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Freshwater Habitat Assessment: Ruakaka Visitors Centre Site, SH1 – SH 15, Northland
November 2020

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Freshwater Habitat Assessment: Ruakaka Visitors Centre Site, SH1 – SH 15, Northland November 2020

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Cover Illustration: Drainage channel on proposed Ruakaka Visitors Centre development site

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1. INTRODUCTION

1.1 Scope

Ruakaka Developments Limited propose to develop the site at the intersection of the State Highway 1 and State Highway 15a, One Tree Point Road as a visitors centre. Bioresearches were requested to provide an ecological assessment the watercourse running through the site (Figure 1).

The request was to assess the flow path under the provisions of the Northland Regional Plan, and to provide the information to inform the consent, including an assessment of ecological effects of the proposed works, mitigation of adverse effects and an assessment of fish passage under State Highway 1.

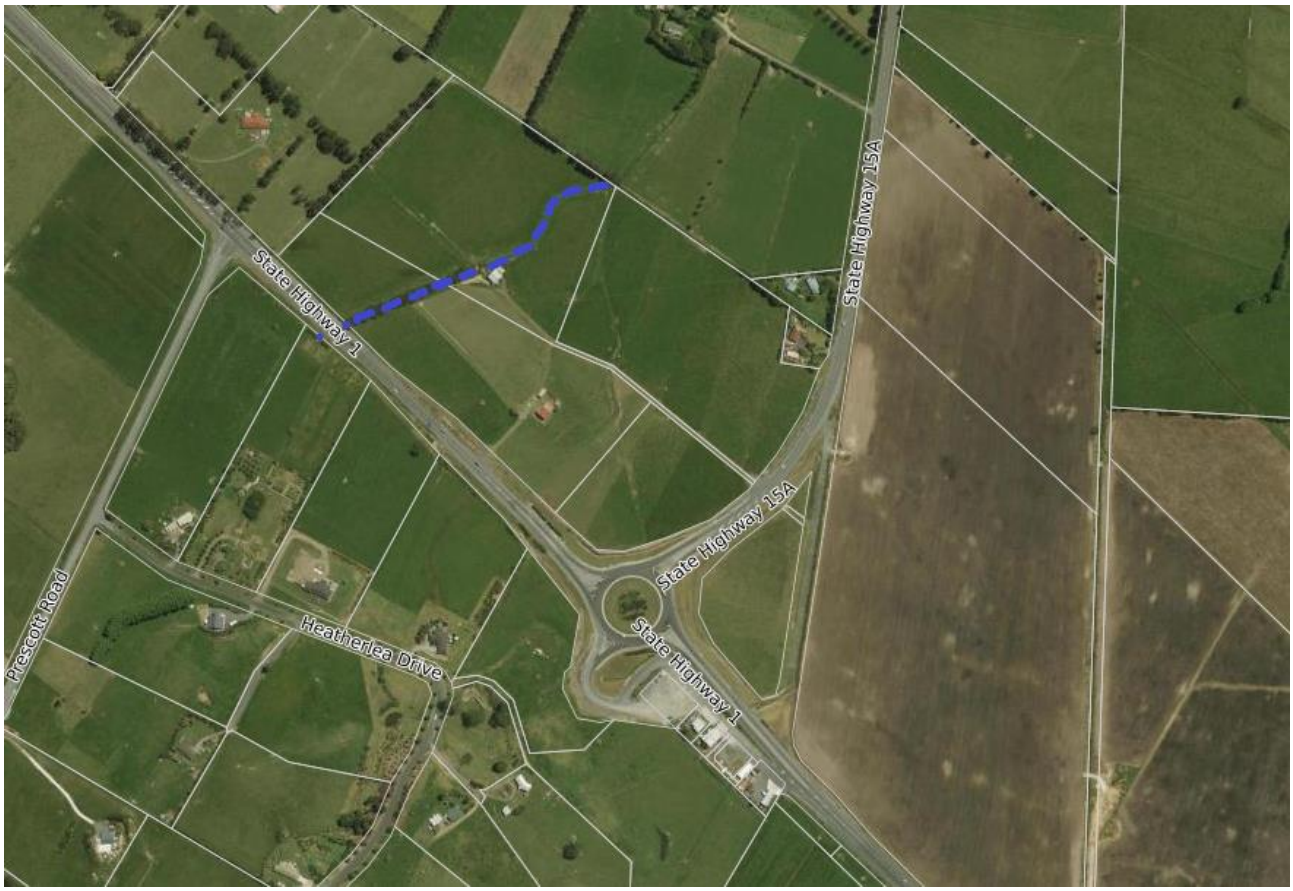

Figure 1. Site watercourse (blue dashed line)

1.2 Streamworks Proposal

In order to accommodate the additional impervious area from the development (which all sits to the south of the watercourse) Ruakaka Developments propose to provide swales, a dual purpose stormwater attenuation pond / rain garden around the northern corner of the parking area and enhance the stream by fencing from stock and restoring the riparian vegetation adjacent to the stream with native vegetation.

