivision proposal will enhance the ecological health, structure, and function of the Ahuroa River and its riparian margins through permanent stock exclusion, riparian revegetation, pest and weed control, and the creation of new habitats and buffer zones. These actions will strengthen ecological networks, improve ecosystem services, and provide significant benefits to indigenous habitats and wildlife within the site and surrounding areas.

7.4 The proposal achieves a balanced outcome by protecting and enhancing areas of high ecological value, while focusing future development in areas of low ecological significance.

7.5 I believe that any potential adverse ecological effects can be mitigated through best practice sediment and erosion control measures, along with effective planning and development controls. If properly implemented, these measures will ensure that adverse effects on the environment are negligible.

7.6 It is my opinion that there are no ecological reasons to decline the application for consent.

DATED this 25th day of September 2024

Madara Vilde

MVilde

APPENDIX 1 – STATEMENT OF QUALIFICATIONS AND EXPERIENCE

My name is Madara Vilde. I am the Director and Principal Ecologist at Wild Ecology Ltd, an ecological consultancy specialising in ecological restoration and sustainable land use management.

I have a BSc 1st Class Honours degree in Environmental Protection from University of Edinburgh (2017). I am also a member of the New Zealand Ecological Society (NZES).

I have 6 years' professional experience as an ecologist, working primarily in ecological consulting and environmental research, with a particular focus on terrestrial and aquatic ecology and application of Geographical Information Systems (GIS).

My professional work covers land and infrastructure development and my involvement in projects ranges from pre-purchase due diligence, preliminary ecological assessments/concept development design, resource consent applications, private plan change assessments, and implementation of monitoring and reporting of ecological effects and management.

My work primarily covers rural and greenfield sites and includes ecological surveys of freshwater and terrestrial values, assessment of their condition and value and interpretation of national, regional or district policies and rules regarding classification of ecological features, and management of potential adverse effects.

My project works spans across primarily Northland and Auckland Regions, including Kaipara District, where I conduct ecological surveys and assessments for resource consenting purposes. I also conduct peer reviews of resource consent applications for Kaipara District Council ("KDC") and Whangārei District Council ("WDC").

Examples of my experience relevant to this project are:

- (a) Advising private clients on a wide range of activities, including land development and subdivision proposals of all scales, with respect to the ecological aspects in relation to ecological enhancement as well as avoidance, minimisation and mitigation of potential adverse effects.
- (b) Preparation of ecological reporting for private clients to form part of land use and resource consent applications, including ecological

assessments, wetland and stream assessments, ecological management plans and completion of ecological works reports.

- (c) Carrying out wetland assessments for private clients utilising Wetland delineation protocols as per Ministry of Environment (MfE) 2022 for identifying and delineating wetlands based on vegetation, soils and hydrology in respect to meeting obligations of National Policy Statement on Freshwater Management 2020 (NPS-FM) and National Environmental Standards for Freshwater Management 2020 (NES-FW).
- (d) Representing private clients at resource consent and environment court hearings in Northland Region, including resource consent hearings for Hurupaki Holdings Ltd, Onoke Heights Ltd, The Rise Ltd, Vermont Street Partners Ltd, in relation to assessment of ecological values, preservation and enhancement of biodiversity and adverse effects management.
- (e) Conducting ecological assessments (flora and fauna surveys) and preparation of ecological restoration/management plans for private landowners and local restoration groups including preparation of a Wetland Restoration Plan for Mangawhai Tracks Charitable Trust.
- (f) Providing ecological consulting services for Kaipara and Whangārei District Councils including the review of ecological reports, pest plant and animal management plans, and planting completion reports prepared for land use and resource consent applications.

APPENDIX 2 – ECOLOGICAL ASSESSMENT REPORT



WILD ECOLOGY

Ecological Assessment

Proposed subdivision of

47 Millbrook Road,
Waipu

Part Lot 1 DP 44163

Prepared for

Vaco Investments (Waipu Project) Ltd

September 2024

DOCUMENT QUALITY ASSURANCE

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Author:	Madara Vilde Principal Ecologist Wild Ecology	<i>MVilde</i>
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	FINAL	Issue date: 18/09/2024
Status:	Draft	Issue date: 12/09/2024
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1. INTRODUCTION

1.1 Summary of the proposal

Vaco Investments (Waipu Project) Ltd ('the Applicant') engaged Wild Ecology to prepare an Ecological Assessment for a proposed subdivision of 47 Millbrook Road, Waipu ('the subject site'). The subject site is legally described as Part Lot 1 DP 44163 with a site size of approximately 31.78 ha. The site is located within the Rural Production Zone (RPZ) under the Whangārei District Plan (WDP). The Applicant is applying for a subdivision consent of the subject site through the subdivision rules in the Rural Production Zone under SUB-R16 of the WDP.

This report addresses the requirements for a Net Environmental Benefit (NEB) subdivision to be sought under SUB-R16(3), however, compliance with certain SUB-R16(3) Table 1 requirements cannot be achieved and is therefore a non-complying activity under SUB-R16(4). Specifically, the proposal can not meet the requirement to protect both banks of the river, given that the sites cadastral boundaries only abound the southern bank of the Ahuroa River.

To achieve a Net Environmental Benefit from the subdivision proposal as required under Rule SUB-R16, the proposal is based on the following combination of environmental protection measures which require:

- b. Where the environmental protection area is:
 - i. For Category A, an existing area of wetland or indigenous vegetation (terrestrial bush, riparian margin or coastal dune) of significant ecological value as determined by Appendix 5 of the Northland Regional Policy Statement 2016.
 - iii. For Category C:
 - a) An unvegetated area or area in pasture or non-indigenous plants to be retired and rehabilitated identified either as Highly Erodible Land or as land within a riparian margin of a stream, river, estuary or the coast located within Acutely or Chronically threatened land environments associated with Land Environments of New Zealand Level 4.

The subdivision proposal seeks to create 1 additional lot through the protection and enhancement of the riparian margin of Ahuroa River as shown under Figure 1. In summary, the Applicant proposes to protect and enhance 2.28 ha of riparian margin partly comprising of existing PNA bush area (Category A) and partly comprising of proposed revegetation plantings (Category C) protecting and enhancing the Ahuroa River margin. The proposed environmental protection area will be protected in perpetuity through a conservation covenant and require enhancement through a combination of stock exclusion, fencing, pest animal and pest weed control and native revegetation planting.



Figure 1: Showing the proposed net environmental benefit riparian protection and enhancement areas plan

1.2 Consistency with operative Whangarei District Plan Rules

Due to the subdivision not being able to meet all of the requirements under SUB-R16 (Subdivision in the Rural Production Zone) of WDP, the proposed subdivision is a Non-Complying Activity. In respect to ecological reporting Rule SUB-R16 requires the following:

- Any application under rule SUB-R16.4(b)(iii) (Category C) must include an ecological report prepared by a suitably qualified ecologist (SUB-REQ3.3)
- Any application under rule SUB-R16.4 resulting in 4 or more additional allotments (excluding one balance allotment), or any non-complying subdivision that proposes environmental protection and on-going management of an area or feature, must include the following (SUB-REQ3.6)
 - ❖ An Ecological Plan, which shall describe the values on site to be protected and demonstrate how the attributes and values of the environmental protection area are to be maintained or restored and protected, including means of managing potential ecological effects identified in the ecological effects assessment (SUB-REQ3.6(c))
 - ❖ An Ecological Effects Assessment, which shall identify and assess actual and potential ecological effects arising from human disturbance and plant and animal pests associated with existing and proposed development within the application area (SUB-REQ3.6(d))
- Any subdivision under rule SUB-R16.4 or any non-complying subdivision that proposes environmental protection and on-going management of an environmental protection area, must provide a Management Plan (SUB-REQ3.7)

Wild Ecology have therefore conducted detailed ecological site surveys and prepared an Ecological Assessment addressing relevant ecological matters under SUB-R16 provisions, including an Ecological Effects Assessment (as required under SUB-REQ3.6(d)).

A site-specific Ecological Management Plan (addressing SUB-REQ3.7) is appended to this report.

1.3 Scope

The objectives of this ecological report and ecological effects assessment are to:

- Describe the sites ecological baseline.
- Describe the terrestrial and aquatic habitats and features on the subject site.
- Determine their significance (as per significance criteria in accordance with policy 4.4.1 and Appendix 5 of the Northland Regional Policy Statement 2016).
- Identify and assess actual and potential ecological effects arising from human disturbance and plant and animal pests associated with existing and proposed development within the application area.
- Describe the process and outcome of determining and managing the potential adverse effects through the design process, to the application process, and outline proposed avoidance, reduction and mitigation measures.

This assessment will outline:

- A description of the assessment methodology (Section 2.0)
- A description of the project and site location (Section 3.0).
- Ecological survey results (Section 4.0)

- The assessment results, including the determination of ecological significance (Section 5.0).
- Proposed ecological protection and enhancement areas (Section 6.0).
- An assessment of potential ecological effects and the recommendations to avoid, minimise, remedy and mitigate potential adverse ecological effects (Section 7.0),
- The conclusions on effects and recommendations (Section 8.0)

2. METHODOLOGY

2.1 Desktop Review

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

- Retrolens historic aerial imagery
- Wilderlab eDNA database
- Oblique photography of the site
- DOC Bio-web Herpetofauna database;
- DOC Bat database;
- iNaturalist New Zealand; and
- New Zealand Freshwater Fish Database.
- LENZ Threatened Environments Classification
- Land Use Classification
- New Zealand Freshwater Fish Database (NZFFD)

2.2 Site Investigation

Field surveys were undertaken on the 5th of September 2024. Vegetation was recorded over the entirety of the subject site and classified as per Singers *et al.* (2017). The natural features were surveyed and recorded using a GPS unit (Trimble DA2).

The following fauna surveys were conducted:

- Opportunistic bird surveys were conducted at various parts of the site to record avifauna (bird) present on site;
- eDNA survey was undertaken to assess in-stream fauna presence/absence;
- Bird and bat habitat suitability survey;
- Qualitative assessment of habitat values for native lizards (skinks and geckos) and herpetofauna (frogs);

Watercourses on site and immediate surrounds were classified in general accordance with criteria outlined in the Proposed Regional Plan for Northland (February 2024).

2.3 Evaluation of Ecological Value

RPROZ-P9 subclause (1) of Whangarei District Plan determine whether a Net Environmental Benefit (NEB) can be achieved from a subdivision proposal. A NEB is a fundamental part of the Environmental Benefit Lot rules. RPROZ-P9 requires that the significance of indigenous vegetation and habitats is assessed by reference to policy 4.4.1 and the significance criteria as outlined under Appendix 5 of the Northland Regional Policy Statement (2016) when processing applications for resource consent for land use or subdivision.

- a. Appropriate area(s) of indigenous vegetation, or habitat of indigenous fauna, assessed as significant in accordance with policy 4.4.1 and appendix 5 of the Northland Regional Policy Statement 2016;

Under Appendix 5 of NRPS 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
2. Rarity/distinctiveness
3. Diversity and pattern
4. Ecological Context

Policy 4.4.1 of NRPS relates to maintaining and protecting significant ecological areas and habitats which requires that:

(1) In the coastal environment, avoid adverse effects, and outside the coastal environment avoid, remedy or mitigate adverse effects of subdivision, use and development so they are no more than minor on:

- (a) Indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists;*
- (b) Areas of indigenous vegetation and habitats of indigenous fauna, that are significant using the assessment criteria in Appendix 5;*
- (c) Areas set aside for full or partial protection of indigenous biodiversity under other legislation.*

(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.*

2.4 Evaluation of Potential Ecological Effects

As a part of the ecological assessment, potential ecological effects associated with the subdivision consent on both terrestrial and aquatic values on site were described and appropriately assessed. Where necessary, avoidance and mitigation measures have been outlined to ensure that the site's future development does not result in adverse effects on the environment. The format of this generally follows that of Ecological Impact Assessment (EcIA) Guidelines (EIANZ 2018).

3. SITE DESCRIPTION

3.1 Site description and location

The subject site at 47 Millbrook Road, Waipu (Part Lot 1 DP 44163) is a large agricultural land block with a total site size of approximately 31.78 ha. The site is located on the intersection between State Highway 1 and Millbrook Road. It is zoned as a 'Rural Production Zone' (RPZ) under the operative Whangarei District Plan (WDP) (Figure 2). The site is predominantly comprised of cropping and grazing land (pasture), with the site's northernmost boundary contains a band of terrestrial mature bush forming the riparian margin of the Ahuroa River.



Figure 2: Showing the location, legal description, parcel size and zoning under WDP of the subject site

3.2 Historic land use

Originally the vegetation cover on site and the surrounding area (pre-human modification) across most of the site and immediate surrounds would have been best represented by kahikatea, pukatea forest (WF8) grading into puriri, totara forest (WF7-1) extending along the alluvial floodplains of the Ahuroa River as classified by Singers (2018) (Figure 3). Agricultural activities have highly modified the native vegetation and hydrological patterns in the area through the removal of trees, channelized drainage, dams and intensive earthworks.

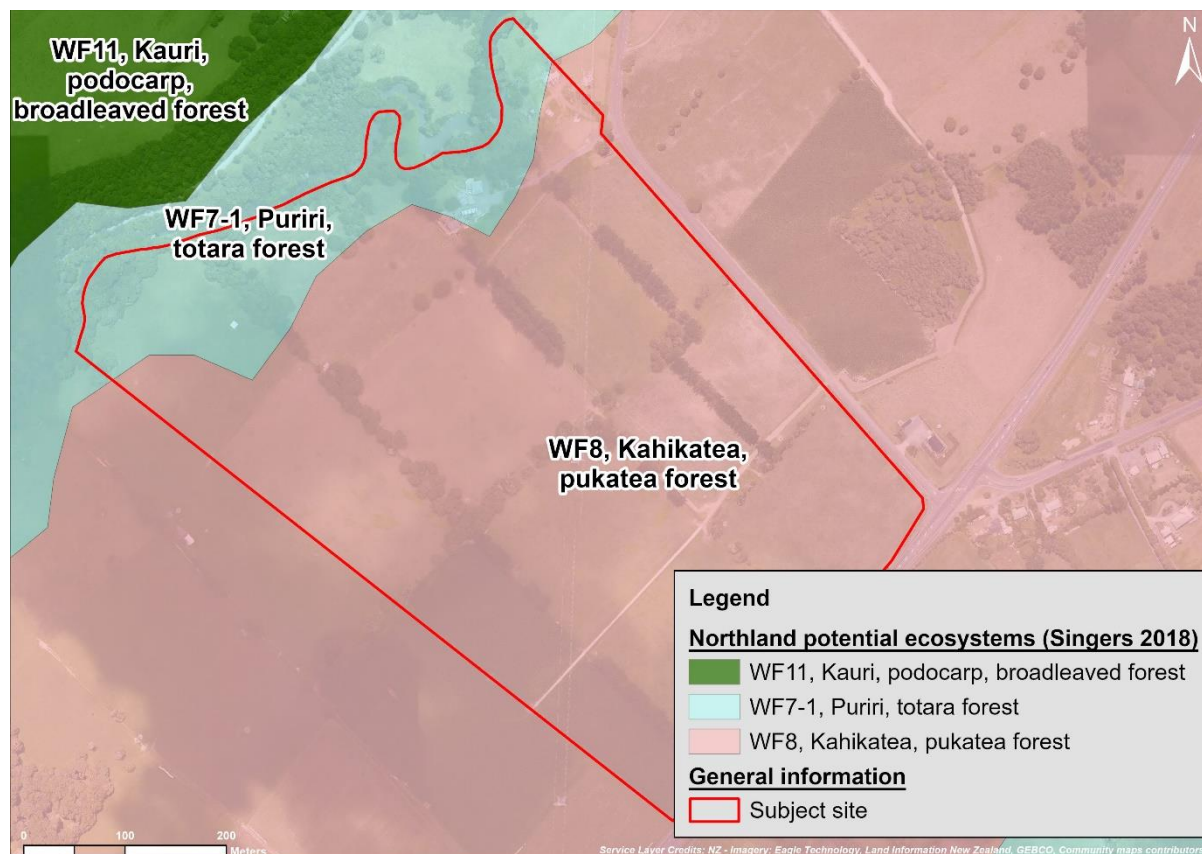


Figure 3: Northland potential ecosystem classification (Singers 2018)

By analysing historic aerial imagery from Retrolens, the majority of historic indigenous vegetation cover has already been cleared at 1963 (Figure 4) and the site has likely been actively used for agricultural purposes since. Between 1963 and 2018-2020, the site has largely retained its indigenous vegetation cover, albeit it appears that vegetation clearance in the immediate surrounds has accelerated, especially so to the west of the subject site (Figure 5).



Figure 4: Showing the subject site and surrounds in 1963 (Source: Retrolens)



Figure 5: Showing the subject site and surrounds in the most recent LIDAR aerial imagery for Northland 2018-2020 (Source: LIDAR)

3.3 Site characteristics

The site is generally flat to gently sloping and is comprised of primarily exotic pastureland, with indigenous vegetation cover being restricted to the Ahuroa River margins which extend along the site's northern boundary (Figure 6).



Figure 6: Showing the general characteristics of the site – the majority of the site is in pasture with indigenous vegetation cover extending along the Ahuroa River margins

The geology of the site is underlain by late Pleistocene river deposits characterised by poorly consolidated mud, sand, gravel and peat deposits of alluvial, swamp and estuarine origin (GNS 2024). Waipu clay (YU) and Whakapara silt loam and clay loam (WF) soils extend over the majority of the subject site (Figure 7). These soils are seasonally very wet, strongly acidic with low nutrient reserves, consisting of clayey subsoils with slow permeability. These soils tend to have dispersible surface horizons susceptible to livestock treading damage, are prone to erosion and typically have impeded drainage (Landcare Research 2024).

