



**Ecological Assessment
R & V Goodall,
42 Jumna Road, Maungatūroto**



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1. Background

An application for a three-lot subdivision under the Small Development/Overlay (Rule 12.14.1) was lodged by R. & V. Goodall to the Kaipara District Council (KDC) for the property located at 42 Jumna Road, Maungatūroto (LOT 27 DP 342229). The application was deemed non-complying, based on the size of the parent property (greater than 5 ha). It was recommended by the KDC Planner that the applicant consider lodging the subdivision proposal under Environmental Benefit Rule (12.13.1), particularly based on the potential value of a stream running through the property and the proximity of that stream to the Kaipara Harbour.

In January and February 2022, site visits were undertaken by Ecology North to carry out vegetation surveys, assess the site for wildlife value and to try to gain an understanding of the upstream and downstream condition. However, due to lack of public access, no detailed ground survey was able to be done downstream of the property. Assessment of the stretch of stream between Jumna Road and the Harbour was therefore done based on visuals from Jumna Road, drone footage, GIS aerial photos and the DOC Protected Natural Areas Programme (PNAP) Report for the Otamatea Ecological District (ED) (Lux & Beadel 2006).

Given the current ecological condition of the site, it was decided that a walkover survey of bird and lizard species would be adequate.

Additional information gathering was done as a desktop exercise, searching for information in the PNAP Report for the Ōtamatea Ecological District (Lux & Beadle 2006) and other information web sites.

The following is an ecological assessment and management recommendations for the site. The overall assessment is made in relation to *Appendix 25G – Assessment of Ecological Significance*, and Rule 12.13.1 - *Environmental Benefit* in the Kaipara District Plan.

2. Site characteristics

The total property is approximately 5.4 hectares (Diagram 1). The proposal is to divide the property into three lots: Lot 1 – 2.35 ha, Lot 2 - 1.35 ha, Lot 3 – 1.7 ha.

The site is a mix of open (rank) pasture with occasional (predominantly exotic) trees and an open narrow stream system (perennial and intermittent) running through a culvert under Jumna Road into mixed pasture and tree cover to a tidal branch of the Wairau River (Kaipara Harbour). The site is less than 500 metres from the tidal reach (Photo 1 & Diagram 3).

During the site survey, [no observed site characteristics indicated the presence of natural wetland on the property](#) as per the National Policy Statement – Freshwater (2020) definitions. The streams are deeply channelised and therefore characteristic of stream/riparian habitat. Based on this visual assessment, it was deemed unnecessary to undertake any wetland delineation assessment under the MfE Protocols.

It appears that the property has not been grazed recently, based on the dense/rank growth of mixed ground cover.

The topography of the site is sloping from the east and south, leading down to flats on the northwestern section of the property. On the flats, the stream appears to be perennial, fed from the properties to the west (across Bickerstaffe Road). A smaller stream arm runs down the slope from the east (likely spring fed), which appeared dry (or possibly damp in sections) at the times of survey and is therefore likely to be classified as intermittent (or ephemeral).

The NRC Soils Viewer Map (NRC 2019) lists one soil type across the entire property; Rockvale clay, a young calcareous mudstone soil classified as poorly drained and unstable, especially soft and wet in winter and prone drying and cracking in summer, with reduced natural fertility due to leaching.

The site is located in the Ōtamatea ED, close to the western boundary of the Rodney ED (Northland Conservancy) and within the Wairau River (Kaipara Harbour) catchment.

The property falls within a Category 2 (Chronically Threatened) environment under the Land Environments New Zealand (LENZ) 'Threatened Environment Classification' (Cieraad 2015). The Manaaki Whenua Potential Natural Vegetation Map for the site (Manaaki Whenua 2022) classifies the historic vegetation cover as kauri (*Agathis australis*) forest, however given the presence of the stream flats, it is possible that the lower section of the property may have had a cover of mixed riverine species, particularly kahikatea (*Dacrycarpus dacrydioides*).

Diagram 1: Outline of property boundary (source: online GIS maps)



Diagram 2: General flow path of streambeds



2.1 Vegetation cover

The majority of the property is covered in rank/rough mixed pasture.

A stand of trees on the northern boundary is dominated by blackwood (*Acacia melanoxylon*) with tōtara (*Podocarpus totara*).

The level of indigenous vegetation diversity is extremely low with only seven species recorded for the entire site.

Table 1: Indigenous vegetation

Dicot trees & trailing plants	
<i>Calystegia sepium</i>	pink bindweed
<i>Hydrocotyle dissecta</i>	
<i>Podocarpus totara</i>	tōtara
Monocots	
<i>Carex lessoniana</i>	rautahi
<i>Cordyline australis</i>	tī kōuka
<i>Juncus edgariae</i>	wīwī
Ferns	
<i>Doodia australis</i>	rasp fern

The remainder of the site, including the streambeds are dominated by naturalised exotic plant species (Table 2), some of which are classified as Unwanted Organisms in the New Zealand National Pest Plant Accord (NPPA) (Biosecurity NZ 2019), or as Sustained Control Plants (SCP) in the Northland Regional Pest and Marine Pathway Management Plan (NRPMPM) (NRC 2017).

