ENCLOSURE G

Restoration Options Whirinaki Drain

EAM Environmental Consultants

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RESTORATION OPTIONS
Whirinaki Drain
Whirinaki

PROJECT NO. EAM2282 REP- 02

PREPARED FOR

EVANS FAMILY TRUST

PREPARED BY

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TABLE OF CONTENTS

1 INTRODUCTION

EAM NZ Limited (EAM) has been engaged by the Evans Family Trust (EFT) to provide guidance on any restoration opportunities for the Whirinaki Drain as part of the proposed subdivision application for their land.

Whirinaki drain arises on the hillslopes behind the PANPAC mill bisecting the property from the corner of Northshore Road and SH2 to the Esk Lagoon. EFT are proposing to develop a bare paddock at the site to provide for new housing (Figure 1 in Appendix A) which is adjoining the Whirinaki drain.

The proposal involves establishing an urban style subdivision at the site on the seaward portion and retaining the landward portion for horticultural uses. Acknowledging that this land use change may have an impact on the current values with the Whirinaki Drain, options to firstly mitigate any negative impact and ultimately provide a net positive ecological outcome for the site are proposed.

This report is the second at this site and relates more directly to habitat enhancement and creation. EAM 2282 – REP -01 should be referred to for details of the site investigation.

2 PROJECT GOALS AND OBJECTIVES

2.1 GOALS

- Create an ecological and amenity asset of the Whirinaki drain whilst still providing for the drain's primary function of conveying flows from the wider catchment and stormwater discharges from the proposed development.
- Fulfil resource consent requirements to enable the proposed subdivision to proceed.
- Protect and enhance the ecological integrity of the drain by implementing the management actions identified within this restoration plan.

2.2 OBJECTIVES

- Identify the current ecological values and threats to species and habitats within the site and implement management actions to enhance the values and manage the threats on an ongoing basis.
- Work with the landscape architects to design planting plans to enable an ecologically viable stream environment from the current drain.

3 SITE DETAILS

3.1 SOILS

The site is located on young alluvial soil, predominantly silts likely deposited by the nearby Esk river. No areas of pugging or poor drainage were noted in the surrounding paddocks and the landowner reports the site as being free draining.

3.2 SPECIAL FEATURES OF THE SITE

The drain discharges into the Esk River lagoon which holds moderately high ecological values for both fish and birds. The lagoon has highly modified edges constraining its function and little native

vegetation. It is often closed by a gravel bar forming with easterly swells and low flows form the river.

Nukurangi Pa adjoins the drain at its seaward end and is currently covered in large pine and macrocarpa trees with an understory of weeds and rank grass. There is potential to incorporate any planting in the drain corridor with plantings at the Pa to increase the habitat provision. This however would need the input of an archaeologist before any activity was undertaken. Similar to the situation with the willow tree, although none of the trees in the pa are indigenous species they provide valuable landscape features for wildlife.

