

# Koputaroa No. 4 Pump Station Network Environmental Enhancement Potential



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**Front Cover Photos**  
Native Planting alongside Drain A3  
Photo: (Emily Carroll)

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## 1. Background

The Koputaroa Drainage Scheme originated in 1913 to provide drainage to the Buckley area west of Shannon. Over time the scheme has expanded and been developed into the network of infrastructural assets that we currently maintain today. The scheme currently provides drainage and flood protection benefit to approximately 2,500 ha of low-lying rural land between Shannon and Levin.

The scheme has a catchment of around 8,500 ha extending from the lower reach of the Tararua Ranges to the Manawatu River with the low-lying areas of the scheme being protected by stopbanking on the Manawatu River, Koputaroa Stream and Aratangata Drain.

In total, the scheme maintains approximately 50 km of drains and stream channels, four pump stations, 19 km of stopbanks and 37 floodgates. Six of the floodgates are on outlets into the Manawatu River and are jointly maintained with the Lower Manawatū Scheme. The two largest of these river floodgates are on the Koputaroa Stream and Aratangata Drain.

Koputaroa No. 4 Pump Station network is the most western outlet for the Koputaroa Drainage Scheme and has a catchment of approximately 655 ha.

### 1.1 Koputaroa No. 4 Pump Station

The current Koputaroa No.4 Pump Station was constructed in 1963 as part of a comprehensive drainage upgrade following the completion of the Manawatu River stopbanks. The station was expanded in 2003 to include a submersible pump to provide low level drainage pumping.

The Koputaroa No.4 Pump Station services an area of 655 ha and comprises a MacEwans axial flow pump (flood pump) and a submersible pump (duty drainage pump). The combination of the two has a maximum pumping capacity of 985 l/s via a surge chamber and discharge line through the stopbank.

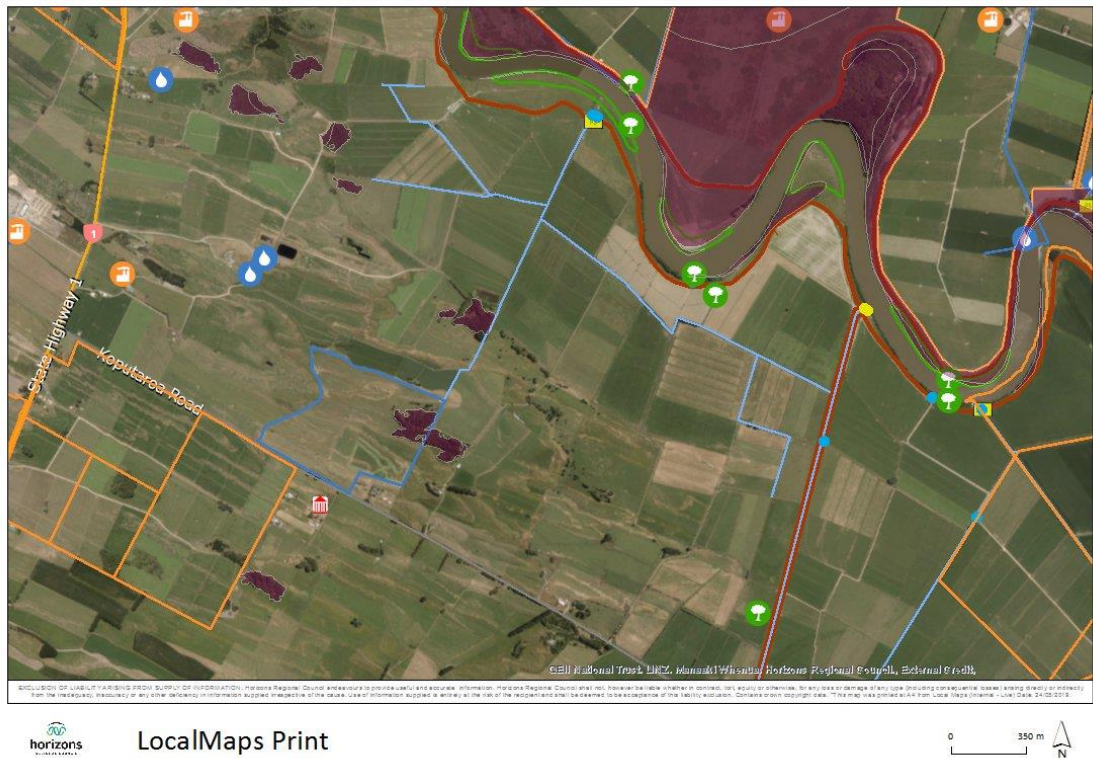
Pump	Type	Pumping Capacity	Pumping Coefficient (mm/ha/day)	Catchment Area (ha)
Koputaroa No.4	MacEwans PPF 24/30	760 l/s	12.9	655
	Flygt	225 l/s		

The pump operates when the water levels in drain A1 are high due to either the gravity outlet being shut or the flow is too great for the outlet.