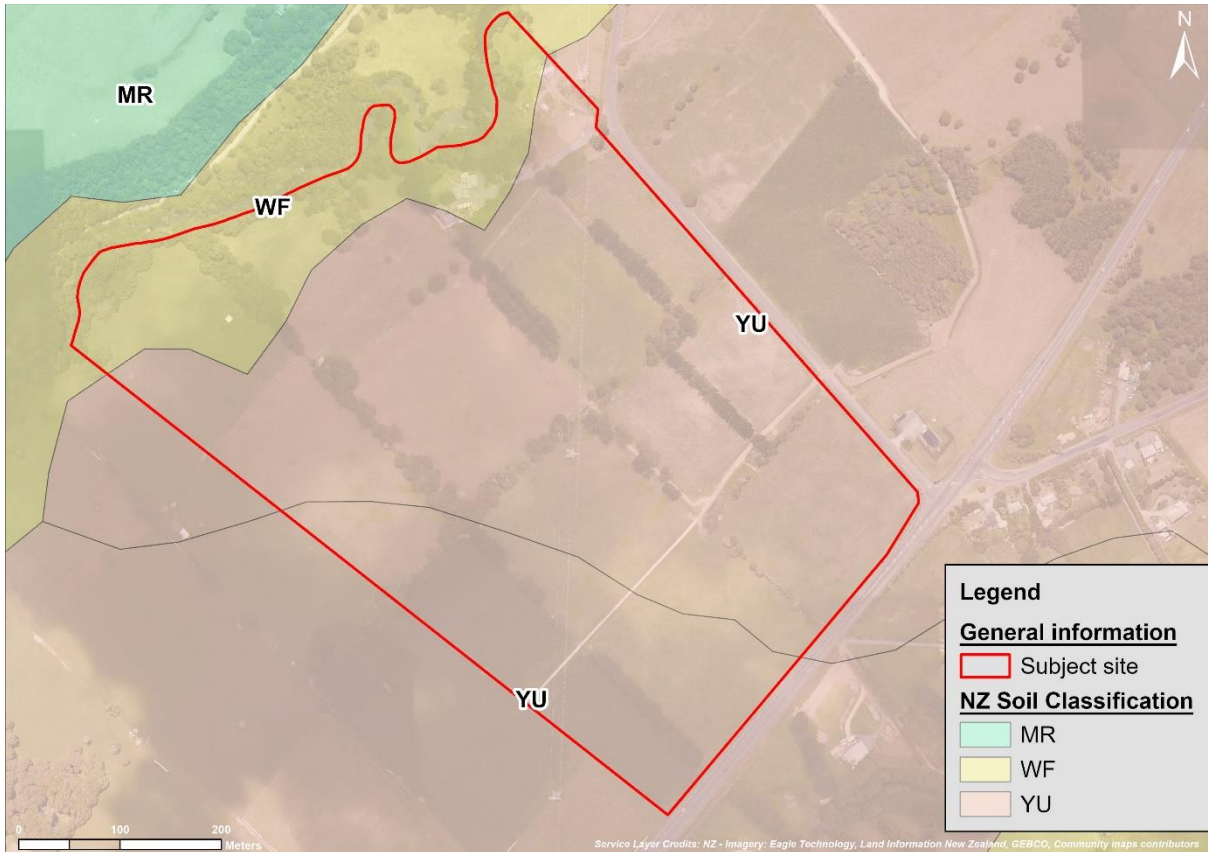


Figure 7: Showing the soil classification for the site

The site forms a lower catchment area of Ahuroa River (Figure 8) which eventually flows into Bream Bay. The entirety of the margins of Ahuroa River on site is mapped by NRC as a Priority River Flood Hazard Zone 10, 50 and 100-year extent. These areas are potentially susceptible to river flooding in a 10% AEP / 10Yr ARI, 2% AEP / 50Yr AR and 1% AEP / 100Yr ARI + CC (climate change) respectively.

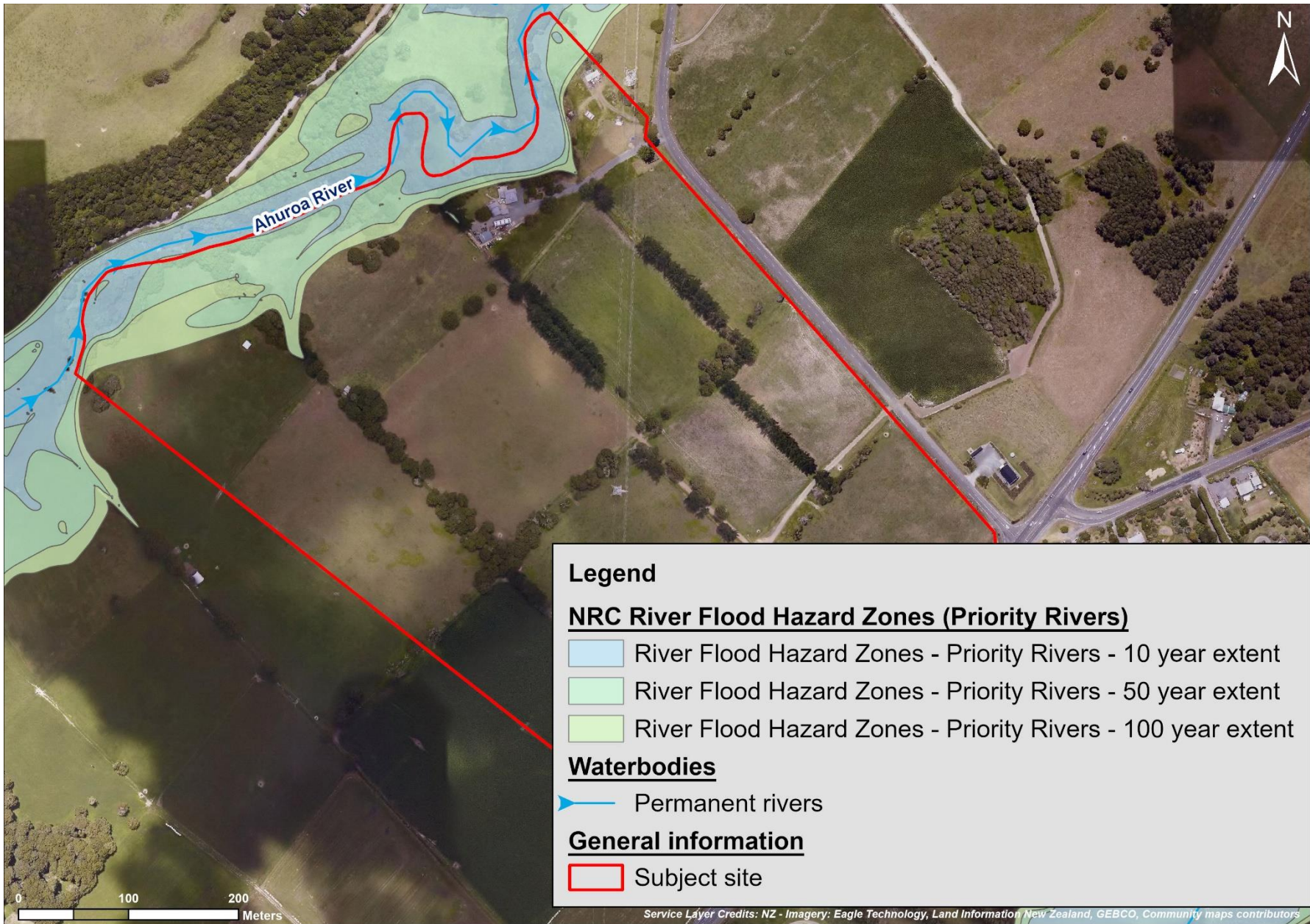


Figure 8: Showing the general hydrological patterns as observed on site during site field visits and NRC River Flood Hazard Zones

The site is situated within the Waipu Ecological District in the Northland Region. The majority of the indigenous vegetation on site has been classified as Ahuroa River Forest Remnants (Q08/235), which is a designated Protected Natural Area (PNA) in the Natural Areas of Waipu Ecological District Reconnaissance Survey Report (Lux, Martin and Beadel 2007) (Figure 9). It is noted that the proposed Significant Natural Areas (not operative) overlay covers a similar extent of vegetation on site, slightly adjusting for the inclusion of all terrestrial vegetation.

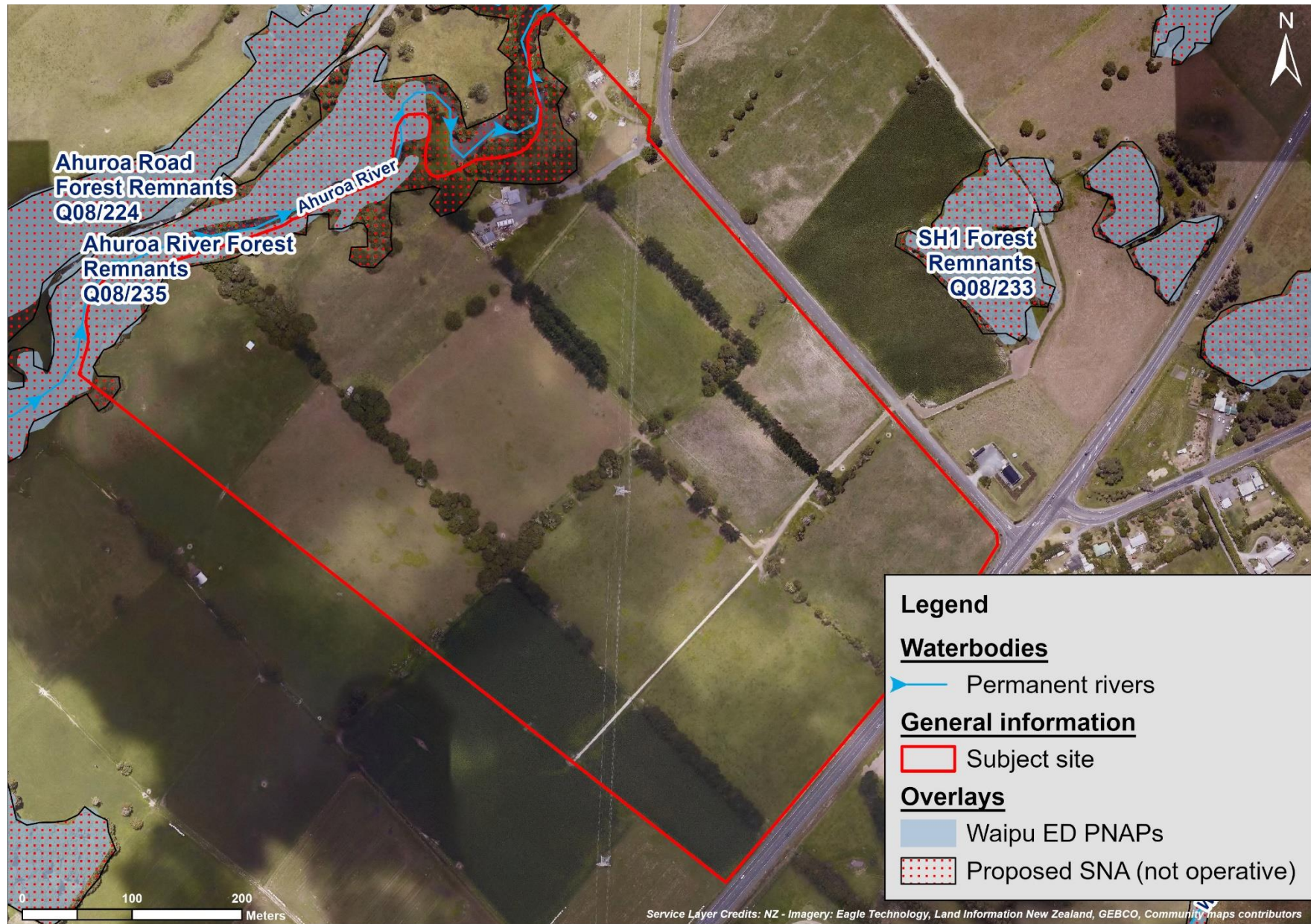


Figure 9: Map showing the subject site and PNAs as identified in Lux, Martin and Beadel (2007) and proposed SNA overlay (not operative)

According to the Land Environments of New Zealand (LENZ) classification, the majority of the riparian margins along the Ahuroa River are categorized as 'Chronically Threatened,' with only 10-20% of their original indigenous cover remaining, and 'Acutely Threatened,' with less than 10% of indigenous cover remaining (refer to Figure 10). These classifications highlight that indigenous biodiversity in these 'At Risk' environments is highly vulnerable to loss and decline, especially given the limited formal protection currently in place for natural heritage. Implementing measures to safeguard and restore these critical environments will be crucial in preserving the remaining biodiversity and ensuring the long-term ecological health of the riparian zones.

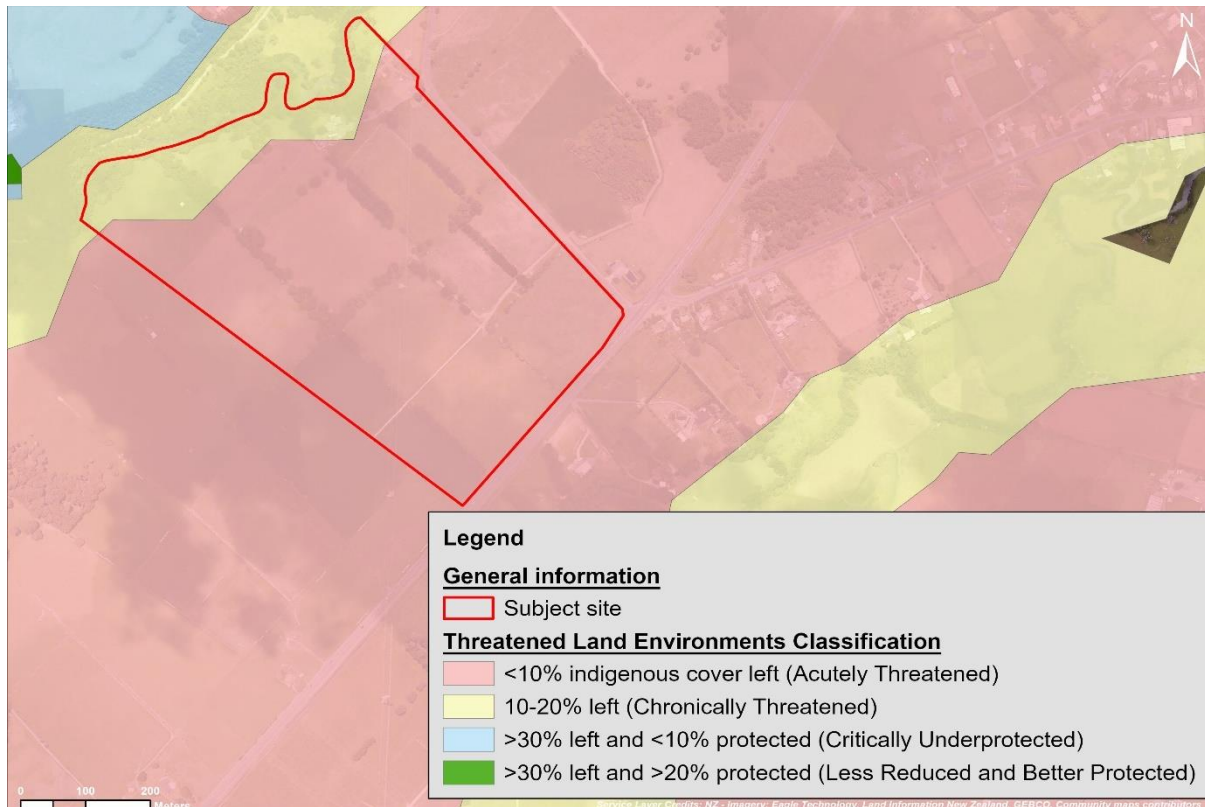


Figure 10: Showing the subject site and Threatened Environment Classification for New Zealand (2012)

From the analysis conducted above, it is apparent that the site and surrounds as described above have been modified since at least early 1900s, with large tracts of indigenous forest cleared for agricultural production purposes. It is recognised that the remnant terrestrial vegetation extending along the Ahuroa River margins on site is 'Significant' and should be appropriately enhanced and protected as a part of the subdivision proposal.

To ensure the long-term ecological health and functionality of the Ahuroa River and its riparian margins, it is crucial to implement permanent measures for stock exclusion, pest plant and pest animal control, and supplementary revegetation with indigenous species. Active management of pest weeds and animals, along with the exclusion of stock and the planting of native vegetation along terrestrial margins, will contribute to achieving a net environmental benefit from the proposed development. For optimal results, it is essential to maintain and enhance the site through coordinated efforts with neighbouring properties, focusing on effective weed management and pest control. This collaborative approach will help safeguard and improve the ecological integrity of the entire area.

4. ECOLOGICAL SURVEY RESULTS

4.1 Terrestrial

Field surveys were undertaken during in September 2024. The study of historic imagery and recent aerial imagery, and ground truthing was utilised to delineate the ecosystem types and vegetation on the site and surrounds. A complete list of ecosystem types identified on site can be found under Figure 11 as depicted in below. All plants recorded on site have been summarised under Appendix 2.