Two species of poplar (*Populus nigra* and *P? alba*) have been planted along the roadside and on the stream edge close to Bickerstaffe Road.

The groundcover and streambed below the stand of trees is particularly weedy, including the highly invasive tradescantia (*Tradescantia flumenensis*), arum lily (*Zantedeschia aethiopica*) and elephant ears (*Alocasia brisbanensis*).

All species deemed to pose a long-term ecological threat will need be controlled as part of an Integrated Ecological Management and Enhancement Plan.

3. Wildlife values

3.1 Avifauna

A total of ten bird species were observed (Table 3), four indigenous and six exotics. All species are common to the open pasture, treeland and stream habitat.

3.2 Herpetofauna

During the two site visits (January & February 2022), manual lizard searches were undertaken. This included a check under (lifting of) potential lizard groundcover (e.g. branches on the ground and other debris) and using binoculars to scan trees. No lizards were observed.

Table 2: Naturalised exotic vegetation

Dicot trees shrubs, herbs and trailing plants		NPPA*	NRPMMPM**
<i>Acacia mearnsii</i>	black wattle		
<i>Acacia melanoxylon</i>	blackwood		
<i>Cirsium vulgare</i>	Scotch thistle		
<i>Crepis capillaris</i>	hawksbeard		
<i>Erythrina crista-galli</i>	cockspur coral tree		
<i>Jacobaea vulgaris</i>	ragwort		
<i>Ligustrum lucidum</i>	tree privet	✓	SCP
<i>Lotus pedunculatus</i>	lotus		
<i>Nasturtium officinale</i>	watercress		
<i>Oenanthe pimpinelloides</i>	parsley dropwort		
<i>Populus? alba</i>	white poplar		
<i>Populus nigra</i>	Lombardy poplar		
<i>Ranunculus repens</i>	buttercup		
<i>Rubus fruticosus</i> agg.	blackberry		
<i>Rumex obtusifolius</i>	broad-leaf dock		
<i>Rumex sagittatus</i>	climbing dock		
Monocots			
<i>Alocasia brisbanensis</i>	elephant ears		SCP
<i>Carex ovalis</i>	oval sedge		
<i>Cenchrus clandestinus</i>	kikuyu grass		
<i>Cortaderia selloana</i>	pampas grass	✓	
<i>Cyperus eragrostis</i>	umbrella sedge		
<i>Tradescantia flumenensis</i>	tradescantia	✓	
<i>Zantedeschia aethiopica</i>	arum lily		

* **NPPA** (National Pest Plant Accord) species are classified as ‘unwanted organisms’ under the Biosecurity Act (1993).

** The identified plants included in the **NRPMMPM** are classified as Sustained Control Plants (SCP), where:

*The pest plants in the **Sustained Control** programme are plants that are widespread in suitable habitat throughout Northland. They all cause adverse effects to the environmental, economic, social or cultural values of the region.*

People are required to undertake actions to help reduce the impacts and spread of the sustained control pest plants and prevent unreasonable impacts from these plants spreading across property boundaries (NRC 2017; pg. 48).

Table 3: Bird observations

Indigenous/endemic	
kāhu/swamp harrier	<i>Circus approximans</i>
kōtare/kingfisher	<i>Todiramphus sanctus</i>
matuku moana/white-faced heron	<i>Egretta novaehollandiae</i>
riroriro/grey warbler	<i>Greygone igata</i>
Exotic	
blackbird	<i>Turdus merula</i>
chaffinch	<i>Fringilla coelebs</i>
common myna	<i>Acridotheres tristis</i>
house sparrow	<i>Passer domesticus</i>
pheasant	<i>Phasianus colchicus</i>
song thrush	<i>Turdus philomelos</i>

3.3 Freshwater fish

A search of the NIWA New Zealand Freshwater Fish Database (NZFFD) (NIWA 2022) showed no records for this stream, however a search of nearby streams in the catchment (the majority further inland) provided the following records.

Table 4: NZFFD records from nearby streams

Indigenous fish	
Cran's bully	<i>Gobiomorphus basalis</i>
common bully	<i>Gobiomorphus cotidianus</i>
tuna/long-fin eel	<i>Anguilla dieffenbachii</i>
Banded kōkopu	<i>Galaxias fasciatus</i>
tuna/short-fin eel	<i>Anguilla australis</i>
tuna/unidentified sp.	<i>Anguilla</i> sp.
red-fin bully	<i>Gobiomorphus huttoni</i>
īnanga	<i>Galaxias maculatus</i>
Indigenous invertebrates	
Kōura	<i>Paranephrops planifrons</i>
Freshwater shrimp	<i>Paratya</i> sp.
Exotic/pest fish	
gambusia/plague minnow	<i>Gambusia affinis</i>

Based on the current open/unshaded nature of the stream, the site is ideal habitat for the highly invasive gambusia (*Gambusia affinis*) and not suitable for the majority of indigenous fish species. However, given appropriate planting of the stream edge (shading), this section of stream could provide habitat for a range of indigenous aquatic faunal species and given the close proximity to the marine environment, with appropriate planting (e.g. native sedges) potential breeding habitat for īnanga (*Galaxias maculatus*).