On average, the Koputaroa No.4 MacEwans pump operates for about 100 hours per year and the submersible about 2,370 hours per year.

### 1.2 Soil Types And Land Use Within The Catchment Area

Most of the low-lying land is peat silt loam with sand hills surrounding the low-lying land. Significant settlement occurred in this area following the installation of the original pumps in this area.



The land is predominantly farmed for dairy and dairy runoff, with periodic cropping of several of the paddocks close to the Aratangata Drain.

There are pockets of remnant native bush spread across the catchment most of which have been fenced off to exclude stock.

## 2. Current Network Profile

### 2.1 Drainage Network

The drainage network for this area has a single exit into the Manawatu River at the Koputaroa No.4 Pump Station. This reach of the Manawatu is tidal limiting gravity drainage under normal river flow conditions. The installation of a fish friendly floodgate at this site has allowed some back flow into the network with a corresponding minor increase in operating costs.

When heavy rainfall coincides with high river levels, the network is reliant on the pumps to maintain the drainage levels. In sizeable events, one of the spillways on the Aratangata Drain, situated approximately 400 m upstream of the Aratangata floodgates, will spill water into the top end of the Koputaroa No.4 network increasing flow velocity in some of the drains on the eastern side of the network.

Asset Type	Total Length Fenced (km)	Total Length Not Fenced (m)
Scheme drains	6.8 km	776 m
Non-scheme drains	11.3 km	369 m

### 2.2 Native Plantings

Over the last few years, there has been an increasing desire to plant along the bank of scheme drains to provide shade and filtration of runoff into the drain. Current practice is to allow the planting up one side of the drain in accordance with accepted planting guideline and to leave the adjacent side open for ongoing maintenance purposes.

At present approximately 740 m of scheme drains have been planted with natives, an initiative of the landowner.

### 2.3 Culverts

A total of 17 culverts form part of the wider Koputaroa No.4 network. From our preliminary observations, there is currently one that is affecting fish passage.