FIGURE 1: SITE LOCATION

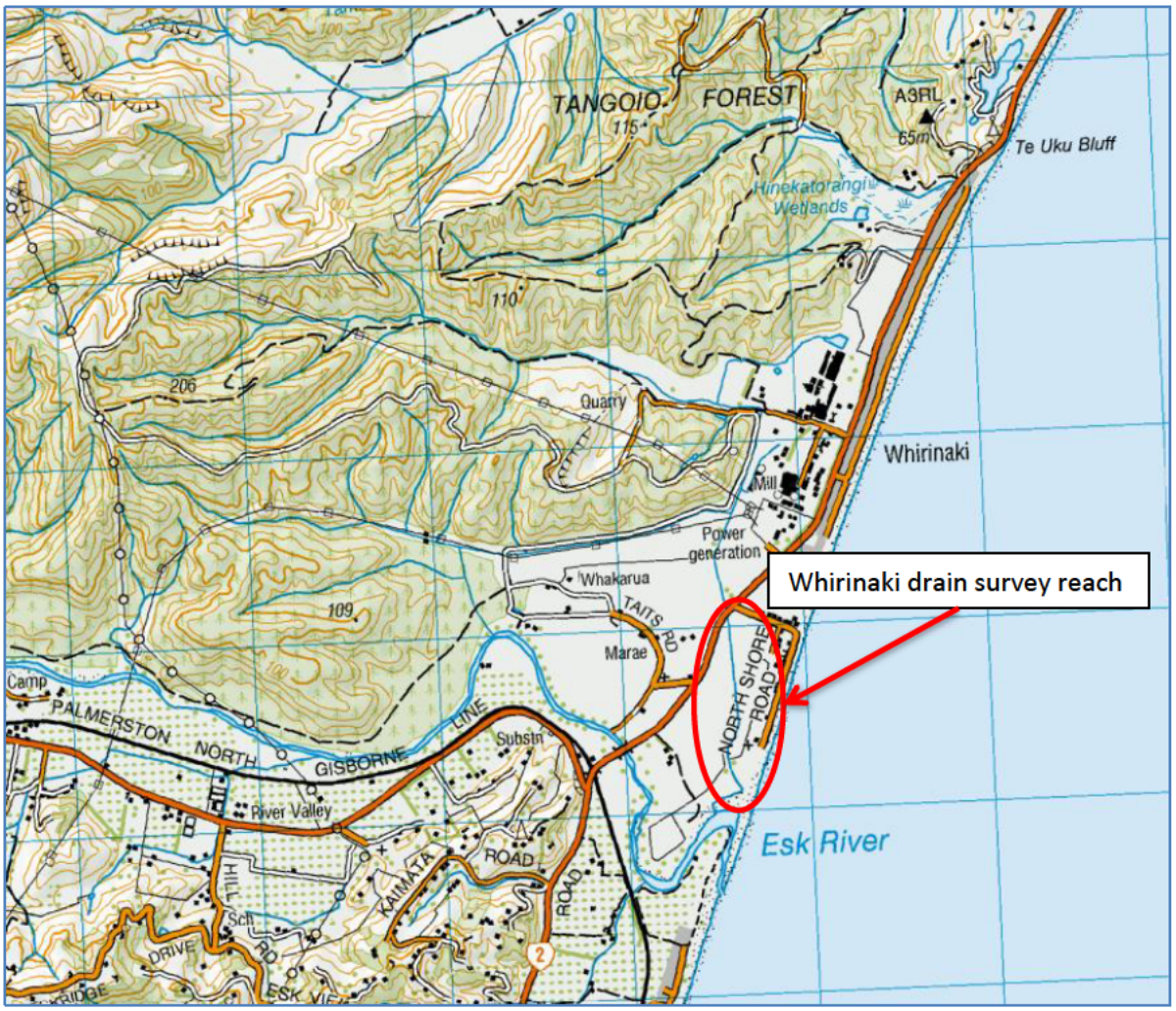


FIGURE 2: AERIAL IMAGE SHOWING CRITICAL SITES

4 FINDINGS

The drain receives flows from the wider catchment which has a mix of pine forestry, industrial and agricultural and horticultural uses. Some storm water discharges are already present in the lower reaches of the drain. Additional flows will come via the proposed subdivision as stormwater flows. The design for managing stormwater flows has not been finalised but vegetated swales and a vegetation detention dam is likely.

The drain has a tidal influence for much of the survey reach. This tidal flow is a controlling factor for species establishment for much of this reach. The eventual amount and scale of tidal influence is not yet known but is likely to increase as artificial barriers in the downstream reaches are modified or removed.

The water flow within the drain is strongly tied to rainfall events with only a minimal base flow at periods of low flow and often tending toward dry during low rainfall periods. Tidal flooding of the drain occurs during high tides and flows were noted during the neap tide just breaching the artificial barriers. The entire survey site can be considered as an artificial structure created to

provide drainage of the upstream flat land. A farm bridge suitable for vehicle use crosses the drain approximately halfway down the survey reach.