4. Overall current condition

Overall, the site is highly modified, dominated by exotic/naturalised vegetation cover

The site will require a significant amount of work (e.g. pest control and planting) to achieve a level of ecological integrity able to sustain natural processes such as plant community succession and improved water quality/stream habitat.

Photo 1: View across property to the Wairau River mangrove forest (Kaipara Harbour)



Photo 2: The main stream on the northwestern flats



Photo 3: The fenced and partially planted section of stream adjoining the site to the west (rail embankment to at the top of the photo)



Photo 4: The stream running under Bickerstaffe Road



Photo 5: View of the edge of the tree stand with dense blackberry cover to the left



Photo 6: View up the property from the west



Photo 7: View from the northeastern boundary



Photo 8: View up the main stream from Jumna Road



Photo 9: The smaller (intermittent) streambed running through the tree stand – currently overgrown with arum lily and elephant ears



5. Animal pests

No animal pests were observed, however it would be expected that the usual suite of mammalian pest species would be present, such as possums (*Trichosurus vulpecula*), rats (*Rattus* spp.), mustelids (*Mustela* spp.), mice (*Mus musculus*) and feral cats (*Felis catus*).

6. Surrounding landscape

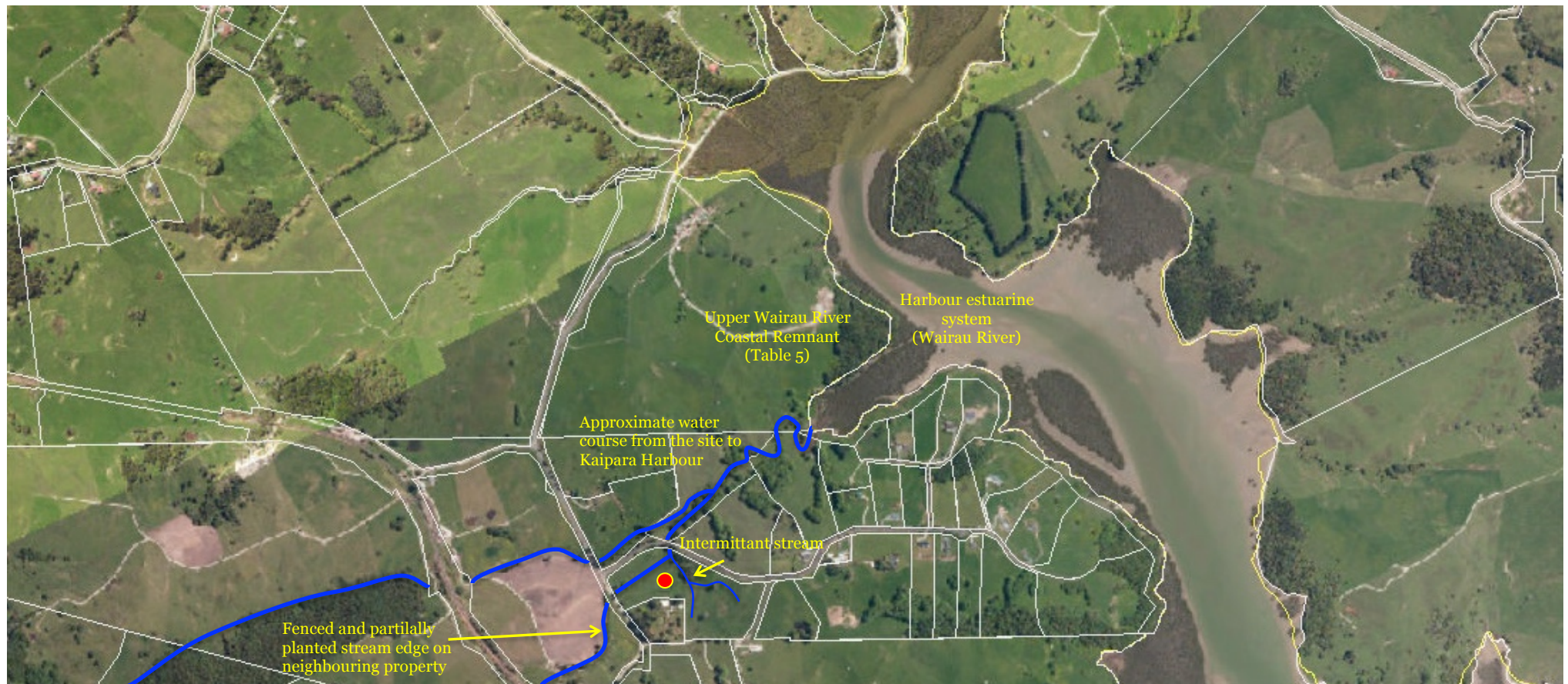
The surrounding landscape is predominantly pastoral farms and lifestyle blocks with small forest remnants and production forest.