2. SURVEY METHODOLOGY

The site visit was undertaken by an experienced freshwater ecologist on 22 and 23 May 2020. The site assessments evaluated the overland flow path, the terrestrial vegetation, potential fauna habitats and values, and specifically native fish habitats and potential use by native fish. Eight baited Gee's minnow traps were placed in the outlet pool from the SH1 culvert, left overnight and retrieved the following morning.

Prior to the field surveys, a map of the site was created from Google Maps, NRC Maps and NZMS Topo Maps, which defined the overland flow path, the current infrastructure, the contours of the works area and any ecological overlays.

Guidelines for undertaking Ecological Impact Assessments have been published by the Environment Institute of Australia and New Zealand (EIANZ 2018)[1]. Chapter 5 of the Guidelines provides criteria for assigning value to habitat for assessment purposes. Ecological values have been assigned based on Table 1, adapted from Tables 5 and 6 of EIANZ 2018.

Table 1. Criteria for assigning value to habitat and species for assessment purposes, based on criteria set out in EIANZ 2018.

Value	Determining Factors
Very High	Nationally Threatened species found in the 'zone of influence' (ZOI) either permanently or seasonally. Area rates 'High' for at least three of the assessment matters of Representativeness, Rarity/distinctiveness, Diversity and Pattern, and Ecological Context. Likely to be nationally important and recognised as such.
High	Species listed as At Risk – Declining found in the ZOI either permanently or seasonally. Area rates 'High' for two of the assessment matters, and 'Moderate' and 'Low' for the remainder OR area rates 'High' for one of the assessment matters and 'Moderate' for the remainder. Likely to be regionally significant and recognised as such.
Moderate	Species listed as At Risk – Relict, Naturally Uncommon, Recovering found in the ZOI either permanently or seasonally; AND/OR Locally uncommon or distinctive species. Area rates 'High' for one of the assessment matters, 'Moderate' or 'Low' for the remainder OR area rates as 'Moderate' for at least two of the assessment matters and 'Low' or 'Very Low' for the remainder. Likely to be important at the level of the Ecological District.
Low	Nationally and locally common indigenous species. Area rates 'Low' or 'Very Low' for majority of assessment matters, and 'Moderate' for one. Limited ecological value other than as local habitat for tolerant native species.
Negligible	Exotic species including pests, species having recreational value. Area rates 'Very Low' for three assessment matters and 'Moderate', 'Low' or 'Very Low' for the remainder.

[1] EIANZ (2018) Ecological Impact Assessment (EcIA) guidelines for use in New Zealand terrestrial and freshwater ecosystems. 2nd edition. Environment Institute of Australia and New Zealand Inc.133pp

3. FRESHWATER HABITATS AND VALUES

3.1 Freshwater Habitats

The stream is a lower tributary to the Ruakaka River. From SH1 the stream flows north, parallel to SH15a (Port Marsden Highway) for 1.6km to the tidal reaches of Ruakaka River (Figure 1Figure 2).