The drain is primarily serving the purpose for which it was created, that being the efficient conveyance of water away from the area now occupied by PANPAC and the adjoining orchards. It is therefore difficult to modify the drain to replicate a naturally functioning estuarine stream without compromising the drainage capacity or significant recontouring of the land. The drain form as it is, is inconsistent with what would typically have been present at the lagoon edge. The drain is tidally influenced extending inland at least as far as the SH2 culvert. Due to the artificially incised stream and steep banks the saltmarsh which would have been representative of this zone in the lagoon is essentially non-existent.

The site has been so heavily modified that determining suitable restoration has been problematic. However, once enhanced the drain may provide a valuable extension to the existing habitat as well as re-introducing a long-departed forest type to the area. The site is currently a blank slate regarding indigenous woody vegetation with the exception of a few taupata shrubs. It is rare that opportunities to create this type of habitat present themselves in the coastal areas of Hawkes Bay.

Working within the constraints of form and function of the drain it is however possible to recreate a forest type habitat along the length of the drain to the lower weir/ford. A lowland podocarp hardwood forest type similar to that present at the Waipatiki Scenic Reserve could be created. The incised nature of the drain will allow species which would typically be sited further inland to be placed very close to the lagoon edge and along the length of the drain. Species such as Kahikatea, *Dacrycarpus dacrydioides,* Pukatea, *Laurelia novae-zelandiae,* and Nikau, *Rhopalostylis sapida* could be established throughout the length on the drain banks and any reserve areas which may be created. At the water's edge species such as Saltmarsh ribbon wood *Plagianthus divaricatus* and harakeke *Phormium tenax* could be incorporated into the existing rushland.

Cessation of the mechanical control along the length of the drain will be needed to establish any indigenous tree cover and this will aid the re-establishment of the rush and sedge growths throughout the length of the drain. The eventual canopy closure will reduce this rush and sedge growth in the medium term and will then eventually add coarse wood debris into the water course in the longer term. The addition of coarse woody debris will create instream habitat similar to that currently provided by the individual willow tree. Fallen branches will add bed diversity and nutrients into the system necessary for recreating a functioning system.

The site currently supports large trees surrounding the Nukurangi Pa archaeological site at the drain's discharge location into the Esk lagoon, therefore the restoration recommendation has good potential to succeed based on the health of these trees. Forested banks should aid in the management of the currently eroding banks and provide some terrestrial biodiversity values currently lacking. Once established the ford/weir structures, which were in part installed to reduce the scour of the bed and banks, could be progressively removed as these establish which will improve connectivity especially in relation to the migratory galaxiid species.

These restoration options will need to be discussed with the HBRC works team to ensure the drainage functions of the drain are not overly compromised.

There is a limited presence of pest plant species and targeted control of these species deemed as potentially problematic will enhance the biodiversity value of the site and facilitate the natural regeneration of indigenous plant species.

Overall, the proposed restoration work aims to increase the extent of indigenous vegetation and habitats, and improve indigenous biodiversity in the area, which will increase the available habitat for indigenous wetland fauna and indigenous fish species.

5 RESTORATION OPPORTUNITIES

5.1 HYDROLOGY

The drain is a linear, mechanically created form with little flow diversity. The banks are uniform battered slopes with a low terrace adjoining the flow in the upper section. The lower reach, effectively below the farm access bridge of the site, is less uniform with steeper banks and often some bank collapse and a discontinuous lower terrace. Two weir/ford structures impact the flow of both freshwater and tidal flows.