The neighbouring upstream property to the west (across Bickerstaffe Road) has fenced and partially planted the stream edge with indigenous plants intermixed with dense kikuyu grass (*Cenchrus clandestinus*) and other invasive exotics (Photo 3).

Between the property and Kaipara Harbour the stream runs through a mix of open pasture, exotic trees (mainly crack willow (*Salix x fragilis*)) and stands of mixed forest (e.g. tōtara) before entering into mānawa/mangrove (*Avicennia marina* subsp. *australasica*) forest. Based on recent surveys of mangrove forest on Bickerstaffe Road approximately 1 km north, the vegetation may possibly also contain oioi (*Apodasmia similis*) with occasional mākaka/salt-marsh ribbonwood (*Plagianthus divaricatus*) along the drier edges. As I was unable to access this site, it is difficult to estimate the condition of the downstream environment and level of disturbance from farming activity/stock access.

The coastal mangrove forest forms part of the Te Papa Atawhai/ Department of Conservation (DOC) Protected Natural Areas Programme (PNAP) Level One Site of Ecological Significance for the Ōtamatea Ecological District (ED): Ōtamatea River (Qo8062) (Lux & Beadle 2006), directly adjoining a forest remnant to the north, part of the Upper Wairau River Coastal Forest Remnants (Qo8151) (Diagram 3).

Diagram 3: Wider landscape view – site is red dot (source: NRC online GIS maps)



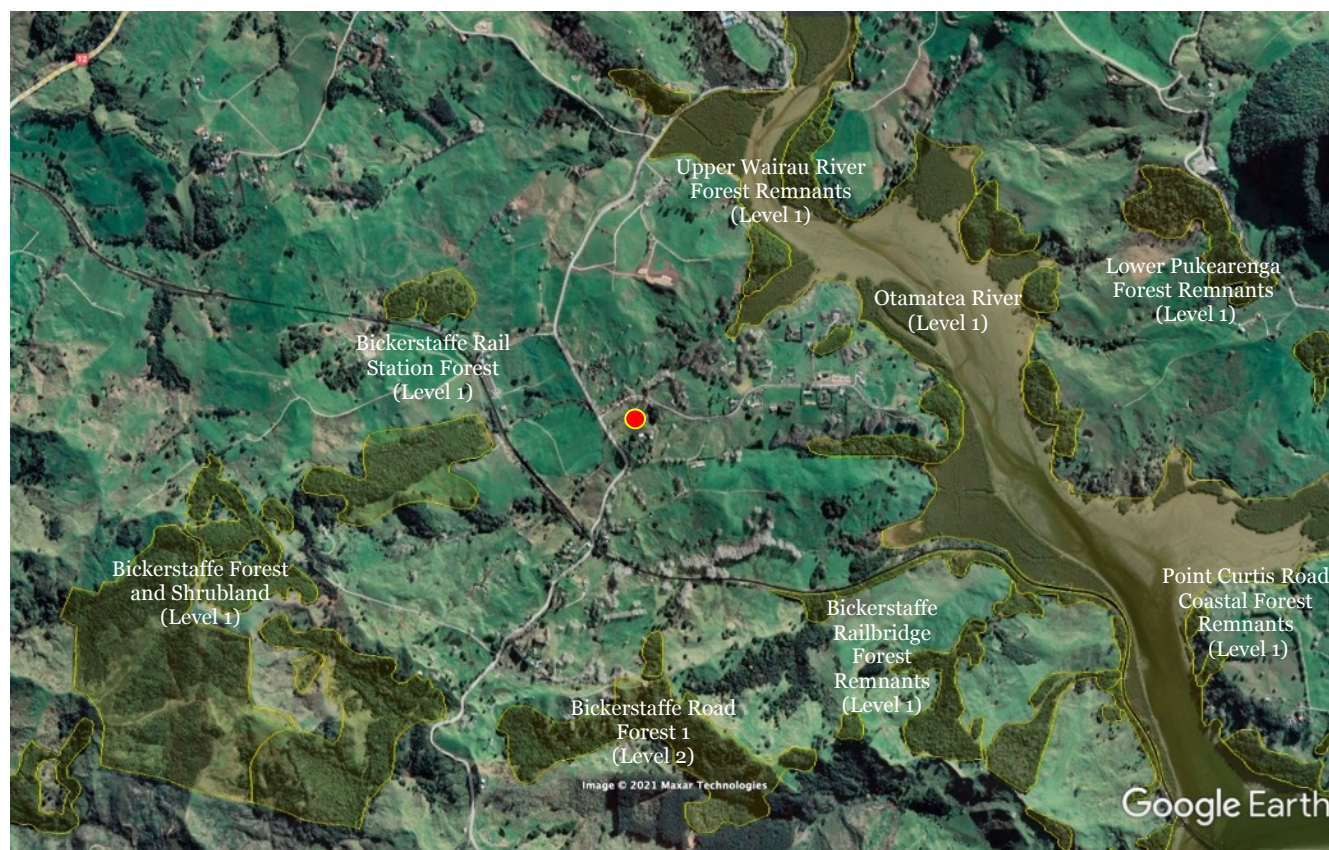
The site is also in close proximity to a number of other sites identified for ecological significance in the PNAP Report for the Ōtamatea Ecological District. These include Level 1 and Level 2 sites (Diagram 4 & Table 5). None have direct connection (ecological corridor) to the site but do have potential for ecological steppingstone functions (e.g. feeding habitat to sustain mobile species such as kūkupa and tūi, seed spread and pollination functions).