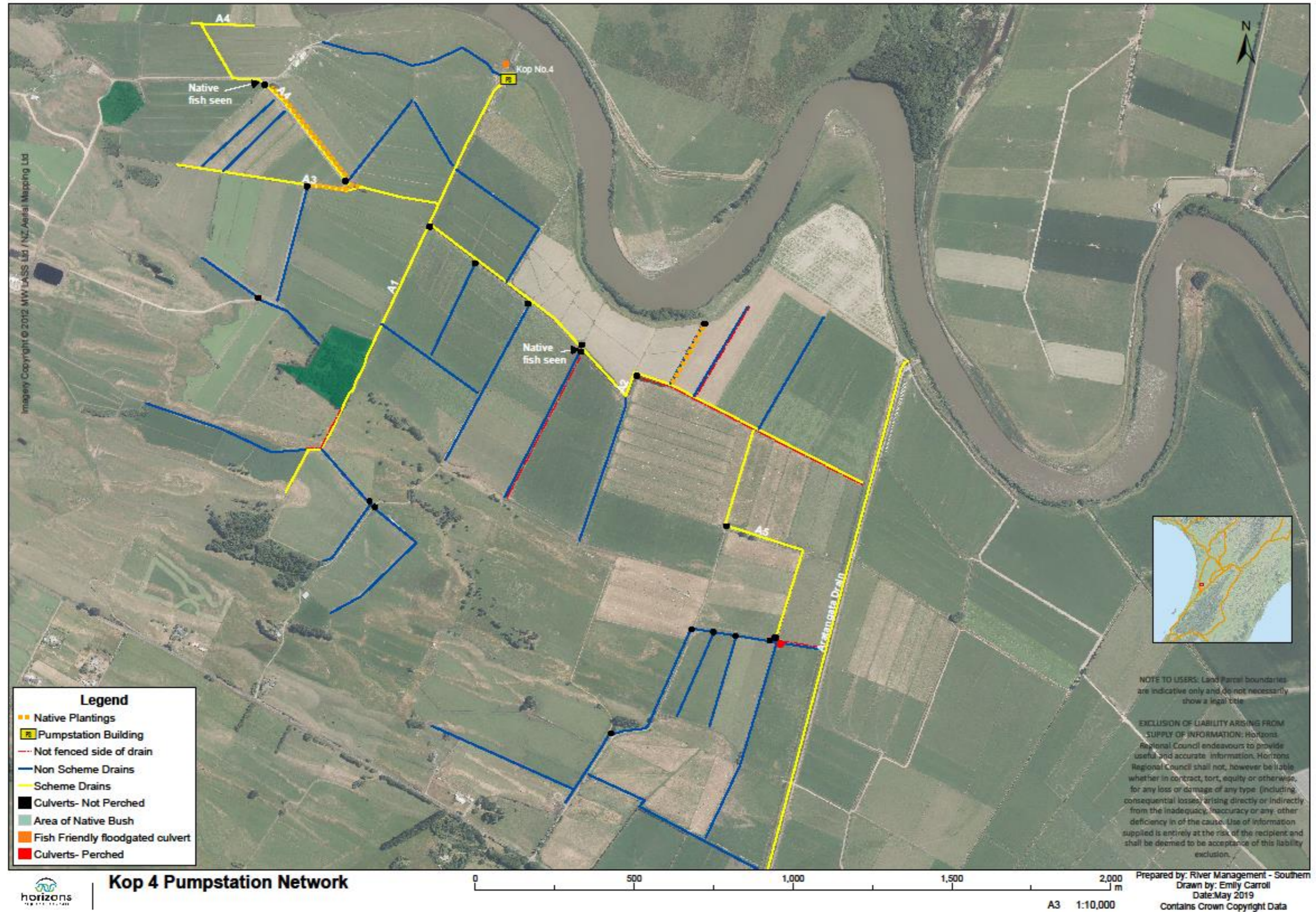
Further investigation is required to determine if factors other than invert level are impacting on the ability of the other culverts to allow the passage of native fish species. Those other factors include:

- Water velocities and depths downstream of, throughout and upstream of the structure;
- Excessive turbulence;
- Adequate natural light;
- Debris accumulation; and
- Abrupt changes on flow regime during periods of high flow.

Access to the main river for fish passage is also important and while the outlet on the gravity gate at the Koputaroa No. 4 Pump Station is a fish-friendly gate, further investigation is required to identify the operational frequency that this gate allows for fish passage and options to improve fish passage at specific times of the year during migration periods.







## 2.4 Map of Current Drainage Network Key Features













## 2.5 Table of Photos Plus Description of Key Features

Feature Type	Photo	Description/ Profile
Paddock runoff -drainage channel		Side drain running along farm track <ul style="list-style-type: none"> <li>▪ fenced both sides- 2-wire</li> <li>▪ grassed up drain banks</li> <li>▪ low batter slopes</li> </ul>
Paddock runoff -drainage channel		Side drain running along farm track <ul style="list-style-type: none"> <li>▪ fenced both sides- 2 –wire</li> <li>▪ grassed up drain banks with a few native cabbage trees and toi toi</li> <li>▪ low batter slopes</li> </ul>
Culvert		<ul style="list-style-type: none"> <li>▪ 500 mm plastic culvert</li> <li>▪ 30% water level</li> </ul>
Culvert		<ul style="list-style-type: none"> <li>▪ 300 mm concrete culvert end pipe dipping- could be perched in low water levels due to dropping of end pipe.</li> </ul>




<p>Paddock runoff -drainage channel- runs into scheme drain</p>		<p>First 300 m section fenced both sides.</p> <p>Last 200 m section only fenced one side- can see where stock have trampled in and out.</p>
<p>Scheme drain A5-( 0-300 m section)</p>		<p>Fenced both sides.</p> <p>Good grass cover on banks with small over hang.</p>
<p>Scheme drain A5-( 300-600 m section)</p>		<p>Fenced both sides.</p> <p>Good grass cover on banks with small over hang and a few larger trees.</p>
<p>Culvert crossing on A5 drain</p>		<ul style="list-style-type: none"> <li>▪ 900 mm culvert</li> <li>▪ 50% full of water</li> </ul>