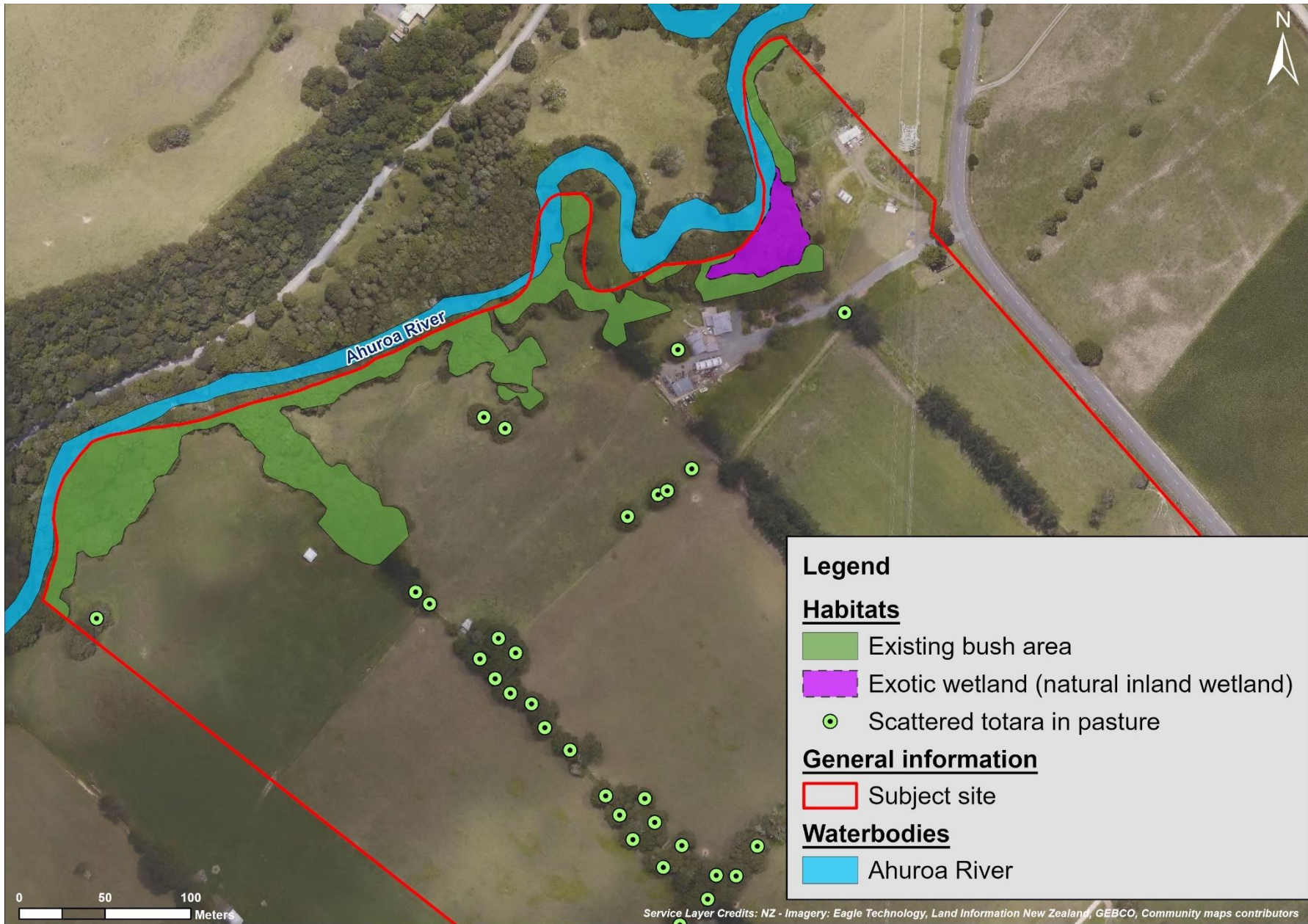


Figure 11: Showing general habitat types noted on site

4.1.1 Existing bush

The canopy in the bush area primarily characterized (Figure 12) by large likely primary forest remnant totara (*Podocarpus totara* var. *totara*) interspersed with taraire (*Beilschmiedia tarairi*), with occasional occurrences of titoki (*Alectryon excelsus* subsp. *excelsus*), kahikatea (*Dacrycarpus dacrydioides*), and the 'Regionally significant' lowland ribbonwood (*Plagianthus regius* subsp. *regius*) (Figure 13). Less frequently, ti kouka (*Cordyline australis*), taraire (*Corynocarpus laevigatus*), kohekohe (*Didymocheton spectabilis*), puriri (*Vitex lucens*), kowhai (*Sophora chathamica*), rewarewa (*Knightia excelsus*), and nikau (*Rhopalostylis sapida*) are also present. Many of the trees noted within the bush area were covered in epiphytes and climbers such as tank lily (*Astelia hastata*), perching lily (*Astelia solandri*), kiekie (*Freycinetia banksii*), and supplejack (*Ripogonum scandens*).



Figure 12: Showing the general emergent canopy layer of the onsite bush area extending along Ahuroa River margins



Figure 13: Showing the 'Regionally Significant' regenerating saplings of lowland ribbon within the bush area

Generally, species found in the subcanopy, and shrub layer included ponga (*Cyathea dealbata*), mamangi (*Coprosma arborea*), mamaku (*Cyathea medullaris*), *Coprosma crassifolia*, twiggy coprosma (*Coprosma rhamnoides*), putaputaweta (*Carpodetus serratus*), hangehange (*Geniostoma ligustrifolium*), pigeonwood (*Hedycarya arborea*), houhere (*Hoheria populnea*), mahoe (*Melicactus ramiflorus*), large leaved mahoe (*Melicactus macrophyllus*), mapou (*Myrsine australis*), and kawakawa (*Piper excelsum*).

Fencing of various typology and quality generally extends along the bush area boundaries, albeit stock presence within the bush area was noted. Some sections of the bush contained only very limited understory and ground tier layers, which is attributed to stock grazing pressures. Within areas that are less accessible, or have had stock excluded for some time, ground tier species such as basket grass (*Oplismenus hirtellus* subsp. *imbecillis*) and bastard grass (*Carex uncinata*), were recorded. Ground ferns common within bush area included common maidenhair (*Adiantum cunninghamii*), hen and chicken fern (*Asplenium bulbiferum*), shining spleenwort (*Asplenium oblongifolium*) and hairy fern (*Lasteopsis hispida*). Regenerating seedlings of puriri, lowland ribbonwood and kowhai were noted within the ground tier.

Weedy species throughout the bush area and riparian margins of Ahuroa River included tradescantia (*Tradescantia fluminensis*), montbretia (*Crococsmia × crocosmiiflora*), Jerusalem cherry (*Solanum pseudocapsicum*), wild ginger (*Hedychium gardnerianum*), Arum lily (*Zantedeschia aethiopica*), Chinese privet (*Ligustrum sinense*), lilly pilly (*Syzygium smithii*), Queen of the night (*Cestrum nocturnum*), jasmine (*Jasminum polyanthum*) and Woolley nightshade (*Solanum mauritianum*). These will require sustained ongoing weed control efforts.

4.1.2 Exotic wetland area

An exotic species dominated wetland area is present along the sites north-eastern boundary forming a floodplain of the Ahuroa River (Figure 14). The key vegetation type across the wetland area was 'facultative wetland' creeping bent (*Agrostis stolonifera*), mercer grass (*Paspalum distichum*), with patches of 'obligate' alligator weed (*Alternanthera philoxeroides*), 'facultative wetland' soft rush (*Juncus effusus*) along with common exotic pastoral species such

and 'facultative' Yorkshire fog (*Holcus lanatus*), Lotus (*Lotus pedunculatus*), and buttercup (*Ranunculus repens*). Two willow (*Salix* sp.) trees were noted growing along the interface between the wetland the Ahuroa River.

Please note that the identified exotic wetland does not meet the criteria of a 'significant wetland' as defined under PRPN. It has been described and highlighted to specify its location and to align with the definition of a natural inland wetland as outlined in the NPS-FM. This ensures that the wetland is properly recognized and, where feasible and practicable, enhanced.



Figure 14: An exotic wetland area is present nearby the sites north-eastern boundary forming the floodplain area of the Ahuroa River

4.1.3 Scattered trees in pasture

Much of the remainder of the site is comprised in exotic pasture. Some scattered mature totara, with the odd kahikatea are dotted throughout, primarily lining existing farm tracks and/or farm drains.



Figure 15: Showing scattered isolated totara within pasture

4.2 Aquatic

4.2.1 Freshwater habitats

The site constitutes the lower catchment area of the Ahuroa River (Figure 16), which ultimately flows into Bream Bay. The river meanders along the northern boundary of the site (Figure 17). Observations recorded the Ahuroa River as approximately 5 to 7 meters wide, with bank heights varying between 1 and 3 meters and an estimated depth ranging from 2 to 3 meters. The stream has a soft bottom and is influenced by tidal conditions. During a site visit in September 2024, stream bank erosion was noted, and there was evidence of periodic flooding affecting both the stream and the lower floodplain area.

The wider site also contains a series of artificial drainage watercourses (farm drains) (see Figure 18). These are considered to be fully artificial in nature (human-made) and were not assessed further as part of this assessment.

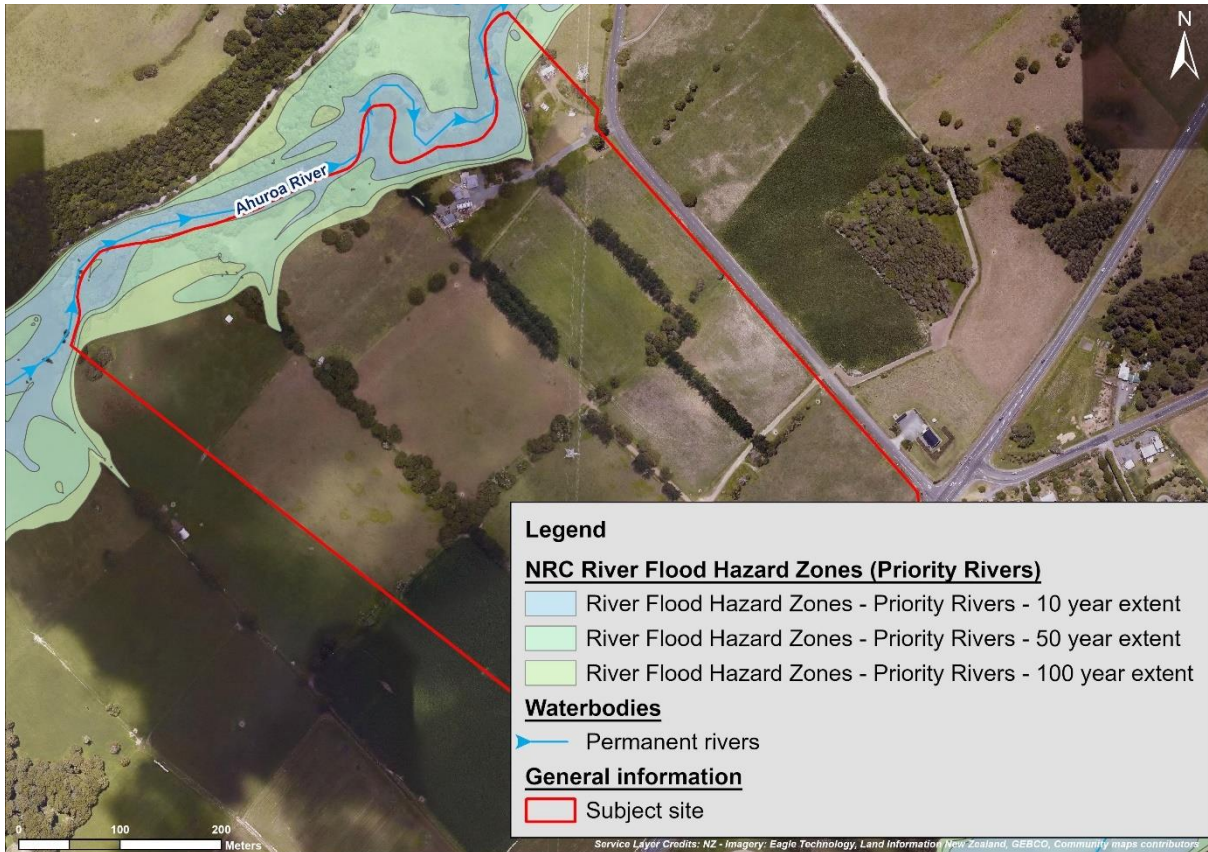


Figure 16: Showing the general hydrological patterns of the subject site with NRC River Flood Hazard Zones Overlay



Figure 17: Showing a representative cross-section of Ahuroa River meandering along the sites northern boundary, note significant bank erosion



Figure 18: Showing an artificial watercourse (farm drain) within the wider pasture area

4.2.2 Aquatic diversity

An eDNA aquatic diversity survey was undertaken utilising WilderLab test kit for multi-species analysis (WilderLab 2024) during the site visit in September 2024. The full eDNA sampling and analysis methodology can be found at wilderlab.co.nz. A summary of the eDNA results is presented under Table 1. Full survey results can be found in Appendix 3.

Table 1: Aquatic species recorded during the eDNA survey in September 2024 (Conservation status as per Dunn et al. 2017 and Grainger et al. 2018)

Scientific name	Common name	Conservation status
<i>Aldrichetta forsteri</i>	Yelloweye mullet	Native and Not Threatened
<i>Anguilla australis</i>	Shortfin eel	Endemic and Not Threatened
<i>Anguilla dieffenbachii</i>	Longfin eel	Native & Declining (At risk)
<i>Cheimarrichthys fosteri</i>	Torrentfish	Endemic & Declining (At risk)
<i>Echydella menziesii</i>	Kakahi	Native & Declining (At risk)
<i>Galaxias fasciatus</i>	Banded kokopu	Endemic and Not Threatened
<i>Galaxias maculatus</i>	Inanga	Native & Declining (At risk)
<i>Gobiomorphus cotidianus</i>	Common bully	Native and Not Threatened
<i>Gobiomorphus huttoni</i>	Redfin bully	Native and Not Threatened

<i>Retropinna retropinna</i>	Common smelt	Endemic and Not Threatened
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Of particular significance, the eDNA survey has identified the Ahuroa River as a crucial marine-freshwater interface. This transitional zone is vital for various species, supporting a diverse range of aquatic life. Notably, the river provides habitat for the 'At Risk-Declining' torrentfish (*Cheimarrichthys fosteri*), which relies on clean, fast-flowing waters; inanga (*Galaxias maculatus*), a key species in the freshwater ecosystem; longfin eel (*Anguilla dieffenbachii*), known for its migratory lifecycle; koura (*Paranephrops spp.*), a native freshwater crayfish; and kakahi (*Echydella menziesii*), a native freshwater mussel. Additionally, the river supports the 'Regionally Significant' banded kokopu (*Galaxias fasciatus*). The presence of these species underscores the high ecological value of the Ahuroa River and highlights the need for ongoing conservation efforts to preserve its unique marine-freshwater interface environment.

4.3 Avifauna

Avifauna species were observed on the subject site via opportunistic observations during a site visit in September 2024, with a comprehensive bird species list outlined in Table 2 below. The diversity of birds was moderate, with 9 native/endemic species observed.

Table 2: Bird species recorded on the site during site visit in September 2024

Scientific name	Common name	Conservation status
Myna	<i>Acridotheres tristis</i>	Introduced & Naturalised
Mallard	<i>Anas platyrhynchos</i>	Introduced & Naturalised
Grey warbler	<i>Gerygone igata</i>	Endemic & Not threatened
Australian magpie	<i>Gymnorhina tibicen</i>	Introduced & Naturalised
Kereru*	<i>Hemiphaga novaeseelandiae</i>	Endemic & Not threatened
Pukeko	<i>Porphyrio melanotus</i>	Native & Not threatened
Tui	<i>Prothemadera novaeseelandiae</i>	Endemic & Not threatened
New Zealand fantail	<i>Rhipidura fuliginosa</i>	Endemic & Not threatened
Paradise shelduck	<i>Tadorna variegata</i>	Endemic & Not threatened
Sacred kingfisher	<i>Todiramphus sanctus</i>	Native & Not threatened
Spur-winged plover	<i>Vanellus miles</i>	Native & Not threatened
Silvereeye	<i>Zosterops lateralis</i>	Native & Not threatened

*regionally significant species in Waipu ED

The birds observed on site are representative of regenerating bush and riparian habitats. An abundance of native forest-dwelling avifauna such as grey warblers (*Gerygone igata*) and New Zealand fantails (*Rhipidura fuliginosa*) were observed foraging within the bush area and edges. Along the riparian margins of Ahuroa River, several kingfishers (*Todiramphus sanctus*) were observed foraging. Within the bush area the most dominant calls were of tui (*Prothemadera novaeseelandiae*). Kereru (*Hemiphaga novaeseelandiae*) were also seen roosting within the bush area.

The ecological value of the existing site for avifauna is therefore moderate with the most likely species to use the site being a wide variety of native and introduced regenerating forest bird species.

4.4 Herpetofauna

In September 2024, a visual inspection and habitat suitability assessment were carried out to evaluate areas likely used by native lizards for sheltering or foraging, such as beneath logs, boulders, and man-made objects.

The quality of lizard habitat along the Ahuroa River margins and within the adjacent bush area is generally sub-optimal. This is primarily due to historical grazing, which has resulted in a reduced ground and shrub layer vegetation—the essential components for lizard shelter. Consequently, the current ecological value of this habitat for native herpetofauna is deemed low. This low value is attributed to a history of disturbance, habitat degradation, land clearance, predation by common pest animals, and habitat fragmentation.

To enhance herpetofauna habitat, it is crucial to implement measures such as permanent stock exclusion from the bush areas and revegetation planting. These actions will help restore suitable conditions for native lizards and improve the overall ecological quality of the area.

4.5 Chiroptera (Bats)

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

During the site visits, some suitable habitat for bat commuting (forest edges and riparian habitats) and roosting (primarily old growth native trees) was noted on site. eDNA analysis carried out on site did not record any traces of long-tail bat DNA, and it is possible that the presence of exotic mammalian predators (such as rats and mustelids) currently inhibits long tail bat use of the site. Given the extent of suitable habitat on site and long linear riparian features, it is not discounted that long-tailed bats may periodically utilise the site for foraging and potentially roosting.

No indigenous vegetation clearance is proposed to be carried out as part of the proposal, so bat roost potential on site will not be affected. The nature of the subdivision proposal is unlikely to have any effect on any potential bat populations utilising the area. It is deemed that bat foraging habitat will in fact be enhanced through the protection and enhancement of the onsite bush areas and riparian features which will promote emergent aquatic insect prey for foraging and provide a protected linear landscape corridor for movement and navigation to the wider area.

5. ASSESSMENT OF ECOLOGICAL SIGNIFICANCE

The Ahuroa River and its terrestrial margins are considered to be of high ecological significance/quality made up of representative indigenous habitats and fauna as described above. The site consists of modified old growth indigenous totara floodplain forest covering the northern aspect of the site encompassing Ahuroa River. Pest plant incursion is moderate and will require to be controlled to avoid their spread along the river corridor.

SUB-REQ3 of Whangarei District Plan requires that the significance of indigenous vegetation and habitats is assessed by reference to the criteria in Appendix 5 of the Northland Regional Policy Statement (2016) when processing applications for resource consent for land use or subdivision.

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
2. Rarity/distinctiveness

3. Diversity and pattern
4. Ecological Context

It is considered that the onsite bush area encompassing the Ahuroa River on site meets a minimum of one of the criteria for ecological significance in Appendix 5 of the RPS and therefore are considered 'significant' and is of Significant Natural Area (SNA) quality/criteria. Table 3 provides a brief discussion of the ecological significance of the indigenous ecosystem and associated flora and fauna noted on site in relation with the criteria set out under Appendix 5 of the Northland Regional Policy Statement (2016).