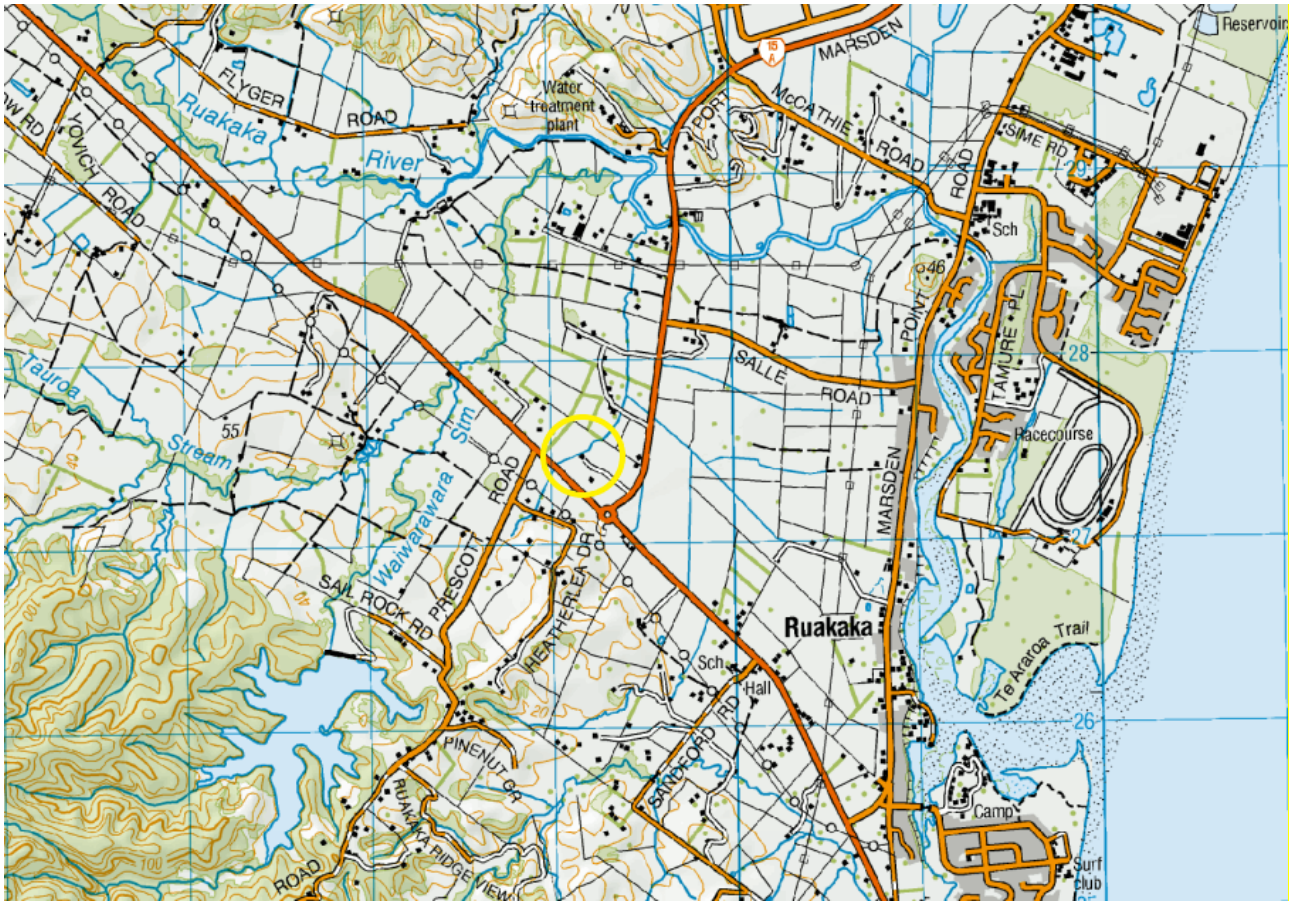

Figure 2. Location of site watercourse (yellow circle) and the Ruakaka River.

The ecological habitats associated with the flow path are the riparian vegetation, within 10m of the water course, and the stream bed habitats.

3.2 Riparian Vegetation and Flora

The riparian vegetation comprised grazed pasture grass, ungrazed pasture on the top of the banks, and a row of hedge trees.

Pasture was the dominant vegetation within the riparian zone. The ecological value of the pasture was negligible. Between SH1 and the cow shed, approximately 130m from the highway a single row of trees are planted in a row on the top of the true right bank (southern bank) adjacent to the fenceline. The trees are sheoaks (*Casuarina cunninghamiana)* and tree privet (*Ligustrum lucidum*), planted in a linear, alternating pattern of sheoaks then privet, with approximately 2m spacing between the trees (with rare gaps where a tree has died).

Vegetation clearance *within 10 metres of the bed of an intermittently flowing river, and any associated damming and diversion of stormwater and discharge of stormwater onto or into land where it may enter water*, has a permitted baseline under C8.4.1 of the Regional Plan, outside of that baseline, clearances that are not a permitted activity in section C.8.4 of the NR Plan are discretionary activities. The restrictions on vegetation clearance does not include clearing:

1) hedges and amenity plants, or
2) vegetation along fences and around dams and ponds, or
3) vegetation around network utilities, or
4) vegetation alongside roads and tracks, or
5) vegetation that is infected by an unwanted organism as declared by the Ministry of Primary Industries Chief Technical Officer or an emergency declared by the Minister under the Biosecurity Act 1993

As this linear row of vegetation is amenity vegetation planted as a hedge along a fence line, the restriction on clearance does not apply. Although the line of trees has negligible value and removal is permitted, it is likely to used by common native birds for nesting and roosting.

