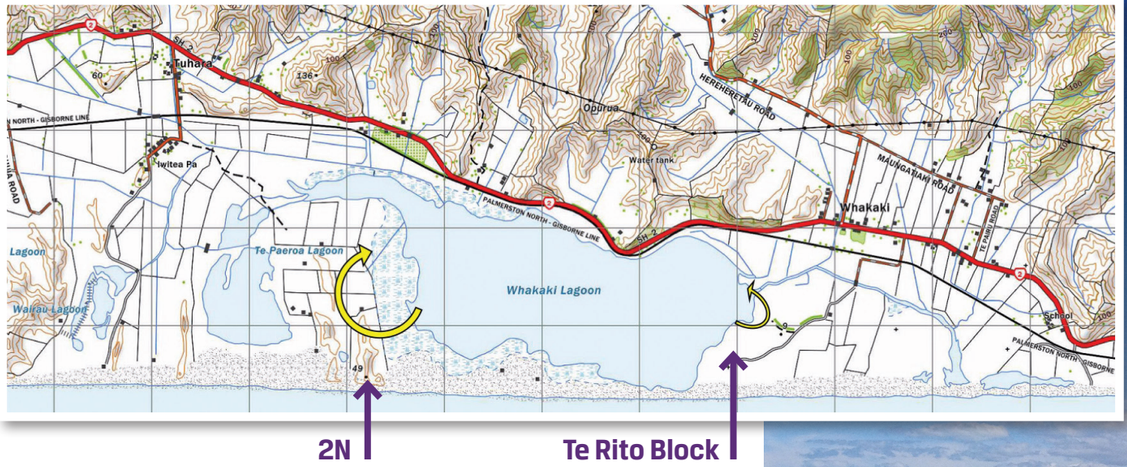
Where do we go from here

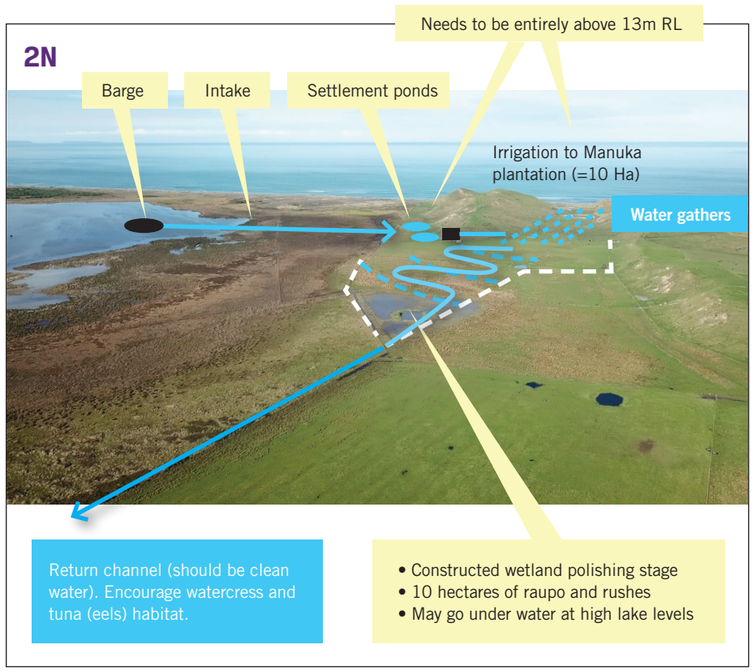
Recirculating wetland option

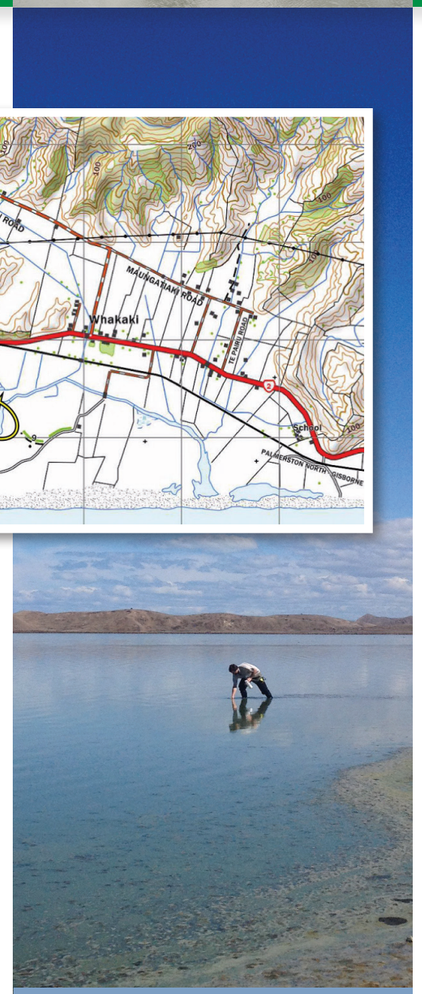
Options for locations



Two locations have been investigated for a recirculating wetland, but we are considering any offers from land owners around the lake.

The first site is at the western end of the Rahui Channel, the second site is on 2N land. Both sites have excellent promise, but require further site investigations and consultation with landowners.





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What do we do about

Nutrient & sediment accumulation in the lake

Restoring a taonga

Whakakī is taonga to the Whakakī community. The wetland is considered of national importance. The lake currently has poor water quality, is heavily silted and is unsafe for swimming. However, aquatic vegetation will recover and stabilise the lake **if action is taken now**. Our goal is to **restore Whakakī Lake** so tuna (eels) are fit for consumption and people can swim safely. Restoration will help ahi kaa to provide a self-sustainable future. **Let's work together to make this happen.**

The issue

The water quality of Whakakī Lake has deteriorated significantly in the last 20 years. This coincides with the reinstatement of the Rahui Channel, with the lake openings being less extreme in comparison to when the lake was opened direct to the sea. The direct opening to the sea had huge benefits for the fringing wetland and fish populations in the lake. However, the less extreme openings via the Rahui Channel will not 'flush' the lake as effectively, so more sediment and nutrients accumulate in the lake. Lake water quality has deteriorated, indicated by reduced black swans and presumably less aquatic vegetation.

He paku a uta,
he paku a rō wai,
Hei pūpūtanga mō te pani me te rawakore e.

Food from the land,
Food from the water,
Sustenance for the orphans and the poor (Food for those less fortunate).

The current situation