Table 3: Assessment of terrestrial ecological values as per Appendix 5 of Northland Regional Policy Statement

Title	47 Millbrook Road, Waipu habitat assessment	
Protection status	Bush area is a designated PNA but vegetation not legally protected	
Ecological District	Waipu ED	
Vegetation type	Size within site boundaries	
Existing bush encompassing Ahuroa River margins	1.41 ha	
Notable Flora	Mature totara (<i>Podocarpus totara</i> ; likely primary forest remnants) Lowland ribbonwood (<i>Plagianthus regius subsp. regius</i> ; Regionally significant); Kānuka (<i>Kunzea</i> sp.; Threatened-Nationally Vulnerable), mānuka (<i>Leptospermum scoparium</i> ; At Risk-Declining)	
Notable Fauna	Kūkupa (<i>Hemiphaga novaeseelandiae</i> ; regionally significant), torrentfish (<i>Cheimarrichthys fosteri</i> ; At Risk-Declining), inanga (<i>Galaxias maculatus</i> ; At Risk-Declining), banded kōkopu (<i>Galaxius fasciatus</i> ; regionally significant), long-fin eel (<i>Anguilla dieffenbachii</i> ; At Risk-Declining), koura (<i>Paranephrops</i> spp.; At Risk-Declining') and 'At Risk-Declining' kakahi (<i>Echydella menziesii</i> ; At Risk-Declining');	
Notes/comments	Representative site for secondary riverine podocarp forest (totara forest and totara-kahikatea forest) - one of only two examples in the Ecological District of the latter - with some plant species which are only found in riparian situations, e.g. lowland ribbonwood (<i>Plagianthus regius subsp. regius</i>). An uncommon and diminishing forest type which is likely to perform riparian functions such as riverbank stabilisation, lowering water temperature and providing habitat for other riparian species.	
Significant	Yes	
Significance justification	Criteria met	Justification
	1a(i)	Contains representative forest and shrubland vegetation types, dominated by indigenous vegetation.
	1a(ii)	Contains vegetation types that would have existed circa 1840, e.g. riverine podocarp broadleaf forest and broadleaved species scrub and forest.
	1a(iii)	Is represented by faunal assemblages in most of the guilds expected for the habitat type
	1b(i)	A large example of the existing vegetation types at the Ecological District scale.
	1b(ii)	Appears to be a good example of the vegetation types

		present albeit has been degraded by anthropogenic activities and/or exotic pest species.
	2a(i)	Bush area extends over a 'Chronically Threatened' land environment.
	2a(ii)	Riverine podocarp forest has been reduced to less than 20% of its original extent in the Northland Region.
	2b	Supports At Risk and Regionally Significant fauna species.
	3a(i)	Contains a moderate diversity of habitat types.
	3a(ii)	Contains a moderate diversity of flora and fauna species.
	4a	Facilitates linkage between several other adjacent, large forest PNA sites.
	4b	Provides for an important hydrological, ecological role in the natural functioning of riverine ecosystems associated with Ahuroa River
	4c	Provides important habitat for a range of common and regionally significant endemic fauna.
Threats/ Modifications /Vulnerability		Surrounded by exotic grazed pasture, historic stock grazing pressures within the bush areas were evident. Continued weed invasion along the edges of the bush is likely.
Assessment of Significant based on		Site visits conducted on September 2024, analysis of LIDAR aerial photography (2018-2020), and analysis of existing ecological information (PNA reports, DoC data)
Assessment date		09/09/2024

6. PROPOSED RIPARIAN PROTECTION AREAS

Following the ecological assessment, it has been determined that the Ahuroa River and its surrounding bush areas hold significant ecological value. To ensure adequate protection and enhancement of these areas, a proposal has been made to further improve them. Specifically, it is recommended that 2.28 hectares of the Ahuroa River riparian margins, including the existing riverine bush, be protected and enhanced through revegetation planting. This initiative aims to establish a substantial, interconnected ecological protection area (Figure 19 and under Appendix 1). The proposed riparian enhancement zone is designed to extend at least 15 meters from the Ahuroa River's bank edge where feasible, creating a buffer that strengthens the river's ecological integrity. Additionally, the enhancement area will incorporate all existing terrestrial vegetation that meets Significant Natural Area (SNA) criteria, ensuring the preservation and integration of valuable natural habitats into the broader ecological restoration efforts. This approach is intended to support the long-term health and functionality of the riparian ecosystem.

The following sections outline key management strategies for the proposed riparian protection area, including revegetation with eco-sourced species, stock exclusion, pest control, biosecurity, covenant fencing, and ongoing monitoring. This information is further expanded on in the associated Ecological Management Plan (EMP) prepared for the proposal.



Figure 19: Showing the proposed net environmental benefit Ahuroa River riparian margin protection and enhancement areas plan

6.1 Riparian margin planting

Approximately 0.77 ha of the proposed Ahuroa River riparian margin enhancement and protection area is to be planted with terrestrial buffer and wetland plantings (Figure 20 and Figure 21). Generally, the planting will utilise tight spacing between 0.75 m for wetland areas and 1.4m of pioneer revegetation terrestrial species mix to ensure canopy cover is achieved is achieved within 3-5 years. The proposed species list (Table 4) is aimed at ensuring that suitable ground coverage is achieved through dense planting, which will aid weedy species suppression, manage soil erosion by providing some surface stability through vegetation cover and soil binding roots and enhance the natural character and ecological values of the site.



Figure 20: Terrestrial buffer planting will provide connectivity between the onsite bush areas and Ahuroa River margins



Figure 21: Wetland planting will help infiltration and reduce sediment input into the Ahuroa River

Table 4: Proposed riparian margin revegetation planting species detail

Riparian margin enhancement planting							
Eco-sourcing region	Waipu ED						
Stakes required	Recommended – alternatively if stakes not used more frequent ongoing plant releasing required						
Planting timeframes	April-September						
Fertiliser required	Recommended						
Irrigation	Only should planting occur within shoulder season (i.e. March/October)						
		Terrestrial buffer planting – 6,212 m ²			Wetland infill planting – 1,507 m ²		
Scientific name	Common name	% mix	Grade	Spacing (m)	% mix	Grade	Spacing (m)
<i>Carex lessoniana</i>	Rautahi				20%	0.5L	0.75m
<i>Carex virgata</i>	Pukio				20%	0.5L	0.75m
<i>Carex secta</i>	Purei				20%	0.5L	0.75m
<i>Coprosma robusta</i>	Karamu	10%	0.5L	1.4m			
<i>Cordyline australis</i>	Ti kouka	10%	0.5L	1.4m	10%	0.5L	1m
<i>Corynocarpus laevigatus</i>	Karaka	2%	1L	2m			
<i>Cyperus ustulatus</i>	Giant umbrella sedge				5%	0.5L	0.75m
<i>Dacrycarpus dacrydioides</i>	Kahikatea	5%	1L	2m	5%	1L	2m
<i>Kunzea robusta</i>	Kanuka	26%	0.5L	1.4m			
<i>Leptospermum scoparium</i>	Manuka	15%	0.5L	1.4m	5%	0.5L	1m
<i>Machaerina articulata</i>	Jointed twig rush				5%	0.5L	0.75m
<i>Machaerina rubiginosa</i>	Orange nut sedge				5%	0.5L	0.75m
<i>Melicytus ramiflorus</i>	Mahoe	5%	0.5L	1.4m			
<i>Phormium tenax</i>	Harakeke	10%	0.5L	1.4m	5%	0.5L	1m
<i>Podocarpus totara</i>	Totara	5%	1L	2m			
<i>Sophora chathamica</i>	Kowhai	5%	1L	2m			
<i>Veronica stricta var. stricta</i>	Hebe	5%	0.5L	1.4m			
<i>Vitex lucens</i>	Puriri	2%	1L	2m			

6.2 Pest plant management

The proposed riparian protection area contains a number of pest plant species or weedy species that are likely to interfere with natural regeneration processes within the bush areas or the successful establishment of the proposed revegetation plantings. Some of the pest plants noted on site have been designated as Sustained Control Plants as classified within Northland Regional Pest and Marine Pathway Management Plan (NRPMPMP) (2017-2027). Pest plants and weedy species observed on site are briefly summarized under Table 5 below.

The proposed revegetation planting areas are currently either in pasture or comprised of exotic wetland species. These are to be controlled prior to revegetation planting through blanket spray of appropriate herbicide (noting only herbicides approved over the use of water are to be used when working nearby the existing wetland areas and Ahuroa River). The existing bush areas proposed to be protected as part of the subdivision proposal contained moderate pest plant species, which will require ongoing control.

An Ecological Management Plan (EMP) is appended to this report. It details specific management actions, including species identification and weed control measures. The plan also outlines ongoing maintenance and monitoring requirements to ensure that invasive species are managed to a practicable minimum density.

Table 5: Pest plants and weedy species recorded within the proposed protection and enhancement areas, their designation and abundance (A = Abundant, C = Common, O = Occasional, S = Sparse)

Latin name	Common name	Designation within NRPMPMP		Abundance/location
<i>Alternanthera philoxeroides</i>	Alligator weed	Not listed		O
<i>Cenchrus clandestinum</i>	Kikuyu & other exotic pastoral grass and herb species	Not listed		A
<i>Cestrum nocturnum</i>	Queen of the night	Sustained Plants	Control	O
<i>Crocasmia crocosmiiflora</i>	× Montbretia	Not listed		C
<i>Cortaderia selloana</i>	Pampas	Not listed		O
<i>Hedychium gardnerianum</i>	Wild ginger	Sustained Plants	Control	O
<i>Jasminum polyanthum</i>	Jasmine	Sustained Plants	Control	O
<i>Ligustrum sp.</i>	Tree privet and Chinese privet	Sustained Plants	Control	S
<i>Rubus fruticosus</i> agg.)	Blackberry	Not listed		S
<i>Solanum mauritianum</i>	Woolly nightshade	Sustained Plants	Control	O

<i>Solanum pseudocapsicum</i>	Jerusalem cherry	Not listed		C
<i>Syzygium smithii</i>	Lilly pilly	Not listed		C
<i>Tradescantia fluminensis</i>	Tradescantia	Not listed		C
<i>Ulex europaeus</i>	Gorse	Sustained Plants	Control	S
<i>Zantedeschia aetioipica</i>	Arum lily	Not listed		C

6.3 Pest animal management

While not directly observed during site visits, the site likely supports a full suite of exotic mammalian pest animal species, including possum (*Trichosurus vulpecula*), European rabbits (*Oryctolagus cuniculus*), rats (*Rattus rattus* and *R. norvegicus*), stoats (*Mustela erminea*), and hedgehogs (*Erinaceus europaeus*). The adverse ecological effects of exotic mammals on native flora and fauna are well documented, and their ability to interfere with natural regeneration processes and revegetation plantings through active browsing can be detrimental to overall plant health and survival.

A comprehensive control and monitoring program has been developed within the body of an Ecological Management Plan (EMP).

6.4 Covenant fencing and stock exclusion

To ensure long-term protection of the new riparian margin protection areas, a 7-wire post and batten fence will be required to be installed along the southern boundary, outside the floodplain, to prevent stock access. For the easternmost and westernmost boundaries, which are within the Ahuroa River floodplain, a 3-wire fence is recommended due to its adaptability to flooding. The northern boundary is defined by the Ahuroa River, making stock intrusion from this side highly unlikely.

The proposed covenant fencing plan is included within the body of an Ecological Management Plan (EMP).

6.5 Maintenance

Ongoing maintenance including weed control and plant replacement within the proposed riparian protection area is recommended to take place for **minimum of 5 years** following issue of 224(c). Maintenance should be carried out bi-annually during Years 1-3 and annually during Years 4 & 5 for a minimum period of five years following planting in spring and late summer. Should maintenance be undertaken with this frequency by Year 5, 85% canopy closure should be achieved.

A 5–10% mortality rate can be expected in the revegetation plantings due to natural causes such as insect damage, frosts and drought along with mortality from animal pest damage and spray drift. Therefore, plant blanking (replacement) is likely to be required during Years 2 and 3 following the planting. Plant species replacement is to be consistent the specifications outlined under Table 4.

Ongoing maintenance and monitoring is described in more detail under an Ecological Management Plan (EMP) to ensure that 85% canopy closure can be achieved within a 5-year period from planting.

6.6 Monitoring

For this net environmental benefit proposal to be successful, keeping up to date records of pest plant and animal control efforts, and monitoring of general planting establishment success rates are key to determine the success of restoration efforts.

It is recommended that at the time of physical ecological works completion the consent holder shall provide an Ecological Works Completion Report from a suitably qualified ecologist following the implementation of physical ecological works completion (covenant fencing, planting, first round of pest weed, and pest animal control implemented) to be submitted to Council, and the Council will undertake inspections as required to confirm compliance. All works shall be demonstrated to the satisfaction of the Compliance Monitoring Officer or similar position.

Example monitoring forms are provided within the body of the Ecological Management Plan which can be used by the Applicant or their engaged suitably qualified contractor to keep up to date maintenance/monitoring records for any pest weed, pest animal and revegetation works carried out on site during the 5-year maintenance and monitoring period.

7. ASSESSMENT OF POTENTIAL ECOLOGICAL EFFECTS

As this application is for a subdivision consent, to create an additional lot within the subject site's boundaries, the physical site development will not take place as part of subdivision consent itself. Specific design for the construction of buildings and associated services can only be confirmed at a building consent stage, so the following sections describe potential ecological effects only. A brief assessment of potential ecological effects and mitigation measures is provided under Table 6.

Table 6: Potential effects associated with the subdivision proposal and potential mitigation options

Activity/effect	Potential habitat/species impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Recommended mitigation/management measures	Level of effect (with management in place)
Earthworks and sedimentation	Stream and wetland habitats	High	High	Earthworks associated with the active development of the site have the potential to result in sediment runoff into the on-site and adjacent watercourses and wetland areas.	To minimise the risk of sediment entering the onsite streams during site development works, and contaminating the downstream catchment, erosion and sediment control plans should be prepared and implemented in accordance with Auckland Council Guideline Documents 2016/005: Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region as required under Section C.8.3 of the Proposed Regional Plan for Northland.	Low
Vegetation clearance	Terrestrial habitats	High	Low	No indigenous vegetation clearance is required.	Vegetation clearance is to be avoided, where possible, through construction design. Overall habitat is to be enhanced through extensive revegetation planting.	Low
Exotic vegetation clearance	Terrestrial habitats	Low	Low	Exotic pest plants are to be controlled on site as per recommendations made within the body of this report and associated EMP.	Wider terrestrial habitat is to be improved through revegetation planting, pest plant and pest animal control and permanent stock exclusion from indigenous habitats on site.	Positive
Stormwater infrastructure management	Wetland and stream habitats	High	Moderate	The development of pasture into additional buildings and servicing can result in alteration to natural drainage patterns and increased catchment imperviousness that can alter hydrology and water quality in the downstream environment.	The potential stormwater infrastructure construction, management, and dispersal are not expected to adversely affect the hydrology, habitat quality, or water quantity of the aquatic habitats on site and in the immediate surroundings, provided they are constructed and maintained in accordance with reporting prepared by a suitably qualified and experienced professional.	Low

Activity/effect	Potential habitat/species impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Recommended mitigation/management measures	Level of effect (with management in place)
Wastewater infrastructure management	Wetland and stream habitats	High	Moderate	Any new buildings constructed on site may require wastewater disposal.	All wastewater infrastructure to be designed by a suitably qualified engineer in accordance with best practice and abide by setback requirements as per PRPN (February 2024).	Low
Construction effects (vegetation clearance, earthworks, land disturbance)	Wetland habitats	High	Low	No natural inland wetlands are to be reclaimed as part of subdivision proposal.	The mapped exotic wetland habitat associated with the Ahuroa River is to be enhanced as part of revegetation planting, pest plant and pest animal control and permanent stock exclusion.	Positive
Introduction of pathogens and pest plants and organisms	Terrestrial and aquatic habitats	High	High	Potential introduction of pathogens (i.e. PTA) and pest organisms (Argentine ants) on site.	All machinery entering the site will have to be appropriately disinfected and cleaned regularly (if taken offsite).	Low
Introduction of additional pet animals on site	Terrestrial and aquatic habitats	High	Moderate	While no terrestrial susceptible fauna was encountered on site, it is recommended that at least basic domestic pet animal controls are implemented.	Restrictions of pet animals on site following subdivision should include a ban of pet cats, mustelids, exotic fish, turtles and birds and secured containment for dogs (including working dogs when they are not performing their duties). Any existing domestic pets present on site prior to the issue of 224(c) are to be excluded.	Low
Fire risk	Terrestrial habitat	High	Low	Buildings near bush areas have the potential for increasing fire risk.	Ongoing flammable weed management (e.g. gorse) within a 20m setback of all buildings to ensure fire risk is minimized.	Low
Stock presence on site	Terrestrial and aquatic habitats	High	High	Any stock to be grazed on site following the subdivision will be excluded from the proposed riparian protection area through appropriate	The proposed riparian protection area is to be fenced with primarily 7-wire post and batten standard fencing, where feasible and practicable, taking into account flood hazard areas.	Low

Activity/effect	Potential habitat/species impacted	Ecological value	Magnitude of effect (no mitigation)	Comment	Recommended mitigation/management measures	Level of effect (with management in place)
				stock-proof fencing.		
Disturbance during construction	Avifauna habitat	Moderate	High	'Regionally significant' kereru noted onsite. No 'Threatened' avifauna noted on site, however works should be minimized to reduce disturbance.	No adverse effect on avifauna anticipated. Habitat is to be improved through revegetation planting, pest plant and pest animal control, domestic pet controls and stock exclusion.	Positive
Disturbance during construction	Lizard habitat	High	Low	Only sub-optimal lizard habitat present on site currently.	No adverse effect on herpetofauna anticipated. Habitat is to be improved through revegetation planting, pest plant and pest animal control, domestic pet controls and stock exclusion.	Positive
Disturbance during construction	Bat habitat	High	Low	Previous long-tail bat records within 10km of the site. Suitable foraging and roosting habitat is present on site, so future use is not discounted.	No adverse effect on bats anticipated. Habitat is to be improved through revegetation planting, pest plant and pest animal control, domestic pet controls and stock exclusion.	Positive
Manawhenua values	Habitats of importance to manawhenua	N/A	N/A	Please note that an ecologist cannot assign or assess manawhenua values or effects on an ecological feature – this can only be done by manawhenua or the iwi and hapū of the particular location.	The protection of the Ahuroa River and its margins, including permanent stock exclusion, and revegetation planting will provide for an overall positive benefit to the ecosystem health of the River. The ecological enhancements are expected to create positive flow-on effects that align with mana whenua's holistic environmental stewardship, supporting mahinga kai (traditional food resources), protecting taonga species, and safeguarding the mauri (life force) of the river, which is central to mana whenua values.	N/A

8. RELEVANT NATIONAL POLICY STATEMENT CONSIDERATIONS

The following section summarises the ecological considerations in relation to national policy statements associated with the preservation and mitigation of effects related to potential development of the site. In respect to the proposal, it is considered that the following are applicable:

- National Policy Statement for Indigenous Biodiversity (2023)
- National Policy Statement for Freshwater Management (NPS-FM) 2020

8.1 National Policy Statement for Indigenous Biodiversity (NPS-IB)

National Policy Statement for Indigenous Biodiversity (NPS-IB) came into force on August 4th, 2023 (commencement date) and applies to indigenous biodiversity in the terrestrial environment throughout Aotearoa New Zealand. The objective of NPS-IB is to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date.