<p>Scheme drain A5-(600 m-outlet into A2 drain)</p>		<p>Good grass cover on banks with small over hang.</p> <p>Fenced both sides however fence on left hand side is set back 4 m to include access track along drain edge.</p>
<p>A2 drain (0-350 m)</p>		<p>Low batter slopes.</p> <p>Plantings and fenced on one side.</p> <p>No fence on left hand side.</p>
<p>A2 drain 350-450 m</p>		<p>Low batter slopes.</p> <p>Plantings and fenced on one side.</p> <p>No fence on left hand side.</p>
<p>Culvert A2 drain</p>		<ul style="list-style-type: none"> <li>▪ 1050 mm culvert</li> <li>▪ 30% in water level</li> </ul>



<p>A2 drain 450-500 m</p>		<p>Inanga seen in this section of drain hanging around the below culvert.</p> <p>This section is fenced on both sides.</p>
<p>Culvert along A2</p>		<ul style="list-style-type: none"> <li>▪ 1050 mm culvert</li> <li>▪ 20% in water level</li> </ul>
<p>A2 drain (500-1.2 km)</p>		<p>Fenced both sides.</p> <p>Good grass cover on slopes.</p>
<p><b>Koputaroa No. 4 Pump Station</b></p>		
<p>Scheme Drain A1</p>		<p>Fenced both sides.</p> <p>Grassed banks.</p>

<p>Culvert A2 drain through to A1 drain</p>			<ul style="list-style-type: none"> <li>▪ 900 mm concrete culvert</li> <li>▪ 30% of culvert in water level</li> </ul>
<p>Native bush area adjacent to A1 drain</p>			<p>Large area of native bush land with drains feeding into it and then run along into A1 drain (seen on above map).</p> <p>A1 drain is fenced on land side.</p>
<p>A1 drain past bush area</p>			<p>Is only fenced on one side.</p> <p>Can see where the stock have been along.</p> <p>Steeper profile banks from bush land up.</p>
<p>A1 drain into A3 drain</p>			<p>Fenced both sides and has no culvert.</p> <p>Is an open outlet.</p>

<p>A3 drain</p>		<p>300 m upstream from outlet into A1 a 150 m section has been planted up with native plants.</p> <p>The drain has been fenced off both sides.</p>
<p>A4 drain</p>		<p>A 400 m section of the right bank has also been planted up with natives plants and the drain fenced off.</p>
<p>Culvert across access track on A4</p>		<p>A 900 mm concrete culvert.</p> <p>Fish were seen in this section of drain by the culvert.</p>



### 3. What Has Been Done To Date

The landowners in this network have been fairly proactive and actively working towards improving the habitats around the drainage networks. To date, the following actions have been undertaken:

- Fencing
  - 90% of the scheme drains have adequate fencing on both sides to keep stock out. There is still approximately 800 m left still to be fenced.
- Planting
  - Length of scheme drains planted in natives is 740 m. These plantings were an initiative of the landowner.
- Fish friendly floodgate at Koputaroa No. 4 Pump Station gravity outlet
  - A fish 1200 mm plastic friendly floodgate has been installed. This is to allow for the upstream movement of migratory fish being able to move around, through or over a barrier.



## 4. Issues found

From our preliminary inspection of the network, there are very few actions that are required to protect the existing habitat. Some of the actions identified include:

- Some sections of drains are yet to be fenced which has led to stock damage of the drain. Fencing of the remaining sections of drain will exclude all stock from the waterways.
- There was one perched culvert identified, replacing this with a correctly design fish friendly culvert will extend the habitat available to native fish.



## 5. Options To Improve Our Understanding Of Network Habitat

The work we have done to date has included a visual inspection of the infrastructure/ improvements that currently exist within this network. We have also identified additional works that will help improve aquatic ecosystem values without detrimentally affecting the levels of service.

Going forward we need to better understand the actual habitat and what currently exists and what are achievable. To achieve this next step we would like to recommend that further in-depth catchment study needs to be carried out focusing on the below areas:

- Identify fish species and fish numbers already present within the catchment, which will help us in knowing what habitats we need to provide for the specific fish found;
- Identify the current water quality in the various parts of the network;
- Undertake some flow monitoring to understand the catchment hydrology; and
- Review the current culvert sizing and design to maximise fish passage.

Using this information we can then look to prioritise habitat improvement works based on the potential benefit we would gain from the work against estimated cost to undertake the work.

