

Subject: Makauri Aquifer - Managed Aquifer Recharge Trial Update

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Report to ENVIRONMENTAL PLANNING & REGULATIONS Committee for decision

SUMMARY

A trial of Managed Aquifer Recharge (MAR) is being considered for the Makauri Aquifer, in order to identify whether this is a possible method to recharge the aquifer.

This report updates on the progress with technical work investigating the Waipaoa River as a potential water source for the trial. The technical work indicates that the Waipaoa River is certainly a comparable option to the Mangapoike Dams, and from an iwi perspective is probably a preferred water source. Based on the options analysis the project team are proposing to progress the project with the Waipaoa River as the water source for the trial. This option would see the injection bore drilled on the Kaiaponi Farms site, utilising in part treatment of the water through the existing Kaiaponi Farms infiltration chamber and filter systems. Some additional treatment is likely to be required, however this will be to a lesser level than is used for the city drinking water supply and has been costed into the option.

The technical work to underpin an application for resource consent for the trial is nearly complete and the timeline sees this being brought back to Council for approval to lodge the resource consent on 21 April. The Bay of Plenty Regional Council has been delegated authority to process the resource consent on the Council's behalf.

RECOMMENDATIONS

That the Committee

- 1. receives the report**
- 2. endorses the pursuit of the Waipaoa River at Kaiaponi Farms as the source of water and location for the Makauri Aquifer**



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1. BACKGROUND

Due to declining levels in the Makauri Aquifer, Council in partnership with HortNZ, Leaderbrand, Wi Pere Trust and other community stakeholders has been investigating Managed Aquifer Recharge (MAR) for the Makauri Aquifer for the last two years. Early investigations were funded through Envirolink and the Irrigation Acceleration Fund. These confirmed that MAR is a viable option for the Makauri Aquifer and that a trial project was warranted.

A trial project has now been set up funding jointly by the Eastland Community Trust and the Ministry for Primary Industries.

The trial was initially planned to use water from the Mangapoike Dams when these are overflowing in winter.

At the last report to the Committee in December it was identified that water may not be available in sufficient volumes from the dams for the trial to proceed over winter 2016. As a result investigations have been undertaken into the Waipaoa River as a source of water for the trial – using existing infrastructure already established to treat the river for irrigation.

2. DISCUSSION AND OPTIONS

Golder Associates, Council's geochemical and hydrological consultants for the project, have investigated the Waipaoa River in more detail. Water quality samples have been taken regularly, including during conditions where the water is highly turbid, reflecting a more likely winter high flow/ trial period scenario.

The water quality testing and geochemical work indicate that the Waipaoa River water, once passed through the Kaiaponi Farms infiltration chamber and filtration system, is very suitable for the trial - although if the water becomes very dirty, some additional treatment through either chlorination or UV treatment may be required. Indications are that with these proposed treatments the water quality would be very similar to that of water sourced from the Mangapoike Dams.

An analysis of the costs and the pros and cons of the two options has been undertaken and this is replicated in the tables below. The consultants also considered the option of using the existing Waipaoa Treatment Plant, but due to operational issues (the volume of water produced is much greater than needed for the trial) this is not a practical or cost effective option.

Indicative Costs of Options

Component	Bushmere - Mangapoike	Kaiaponi-Waipaoa
GDC water supply costs (connection to public supply system)	\$16,000-\$24,000	NA
Optional: Residual chlorine reduction	0-\$3000	NA
Kaiaponi water supply system connection costs	NA	\$3000 - \$5000
Optional: Kaiaponi additional source water treatment	NA	\$0-\$65,000
Kaiaponi water supply system maintenance costs	NA	\$0-\$3000
Electricity connection for Pilot Project control system	\$8000	\$8000
Source water quality monitoring for Pilot Trial	\$2000-\$3000	\$7000-\$8000

Total Direct Costs	\$26-\$38,000	\$15 -\$86,000
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Benefits and Limitations

Green text indicates benefits.

Red text indicates limitations.

Black text indicates information that is not beneficial or limiting, or is provided for general advice only

Factor	Bushmere - Mangapoike	Kaiaponi-Waipaoa
Land ownership	GDC land ownership	Private land ownership Ownership of bore and equipment following completion of trial needs to be negotiated
Capital costs	Well drilling and installation costs same for both options.	
	Moderate water supply pipeline connection costs. Backflow protection required due to connection to public water supply system.	Low water supply pipeline connection costs. Backflow protection is not required as it is not connected to the drinking water supply. Moderate costs for additional treatment if required
Operational costs	Trial management, field oversight, data assessment and documentation costs are effectively the same for each option.	
	The cost of water treated to drinking water standard is high	Operational costs low - little more than normal operating costs for Kaiaponi Farms irrigation system. Treatment to drinking water standard not required.
Source water availability	Uncertainty about supply of source water for a full season as water only available once dams are at capacity.	Water supply reliable. Possible flow limitations due to river flow levels and unusable water during high flow storm events (turbidity). Water only available during higher flows
Source water quality	Very stable and drinking water standard	Likely to generally be good. May vary in response to seasonal and storm driven variations in river water quality. May require additional treatment.
Additional source water treatment	Residual chlorine levels may need to be managed before injection (on-site tanks and monitoring required).	Additional filtration and UV treatment may be required.
Aquifer location suitability for trial.	Good site location at appropriate distance from abstraction pressure area in Makauri Aquifer.	Close to main area of groundwater use and pressure on resource. Potential interference from nearby groundwater abstraction on monitoring long term responses. Additional time for analysis required