It is deemed that the proposal gives full effect to the objectives and policies of NPS-IB through

- (a) Integrating the Protection of Existing Ecological Values:** The plan prioritizes safeguarding the natural ecological features already present on the site.
- (b) Maximizing Environmental Benefits:** Significant bush remnants, stream habitats, and wetland areas will be protected and enhanced, ensuring the subdivision works deliver substantial environmental gains.
- (c) Avoiding or Mitigating Adverse Ecological Effects:** The development strategically utilizes areas that have been previously built upon or cleared (e.g., existing buildings or pasture) for access and further site development, minimizing disturbance to undisturbed areas.
- (d) Balancing Rural Development with Ecological Restoration:** The proposal demonstrates how rural growth can coexist with ecological restoration and protection. It highlights and enhances the site's and surrounding area's ecological values while maintaining suitable areas for ongoing agricultural activities.
- (e) Presenting a High-Standard Subdivision:** The proposal balances protecting and enhancing ecologically valuable areas with focusing development on sections of the site with low ecological value or functionality.

To address potential adverse effects on indigenous biodiversity, the proposal includes a comprehensive set of ecological management recommendations, including stock exclusion, restrictions on domestic pet allowances, controls for earthworks nearby sensitive aquatic environments, among others. These recommendations aim to mitigate the impact on flora and fauna by employing best practices and ensuring that disturbance is kept to a minimum. Measures are designed to address the potential effects on fauna, ensuring their habitats are preserved as much as possible during and after the development process.

Furthermore, the proposal includes ongoing management of the Ahuroa River and associated riparian margins on site through a site-specific Ecological Management Plan, which underscores a commitment to the restoration and enhancement of indigenous biodiversity. This plan promotes the reestablishment of native species and habitats, contributing to the long-term ecological health and resilience of the area. Through these

efforts, the proposal not only mitigates potential impacts but also actively supports the objectives of the NPS-IB 2023 by fostering a thriving and sustainable natural environment.

8.2 National Policy Statement for Freshwater Management (2020)

New Zealand has historically lost most of its wetland extent. Those remaining are rare and valuable ecosystems. The core intent of the policies in the NPS-FM (2020) is to provide stronger protection for freshwater bodies and wetlands. It also places a statutory responsibility on territorial and consenting authorities to give effect to Te Mana o te Wai by prioritizing the health and wellbeing of our waterways. With respect to Te Mana o te Wai, the hierarchy of obligations for consenting authorities are;

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

In relation to the proposed development, the application demonstrates a strong commitment to upholding the hierarchy of obligations outlined in the NPS-FM (2020). The primary objective has been to avoid any potential adverse effects on the freshwater ecosystems associated with the Ahuroa River and its immediate surroundings. The subdivision prioritizes the protection and preservation of this ecologically significant marine-freshwater transitional zone by minimizing disruptions to the river and its margins, and by preserving or enhancing their ecological integrity wherever possible.

9. RECOMMENDATIONS

The Applicant proposes to lodge an application for a non-complying subdivision consent based on the provisions under SUB-R16 of the Whangārei District Plan (WDP). The proposal aims to create a Net Environmental Benefit extending over approximately 2.28 ha of land of which approximately 1.41 ha comprises of existing significant terrestrial vegetation within Ahuroa River riparian margin (Category A) and 0.77 ha will comprise of riparian margin revegetation plantings (Category C), resulting in the creation of 1 additional lot which is generally in accordance with SUB-R16 Table 1 requirements.

This will enable the protection of the entire length of Ahuroa River and its margin within the site boundaries, expanding, connecting and buffering the existing bush, wetland and riparian features noted on site and immediate surrounds. Collectively the habitats contained on site and immediate surrounds were recorded to support at least one 'Regional significant' plant species, one 'Regionally Significant' and three 'At risk' fish species, one 'At Risk' freshwater invertebrate species, and one 'Regionally Significant' bird species.

Collectively the ecological significance of both terrestrial and aquatic habitats associated with Ahuroa River, and its terrestrial margins is assessed high in the site's locality context, and ecological condition as stable or degrading due to ongoing stock grazing pressures. It is deemed that these habitats can be further expanded and enhanced as described within the body of this report.

Potential ecological effects on terrestrial and aquatic values associated with the subdivision proposal and recommended mitigation and management actions have been briefly assessed under Section 7. The subsequent level of potential ecological effects (with mitigation measures implemented) is considered to be low.

Therefore, it is considered that the proposal provides for a Net Environmental Benefit, and any potential adverse ecological effects can be sufficiently avoided, remedied or mitigated through a combination of integrated design principles, current WDP and PRPN controls and policies. Should the proposed development be carried out in accordance with the applicable performance standards, it would provide an opportunity to protect and enhance approximately 2.28 ha of

ecological features contained within the site boundaries and result in an overall Net Environmental Benefit as described within the body of this report.

10. CONCLUSIONS

The following recommendations are made to ensure that a comprehensive and robust Net Environmental Benefit can be achieved as part of the sites subdivision Application and that potential adverse ecological effects of the proposed development are avoided or minimised (mitigated) to the extent practicably feasible. These recommendations should be incorporated into resource consent conditions.

1. That the site-specific Ecological Management Plan (EMP) prepared for the Application is implemented during the physical ecological restoration of the riparian protection areas to ensure ecological enhancement described in Section 6 of this report deliver a robust Net Environmental Benefit.
2. Ongoing maintenance including weed control and plant replacement is to take place for **minimum of 5 years** following the issue of 224(c). Maintenance should be carried out bi-annually during Years 1-3 and annually during Years 4 & 5 for a minimum period of five years following planting in spring and late summer. Should maintenance be undertaken with this frequency by Year 5, 85% canopy closure should be achieved.
3. The consent holder shall provide an Ecological Works Completion Report from a suitably qualified ecologist following the implementation of physical ecological works completion (covenant fencing, planting, first round of pest weed, and pest animal control implemented) to be submitted to Council, and the Council will undertake inspections as required to confirm compliance.
4. That keeping of pet animals on site following subdivision is prohibited including a ban of pet cats, mustelids, exotic fish, birds, rodents and turtles. Existing pets residing on the parent lot at the time of the Section 224 approval are to be excluded.
5. Any new dogs introduced on site following the issue of the subdivision consent should always be secured/contained to ensure that they cannot roam into the riparian protection area on the lot or beyond the boundaries of the lot. Secured containment may be in the form of a secure fenced area, dog run or "electronic pet containment fence". Existing pets residing on the parent lot at the time of the Section 224 approval are to be excluded.
6. That a conservation covenant in accordance with Section 77 of the Reserves Act 1977, or an open space covenant under the Queen Elizabeth the Second National Trust Act 1977, is prepared for registration against the titles of the land depicted on the finalized and approved Survey/Scheme Plan as being subject to a conservation/open space covenant. A conservation covenant shall require compliance with the provisions listed of the approved Council conservation covenant document, or an open space covenant shall require compliance with the QEII Trust.
7. That the boundaries of the proposed riparian protection area are fenced to a primarily 7-wire post and batten standard (where feasible and practicable) to ensure that stock are excluded in perpetuity. Note: no new fencing is proposed along Ahuroa River margins which forms an impassible barrier to stock movement. A minimum of 1 secure gate entry will be required to ensure that sufficient ongoing maintenance of pest weeds and pest animals can occur.

8. The consent holder will be required to comply with the Northland Plant Pest Management Strategy (NPPMS) and the National Pest Plant Accord (NPPA) and in so doing exclude, and where necessary, control all known plant pest species (in any category) that occur on the site. This includes avoiding planting any pest species on the property as part of the landscaping, which could become future threats to the covenant area as 'garden escapees'. Dumping of garden waste into the riparian protection/covenant area(s) is prohibited.
9. That regular ongoing maintenance and monitoring of the ecological management areas takes place a minimum annually for a total period of 5-years following the approval of Ecological Completion of Works Report as described under recommendation 2 above. Monitoring should be carried out by a suitably qualified and experienced ecologist or Council's suitably qualified appointed representative. Monitoring reports should as a minimum include detail on the presence of any weedy species (including their location and density), pest animal presence and condition of the pest animal trap network, comments regarding other obvious breaches relating to ecological matters such as dumping of green waste into the ecological management areas on site or breaches to domestic pet restrictions on site.

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APPENDIX 1 – PROPOSED RIPARIAN PROTECTION AREAS PLAN



APPENDIX 2 – FLORA INVENTORY

FERNS	
<p><i>Adiantum cunninghamii</i> common maidenhair <i>Adiantum hispidulum</i> rosy maidenhair fern <i>Asplenium bulbiferum</i> hen and chicken fern <i>Asplenium flaccidum</i> hanging spleenwort <i>Asplenium oblongifolium</i> shining spleenwort <i>Blechnum filiforme</i> (<i>Icarus filiformis</i>) threadfern <i>Blechnum novae-zelandiae</i> (<i>Parablechnum novae-zelandiae</i>) kiokio <i>Cyathea dealbata</i> ponga <i>Cyathea medullaris</i> mamaku <i>Deparia petersenii</i> subsp. <i>Congrua</i> <i>Dicksonia squarrosa</i> wheki</p>	<p><i>Doodia australis</i> (<i>Blechnum parrisiae</i>) rasp fern <i>Hymenophyllum flexuosum</i> filmy fern <i>Hymenophyllum nephrophyllum</i> kidney fern <i>Paesia scaberula</i> sweet fern <i>Pakau pennigera</i> gully fern <i>Parapolystichum glabellum</i> smooth shield fern <i>Pteridium esculentum</i> bracken <i>Pteris macilenta</i> sweet fern <i>Pteris tremula</i> shaking break <i>Pyrrosia elaeagnifolia</i> <i>Zelandia pustulata</i> subsp. <i>pustulata</i> hound's tongue</p>
CONIFERS	
<p><i>Dacrydium cupressinum</i> rimu <i>Dacrycarpus dacrydioides</i> kahikatea <i>Podocarpus totara</i> var. <i>totara</i> totara</p>	
DICOT TREES SHRUBS & CLIMBERS	
<p><i>Acacia melanoxylon</i>** Australian blackwood <i>Alectryon excelsus</i> subsp. <i>excelsus</i> titoki <i>Alseuosmia quercifolia</i> toropapa <i>Beilschmiedia tarairi</i> taraire <i>Carpodetus serratus</i> putaputaweta <i>Cestrum nocturnum</i>** Queen of the night <i>Coprosma aerolata</i> thin leaved coprosma <i>Coprosma arborea</i> mamangi <i>Coprosma robusta</i> karamu <i>Coprosma rhamnoides</i> twiggy coprosma <i>Corynocarpus laevigatus</i> karaka <i>Dysoxylum spectabile</i> kohekohe <i>Geniostoma ligustrifolium</i> hangehange <i>Hedycarya arborea</i> pigeonwood <i>Hoheria populnea</i> houhere <i>Knightia excelsus</i> rewarewa <i>Kunzea robusta</i> kanuka <i>Leucopogon fasciculatus</i> mingimingi</p>	<p><i>Ligustrum sinense</i>** Chinese privet <i>Melicytus ramiflorus</i> mahoe <i>Myrsine australis</i> mapou <i>Muehlenbeckia complexa</i> var. <i>grandifolia</i> large leaved pohuehue <i>Parsonsia heterophylla</i> New Zealand Jasmine <i>Piper excelsum</i> kawakawa <i>Plagianthus regius</i> subsp. <i>regius</i> lowland ribbonwood/manatu <i>Pseudopanax crassifolius</i> lancewood <i>Rubus cissoides</i> bush lawyer <i>Rubus fruticosus</i> agg.** blackberry <i>Salix x fragilis</i>** crack willow <i>Schefflera digitata</i> pate <i>Sophora chathamica</i> coastal kowhai <i>Solanum mauritianum</i>** woolly nightshade <i>Solanum pseudocapsicum</i>** Jerusalem cherry <i>Streblus heterophyllus</i> small leaved milk tree <i>Syzygium smithii</i>** lilly pilly <i>Ulex europaeus</i>** gorse</p>

<i>Ligustrum lucidum</i> * tree privet	<i>Vitex lucens</i> puriri
DICOT HERBS	
<i>Ageratina adenophora</i> ** Mexican devil <i>Anagallis arvensis</i> * <i>Callitriche stagnalis</i> * <i>Centella uniflora</i> centella <i>Cirsium vulgare</i> * thistle <i>Daucus carota</i> * wild carrot <i>Galium aparine</i> * cleavers <i>Hypericum androsaemum</i> * tutsan <i>Jacobaea vulgaris</i> * ragwort <i>Lotus pedunculatus</i> * trefoil <i>Nasturtium officinale</i> * watercress	<i>Persicaria decipiens</i> slender knotweed <i>Persicaria hydropiper</i> * water pepper <i>Phytolacca octandra</i> * inkweed <i>Prunella vulgaris</i> * <i>Ranunculus repens</i> * creeping buttercup <i>Rubus fruticosus</i> agg. ** blackberry <i>Rumex crispus</i> * curled dock <i>Senecio jacobaea</i> * ragwort <i>Solanum americanum</i> <i>Solanum nigrum</i> * black nightshade <i>Tropaeolum majus</i> ** Nasturtium
MONOCOTS	
<i>Allium triquetrum</i> * onion weed <i>Alocasia brisbanensis</i> *** <i>Elephants ear</i> <i>Arum italicum</i> ** <i>Italian arum</i> <i>Agrostis capillaris</i> *brown top <i>Agrostis stolonifera</i> * creeping bent <i>Alisma plantago-aquatica</i> * <i>Astelia hastata</i> tank lily <i>Bromus hordeaceus</i> * soft brome <i>Carex solandri</i> forest sedge <i>Carex uncinata</i> bastard grass <i>Cenchrus clandestinum</i> ** kikuyu <i>Cordyline australis</i> ti kouka <i>Cortaderia selloana</i> * pampas <i>Cynosurus cristatus</i> * Crested dogstail <i>Cyperus eragrostis</i> ** tall flat sedge <i>Crocsmia xcrocosmiiflora</i> ** <i>monbretia</i> <i>Dactylis glomerata</i> ** cock foot grass <i>Freycinetia banksii</i> kiekie <i>Glyceria declinata</i> * glaucous sweet grass <i>Hedychium gardnerianum</i> ** wild ginger <i>Holcus lanatus</i> * Yorkshire fog	<i>Isolepis levynsiana</i> * tiny flatsedge <i>Isolepis sepulcralis</i> * <i>Juncus acutus</i> ** sharp spike sedge <i>Juncus australis</i> wiwi <i>Juncus articulatus</i> * jointed rush <i>Juncus effusus</i> * soft rush <i>Juncus microcephalus</i> ** South American rush <i>Juncus pallidus</i> giant rush <i>Juncus planifolius</i> flat-leaved rush <i>Juncus sarophorus</i> broom rush <i>Lolium arundinaceum subsp. arundinaceum</i> * tall fescue <i>Lolium perenne</i> * perennial ryegrass <i>Oplismenus hirtellus subsp. imbecillis</i> basket grass <i>Paspalum dilatatum</i> * paspalum <i>Paspalum distichum</i> * mercer grass <i>Phormium tenax</i> harakeke <i>Poa trivialis</i> * rough stalked meadow grass <i>Potamogeton cheesemanii</i> red pondweed <i>Rhopalostylis sapida</i> nikau <i>Tradescantia fluminensis</i> ** wandering willie <i>Zantedeschia aethiopica</i> ** arum lily

*- Indicate exotic plant species

**- Indicate exotic pest plants

APPENDIX 3 – EDNA SURVEY RESULTS

Scientific name	Common name	Group	eDNA sampling point
<i>Aldrichetta</i>	Mulletts	Fish	5
<i>Aldrichetta forsteri</i>	Kātaha; aua; kātaka, Yelloweye mullet	Fish	325
<i>Ameletopsis perscitus</i>	Yellow mayfly	Insects	109
<i>Anas platyrhynchos</i>	Rakiraki, Mallard duck	Birds	18
<i>Anguilla australis</i>	Tuna; hao; aopori; hikumutu, Shortfin eel	Fish	639
<i>Anguilla dieffenbachii</i>	Tuna; kūwharuwharu; reherehe; kirirua, Longfin eel	Fish	7418
<i>Anteholosticha monilata</i>		Ciliates	19
<i>Archichauliodes diversus</i>	NZ dobsonfly	Insects	28
<i>Arenigobius bifrenatus</i>	Bridled goby	Fish	59
<i>Arenigobius frenatus</i>	Half-bridled goby	Fish	32
<i>Arripis</i>	Kahawai	Fish	11
<i>Arripis trutta</i>	Kōukauka; kahawai, Kahawai	Fish	22
<i>Aulodrilus pluriseta</i>	Aquatic oligochaete worm	Worms	41
<i>Austroclima sepia</i>	Mayfly	Insects	12
<i>Beilschmiedia tarairi</i>	Taraire, Taraire	Plants	5
<i>Bimastos rubidus</i>	Worm	Worms	13
<i>Bos taurus</i>	Kau, Cattle	Mammals	2010
<i>Canis lupus familiaris</i>	Pero, Dog	Mammals	49
<i>Carpodetus serratus</i>	Putaputawētā, Putaputaweta	Plants	3552
<i>cellular organisms</i>	Cellular organisms	Other	9025
<i>Chaetogaster diastrophus</i>	Oligochaete worm	Worms	44
<i>Cheimarrichthys fosteri</i>	Torrentfish	Fish	6
<i>Cochliopodium kieliense</i>	Amoeba	Amoebae	354
<i>Coloburiscus</i>	Mayfly	Insects	435
<i>Coloburiscus humeralis</i>	NZ spinygilled mayfly	Insects	7
<i>Conyza sumatrensis</i>	Tropical horseweed	Plants	5
<i>Coprosma</i>	Coprosma	Plants	4764
<i>Coprosma grandifolia</i>	Kanono	Plants	466
<i>Coprosma lucida</i>		Plants	4853
<i>Coriaria</i>	Tutu	Plants	1957
<i>Coriaria arborea</i>	Tutu, tutu	Plants	160
<i>Dicksonia squarrosa</i>	NZ tree fern	Plants	122
<i>Echyridella menziesii</i>	Kākahi; kāeo; torewai, Freshwater mussel	Molluscs	427
<i>Egretta</i>	Kōtuku, Plumed egrets	Birds	62