The Regional Council along with other agencies is working on a range of activities to protect the lake. These include: hill country erosion programme, fencing for stock exclusion and riparion planting and pest control. The Whakakī Lake Trust and Ngā Whenua Rahui have an active revegetation programme around the lake.

Community planting day in Rahui Channel, 16 June 2018.

Where do we go from here

Options to be considered

1. Do nothing

Whakakī is currently failing the ecosystem health bottom lines set out by the National Government.

The council is legally obliged to support and carry out activities that work to improve lake water quality at least above the national bottom line.

DOING NOTHING IS NOT AN OPTION

2. Change land use practices

Reducing sediment and nutrient loss from the Whakakī catchment is the ultimate solution, and is being actively encouraged through other work streams. It will take many years before these land use changes make a substantial reduction in loading to the lake, and so undertaking other supporting initiatives may be a good option to help see improvements more quickly. Reductions in inputs to the lake does not help the material that has accumulated in the lake over time, i.e. there is a legacy that needs addressing. Land use activities are seen as a parallel option, rather than a replacement option.

3. Better flushing using direct to sea openings

Openings direct to the sea exposes risk to the other ecosystem values that the switch to the Rahui Channel were designed to protect, such as fringing wetlands and eel populations. It also transfers the problem to the ocean, rather than dealing with it on the land. There have been very strong signals that this is not a culturally acceptable option.

4. Sediment traps/ treatment wetlands in catchment

These can help reduce sediment inputs, but the bulk of material enters the lake during high flow events. Wetlands and sediment traps only work well when the water stays inside the wetland or trap for a long time.

During high flow events, these systems get overwhelmed and do not function effectively unless they are very large which comes at a high cost. They would also not help the legacy material already in the lake.