ACTIONS

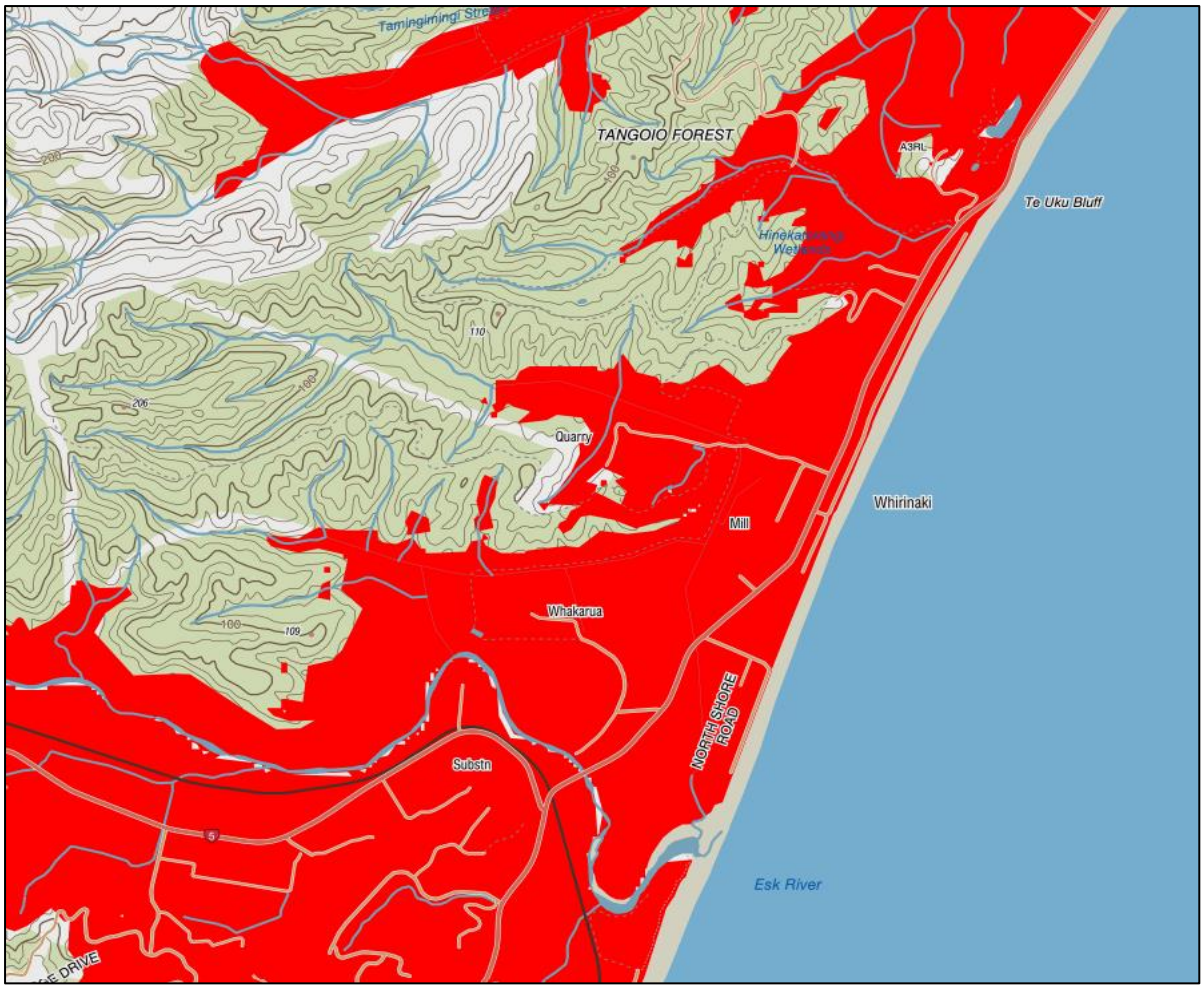
- Remove weir/ford structures, monitor for erosion issues and address where undesirable.
- Some recontouring of the drain profile should be expected as it establishes a more natural form.
- Understand the drainage function requirements from the relevant local authority and if appropriate incorporate some sinuosity into the drain.