<i>Eiseniella tetraedra</i>	Squaretail worm	Worms	240
<i>Engraulis australis</i>	Kokowhaha,Australasian anchovy	Fish	22
<i>Flavobacterium</i>		Bacteria	7054
<i>Forsterygion</i>	Triplefins	Fish	17
<i>Forsterygion lapillum</i>	Common triplefin	Fish	20
<i>Forsterygion nigripenne</i>	Estuarine triplefin	Fish	19
<i>Freycinetia banksii</i>	Kiekie,Kiekie	Plants	246
<i>Galaxias fasciatus</i>	Kokōpu,Banded kokopu	Fish	660
<i>Galaxias maculatus</i>	Īnanga,Inanga	Fish	29
<i>Geniostoma rupestre</i>	Pāpā,Hangehange; Privet leaf	Plants	2998
<i>Girella</i>	Sea chubs	Fish	14
<i>Girella tricuspidata</i>	Ngāoheohe; kopīpiro; parore,Parore	Fish	45
<i>Gobiinae</i>		Fish	10
<i>Gobiomorphus</i>	Bullies	Fish	1118
<i>Gobiomorphus</i>	Bullies	Fish	239
<i>Gobiomorphus cotidianus</i>	Tīpokopoko; toitoi,Common bully	Fish	11
<i>Gobiomorphus huttoni</i>	Redfin bully	Fish	350
<i>Gobiopterus</i>	Goby	Fish	73
<i>Gobiopterus semivestitus</i>	Glassgoby	Fish	840
<i>Gomphonema</i>	Diatom	Diatoms	1346
<i>Goniomonas truncata</i>		Cryptomonads	30
<i>Heterosigma akashiwo</i>	Red tide alga	Heterokont algae	9
<i>Hirundo neoxena</i>	Warou,Welcome swallow	Birds	5
<i>Hoheria aff. sexstylosa SJW-2009</i>		Plants	20
<i>Hydrobiosis styracine</i>	Caddisfly	Insects	10
<i>Knightia excelsa</i>	Rewarewa	Plants	11
<i>Leptophrys vorax</i>		Other	8
<i>Limnodrilus hoffmeisteri</i>	Redworm	Worms	10
<i>Lithodesmium undulatum</i>		Diatoms	44
<i>Mammalia</i>	Mammals	Other	5
<i>Melicytus</i>	Māhoe,Mahoe	Plants	668
<i>Metazoa</i>	Metazoans	Other	418
<i>Metrosideros diffusa</i>	Akakura,White rata	Plants	288
<i>Microcarbo melanoleucos</i>	Kawaupaka,Little shag	Birds	13
<i>Mugil cephalus</i>	Kanae; kanae raukura,Grey mullet	Fish	68
<i>Mustela erminea</i>	Stoat	Mammals	104
<i>Myrsine australis</i>	Māpou,Red matipo	Plants	8
<i>Nais</i>	Sludgeworm	Worms	788

<i>Nematoda environmental sample</i>	Worm	Roundworms	30
<i>Orthonychiurus folsomi</i>	Springtail	Springtails	9
<i>Orthopsyche fimbriata</i>	Hydropsychid caddisfly	Insects	97
<i>Oxyethira albiceps</i>	Micro caddisfly	Insects	2377
<i>Pagrus auratus</i>	Tāmure, Snapper	Fish	18
<i>Paranephrops planifrons</i>	Kēwai; kōura; koeke; kēkēwai; karawai, Koura; freshwater crayfish	Crustaceans	4899
<i>Phalacrocoracidae</i>	Cormorants and shags	Birds	6
<i>Potamopyrgus</i>	Mud snails	Molluscs	474
<i>Potamopyrgus estuarinus</i>	Mud Snail	Molluscs	159
<i>Prumnopitys ferruginea</i>	Miro, Miro	Plants	679
<i>Pseudacaudella rubida</i>	Aphid	Insects	8
<i>Rattus norvegicus</i>	Pouhawaiki; pou o hawaiki; kaingarua; maungarua, Norway Rat	Mammals	157
<i>Rattus rattus</i>	Hinamoki; inamoki, Black Rat	Mammals	1239
<i>Retropinna retropinna</i>	Ngaore; paraki; pōrohe, Common smelt	Fish	77
<i>Retropinnidae</i>	Smelt	Fish	6
<i>Rhogostoma minus</i>		Other	59
<i>Ripogonum scandens</i>	Karea; piritā, Supplejack	Plants	3110
<i>Sarcoptiformes</i>		Mites and ticks	10
<i>Schefflera digitata</i>	Patē; patatē; patete; kōtētē, seven-finger	Plants	186
<i>Sphaeropteris cooperi</i>	Australian tree fern	Plants	5
<i>Sulcanus conflictus</i>	Copepod	Crustaceans	573
<i>Tadorna variegata</i>	Pūtangitangi, Paradise Shelduck	Birds	5
<i>Tanytarsus sp. EJD-2015</i>	Non-biting midge	Insects	30
<i>Todiramphus sanctus vagans</i>	Kōtare, Sacred kingfisher	Birds	134
<i>Trichoptera</i>	Caddisflies	Insects	16
<i>Trichosurus vulpecula</i>	Paihamu; paihama, Common brushtail possum	Mammals	25
<i>Turdus merula</i>	Manu pango, Blackbird	Birds	24
<i>uncultured eukaryote</i>		Other	140
<i>Vexillifera bacillipedes</i>	Amoeba	Amoebae	25
<i>Weinmannia silvicola</i>	Tōwai; tawhero, Tawhero	Plants	14
<i>Zephlebia borealis</i>	NZ mayfly	Insects	10

APPENDIX 3 – ECOLOGICAL MANAGEMENT PLAN



WILD ECOLOGY

Ecological Management Plan

Proposed subdivision of

47 Millbrook Road,
Waipu

Part Lot 1 DP 44163

DOCUMENT QUALITY ASSURANCE

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1. INTRODUCTION

Vaco Investments (Waipu Project) Ltd ('the Applicant') engaged Wild Ecology to carry out ecological survey and reporting for a proposed subdivision of 47 Millbrook Road, Waipu (Part Lot 1 DP 44163) ('the subject site').

This Ecological Management Plan has been developed in conjunction with the Ecological Report for the subdivision consent. It focuses on the proposed protection and ongoing management of approximately 2.28 hectares of ecological protection area encompassing the Ahuroa River margins within the site (please refer to Appendix 1). The plan outlines the required specifications in accordance with SUB-REQ3.7 of the Whangārei District Plan (WDP).

2. BACKGROUND

2.1 Purpose

This Ecological Management Plan addresses site preparation, planting, weed control, animal pest control and monitoring of the restoration planting; and has been prepared in accordance with the specifications as required under SUB-REQ3.6(c) of the Whangārei District Plan (WDP).

The ecological management objectives for the proposed protection area are:

- **Exclude stock permanently** from the ecological protection area through permanent stock-proof fencing.
- **Minimize the presence of weedy pest plants** within the protection area.
- **Restore indigenous vegetation** along the Ahuroa River margins within the site boundaries, enhancing stream bank stabilization where applicable.
- **Control pest animals** to enable successful establishment of revegetation plantings and support natural regeneration processes within the bush area.
- **Prevent the introduction** of biosecurity risks, non-ecosourced plants, and environmental pest weeds to the site.
- **Promote natural ecosystem processes**, including the regeneration and dispersal of indigenous flora and fauna.
- **Enhance the ecological health and functionality** of riparian environments both within and downstream of the selected sites.
- **Establish a self-sustaining native community** that requires minimal ongoing management once planted.
- **Ensure that ecological management** does not interfere with the site's broader agricultural use.

3. ECOLOGICAL MANAGEMENT RATIONALE

The subject site at 47 Millbrook Road, Waipu (Part Lot 1 DP 44163) is a large agricultural land block with a total site size of approximately 31.78 ha. The site is situated within the Waipu Ecological District in the Northland Region. The site abounds the Ahuroa River to the north, and its riparian margin vegetation have been classified as Ahuroa River Forest Remnants (Q08/235) as designated in the Natural Areas of Waipu Ecological District Reconnaissance Survey Report (Lux, Martin and Beadel 2007)(Figure 1).

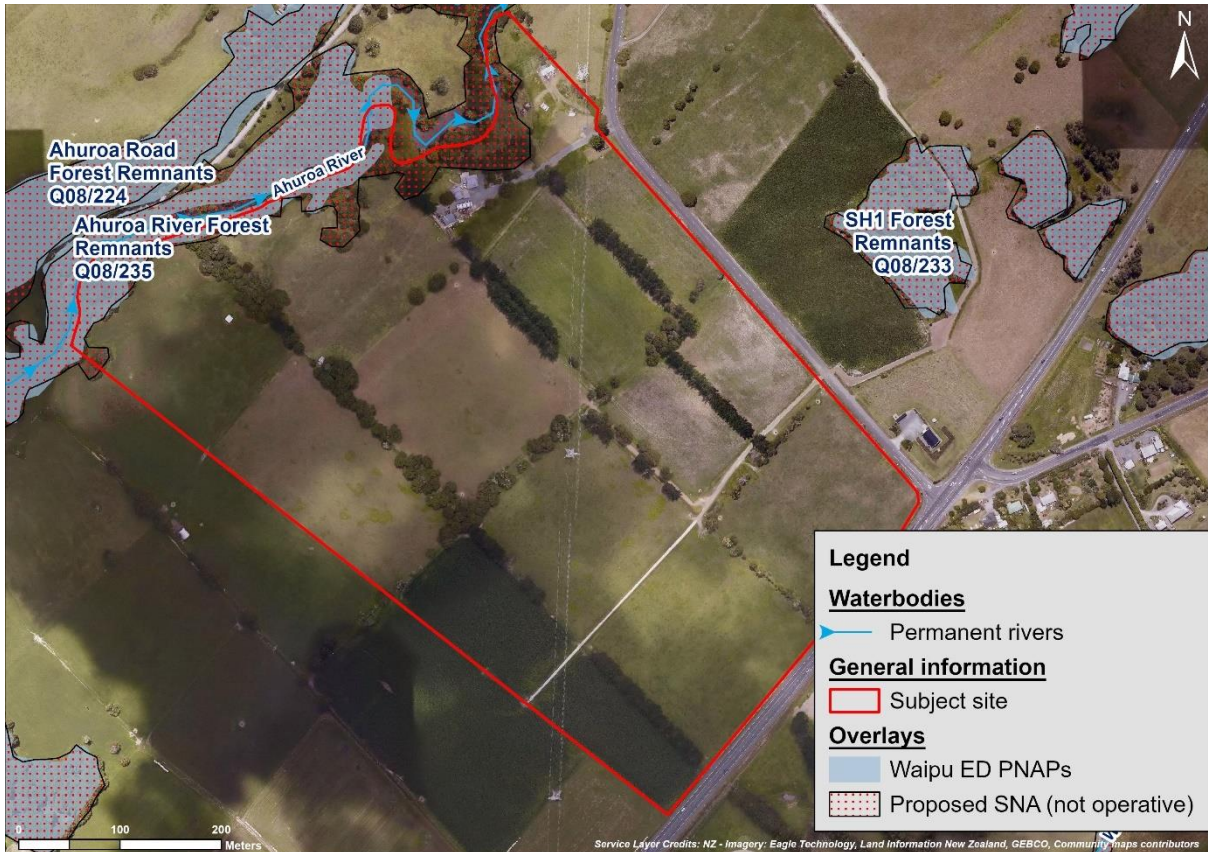


Figure 1: Showing the location of the subject site and relevant ecological overlays

The site forms a lower catchment area of the Ahuroa River (Figure 2). The Ahuroa River discharges into Waipu River and eventually flows into Bream Bay. The entirety of the eastern aspect of the site encompassing Ahuroa River is mapped by NRC as a River Flood Hazard Zone 10, 50 and 100-year extent. These areas are potentially susceptible to river flooding in a 10% AEP / 10Yr ARI, 2% AEP / 50Yr AR and 1% AEP / 100Yr ARI + CC (climate change) respectively.



Figure 2: Showing the general hydrological patterns as observed on site during site field visits

The site contains approximately 1.41 ha of indigenous regenerating bush habitat, and 0.15 ha of exotic species dominated wetland. The remainder of the onsite vegetation is comprised of exotic pasture and scattered indigenous and exotic trees within pasture (Figure 3). Albeit the Ahuroa River margins and associated bush area are encompassed by fencing, primarily limited to electric 3 and 4 wire fencing, large areas of bush have likely been subject to prolonged stock animal presence, which is particularly evident along the north-eastern aspect. Stock exclusion in perpetuity from the proposed ecological protection areas will be a key ecological management action for the site.

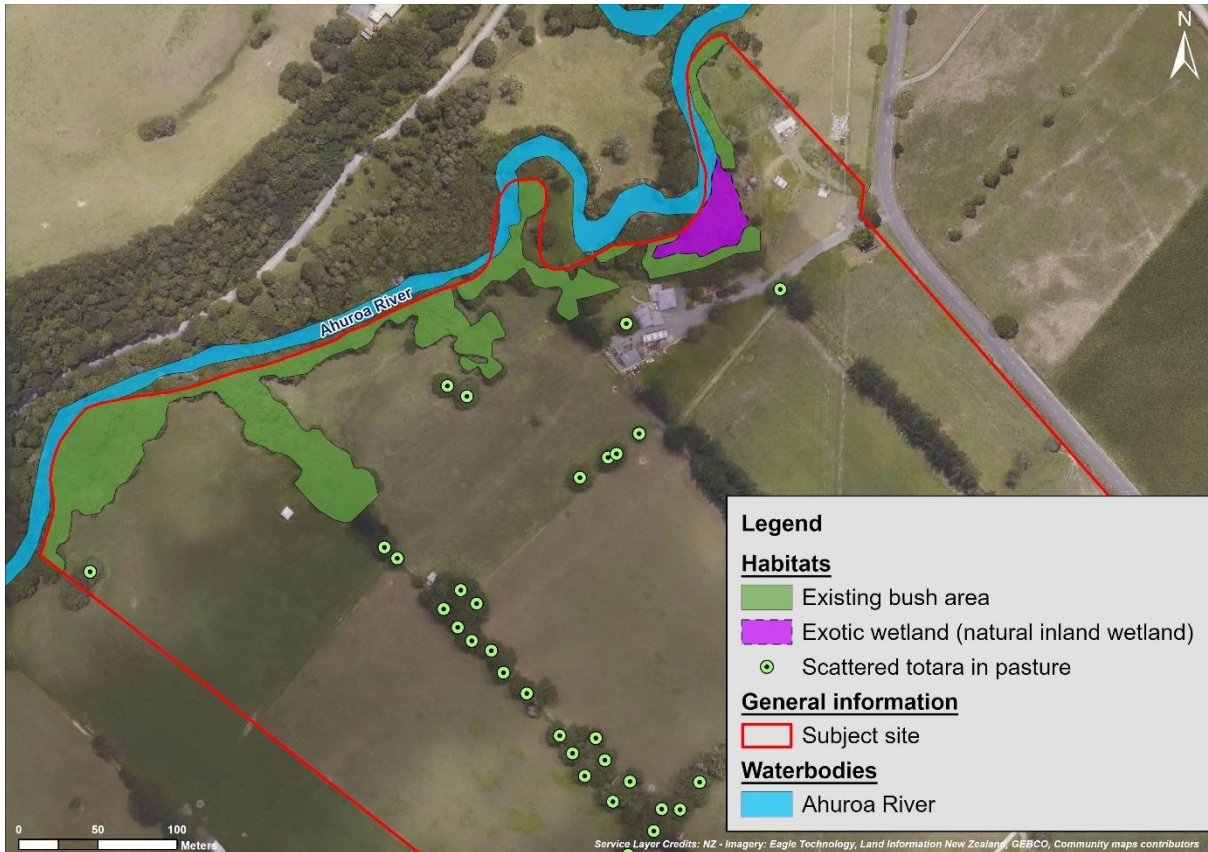


Figure 3: Showing general habitat types noted on site

Exotic weedy species across the site are generally contained the bush area and riparian margins. Generally, the main exotic weedy species of concern included tradescantia, wild ginger, Jerusalem cherry, Chinese and tree privet, montbretia, Arum lily, and Woolley nightshade. These pest plants will need to be controlled to prevent their spread into the wider bush feature to be covenanted as a part of this proposal. The interior of the bush area, following complete stock exclusion, is expected to experience a rapid increase in the regeneration of weedy species. Without grazing pressure, previously suppressed exotic plants may proliferate, outcompeting native vegetation. This could lead to a significant spread of pest species across the site, particularly within the more disturbed areas. Active management, including regular monitoring and targeted control measures, will be necessary to mitigate the impact of this weedy species resurgence and to promote the recovery of native ecosystems.

Gorse and pampas are seen as less of a concern as these species will over time be outcompeted/out shaded by regenerating forest species, however initial control of these species is proposed where they are present within the proposed riparian margin planting areas.



Figure 4: It is likely that following complete stock exclusion from bush area weedy species such as Jerusalem cherry will rapidly expand and regenerate requiring ongoing weed control effort

Evidence of common mammalian pest species was noted on site. Rabbits (*Oryctolagus cuniculus*) were observed within the pasture areas, while possum (*Trichosurus vulpeca*) and their droppings were observed within the bush area. It is also likely that other common pest species such as hares (*Lepus europaeus*), rat (*Rattus sp.*), mustelids (*Mustela spp.*), and hedgehog (*Erinaceus europaeus*) are present on site, thus control and monitoring should be carried out.

Based on the observations above, stock exclusion, fencing, pest plant and pest animal control as well as revegetation planting are essential for this site to enhance the overall ecological function and structural integrity. If appropriate protection of the Ahuroa River riparian margin protection area is implemented, it will ensure that this area continues to provide suitable habitat for native flora and fauna and assist in the enhancement of the indigenous habitats noted on site.

4. ECOLOGICAL MANAGEMENT PLAN

Following the baseline ecological surveys carried out on site during September 2024 and preparation of an Ecological Report for the subdivision proposal, this EMP has been prepared to provide detail on how physical restoration works can be carried out on site in a cohesive manner.

The overall area proposed for protection and ecological management covers approximately 2.28 ha. The proposed ecological benefit covenant area encompasses and expands bush remnants classified as Ahuroa River Forest Remnants (Q08/235) and Ahuroa River margins and floodplain areas. It is important to note that the proposed riparian enhancement area has been designed to extend at least 20 meters from the bank edge of the Ahuroa River, wherever feasible and practical. This buffer zone aims to provide a protective zone that enhances the river's ecological integrity. It is deemed that the shape and width of the proposed ecological restoration and protection area is sufficient to ensure that the restoration area will become self-sustaining following the initial 5-year ecological management and maintenance period. It

has also been designed to allow for the covenant external fencing to be located outside of the immediate floodplain area while also ensuring that appropriate areas outside of the protection areas are retained for ongoing agricultural production activities.