PNAP sites within two kilometres of the site include:

Table 5: PNAP Sites within 2 km of site

Site	Id	Level	Habitat types
Upper Wairau River Coastal Forest Remnants	Q08/151	1	Tōtara-kahikatea, tōtara-kōwhai, tōtara, kānuka-tōtara forests on coastal margin
Bickerstaffe Rail Station Forest	Q08/152	1	Tōtara, tōtara-kahikatea, tōtara-rimu forests
Ōtamatea River	Q08/062	1	Harbour/estuarine environment
North Maungatūroto Forest Remnants	Q08/069	1	Tōtara–mixed broadleaf-podocarp forest
Bickerstaffe Forest & Shrubland	Q08/153	1	Mānuka-kānuka shrubland, mixed podocarp-broadleaf forests
Bickerstaffe Railbridge Forest Remnants	Q08/149	1	Kānuka, tōtara-taraire-pūriri, tōtara, kānuka-tōtara-kauri forests
Point Curtis Road Coastal Forest Remnants	Q08/156	1	Tōtara-kānuka, tōtara-kahikatea, kauri-tōtara forests
Bickerstaffe Road Forest 1	Q08/150	2	Taraire-pūriri, tōtara-kahikatea forests

Diagram 4: PNAP sites in surrounding landscape



7. Ecological significance

The ecological significance of the forest remnant will be described and assessed using the following criteria.

7.1 National Threatened Environment Classification System

The site is part of a LENZ Level 4 'Category 2 Environment' (Chronically Threatened environments with 10-20% indigenous cover left). This classification is described as:

'Indigenous biodiversity in these environments has been severely reduced and remaining habitats are sparsely distributed in the landscape' (Cieraad *et al.* 2015).

Areas of indigenous ecosystems or vegetation types classified either Acutely or Chronically Threatened Land Environments associated with LENZ Level 4 are considered ecologically significant under the Appendix 5 criteria of the Northland Regional Policy Statement. While this site is neither an indigenous ecosystem or vegetation type, it should be considered as a priority area for ecological enhancement and revegetation.

7.2 Appendix 25G of the Kaipara District Plan

The following table (overleaf) provides an assessment of ecological significance of the site based on the criteria in Appendix 25G – 'Assessment of Ecological Significance' in the Kaipara District Plan.

Based on these assessment criteria, the site should be considered to have low ecological significance in its present state. The main value for the site rests on the potential for ecological enhancement works (stream shade/protection and creation of an ecological steppingstone) and connectivity along the stream system through to the marine environment.

Table 6: Kaipara District Plan Appendix 25G 'Assessment of Ecological Significance' criteria

1. Contain critical, endangered, vulnerable, or rare taxa, taxa of indeterminate threatened status (sensu International Union for Conservation of Nature definitions).	None
2. Contain indigenous or endemic taxa that are threatened or rare in Northland.	None
3. Contain the best representative examples in an ecological district of a particular habitat type.	None.
4. Have high density of taxa or habitat types for the ecological district.	None.
5. Form ecological buffers, linkages or corridors to other areas of significant vegetation or significant habitats of indigenous fauna.	Has the potential following enhancement to form part of an ecological steppingstone network with nearby fragmented forest and wetland habitat areas. Provides basis for future corridor linkages through the stream system (e.g. riparian forest) to connect to Kaipara Harbour environment – dependant on future subdivision and ecological enhancement actions. Connects to fencing and partial indigenous planting of upstream environment. Potential instream habitat for a range of aquatic fauna, including breeding habitat for īnanga and other whitebait species.
6. Contain habitat types that are rare in the ecological district.	None.
7. Support good populations of taxa which are endemic to the Northland or Northland-Auckland regions.	None.
8. Are important for indigenous or endemic migratory taxa.	Has potential (through enhancement) to provide habitat for mobile and migratory terrestrial species and instream habitat for a range of aquatic fauna.
9. Support viable populations of species, which are typical of that habitat type within an ecological district and retain a high degree of naturalness.	None.

8. Potential effects of the development on the ecological feature

The main threats to the ecological values of the site associated with subdivision activities should be considered:

- Erosion and sediment effects associated with the initial earthworks and infrastructure development (short-term),
- Increased nutrient and other contaminant runoff associated with dwellings (e.g. wastewater)
- The introduction of additional ecological pests,
- The effects of domestic pets to ecological values of the site,
- Ongoing stock disturbance of ecological enhancement areas.

8.1 Vegetation clearance & earthworks

Site preparation (earthworks), house construction and infrastructure development have the potential to generate and mobilise sediment, that could cause a range of undesirable downstream effects to waterways and proposed revegetation areas (although the dense planting will provide buffering functions to between the house sites and gully/waterways).