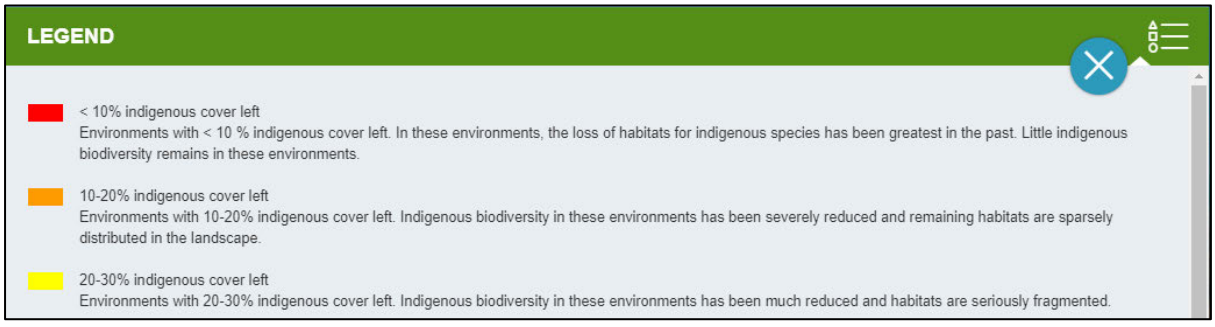
5.2 TERRESTRIAL VEGETATION

No indigenous woody vegetation other than young Taupata growing in the upper bank edges was found. Weeds are a major potential issue. Due to the proximity of remnant forests in the Waihua Ecological District (ED), (White Pine Bush, and Waipatiki Scenic Reserve) and the paucity of any remnants suitable for this proposal it is considered appropriate to utilise the Waihua ED forests as references and as potential seed sources. This is not ideal but can be explained when considering the lack of remnant vegetation as depicted in figure 3. As the proposed area to be planted will be in part amenity planting mindful of maintaining views, a final plant layout has not been attempted at this stage. This layout will be undertaken in consultation with the landscape architects as the proposal develops.

The timing and methods used to control pest plants will be critical to ensure potential impacts on existing indigenous species are minimised and there is no inappropriate discharge of chemicals into the waterway, while at the same time ensuring effective pest plant control. Care will also need to be taken in the selection and application of herbicides to ensure that there are no ecotoxic effects to non-target plants and fauna.