The ecological management actions for the ecological protection areas can be divided into the following:

- Initial weed control (potentially multiple times required depending on weedy species regrowth prior to planting);
- Site preparation for planting;
- Conducting revegetation planting utilising appropriate eco-sourced species based on the sites locality and setting;
- Management of biosecurity risks, non-eco sourced plants and environmental pest weeds into the site;
- Initial set-up of a pest animal control network and ongoing management;
- Establishing of stock-proof covenant boundary fencing;
- Ongoing weedy species maintenance and plant replacement;
- Record keeping and monitoring.

The following sections detail site specific ecological management actions and outline suggested timeframes and frequency of any proposed maintenance and monitoring to be carried out.

4.1 General controls

4.1.1 Changes to water levels or movement

No changes to water level or movement are expected to occur as part of the proposed ecological restoration works. No water is proposed to be dammed or diverted. All weed control and initial site preparation works are to be undertaken with manual low-impact hand-held machinery and no heavy machinery is to be used within the proposed riparian protection area.

All site preparation and weed control works are to take place during periods of extended dry weather forecast to ensure that sediment and erosion of the land is avoided. It is proposed that the initial site preparation works (weed control and site preparation for planting) take place during summertime or early autumn. If works are carried out as per the recommended site-specific control methodology (i.e. using only low-impact hand held tools) any soil disturbance is likely to be minimal.

4.1.2 Use of heavy machinery

4.1.2.1 Weed control

Given the sensitive riparian habitat contained within the proposed riparian margin protection area, all weed control and initial site preparation works are to be undertaken with manual low-impact hand-held machinery with no heavy machinery to be used nearby the riparian areas.

Site preparation for planting is likely to require blanket or foliar spray of appropriate herbicides and manual control through felling or larger brush weeds. This may require taking place multiple times before the area is ready for planting to ensure that weedy species such as kikuyu do not impede the growth of the plantings.

4.1.3 Erosion/sediment controls

The greatest risk of sedimentation/erosion related effects on site are likely to arise as part of the proposed initial weed control works. The overall risks can be minimised by using experienced landscape contractors for the works and carrying out weed control during optimal

weather conditions (i.e. a period of forecasted dry weather). All weed control works undertaken on site will need to be supervised by a suitably experienced landscape contractor.

4.1.4 Avoidance of adverse effects

A number of 'At Risk' or 'Regionally Significant' fish fauna were recorded within the Ahuroa River flowing through the site. Due to the sensitive riparian habitats within the proposed riparian planting areas, it is proposed that only herbicides approved for the use near or over water (for example Garlon 360) are used when site preparation is to take place within any wetland or riparian areas as part of initial weed control works and site preparation for planting.

4.1.5 Weed control strategy

Different plant species may be considered a weed in different locations, often depending on land use or the environment in which it is growing. For the purposes of this report, a 'weed' is defined as any exotic plant growing where it is not wanted, and which has an adverse effect on the natural environment it's growing in.

In Northland Region, Northland Regional Pest and Marine Pathway Management Plan 2017-2027 (Northland Regional Council 2017) (from hereinafter referred to as 'the Plan') sets out priorities and goals for managing animal and plant pests in Northland. Many of the pest plants in Northland Region are persistent in the environment and spread easily, therefore good site weed control is key to reducing the risk of further spread and ensuring that pest weeds do not detrimentally affect ecological values of high value natural environments.

Generally, a good weed control strategy will take an integrated approach to weed management and involve the following 5 phases:

- **Initial control** – control mature pest plant species through felling, drilling & filling or stump cutting & painting which can be carried out during any time of the year;
- **Manual control** – minimise agrichemical use where possible through manual control of weeds – raking, digging, pulling out smaller seedlings, can be carried out all year round;
- **Foliar spray** – efficient way to target larger areas of pest plants, and is well suited to dense shrubs, grasses and vines, usually applied from a backpack sprayer, or in larger infestations a vehicle such as a spray truck or tractor. Aimed at controlling all target species using targeted spray to control specific weed species, generally undertaken between spring and autumn for best results;
- **Seedling control** – focuses on control of any new germinating species or species invading from surrounding sites until seedbank is exhausted. Generally undertaken all year round;
- **Ongoing maintenance** – this is aimed at ensuring that reinvasion of weedy species is minimal and action is taken as soon as newly germinating seedlings reappear. Generally, should be undertaken a minimum biannually during spring and autumn.

Weed control should be undertaken by suitably qualified/trained landscape contractors, as on the ground decisions are essential for long-term successful weed management on the site. Using experienced contractors will ensure that herbicides are handled correctly, and that necessary precautions are undertaken and that herbicides are applied with accordance of industry best practice, and during appropriate weather conditions. Agrichemical applicators should be GrowSafe certified and wear suitable PPE. All agrichemical use including (but not limited to) transport, storage, disposal, training, notification of use, use near waterways and application shall comply with the industry standard NZS 8409:2004 and relevant standards included in the PRPN.

4.2 Timeframes

A 5-year management plan has been prepared to achieve the ecological restoration goals for the proposed riparian protection area (see Table 1). The plan should be adjusted during implementation based on the results of monitoring, surveys, and overall progress with implementation.

Table below provides a basic breakdown of tasks/milestones to be achieved as part of the ecological restoration work associated with the proposal. Proposed target timeline for restoration planting for Year 1 is to be between April and September, and it is recommended that weed control/site preparation should be carried out a minimum 2 weeks prior to revegetation planting to suppress weedy species presence within the ecological covenant areas to an appropriate level. Covenant fencing construction and the initial implementation of pest animal control will commence immediately after the revegetation plantings are established. Target completion date for Year 1 restoration efforts is October-November from which ongoing maintenance should commence for a total duration of 5 years. A Completion of Ecological Works report is to be submitted to WDC following the initial works completion.

Once initial planting, weed and pest animal control has been established, ongoing weed control/revegetation planting maintenance should be carried out every 4-6 months during Years 1-3 and annually during Years 4 & 5 for a minimum period of five years following planting in spring and late summer. For pest animal control, ongoing monthly maintenance and monitoring for 5 years is recommended. Example maintenance and monitoring forms can be found under Appendix 2.

Regarding on-going monitoring, it is suggested that evidence of compliance with the EMP is to be submitted to Council five (5) years from the date of issue of the Section 224(c) certificate. This will ensure that the ecological restoration detail as described under the EMP has been sufficiently implemented and a minimum of 85% canopy cover and 90% survivorship of indigenous revegetation plantings have been achieved by Year 5.

Table 1: Ecological Protection Areas Management Plan for 47 Millbrook Road, Waipu – 5 Year Schedule of Works





Ecological Protection Areas Management Plan for 47 Millbrook Road, Waipu – 5 Year Schedule					
ITEM	(YEAR 1)	(YEAR 2)	(YEAR 3)	(YEAR 4)	(YEAR 5)
Weed control/site preparation for planting/ongoing maintenance	2 weeks - 1 month prior to planting & Every 4-6 months x 2 times a year	Every 4-6 months x 2 times a year	Every 4-6 months x 2 times a year	Annually x 1 times a year	Annually x 1 times a year
Riparian margin planting	April-September				
Infill planting/blanking		April-September	April-September (if required)	April-September (if required)	April-September (if required)
Covenant establishment fencing	Post weed control and revegetation planting				
Initial pest trap and bait station supply & install	Post planting, after fencing is established				
Pest trap monthly check, rebait and monitor – toxins & bait	October/November ongoing (monthly)	January - ongoing (monthly)	January - ongoing (monthly)	January ongoing (monthly)	January - ongoing (monthly)
Completion of Works Report submitted to WDC (prepared by a suitably qualified ecologist)	Prior to issue of Section 224(c) certificate				
Monitoring Completion Report submitted to WDC (prepared by a suitably qualified ecologist)					Five years from the date of issue of the Section 224(c) certificate

4.3 Site specific pest plant and weed control

The majority of the proposed riparian enhancement area is currently comprised of a mixture of exotic pasture, exotic species dominated wetland areas and some isolated areas of exotic scrub. Pest plant/weedy species (Table 2 below) within the proposed riparian enhancement areas included tradescantia (*Tradescantia fluminensis*), montbretia (*Crocasmia × crocosmiiflora*), Jerusalem cherry (*Solanum pseudocapsicum*), wild ginger (*Hedychium gardnerianum*), Arum lily (*Zantedeschia aethiopica*), Chinese privet (*Ligustrum sinense*), lilly pilly (*Syzygium smithii*), Queen of the night (*Cestrum nocturnum*), jasmine (*Jasminum polyanthum*) and Woolley nightshade (*Solanum mauritianum*). These will require sustained ongoing weed control efforts.



Some of the weeds on site (Table) are designated as 'Sustained Control' plants in Northland Regional Pest and Marine Pathway Management Plan 2017-2027 (NRPMMP) or have known tendency to naturalise and impede growth of indigenous revegetation plantings or natural regeneration processes. Long-term management (5-years from initial weed control efforts) over the proposed riparian protection area will be required to allow for successful establishment of the revegetation plantings.

Table 2: Weedy species observed on site and their proposed control mechanism

Botanical name	Common name	Photo ID	Recommended control technique
<i>Alternanthera philoxeroides</i>	Alligator weed		<ol style="list-style-type: none"> 1. Spray terrestrial sites (spring to autumn): glyphosate (20ml/L) or metsulfuron-methyl 600g/kg (5g/10L). Use penetrant in all herbicide mixes. 2. Spray aquatic sites (spring to autumn): glyphosate (20ml/L + penetrant).
<i>Cestrum nocturnum</i>	Queen of the night		<ol style="list-style-type: none"> 1. Cut down and paint stump (all year round): a product containing 100g picloram+300g triclopyr/L (100ml/L) or triclopyr 600 EC (100ml/L) or triclopyr 120g/L (500ml/L). 2. Spray (spring-summer): triclopyr 600 EC (30ml/10L) or triclopyr 120g/L (15ml/L).
<i>Crocsmia crocosmiiflora</i> ×	Montbretia		<ol style="list-style-type: none"> 1. Spray (full leaf stage): glyphosate (10ml/L) + metsulfuron-methyl 600g/kg (4g/10L + penetrant)
<i>Cortaderia selloana</i>	Pampas		<ol style="list-style-type: none"> 1. Physical control: Dig or grub out seedlings or small plants. Chainsaw small plants and remove sizeable plants by bulldozer. Compost or leave on site to rot down. Burn or bury any flowerheads. 2. Spray: 520g/L haloxyfop-P-methyl (150ml/10l + crop oil) to avoid off-target damage to broadleaf plants or glyphosate (100ml/10L + penetrant) for very dense sites. Use a marker dye to avoid wastage and a foaming agent to help prevent spray drift. Leave the plants in the ground until the roots have died off.

<p><i>Hedychium gardnerianum</i></p>	<p>Wild ginger</p>		<ol style="list-style-type: none"> 1. Cut down and paint stump (all year round): cut above pink 'collar' at base and apply picloram gel or glyphosate (250ml/L) or metsulfuron-methyl 600g/kg (1g /L) or metsulfuron gel. Leave stems and leaves on site to rot down. 2. Dig or pulpull-outall plants (all year round). Don't compost, leave on site to rot down or hang rhizomes in trees, as they survive indefinitely. Dispose of rhizomes at a refuse transfer station or by drying out and burning.
<p><i>Jasminum polyanthum</i></p>	<p>Jasmine</p>		<ol style="list-style-type: none"> 1. Stump swab (all year round): metsulfuron-methyl 600g/kg (5g/L) or a product containing 200g/litre 2,4-D plus 100g/litre dicamba (200ml/L) or dicamba 50g/L (400ml/L). Add penetrant to all mixes. Dispose of all cut stems at a refuse transfer station or burn or bury deeply. 2. Spray (regrowth): glyphosate (150ml/15L + penetrant (knapsack) or 1L/100L + penetrant (spraygun)) or metsulfuron-methyl 600g/kg (5g/10L + penetrant (knapsack) or 40g/100L + penetrant (spraygun)) or a product containing 200g 2,4-D+100g dicamba/L (120ml/L) or dicamba 50g/L (24ml/L).
<p><i>Ligustrum sp.</i></p>	<p>Tree and Chinese privet</p>		<ol style="list-style-type: none"> 1. Cut and paint stump (within 15 minutes of cutting): glyphosate (200ml/L) or metsulfuron-methyl 600g/kg (5g/L + penetrant) or a product containing 100g picloram+300g triclopyr/L (200ml/L) 2. Frilling: make deep cuts into the sapwood at regular intervals around the base of the tree, taking care not to ring-bark the plant, immediately saturate the cuts with metsulfuron-methyl 600 g/kg (5g/10L + penetrant) or a product containing 100g picloram+300g triclopyr/L (undiluted). 3. Injection method: Drill sloping holes into the sapwood at regular intervals around the tree, immediately saturate with metsulfuron-methyl 600 g/kg (5g/10L + penetrant) or a product containing 100g picloram+300g triclopyr/L (undiluted).
<p><i>Salix sp.</i></p>	<p>Willow sp.</p>		<ol style="list-style-type: none"> 1. Cut and squirt (summer-autumn) or bore and fill: Make 1 cut or hole every 100 mm around the trunk and saturate each cut or hole with 10ml glyphosate (undiluted). 2. Frilling (summer-autumn): glyphosate (100ml/L). 3. Spray (full leaf stage only): glyphosate (12.5ml/L + penetrant, total coverage needed) or metsulfuron-methyl 600 g/kg (5g/10L in December).

<p><i>Solanum mauritianum</i></p>	<p>Wooley nightshade</p>		<ol style="list-style-type: none"> 1. Pull up all small plants (easiest in winter). Leave on site to rot down. 2. Cut and squirt (all year round): make cuts at regular intervals around the trunk, apply 1.5ml of a product containing 100g picloram+300g triclopyr/L (undiluted) per cut.
<p><i>Solanum pseudocapsicum</i></p>	<p>Jerusalem cherry</p>		<ol style="list-style-type: none"> 1. Hand pull all but the largest plants (all year round). Leave on site to rot down. 2. Spray plants over 30 cm tall (spring-autumn): glyphosate (10ml/L).
<p><i>Syzygium smithii</i></p>	<p>Lilly pilly</p>		<ol style="list-style-type: none"> 1. Pull or dig seedlings (all year round). Leave on site to rot down. 2. Cut and squirt (all year round) or bore and fill: Make 1 cut or hole every 10 cm around the trunk, apply a slurry of metsulfuron-methyl 600g/kg (2g) to each cut or hole. 3. Cut down and paint stump (all year round): metsulfuron-methyl 600g/kg (5g/L). 4. Frill (continuous cut): treat with metsulfuron-methyl 600 g/kg (4g/L + penetrant) 5. Spray (spring-autumn): metsulfuron-methyl 600g/kg (5g/10L + penetrant).
<p><i>Tradescantia fluminensis</i></p>	<p>Tradescantia</p>		<ol style="list-style-type: none"> 1. Spray: triclopyr 600 EC (6ml/L + penetrant) or triclopyr 120g/L (30ml/L + penetrant) or triclopyr 300 EC (12ml/L). 90+% kill. Follow up quickly (2-3 months) before plant recovers. 2-3 treatments needed for total control. 2. Spray: glyphosate (20ml/L + penetrant) or triclopyr 600 EC (3ml/L + penetrant) or triclopyr 120g/L (15ml/L + penetrant). Follow up quickly (2-3 months) before plant recovers. 2-3 treatments needed for control.

<p><i>Zantedeschia aethiopica</i></p>	<p>Arum lily</p>		<ol style="list-style-type: none"> 1. Cut down and paint stump: metsulfuron-methyl 600g/kg (1g) + glyphosate (100ml) + penetrant per L water. Leave on site to rot down. stems and leaves. 2. Spray: metsulfuron-methyl 600g/kg (3g) + glyphosate (150ml) + penetrant per 10L water.
<p><i>Ulex europaeus</i></p>	<p>Gorse</p>		<ol style="list-style-type: none"> 1. Stump swab: glyphosate (250ml/L) or metsulfuron-methyl 600g/kg (2g/L) or triclopyr 600 EC (250ml/L) or a product containing 100g picloram+300g triclopyr/L (100ml/L) or picloram gel. 2. Spray (spring-summer): triclopyr 600 EC (20ml/10L) or triclopyr 300 EC (40ml/10L). 3. Spray (autumn-winter): metsulfuron-methyl 600g/kg (5g/10L + penetrant (knapsack) or 20g/100L + penetrant (spraygun) or a product containing 100g picloram+300g triclopyr/L (250ml/100L (spraygun)).

4.4 Disease prevention

4.4.1 Myrtle rust

Myrtle rust is a plant disease caused by the fungus *Austropuccinia psidii*. It produces powder-like spores that can be easily spread through direct contact or by the wind. Once established on a host tree or shrub, it destroys new growth and soft tissues, eventually killing the plant.

Myrtle rust can be dispersed by:

- movement of infected plant material (nursery stock, cut flowers, plant cuttings, germplasm)
- movement of contaminated equipment (secateurs, chainsaws)
- wind, water (wind-driven rain, irrigation) and gravity
- animals and insects, including bees, birds, other wildlife and pets
- humans (on clothing)
- vehicles.

Best practice for preventing the spread of myrtle rust caused by *Austropuccinia psidii* shall be adhered to when working with plants within the *Myrtaceae* family e.g. manuka.

- Visually check all plants for signs and symptoms of myrtle rust before entering site.
- Inspect plants of planting and first flush of new growth
- Undertake regular inspections of *Myrtaceae* on maintenance inspections
- Do not transport plants or green waste you suspect to be infected with myrtle rust (or any other pest).
- If you need to treat or remove infected plants or material, follow the advice on myrtlerust.org.nz
- After working on *Myrtaceae*, sterilise tools and equipment with methylated spirits or 5-10 per cent bleach. Cover and contain clothes in plastic if moving them between the site and laundry. Wash exposed clothing in hot water.
- Contact Ministry for Primary Industries if Myrtle rust is suspected.

4.5 Riparian planting timeframes and specifications

The planting should be undertaken during the winter season (late April-early September) to ensure successful plant establishment and growth rates are achieved. Work shall only be undertaken when the weather is suitable i.e. mild, dull and moist.

All plants shall be spaced and planted to replicate naturalness in the landscape, following natural contours. Planting in straight rows should be avoided and generally, no more than five specimens of the same species shall be located together in a single cluster. The exception to this is where conditions of a particular site are suited to only one or a few individual species within the mix, such as wetland type planting areas. Plants within specified planting zones are to be distributed randomly and in small clusters, as they would occur naturally. It is recommended that an experienced Landscape Contractor oversees the implementation of the works.

All plants shall be planted in hand dug holes. All wetland plants will be spaced at 0.75m centres to ensure dense coverage, while terrestrial plantings are to be spaced at 1.4m (pioneer species), and 2m-3m (climax species) spacings. Generally, all plants to be utilised within the proposed revegetation planting area should be a minimum of 0.5L grade to achieve sufficient coverage and canopy closure to be achieved within a 5-year period from planting.