3.3 Freshwater Habitats

The watercourse through the site was classified as an intermittently flowing river or stream under the criteria of the Northland Regional Plan.

An intermittent river or stream is naturally dry at certain times of the year and has two or more of five listed characteristics. The five characteristics as they relate to the watercourse on the project site are listed and applied in Table 2.

Table 2. Stream classification characteristics of site watercourse (NRC Characteristics).

	NRC Characteristics	Yes/No - discussion
1	it has natural pools	No – only pools were scour pools associated with culvert inlets and outlets.
2	it has a well-defined channel, such that the bed and banks can be distinguished	Yes – clear bed and banks, although clearly modified system, straightened and deepened for more than 60 years – Appendix 1.
3	it contains surface water more than 48 hours after a rain event which results in river flow	Indeterminate
4	rooted terrestrial vegetation is not established across the entire cross-sectional width of the channel	Yes
5	it appears as a blue line on topographical maps at 1:50,000 scale	Yes – Appendix 1
	Conclusion	**3/5, therefore INTERMITTENT STREAM**

The aquatic ecological value of the flow path at the time of the site visit was negligible. With the exception of a small pool at the outlet of the SH1 culvert the watercourse was dry for the 300m to the eastern property

boundary. The stream path had been clearly modified and has been maintained for stormwater / flood control with a straightened channel, wide flat base and uniform banks (Photo 1).

Although the channel was dry, exotic plants that are commonly found in damp areas were present throughout the flow path. Water pepper (*Persicaria hydropiper*) dominated with occasional patches of Mercer grass (*Paspalum distichum*) and water celery (*Apium nodiflorum*). From approximately 10m downstream of SH1 to the end of the line of trees on the true right bank water pepper dominated the stream (Photo 2).

The substrate was soft, silt and clay with little wood or harder debris that would supply habitat for aquatic macrofauna. There were no undercut banks, large woody debris or pools that would provide habitat for native freshwater fish.

The flattened base of the channel averaged 3m wide with a bank to bank width of 5m.

An access bridge (Photo 3) and a culvert was present in the flow path. The culvert was approximately 10m long, 1.2m internal diameter and dry, with variable substrate throughout the length of the pipe. The dried marks of previous water levels ranged between 0.27 depth (1.06m width) and 0.4m depth (1.16m width) within the culvert (Photo 4). Upstream, the ground level rose about 0.3m above the culvert in a wide shallow swale approximately 4m wide, with 1.5m banks and 5 -6m width at the top of the banks. Water pepper formed a monoculture in the base of the dry flow path (Photo 2, Photo 5).

Near the SH1 boundary fence a 10m long by 2m wide culvert outlet pool was present. There was no flow into or out of the pool. The top of the water level extended past the boundary fence and roadside drains to approximately 4m into the SH1 culvert. Duckweed (*Lemna minor*) and azolla (*Azolla pinnata*) covered the water surface in distinct zones, separated by kikuyu covered fencing (Photo 6).

The current aquatic ecological value of the stream is negligible, primarily due to the lack of water. During periods of flow the aquatic ecological value would be low, as the channel has been modified, straightened, widened and deepened to provide for efficient flow and flood management; there is no hydrologic heterogeneity with no deep pools, meanders, undercuts, boulders or large wood to relive the uniform run. The aquatic habitat for macroinvertebrates is temporary, limited to macrophytes in a soft bottom habitat, with no cobble, rocky substrate or woody debris providing for quality macroinvertebrate habitat. The shading to the stream is minimal through most of the flow path, receiving no effective shading with the exception of a section of the upper flow path receiving low to moderate shading from trees on the southern bank.