The following actions are recommended:

- House sites should be positioned with a minimum 20 m setback from the ecological management area/s.
- Prior to the commencement of earthworks at the building consent stage, the owner should provide to Kaipara District Council an Erosion and Sediment Control Plan (ESCP), following the standard guidelines and rules within in the Auckland Council Guideline Document 005; *Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region* and requirements under Section C.8.3 of the *NRC Proposed Regional Plan for Northland*.

This ESCP should be approved by Council prior to the commencement of any earthworks.

The plan and associated earthworks should be undertaken in a manner to avoid the discharge of sediment into the streams or any other watercourses or stormwater drainage systems across this and neighbouring properties.

8.2 Wastewater management

All domestic wastewater treatment discharge is to be designed in a manner to reduce the risk of runoff in to the management area, following the requirements outlined in Section C.6 the Draft Northland Regional Plan (particularly Section C.6.1.3)

8.3 Pest plants and pathogens

Additional pest plants and pathogens can be introduced to the site during the development and ongoing establishment of gardens and landscaping areas. This can pose a significant threat to the short and long-term ecological health of waterways and ecological enhancement areas.

The following actions are recommended:

- Manage/control current and future ecological pests (flora and fauna) through the enhancement areas and lots under the guidance of an Integrated Ecological Enhancement and Pest Management Plan (IEEPMP).
- As part of this IEEPMP, undertake regular annual surveillance monitoring to identify any pest plants that may have arrived or spread to the covenant or surrounds.

- Provide a list of ‘unwanted’ plant species as part of the management based on the DOC Weedbusters site, National Pest Plant Accord and NRC Regional Pest and Marine Pathway Management Plan 2017-2027.
- To reduce the risk of introducing pest plant material and soil pathogens, ensure that all earthmoving machinery be cleaned away from and prior to entering site.

Refer to the National Pest Control Agency document: *‘Keep it Clean: machinery and vehicle hygiene guidelines and logbook to prevent the spread of pests and weeds (2015)’*. Available at:

http://www.fedfarm.org.nz/FFPublic/Policy2/Industry/Factsheets/Keep_it_Clean_Machinery_hygiene_guidelines_and_logbook_to_prevent_the_spread_of_pests_and_weeds.aspx

The Australian Government document: *‘Arrive Clean, Leave Clean - Guidelines to help prevent the spread of invasive plant diseases and weeds threatening our native plants, animals and ecosystems’*. Available at:

<http://www.environment.gov.au/system/files/resources/773abcad-39a8-469f-8d97-23e359576db6/files/arrive-clean-leave-clean.pdf>

And the general concepts outlined in the hygiene protocols for kauri dieback. Information source: www.kauridieback.co.nz and NRC pest control hub:

<https://www.nrc.govt.nz/environment/weed-and-pest-control/pest-control-hub/>

- To reduce the risk of introducing pest plant material and soil pathogens, avoid introducing additional soil and fill from off site. If topsoil or fill is needed it should be sourced from a reputable supplier and have been screened and sterilised (topsoil) before entering the site.
- Ensure that any indigenous vegetation introduced to the site for landscaping and revegetation purposes be appropriate to the site and ecosourced from the Ōtamatea ED (or if necessary due to supply issues, in consultation with the consulting ecologist – the Rodney ED (Northland Conservancy)). Any landscape plans required for the subdivision process should be done in consultation with an ecologist (species selection).
- Within the Integrated Ecological Enhancement and Pest Management Plan, provide information for future property owners on ways to avoid negative impacts on the ecological enhancement area, including the need to keep dogs out of the protection area and describing how non-native garden waste must be disposed of appropriately (e.g. taken to a waste transfer station) and that dumping garden waste into the planting areas is not to occur.

8.4 Domestic pets

Cats can have a significant impact of indigenous wildlife and ecological processes. As this subdivision application is being justified on ecological (enhancement) grounds, it is recommended that cats be banned from all residential lots.

All dogs should be kept within the property boundaries and kennelled or kept inside at night, with the boundaries fenced in a manner to ensure that dogs are also excluded from entering the protection/ecological enhancement areas at any time.

9. Summary of ecological rehabilitation recommendations

1. That the recommended area identified for ecological enhancement/revegetation (Diagram 5 - Pg. 22) be given legal protection.
2. That stock be permanently excluded from the ecological enhancement area, either through fencing and/or a ‘no-stock’ consent condition placed over the appropriate lots containing those enhancement areas (e.g. Lots 1 & 2)

3. That if required, any stream crossings be designed in a manner appropriate to the stream characteristics under the appropriate National, Regional and District rules and guidelines, [including the NIWA New Zealand Fish Passage Guidelines](#) (2018).
4. An integrated ecological management and enhancement and monitoring plan be prepared and implemented by a suitably qualified and experienced ecologist.

This plan should be aimed at the total eradication of any ecological pest plant species deemed by an ecologist to pose a threat to long-term ecosystem integrity, structure and function.

The revegetation of the entire enhancement site using appropriate indigenous species suited to the site characteristics ecosourced from wild plant population in the Ōtamatea ED (or if necessary due to supply issues, in consultation with the consulting ecologist – the close by Rodney ED (Northland Conservancy)).