Planting holes for individual plants should be broken up or roughened using a double spade cut and be large enough to accommodate the plant roots without distortion. All holes must be hand-dug, with the sides and bottom well loosened to remove glazing and facilitate root penetration. For plants in drier areas, away from wet zones, a controlled-release (2-year) general fertilizer should be used. If necessary, an additional application of slow-release fertilizer should be applied approximately 6 months after the initial planting during the first year of maintenance. All fertilizers must be applied according to the manufacturer's recommendations based on plant size.

4.6 Proposed riparian planting detail

Approximately 0.77 ha of the proposed Ahuroa River riparian margin protection area is to be planted with terrestrial buffer and wetland plantings. The proposed species list (Table 3) is aimed at ensuring that suitable ground coverage is achieved through dense planting, which will aid weedy species suppression, manage soil erosion by providing some surface stability through vegetation cover and soil binding roots and enhance the natural character and ecological values of the site. The plantings will allow for a more complex pest weed free core riparian ecosystem to naturally develop over time.



Figure 5: Showing the proposed net environmental benefit Ahuroa River riparian margin protection and enhancement areas plan

Table 3: Proposed riparian margin revegetation planting species detail

Riparian margin enhancement planting								
Eco-sourcing region	Waipu ED							
Stakes required	Recommended – alternatively if stakes not used more frequent ongoing plant releasing required							
Planting timeframes	April-September							
Fertiliser required	Recommended							
Irrigation	Only should planting occur within shoulder season (i.e. March/October)							
		Terrestrial buffer planting – 6,212 m ²			Wetland infill planting – 1,507 m ²			Total Number of plants required
Scientific name	Common name	% mix	Grade	Spacing (m)	% mix	Grade	Spacing (m)	
<i>Carex lessoniana</i>	Rautahi				20%	0.5L	0.75m	400
<i>Carex virgata</i>	Pukio				20%	0.5L	0.75m	400
<i>Carex secta</i>	Purei				20%	0.5L	0.75m	400
<i>Coprosma robusta</i>	Karamu	10%	0.5L	1.4m				316
<i>Cordyline australis</i>	Ti kouka	10%	0.5L	1.4m	10%	0.5L	1m	400
<i>Corynocarpus laevigatus</i>	Karaka	2%	1L	2-3m				36
<i>Cyperus ustulatus</i>	Giant umbrella sedge				5%	0.5L	0.75m	86
<i>Dacrycarpus dacrydioides</i>	Kahikatea	5%	1L	2-3m	5%	1L	2m	110
<i>Kunzea robusta</i>	Kanuka	26%	0.5L	1.4m				822
<i>Leptospermum scoparium</i>	Manuka	15%	0.5L	1.4m	5%	0.5L	1m	514
<i>Machaerina articulata</i>	Jointed twig rush				5%	0.5L	0.75m	86
<i>Machaerina rubiginosa</i>	Orange nut sedge				5%	0.5L	0.75m	86
<i>Meliccytus ramiflorus</i>	Mahoe	5%	0.5L	1.4m				158
<i>Phormium tenax</i>	Harakeke	10%	0.5L	1.4m	5%	0.5L	1m	354
<i>Podocarpus totara</i>	Totara	5%	1L	2-3m				88
<i>Sophora chathamica</i>	Kowhai	5%	1L	2-3m				88
<i>Veronica stricta</i> var. <i>stricta</i>	Hebe	5%	0.5L	1.4m				158
<i>Vitex lucens</i>	Puriri	2%	1L	2-3m				88
Total plant number								4,590

4.7 Plant releasing

Ongoing maintenance including weed control and plant replacement is recommended to take place for **minimum of 5 years** following the issue of 224(c). Maintenance should be carried out bi-annually during Years 1-3 and annually during Years 4 & 5 for a minimum period of five years following planting in spring and late summer. Should maintenance be undertaken with this frequency by Year 5, 85% canopy closure of the revegetation plantings should be achieved.

Plant releasing can be conducted either through hand/manual releasing, or spray releasing with selective herbicide. Hand/manual releasing can involve the use of a scrub bar or hand tools to cut back grass and weed growth around plants which have or are at risk of becoming suppressed. This method is labour intensive but low risk to plant health. The use of selective herbicide is often more effective given that the primary species to be controlled typically is a mixture of kikuyu and other suppressive exotic pastoral weeds. It is recommended that a mixture of manual releasing and chemical spray are utilised for this site to achieve best results.

Plant releasing is an essential maintenance requirement of releasing young plants primarily from competitive grass, forbs and exotic shrub dominance until the revegetation plantings have sufficiently established and achieved a minimum of 85% canopy closure.

Revegetation plants should be released using the following methods:

- Hand/manual releasing, which can involve the use of a scrub bar or hand tools to cut back grass and weed growth around plants which have or are at risk of becoming suppressed. This method is labour intensive but low risk to plant health.
- Spray releasing with herbicide, this method depends on the herbicide to be used and the skill of the contractor. Typically, selective herbicides such as haloxyfop is able to be applied safely around/over most native species (excluding monocots such as cabbage tree, flax and *Carex* and *Cyperus* species). In the instance where spray releasing can reduce labour, incompatible species can be manually cleared as per manual release above.
- Non-selective herbicides (such as glyphosate) will not be used via foliar spray due to the high risk of spray drift and associated non-target mortality.

To measure the effectiveness of the ecological management programme it is important that good quality records are maintained to track weed control and ongoing revegetation efforts and site outcomes. Basic maintenance schedule is described under Table and example record forms to be utilised for maintenance purposes are attached under Appendix 2. These should be filled in during each round of maintenance and saved for submission to Council 5 years following the issue of the 224(c).

4.8 Blanking

A 5–10% mortality rate during Years 1-3 of initial ecological restoration effort can be expected in revegetation plantings due to natural causes such as insect damage, frosts and drought along with mortality from animal pest damage and spray drift. Therefore, plant blanking (replacement) is likely to be required during Years 2 and 3 following the planting. Plant species replacement is to be consistent with the original planting schedule outlined under Table 3.

4.9 Pest animal control

The site and wider area are likely to be inhabited by an array of common animal pest species such as possum (*Trichosurus vulpecula*), Norway rat (*Rattus norvegicus*), ship rat (*Rattus rattus*), brown hare (*Lepus europaeus occidentalis*), European rabbit (*Oryctolagus cuniculus*),

mustelids (*Mustela* spp.), and hedgehog (*Erinaceus europaeus*). Animal pest management is proposed to be implemented within the proposed riparian enhancement planting areas.

A network utilising a mixture of primarily covered or elevated kill traps and bait stations is proposed to be implemented following the revegetation planting establishment on site. For an enhancement area of this size, keeping in mind the locality of the site the following specifications are made:

- 1 x DoC 200/250 kill trap (suitable for ferrets, stoats, hedgehogs and rats) placed within the riparian enhancement area for the control of stoats/mustelids. Can be baited with pilchard, egg or rabbit. Dry baits can be obtained by various suppliers;
- 2 x possum traps (Timms, Flipping Timmy, AT220 or similar) placed within the riparian enhancement area;
- 12 x rat and mouse bait stations or traps (covered bait stations, Goodnature A24 Rat & Mouse Traps, or Victor Rat Traps) placed in an approximately 50m x 50m grid within the ecological enhancement area.
- 6 x Pindone Bait stations baited with pindone poison placed 100 metres apart the along the covenant area boundary on the interface with pasture to maximise bait uptake by both rabbits and possums.

Animal pest control and monitoring can generally be undertaken in conjunction with weed control efforts, albeit ideally regular (monthly) maintenance of pest control network and monitoring is recommended especially during bird breeding season (September and March). Generally, animal pest control is most effective when undertaken in perpetuity, albeit 1-2 years of intensive control often allow to reduce the pest animal density to a level where natural regeneration processes can successfully begin.

A suitably qualified pest control operator should be engaged to set up the initial pest trap/bait station network in general accordance with the specifications outlined in the pest animal bait station/trap management plan outlined under Figure 6 below. Following this, monitoring, rebaiting and resetting of traps could be carried out by the consent holder/lot owner. Example forms to be utilised for record keeping are attached under Appendix 2.



Figure 6: Showing indicative pest animal control point layout within the proposed riparian protection area

4.10 Ongoing protection mechanisms

To ensure the riparian protection area is safeguarded indefinitely, it is recommended that a conservation covenant, in accordance with Section 77 of the Reserves Act 1977, or an open space covenant under the Queen Elizabeth the Second National Trust Act 1977, be prepared for registration against the titles of the land shown on the finalized and approved Survey/Scheme Plan. This covenant will mandate adherence to the provisions of the chosen legal protection mechanism.

4.11 Stock exclusion and covenant fencing

To ensure the long-term protection of the new riparian margin covenant areas, it is proposed to install a stock-proof 7-wire post and batten fence along the southern boundary of the covenant area. The proposed fenceline will sit outside of the immediate floodplain area of the Ahuroa River and is unlikely to experience severe flooding. This robust fencing will effectively prevent stock from accessing the protected area. For the easternmost and westernmost boundaries, which are situated within a floodplain and are susceptible to occasional flooding, a 3-wire fence is recommended. This type of fencing is more adaptable to the dynamic conditions of flood-prone areas, and may require more frequent repairs due to jamming of logs and flood debris.

The northern boundary is defined by the Ahuroa River, which spans approximately 5 to 7 meters in width. Given this natural barrier, stock intrusion from the northern side is considered highly unlikely.

The proposed covenant fencing plan is illustrated in Figure 7, which outlines the specific locations and types of fencing to be used. It is deemed that a minimum of one access gate will be required to be established within the covenant fencing to ensure that suitable access can be maintained for ongoing planting/covenant maintenance and weed and pest animal control operations. The gate entry will also allow to remove any loose stock from the area in a controlled manner should they be found within the area following fencing completion.

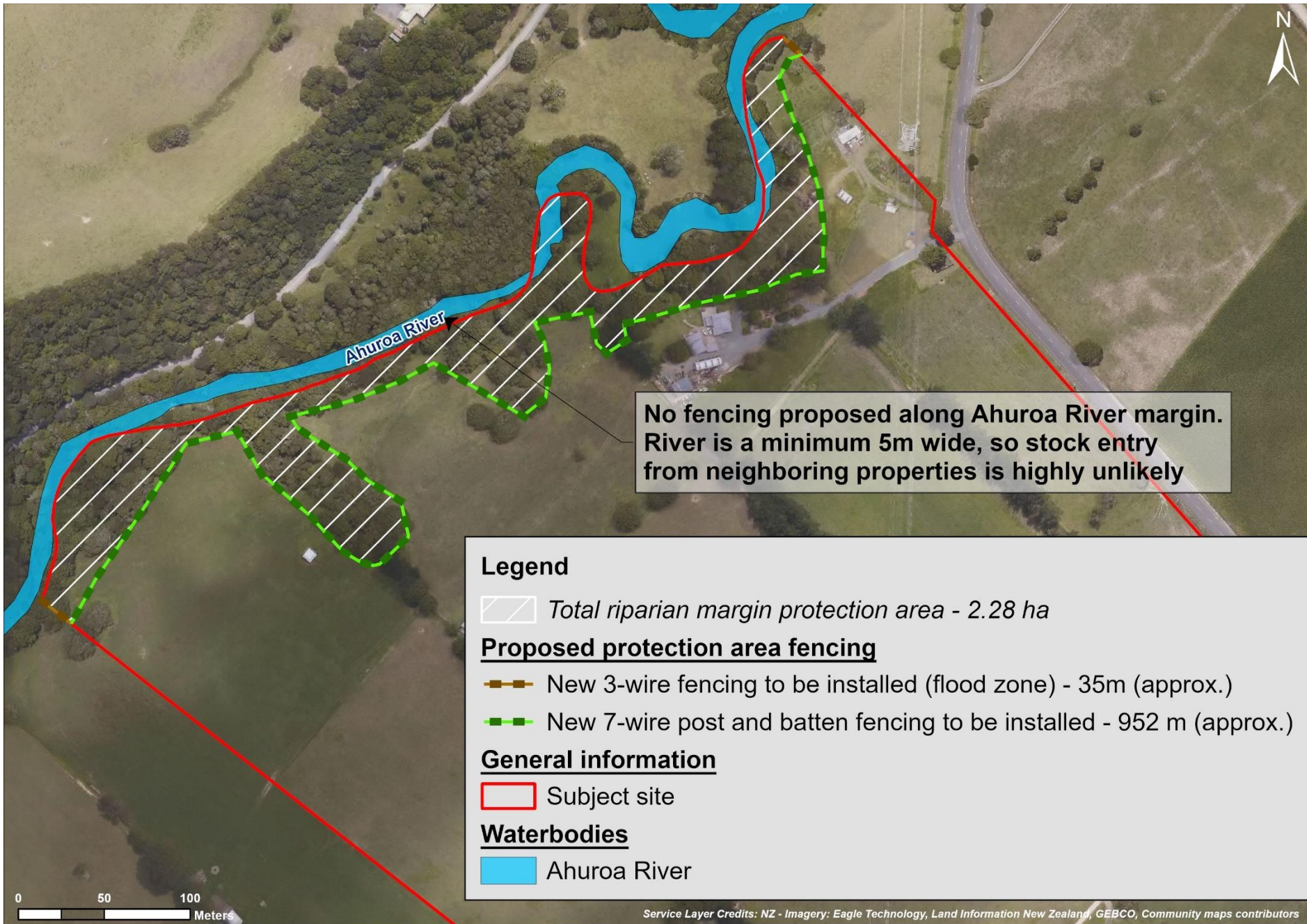


Figure 7: Showing the proposed riparian protection area fencing plan

4.12 Fire risk management

Fire is of high to moderate risk in Northland all year, and therefore fire prevention protocols should be applied during the construction phase of any buildings on site which may need to be required to be placed within 20m of existing bush edges. This risk could be reduced by building during the wetter, winter season. During occupation, landowners should follow and stay up-to-date Northland Regional Council (NRC) fire restrictions, rules and bylaws.

Fire Emergency New Zealand (FENZ) recommendation is for a minimum 20 metre defensible zone (setback) around building platforms; however this requirement cannot be met for the existing on-site dwelling. The existing dwelling is already located <20 metres from the bush edge. Following the subdivision of the site, new buildings are likely to be positioned near State Highway 1, making it improbable that they will be situated within a 20-meter setback from any bush areas.

4.13 Access limitations

In respect of access to the proposed riparian protection area is recommended that

- Access is limited to that required for maintenance and limited low disturbance / passive recreation such as walking / bird watching. Access only permitted by residents from the farm balance lot or maintenance contractors and the exclusion of public access.
- Motorised vehicles (or motorised watercraft) would be prohibited (except for that required for maintenance). Sporting or hunting activities would also be prohibited (other than pest control) including exclusion of associated dogs (other than for pest control) or other domestic animals.
- Any access must ensure no disturbance to indigenous vegetation both direct (vegetation clearance) and indirect (noise), particularly where ground nesting birds are likely to occur.
- No farming activity, meaning the cultivation of farmland for the production of crops, fruits, vegetables, ornamental and flowering plants, and the utilization of farmland for the production of dairy, livestock, poultry, (domestic /working farm dogs), and all other forms of agricultural products having a domestic or foreign market is to take place within the ecological protection/covenant areas.
- The consent holder shall not erect or place any new temporary or permanent building or structure within identified ecological protection/covenant areas.

4.14 Nutrient and sediment control

Earthworks associated with the active development of the site will have the potential to result in sediment runoff into the on-site waterways that eventually discharge into Ahuroa River. To minimise the risk of sediment entering the onsite streams during site development works, and contaminating the downstream catchment, erosion and sediment control plans should be prepared and implemented in accordance with Auckland Council Guideline Documents 2016/005: Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region as required under Section C.8.3 of the NRC Proposed Regional Plan for Northland. Earthworks on site should be conducted during appropriate periods of dry weather to avoid any potential accidental discharges of sediment laden surface or stormwater from site development works.

In respect to nutrient controls, any stormwater and wastewater management required for any new buildings to be constructed on site are to follow expert reporting and recommendations.

All stormwater infrastructure should be designed to maintain natural drainage and landform where possible to reduce a reduction in overland flows. Wastewater design for the sites should be in compliance with Proposed Regional Plan for Northland requirements with appropriate setbacks from waterbodies.

4.15 Building and access location

Any new infrastructure necessary for future development on site will have to be designed to avoid, where feasible and practical, sensitive receiving environments as identified and described within the Ecological Assessment prepared for the site.

5 MONITORING

For this Ecological Management Plan to be successful, keeping up to date records of pest plant and animal control efforts, and monitoring of planting establishment success rates are key to determine the success of restoration efforts.

It is recommended that at the time of physical ecological works completion (site preparation, first round of pest weed control and revegetation planting implemented, covenant fencing established, and pest animal control network set up) prior to Section 224(c) certification the Applicant informs Council that the restoration works as described in this Report have been completed in full. The consent holder shall provide a completion report from a suitably qualified ecologist to the satisfaction of Council. Council will undertake inspections as required to confirm compliance.

It is recommended that following the issue of 224(c) the consent holder keeps up to date records showing clear evidence of ongoing weed and pest animal maintenance, infill planting and fencing maintenance is being carried out in accordance with the specifications outlined within the body of this EMP.

In regard to future monitoring, following the initial 5-year maintenance period evidence of compliance (Monitoring Completion Report) will be required to be submitted to Council five (5) years from the date of issue of the Section 224(c) certificate. Should a minimum of 85% canopy cover and 90% survivorship of indigenous revegetation plantings be achieved prior to the 5-year monitoring period, the landowner may choose to provide a Monitoring Completion Report earlier than the standard 5-year period, and it will be at the Council's discretion as to whether they deem that monitoring can then be ceased at that time.

The Monitoring Completion Report should include, but not be limited to the following:

- Record plant health, noting any indicators of pest, insect or disease damage.
- Record canopy closure of revegetation plantings.
- Assess pest plant incursions and potential invasion risks in the future.
- Comment on the general condition of the covenant area.
- Comment on the condition of fencing.
- Comments regarding any obvious breaches in RC conditions relating to ecological matters (e.g., dumping of green waste into the planting area)

Note: The Monitoring Completion Report should also make recommendations on any follow-up maintenance required in terms of the above, i.e., weed control, plant disease control and covenant fencing maintenance.

6 REFERENCES

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APPENDIX 1 – PROPOSED ECOLOGICAL PROTECTION AREAS PLAN



ADDITIONAL OBSERVATIONS (Green waste disposal, exclusion pest plants noted in garden areas, rubbish in planting areas etc.)