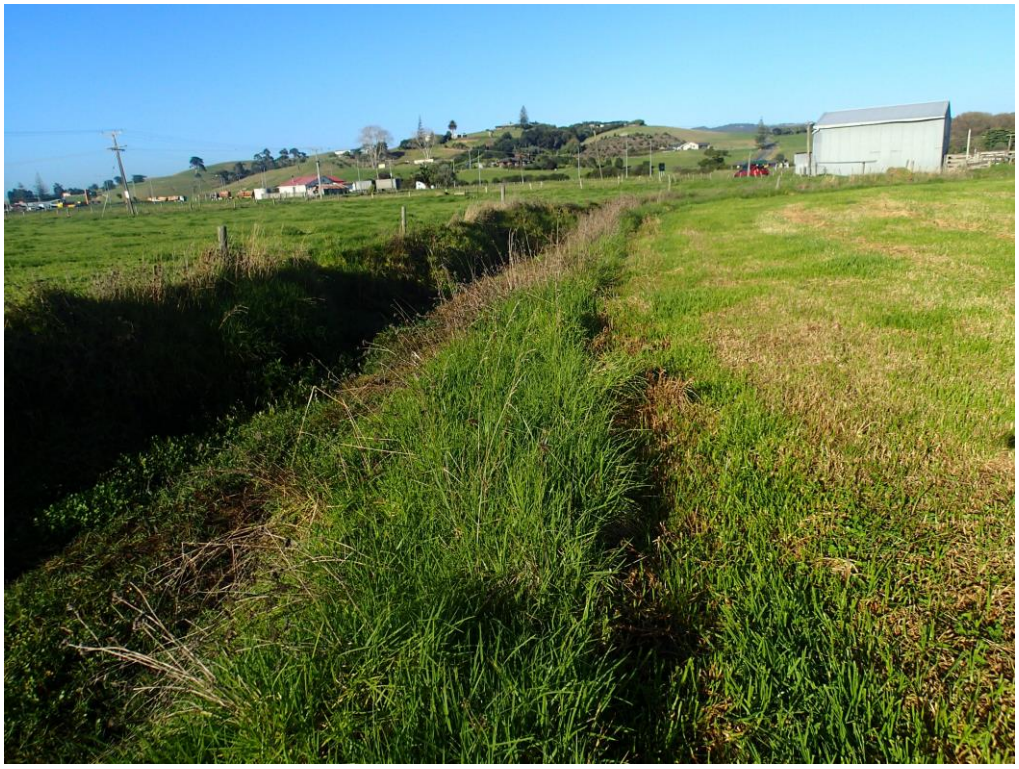

Photo 1. Straightened and deepened watercourse view upstream

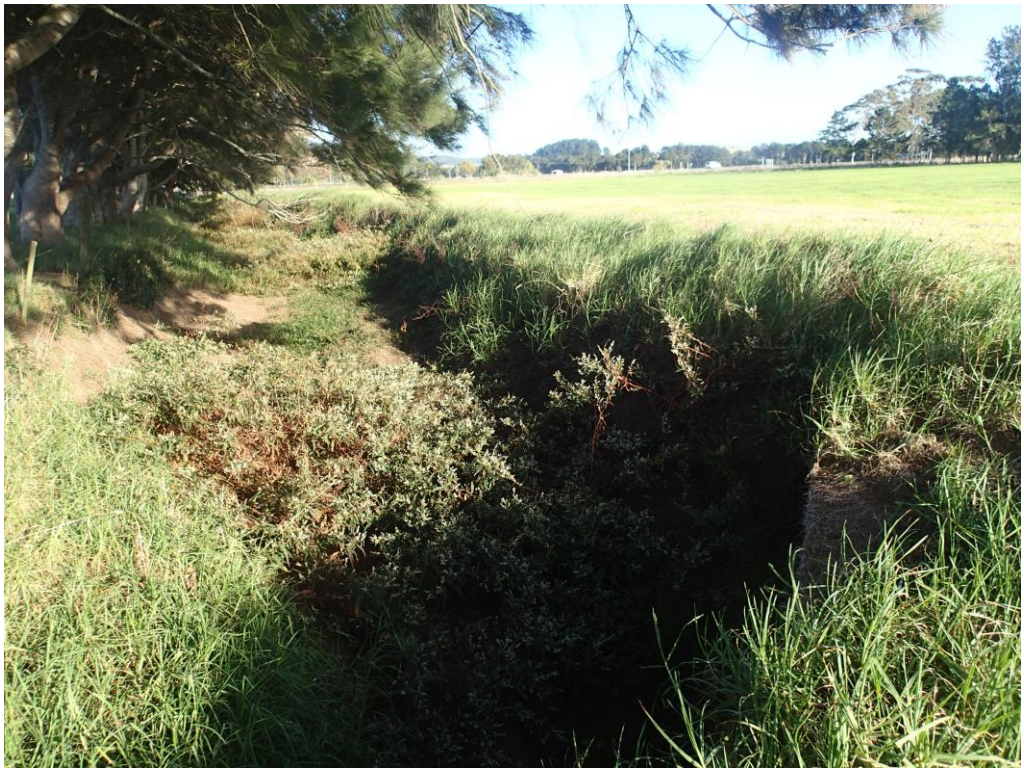

Photo 2. Wide flat bottomed straightened stream bed with water pepper.