FIGURE 3: THREATENED ENVIRONMENT CLASSIFICATION



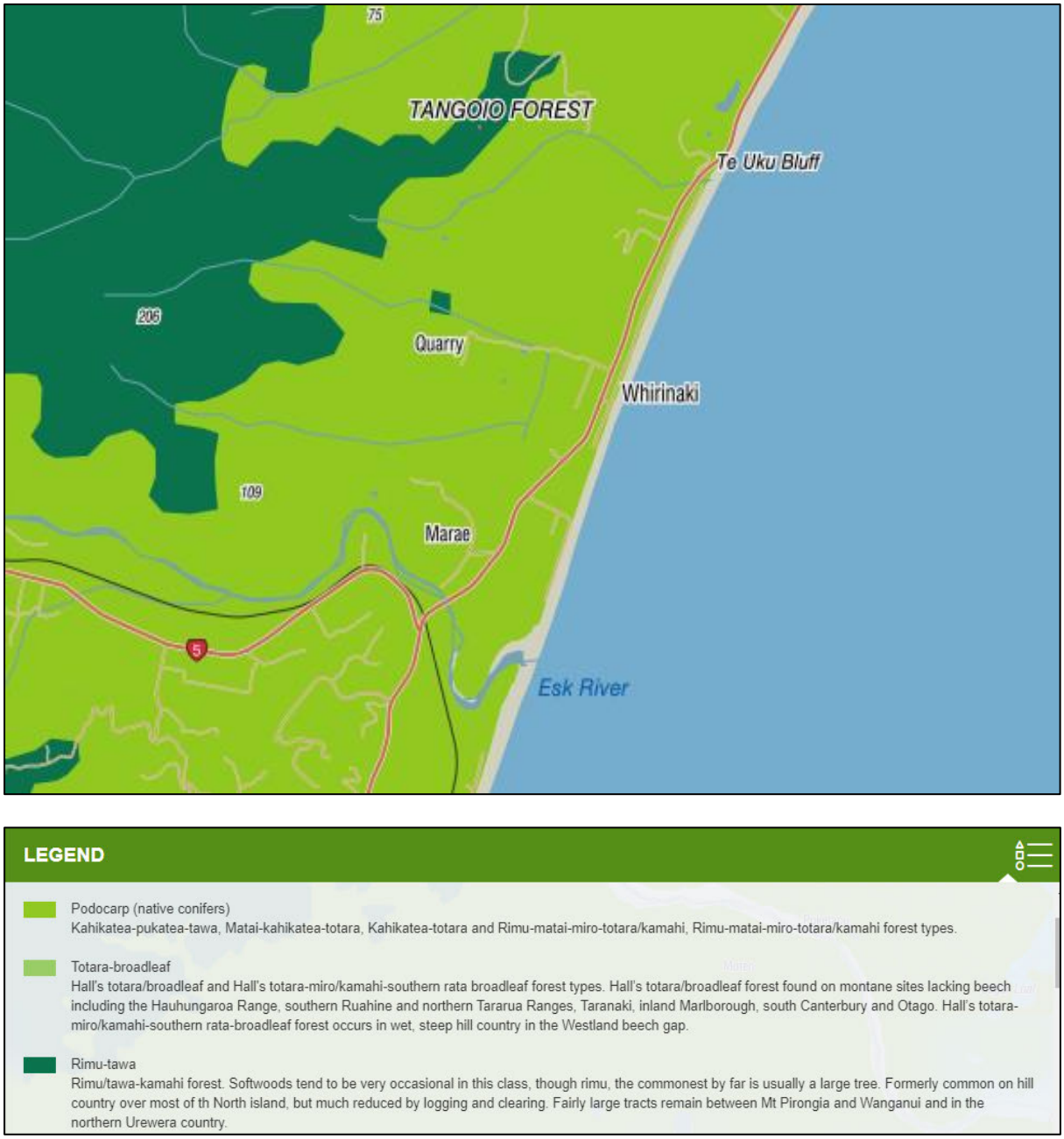


[Threatened Environment Classification » Maps » Our Environment (scinfo.org.nz)]

ACTIONS

- Plant eco-sourced Kahikatea dominant copses along the drain length.
- Include Pukatea and Nikau as desirable amenity species (present in the nearby Waihua Ecological District. See figure 4 Land Atlas of New Zealand Potential Natural Vegetation Map.
- Create stream shade as soon as possible.
- No planting on the lower terrace areas that adjoin the flow is intended as these will be readily colonised by the existing rush and reed species.
- Planting should be undertaken during late spring or autumn to minimise establishment losses.
- The large willow should be left in situ and eventually poisoned using the drill and fill technique. This will minimise disturbance and habitat loss for several years before other plants are able to establish.
- Control of weeds needs to be priority especially Ivy, *Hedera helix* and Chinese Windmill palm, *Trachycarpus fortunei* seedlings. New willow growths will need to be eliminated as part of the problem weed control.
- Spraying herbicide in riparian and wetland areas should only be undertaken during low tide.
- Selective herbicides should be used to minimise non-target plant losses.
- Operators should be suitably qualified, i.e. Growsafe, to ensure correct procedures are used to minimise damage.

FIGURE 4: LAND ATLAS OF NEW ZEALAND POTENTIAL NATURAL VEGETATION MAP



5.3 AQUATIC VEGETATION

Several indigenous sedge, rush and reed species are present in the inundation zone but green filamentous algae are the only submerged species present. Common aquatic herbs are present above the tidal inundation zone.

ACTIONS

- Active planting is not required, it is preferable to allow sedges, rushes and reeds to colonise the site.
- Encourage shading over the stream to minimise algal growths.

5.4 FISH

Very poor fish habitat is present in the survey reach. A single Longfin eel was found where the large willow tree provided overhead and instream habitat. The weir/ford structures will be creating a partial barrier to fish passage. Removal of vegetation along the drain length is impacting potential habitat.