Planting of the flats and waterways in a manner to encourage indigenous fauna (e.g. freshwater fish and birds) and exclude pest species (e.g. gambusia). This will be done by dense planting aimed at creating cover/shading (reduced light and lower water temperatures) and the use of stream edge sedges as habitat for inanga spawning.

Use a staged planting approach, where the initial planting relies on early successional species such as mānuka and kānuka to create a canopy, then once established (e.g. year 3), introduce a few late and mature phase species such as kauri and rimu that should be present but are missing and less likely to naturally regenerate due to limited seed spread between distinct forest remnants, better suited to planting under shade/cover than in the open.

Animal pest control should at a minimum, target possums, rats, mustelids and feral cats.

This plan should provide a framework for ongoing management in perpetuity.

5. The applicant should provide a means that ensures ongoing management of the ecological enhancement and protection area/s is done in a co-ordinated and effective manner (e.g. all pest management actions are done following the same methods and at the same time across the two lots containing the enhancement areas – preferably by the same contractor).
6. A ban be placed on cats from the three new residential lots and dogs be restrained at night and fenced within the property boundaries in a manner to exclude access into the ecological management area.

The implementation of these management recommendations should be considered to support the subdivision application, as outlined in Section 6 of the Kaipara District Plan – ‘Recognising and Protecting Ecological Values’. In particular:

- 6.5.1. (Ecological Area Objectives) *To maintain and enhance the life supporting capacity of ecosystems, and the extent and representativeness of the District’s indigenous biological diversity.*

Leading into 6.62b:

- *Encouraging and where appropriate requiring active pest control and removal and the provision of stock proof fencing to avoid the grazing of such areas; and*
- *Encouraging planting and restoration. Eco-sourcing is preferred practice when planting indigenous plants and in particular, when undertaking revegetation or restorative planting. It serves to maintain genetic diversity and increase plant survival because plants are accustomed to their local environment.*

- 6.5.2. *To maintain ecological values through the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna while allowing appropriate subdivision, use and development.*

- 6.5.3. *To promote active management of areas of significant indigenous vegetation and significant habitats of indigenous fauna.*
- 6.5.4 *To protect the natural character of the coast, rivers and lakes and their margins within the District by avoiding, remedying or mitigating the adverse effects of surface water activities.*
- 6.6.2 (b): g). (Ecological Area Policies) *Encouraging and where appropriate requiring active pest control and removal, and the provision of stock proof fencing to avoid grazing of such areas.*
- 6.7.1.3. (Methods) *Policies in the District Plan supporting initiatives for weed and pest control and habitat management to be implemented, where practicable, when assessing applications for subdivision ...*

10 Discussion of ecological aspects relative to the Environmental Benefit Rule

Under Rule 12.13.1 – ‘Environmental Benefit’ in the Kaipara District Plan, the site should:

- a) *Be offered permanent legal and physical protection.*

The site is to be protected under one of the covenanting mechanisms listed in *Note 2 of Rule 12.13.1.*

- b) *The entire feature shall be protected; and*

The entire survey/enhancement area identified in Diagram 5 and the approved Scheme Plan is to be included in the protection area.

- c) *The environmental benefit meets the minimum size requirements relevant to the type of Environmental benefit...*

- i. *An ‘Ecological’ Environmental Benefit shall be a minimum of 0.5 ha.*

The proposed ecological enhancement and protection area totals approximately 2 ha. This equates to approximately 5,000m² above the minimum requirement should the property owner wish to pursue the subdivision of one additional lot in the future (three Environmental Benefit Lots in total), as per Rule 12.13.1 (d):

No more than three Environmental Benefit Lots can be created per site in perpetuity (these can be created by either one subdivision consent or up to three consecutive consents).

11. Conclusions

In its present state the survey area has low ecological integrity with limited ecosystem structure and functional value. However, it is my opinion that this value can be improved through ecological enhancement and protection to a level of value to justify the approval of up to the maximum three Environmental Benefit Lots under Rule 12.13.1 of the Kaipara District Plan.

The priority of this site for ecological enhancement/restoration and protection should be favoured based on its classification as a Chronically Threatened Land Environment associated with Land Environments New Zealand (LENZ) Level 4 Criteria.

Ecological enhancement and protection through revegetation planting, ecological pest control and stock exclusion will increase wildlife habitat value across the site for both terrestrial and aquatic fauna, provide protection of the entire stream system across the parent property leading to improved water quality running to the Wairau/Ōtamatea River estuary (<500 metres away) and will set precedent for further ecological protection and enhancement of the downstream and upstream riparian corridors. The protection of waterways such as this fit within the national priorities/kaupapa reflected in the *Kaipara Moana Remediation* programme.

Additionally, the ecological enhancement of this area will add to the network of forest and shrubland remnant sites across the landscape providing ecological steppingstone habitat for mobile species, pollination and seed dispersal functions.

It is my professional opinion therefore, that the site should be considered worthy for consideration by the Kaipara District Council for protection and management as part of an Environmental Benefit application.