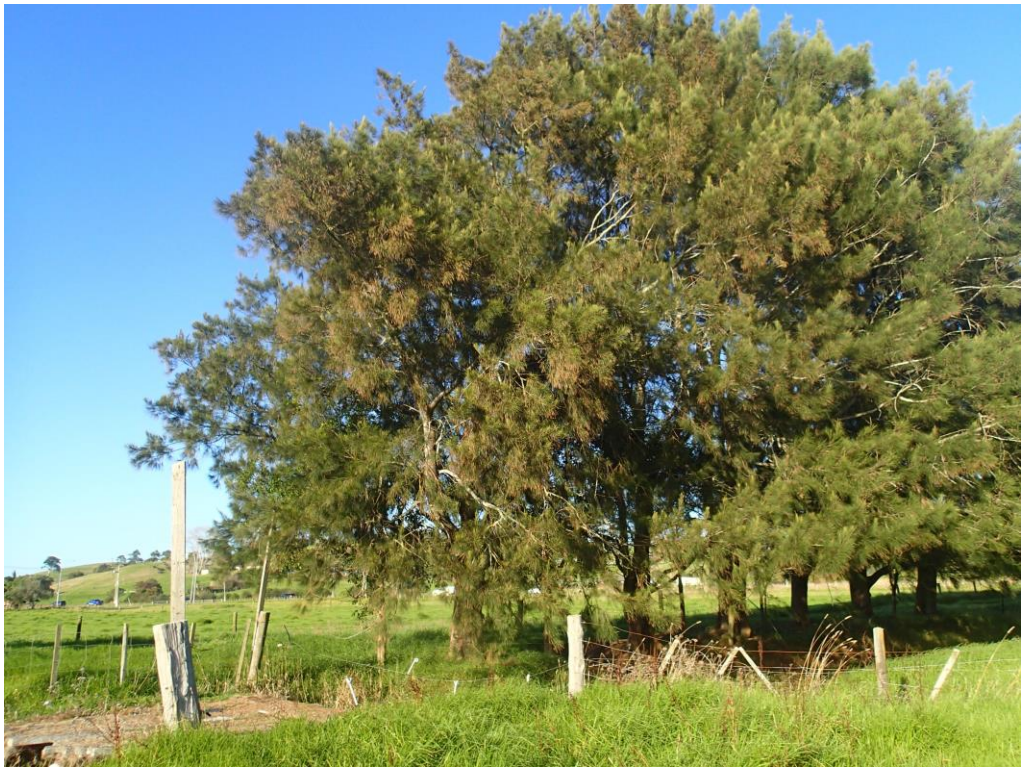

Photo 3. Sheoaks and access bridge with channel and base of trees.