ACTIONS

- Remove fish passage barriers.
- Increase the amount of instream habitat diversity with hardwood logs keyed into the banks.
- Riparian planting to eventually add coarse woody debris, terrestrial food sources and provide shading.

5.5 WHITEBAIT SPAWNING

No spawning was observed during the survey, however, this is potentially a suitable site.

ACTIONS

- Avoid any disturbance during spawning periods of late Summer and Autumn.
- Maintain vegetation cover on the banks.
- Consider predator control throughout the length of the drain to prevent mice eating eggs if spawning sites are found.

5.6 AVIFAUNA

Few birds were noted in the drain corridor during the survey. The lone willow appears to provide a popular roost site as evidenced by the bird distributed seedling beneath the canopy. Common small passerines such as waxeyes and sparrows were observed using the willow as perches before landing on partially submerged branches to drink from the drain.

Common wetland species Pukeko, Australasian harrier/Kahu and Grey Heron, were observed in the drain corridor.

ACTIONS

- Do not remove the willow until some other woody vegetation is established. Preferably kill by the drill and fill technique to maintain at least the architecture of the tree for several years until other trees and shrubs establish.
- Maintain vegetation cover on the banks.
- Create habitat through targeted planting of bird supporting trees in the drain corridor.
- Consider predator control throughout the length of the drain to increase nesting success and minimise disturbance of feeding and resting birds.

5.7 INVERTEBRATES

Not specifically searched for in the initial survey and very little habitat is presently available for them.

ACTIONS

- Create habitat through targeted planting of lizard supporting vegetation in the drain corridor.
- Maintain vegetation cover on the banks.
- Consider predator control throughout the length of the drain to reduce predator numbers.

5.8 HERPTOFAUNA

None noted in the drain corridor but potentially present at low numbers.

ACTIONS

- Create habitat through targeted planting of lizard supporting vegetation in the drain corridor.
- Maintain vegetation cover on the banks.
- Consider predator control throughout the length of the drain to reduce predator numbers.

5.9 REVIEW AND REPORTING

Regular monitoring of the site should be undertaken to determine if restoration actions are effective and to inform future management decisions. Site inspections should be undertaken six-monthly following initial restoration activities. If a requirement to report under a resource consent is stipulated, a simple monitoring system of photopoints should be established to monitor changes in vegetation structure and composition over time. Photopoints should be installed at appropriate locations prior to the commencement of any physical works and should be rephotographed annually for the first five years, after which time monitoring and photopoint frequency should be reassessed.

An annual report can be provided detailing the progress of restoration works undertaken, any potential future threats or limitations to the planned restoration works, and future restoration management requirements including; regular monitoring of the indigenous plant species and hydrology to determine regeneration success of indigenous species, and regular general maintenance, and follow-up control of any pest plant species that may establish.

APPENDIX A - SITE PHOTOS

View downstream from the SH2 culvert. Raupo in the foreground true right is replaced by more salt tolerant species after approximately 20m.

SH2 culvert and small growth of Raupo. This is likely to be the limit of the tidal influence.

Upstream of the farm bridge the channel is wider with low velocity flows, filled with fine sediments and very little habitat provision.

The drain narrows beneath the farm bridge. The increased velocity has flushed some of the fine sediments from this section and exposed coarse woody debris and cobbles.

Good riparian cover on the true right of Whirinaki Drain from the lone willow providing shading and instream habitat.

Bank slumping on the true left of the Whirinaki Drain.

Landuse adjoining the Whirinaki Drain. Note the lack of any indigenous terrestrial habitat.

Lower Weir/Ford at full tide. Note the shallow depth of water providing a small window of access for upstream migration.

The upper Weir/Ford just prior to high tide. Water is moving through the interstitial space but not over this structure.

Large exotic trees at the Nukurangi Pa Archaelogical site. Pine and Macrocarpa