5. Recirculating wetland

A recirculating wetland would pump silt-laden water from the lake and through a treatment system, and return cleaner water to the lake.

Because the pumping rate is controlled, it allows the system to handle flood-delivered silt at a more moderate pace, which reduces the size of the system needed. And a recirculating wetland will be constantly chipping away at the legacy load of silt and nutrients that is already in the lake.

A wetland stage could be tailored to establish more tuna (eel) and bittern habitat

Where do we go from here

Recirculating wetland options

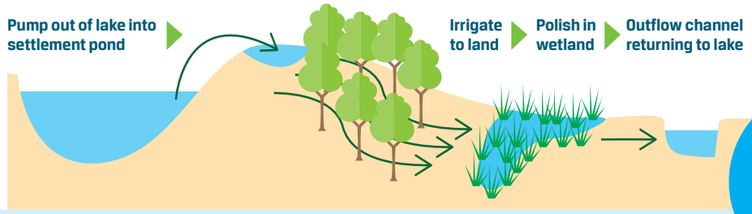
How a recirculating wetland works

The general principle is to pump silt laden water from the lake, onto land in the first instance (to capture silt and phosphorus) and then through a series of wetlands (to remove nitrogen). The first stage would need to be on land greater than RL 13 to avoid it becoming flooded during high lake levels, and leaching the phosphorus it has captured. We have proposed to establish Manuka plantations on the discharge-to-land stage, so that the growing Manuka assimilates nutrients and can produce high value honey for revenue.

Pumping 200 litres per second from the lake in its current condition would remove 1.2 tonnes of phosphorus, 15 tonnes of nitrogen and 946 tonnes of sediment every year. The phosphorus removal would be comparable to reducing P loss from the land by 0.2kg per hectare, for the entire Whakakī catchment. For context, an average loss of 1kg P per hectare is high, so the recirculating wetland operation would make a meaningful contribution to P loss.

THE COUNCIL DOES NOT HAVE A PREFERRED OPTION FOR THE RECIRCULATING WETLAND.

This will depend on the land owners who are willing to support the concept, and can be tailored to meet their preferences.



Lake Paraoa silt was used to grow huge kumera like this one in Iwitea village by the late George Nicholson

Benefits and options

Volume of water to move

Based on a system that would move 200 litres per second the entire lake volume would be treated approximately every 230 days (assuming 400 hectares at 1m deep)

Number and size of units

We could have a larger number of smaller systems pumping less water, distributed around the lake. Or we could have 1 or 2 larger systems, that each process a larger volume of water. There are usually cost efficiencies in building larger systems, but having multiple sites would help treat water from the entire lake.

Solar versus generator power

The initial proposal was based on using solar energy. This is a clean energy option. Conventional power may be an option if solar power cannot provide the energy required, or is preferred for some other reasons.

Sediment traps

Excessive silt may clog up the recirculating wetland, and so a series of silt ponds at the start of the system would capture heavier silt so it does not travel any further through the system. These silt traps would need to be periodically cleaned, which may provide a useful source of high-value soil conditioner.

Relative breakdown of manuka plantation versus wetland

The relative amount of the system dedicated to a discharge to land (Manuka forest or similar) versus wetland is flexible. Discharging to land is more effective for water quality improvements, but a larger wetland area may confer greater biodiversity values.

Straight manuka or greater native diversity?

The original proposal was to use Manuka to generate income and offset the costs of running the system. The exact nature of the discharge to land stage is flexible and could include a greater diversity of species, either mixed natives (such as flax, cabbage tree and kahikatea) or different exotics (e.g. eucalyptus for timber and honey).

Tailoring the system to maximise additional benefits

The recirculating wetland lends itself to various other purposes.The wetland stage could be tailored to create more eel and bittern habitat, the sediment traps could be tailored for creating wader habitat for godwits, the return flow to the lake could be tailored to create a water cress harvesting area or a safe swimming hole. These aspects would be discussed with landowners interested in offering land to be used for this initiative.