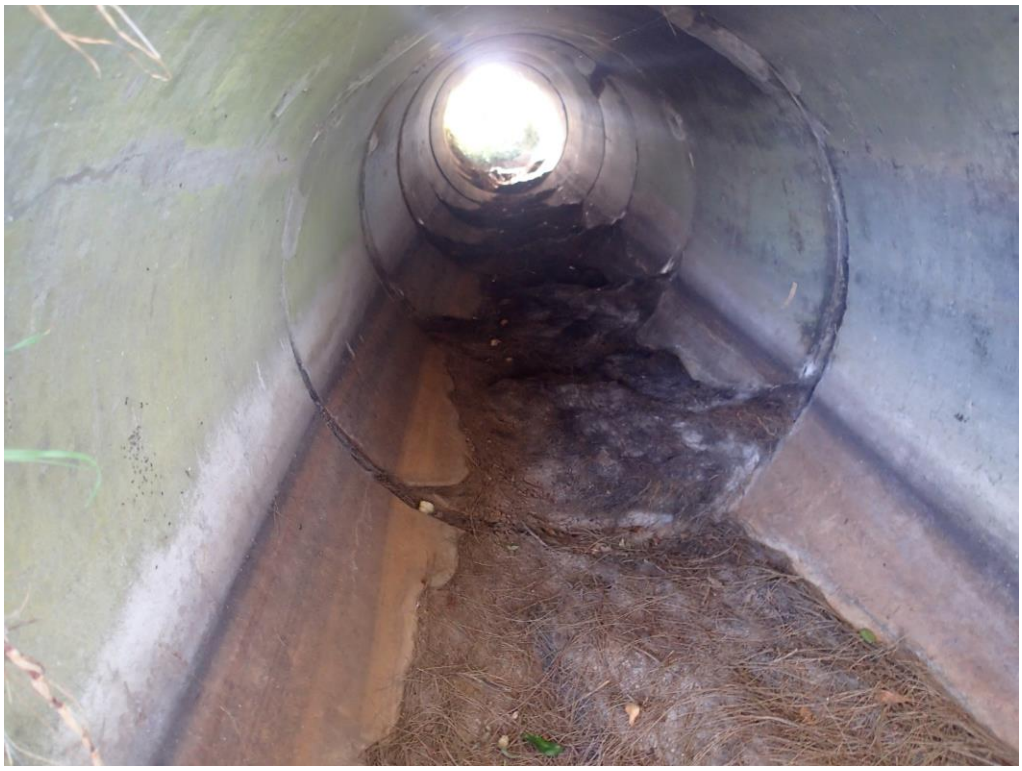

Photo 4. Culvert with natural substrate in base

Photo 5. Dry stream bed covered by sheoak needles under the water pepper

Photo 6. SH1 culvert outlet pool with pond weed in foreground transitioning to azolla. Pool divided by kikuyu covered fence wire at the boundary, partially obscuring culvert in background.

3.4 Native freshwater fish and fish habitat

Native fish habitat was limited to the outlet pool from the SH1 culvert. Eight Gee's minnow traps were placed in the pool on the property and within the roadside reserve overnight, specifically to target Northland mudfish. One shortfin eel, between 500-600mm long was observed in the outlet pool and disappeared into the culvert when setting the traps, and observed again when retrieving the traps. In total, nine shortfin eels, comprising the one adult and eight juveniles were caught or observed. The eight juvenile shortfin eels caught in the traps, ranged in size between 150mm and 300mm in length. Seven of the eels were caught in the road side reserve traps and only one eel, the smallest was caught in the Project Area traps. No other native fish species were caught or observed, and it is likely that any Galaxids that were previously present would have been eaten considering the small size of the pool, and predatory feeding habits of shortfin eels.

A search of NIWAs Freshwater Fish Database, returned 55 native fish records from the Ruakaka River and catchment, listing seven native freshwater fish (Table 3).

Table 3. Native Fish Species Recorded in the Wider Ruakaka River Catchment

Common name	Species name	Conservation Status (Dunn *et al*, 2018)	Habitat present in Project Area
Shortfin eel	*Anguilla australis*	Not threatened	Yes - very limited
Longfin eel	*Anguilla dieffenbachii*	At risk - declining	No
Inanga	*Galaxias maculatus*	At risk - declining	No
Banded kōkopu	*Galaxias fasciatus*	Not threatened	No
Shortjaw kōkopu	*Galaxias postvectis*	Threatened – nationally vulnerable	No
Common bully	*Gobiomorphus cotidianus*	Not threatened	No
Redfin bully	*Gobiomorphus huttoni*	Not threatened	No

Photo 7. Juvenile shortfin eels in roadside reserve pool

There was very little habitat for freshwater fish and it is likely that for long periods the watercourse retains no or minimal water. Due to the low quality habitat, lack of deep pools and intermittent nature of the stream, it is expected that freshwater fish would only use the reach on an intermittent basis only.

The on-site culvert and farm bridge do not provide a barrier to fish passage.

4. ASSESSMENT OF EFFECTS AND RECOMMENDATONS

Proposed works in and adjacent to the stream are:

- removing the existing culvert in the watercourse approximately 100m downstream of SH1;
- adding a road crossing culvert in the main stream (for access to the site for southbound vehicles);
- riparian planting of the stream banks; and
- fencing to exclude stock access.

The ecological effects of the proposed works on the stream are divided into construction effects and operational effects. The primary construction activities that have the potential for adverse ecological effects are related to sedimentation and habitat loss. The primary operational effects relate to maintenance of aquatic habitat and water quality.