12. References

- Cieraad, E., Walker, S., Price, R., Barringer, J. 2015: An updated assessment of indigenous cover remaining and legal protection in New Zealand's land environments. *New Zealand Journal of Ecology* 39(2): 309-315.
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- MfE. 2020: Wetland Delineation Protocols. MfE Publication ME 1515. Ministry for the Environment, Wellington.
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13. Outline of ecological enhancement requirements

Diagram 5: Proposed ecological enhancement/revegetation area (total area approximately 2 ha)



The following outlines the basis for the ecological enhancement of the site. A detailed plan will be prepared by an ecologist and provided as part of the Integrated Ecological Enhancement and Pest Management Plan.

13.1 Pest plant control

Pest plant control will be required as part of the ongoing management across the site including the removal of the existing blackwood and willow trees.

The initial focus will be on the control of those species listed in Table 2 deemed to pose a threat to ecological integrity site.

Prior to planting, the areas of rank pasture within the enhancement site will be blanket sprayed, particularly in areas where kikuyu grass is present.

13.2 Revegetation planting

The site is to be planted with the aim of creating a dry slope and stream flat forest type habitats.

All open areas will be planted using early successional pioneer species, aimed at providing fast canopy closure across the site, mimicking natural primary succession and will be therefore heavy on the use of mānuka and kānuka, two indigenous species expected to colonise a disturbed site such as this.

The stream banks of the main perennial stream will be planted with indigenous sedges (Table 8) to provide spawning habitat for īnanga¹.

If any areas of indigenous tree canopy (e.g. tōtara) remain following the removal of the blackwoods, if deemed to provide an appropriate level of shade/cover by the consulting ecologist, these areas can be underplanted with mature phase species (Table 9) in year 1. However, most of these late species will be planted once an overall cover has been established using the species from Table 7.

Table 7: Species list for open planting areas

Species		Percent mix
<i>Coprosma robusta</i>	karamū	10
<i>Cordyline australis</i>	tī kōuka	10
<i>Kunzea robusta</i>	kānuka	25
<i>Leptospermum scoparium</i>	mānuka	45
<i>Melicytus ramiflorus</i>	māhoe	7
<i>Sophora microphylla</i>	kōwhai	3

¹ Sedges are to be planted above (close to) the 'standard' water level (i.e. non-flood levels) at a height to be partially covered by high tide flood waters. During floods, īnanga (native fish) lay their eggs in the bases of the flooded vegetation. These eggs hatch on a subsequent flood and the larvae move downstream to the sea, returning again at the juvenile stage (whitebait) to spread through the streams and wetlands.

Table 8: Species list for the perennial stream edge/banks running along the northwestern flats

Species		Percent mix
<i>Carex lessoniana</i>	rautahi	30
<i>Carex virgata</i>	pūrei	30
<i>Cordyline australis</i>	cabbage tree	10
<i>Cyperus ustulatus</i>	giant umbrella sedge	30

Table 9: Species list for understory planting in existing cover (if appropriate) and once early canopy has established (e.g. year 3)

Species		Percent mix
<i>Agathis australis</i>	kauri	20
<i>Beilschmiedia tarairi</i>	taraire	5
<i>Dacrycarpus dacrydioides</i>	kahikatea	20
<i>Dacrydium cupressinum</i>	rimu	10
<i>Melicytus ramiflorus</i>	māhoe	20
<i>Metrosideros robusta</i>	northern rātā	5
<i>Pennantia corymbosa</i>	kaikomako	5
<i>Prumnopitys taxifolia</i>	mātai	5
<i>Rhopalostylis sapida</i>	nīkau	10

All open planting (Table 7) is to be at one metre centres, using revegetation grade (e.g. 5cm tubes, root trainers etc. - but larger sizes can be used if desired).

All stream edge sedges (Table 8) are to be planted at 500mm centres on the stream banks, using revegetation grade (e.g. 5cm tubes, root trainers etc.)

All trees used for underplanting (Table 9) are to be in larger grades, a minimum size of pb3 or equivalent. These are to be widely spaced at 5 metre centres under existing vegetation cover.

Final plant numbers will be provided in the IEEPMP.

All plants are to be ecosourced from the Ōtamatea Ecological District (or if necessary due to supply issues, in consultation with the consulting ecologist – the Rodney ED (Northland Conservancy) from nurseries free from Argentine ants (*Linepithema humile*).

The plan will assess the need to add fertiliser and silica gel to the drier open planting areas.

Ongoing monitoring will be required with a 90% success rate required over a three-year period.

13.3 Animal pest control

The pest control plan will assess the effects of and target, possums, rats, mustelids and feral cats, rabbits and any other pest species deemed necessary.

Assessment of rabbit numbers will be undertaken and used as a trigger for the control based on the Modified McLean Scale <https://www.bionet.nz/assets/Uploads/Publications/A5-201211-Rabbitguide-print.pdf>.

Control will be done in a manner to reduce the impacts of animal pests to plants and wildlife, with the understanding that this is a small management area open to high/rapid reinvasion.