Although the aquatic ecological values of the stream were assessed as low, sedimentation resulting from works removing existing structures associated with the watercourse and from construction activities on the wider development of the site have the potential to adversely affect downstream habitats. Increased fine sediment input to aquatic habitats can reduce visual clarity, clog respiratory structures of animals (such as the gills of fish), degrade benthic habitats and may result in burial and suffocation of aquatic biota (NIWA, 2015).

During construction strict sediment control measures and management will be required to mitigate the potential adverse effects on downstream habitats. In addition to the engineered measures (sediment control pond, silt fencing) in the wider site, additional measures will need to be taken in the vicinity of the stream. Timing and staging is the primary management control. If streamworks were staged during summer or autumn, when the stream was dry or mostly dry, then the staged section could be worked and immediately stabilised, mitigating the potential for sedimentation in the downstream watercourse. Hydroseeding within a geo-binder or replanting within a biodegradable fibre matting allow for stabilisation while allowing time for the cleared areas to revegetate.

There were no significant aquatic habitats within the stream system. The ecological effect of the temporary loss of the exotic pest plants, willow weed and water celery are assessed as negligible.

The previous modifications have widened the channel base which reduces the length of time aquatic habitat is present. The site development provides an opportunity to mitigate this effect with the inclusion of a low flow channel in the base of the wider channel to allow for longer retention of aquatic habitat. Additional aquatic ecological benefits can be gained with the addition of meander to the low flow channel (within the existing high flow channel) and the addition of plants or trees in and adjacent to the channel to increase hydrologic variability.

The instream meander can be created both with the use vegetation, and a small amount of excavation. The introduction or planting of plants in rivers is a permitted activity under the Proposed Regional Plan for Northland[2] (the Regional Plan), specifically Section C.2.1.1, and excavation of material from rivers is a

[2] Proposed Regional Plan for Northland Appeals Version – August 2020 issued by Northland Regional Council.

permitted activity under Section C.2.1.2 of the Regional Plan Providing both activities meet their required standards, no consents should be required.

The low flow channel would only require an approximate 0.3m wide, by 0.15 - 0.2m deep (maximum) excavation, within the main channel including a long meander (e.g. two bends within a 20m length). The emphasis on the meander is to provide variation in form. The use of *Carex* species in patches within the main channel and occasional trees that prefer damp habitats, such as kahikatea (*Dacrycarpus dacrydioides*) or pukatea (*Laurelia novae-zelandiae*), on the outer edges of the main channel next to the banks, would provide additional hydrologic variation and shading to the immediate channel. Native *Carex* species provide the ecological benefits of shading, leafy inputs, filtration and velocity control, without major effects during high flows, as they flatten down with the increase in water and velocity, springing back when the water levels recede.

The storm water from the site is proposed to be treated prior to discharge to the stream. The treatment will also provide detention and retention of a significant quantity of the storm water off the site, which will mitigate the effects of flows on the stream. The potential adverse effects of the storm water on water quality of the stream are expected to be less than minor with the proposed treatment, retention and detention. The treatment combined with the proposed fencing and riparian planting of the stream is expected to result in an improvement in the quality of water entering the stream.

The riparian planting adjacent to the stream can provide significant ecological benefits to indigenous fauna in addition to stream function. In addition to rushes and flaxes, inclusion of some or all of the following tree and shrub species (Table 4) will provide for food and habitat for native fauna, as well as variation in form and tiers appropriate to Northland streams.

Table 4. Native trees and shrubs recommended that provide attractive food for native birds and fauna

Common name/s	Scientific name	Food source
Kahikatea / white pine	*Dacrycarpus dacrydioides*	fruit and seeds
Puriri	*Vitex lucens*	Nectar, fruit, and seeds
Kōwhai	*Sophora micophylla*	Nectar
Taraire	*Beilschmiedia tarairi*	Fruit and seeds
Māhoe / whitey wood	*Melicytus ramiflorus*	Fruit and seeds
Māpou	*Myrsine australis*	Fruit and seeds
Karamū	*Coprosma robusta*	Fruit and seeds
Putaputawētā / marble leaf	*Carpodetus serratus*	Fruit and seeds

5. REFERENCES

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Northland Regional Council

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https://www.nrc.govt.nz/media/4i2jloyu/proposed-regional-plan-appeals-version-august-2020.pdf

6. APPENDICES

6.1 Appendix 1. Watercourse – 1961 & NZMS50

Straightened flow path clear in March 1961 (Source: Retrolense)

Site tributary appears as a river on NZ Topographical Maps (1: 50,000)