Operational flexibility	<p>Provided reservoir water available, a high level of flexibility available for injection management.</p> <p>Increased flows may not be available if aquifer proves to be highly permeable</p>	High degree of operational flexibility available
Scalability (Application of trial information to other sites.)	Can be scaled up but new water supply options may require additional geochemical assessment for mixing with aquifer water.	Directly scalable to other sites using water sourced from Waipaoa River
Potential for Pilot Trial program to be directly incorporated into a regional groundwater replenishment scheme.	Can be incorporated into a full operational scheme however water supply costs may prove prohibitive	<p>Can be immediately incorporated in full operational scheme.</p> <p>Water users are highly involved in trial and have ownership. This could lead well into future scheme.</p>
	Would be operated by GDC if incorporated in full scheme	Unsure who would operate, maintain project going forward
Other factors	Due to land ownership and the source of recharge water, this option may provide a potential secure water supply for Gisborne through a future Aquifer Storage and Recovery (ASR) scheme as it is already integrated with the existing GDC water supply network.	<p>At Kaiapoi site GDC would be enabling the framework for a future regional groundwater replenishment scheme.</p> <p>Trial site demonstrates integration with existing irrigation operations</p>

On balance, despite the slightly higher costs if additional treatment is required for the Waipaoa River water, the project team believes that the analysis indicates that the Waipaoa River site is a better option for the source of trial water. The additional costs mainly relate to the potential need for further treatment of the Waipaoa River water – either with chlorination (an intermediate cost) or UV treatment (a higher cost). Monitoring of the source water is continuing with a particular focus on heavy rain events. This will enable a clearer picture of the treatment requirements (if any) prior to any consent being lodged.

Concerns raised by the community during consultation

During the community consultation and further discussions with the stakeholder group, some specific concerns have been raised in relation to:

- Chlorination of water creating carcinogenic compounds
- Mixing of waters – and in particular the use of Te Arai River water in any trial.

In addition to the matters outlined in the table, the Waipaoa River water as a source, should lessen the concerns of the community in relation to these matters.

In relation to chlorine, while the geochemistry of the water and the aquifer makes adverse chlorine reactions exceedingly unlikely, chlorination of the Waipaoa River water may not be required – and if it is, it would be to a lesser level. If residual chlorine was required to be removed as a consent condition, clear tanks through which water was passed could provide for residual chlorine breakdown (through exposure to sunlight) could be used with either source water types.

In relation to iwi concerns, the Waipaoa River is the original source of water in the Makauri Aquifer – from which it gradually percolates through the river bed and gravels over time. Using the river as the source of water for the trial may not have the same issues of mixing of water sources that the Mangapoike Dams option creates.

3. SIGNIFICANCE

This report does not contain any recommendations of significance as defined in Council's significance policy.

4. COMMUNITY OUTCOMES

Undertaking a trial Managed Aquifer Recharge contributes to Prosperous Tairāwhiti as the Makauri Aquifer is a significant contributor to the economic viability of horticulture on the Poverty Bay Flats. The project also contributes to an Environmentally Sustainable Tairāwhiti, as the Makauri Aquifer is a source of springs across the flats. Without recharge, the aquifer will continue to decline putting both these outcomes under threat.

5. STRATEGIC CHALLENGES

At this stage what is proposed is a trial and contributes to the Natural Resource Use Strategic Challenge. Careful monitoring and assessment of this will be part of any resource consent requirements, and the trial should give the Council a wealth of additional information about the extent and state of the aquifer, as well as an understanding of whether MAR is a viable option going forward.

6. POLICY

The MAR trial project has arisen out of the freshwater planning process, as it was through this that the extent of decline of the Makauri Aquifer became widely understood. There is policy support within the Proposed Freshwater Plan for projects like MAR, recognising that water storage is an important solution to meet both current and future needs for water. The MAR trial project is identified as a key non-regulatory project in the Waipaoa Catchment Plan.

7. LEVELS OF SERVICE

Undertaking a trial MAR in the Makauri Aquifer contributes to achieve water and coastal resources levels of service which include efficient and effective management of our water resources.

8. FINANCIAL

The majority of the costs of the trial MAR will be met by external funding \$200,000 from Eastland Community Trust and \$250,000 from the Ministry of Primary Industries. Staff time and the costs of the resource consenting process have been provided for in the Long Term Plan.

9. LEGAL

At this stage there are no legal issues, however if the trial is successful, and a full MAR is desirable then a decision around legal entities and governance to take this forward will be required.

10. CONSULTATION

Consultation to date has included more than 10 meetings with groups including: the Freshwater Advisory group, water users, iwi land owning entities, iwi trusts, individuals and one public meeting.

Articles in Conservation Quorum, Gisborne Herald and GDC website have also been provided. All technical papers are available on the GDC website. A Stakeholder Advisory Group has been formed and this has had three meetings about the project. Further communications and consultation is planned prior to lodging of the resource consents. The Resource Management Act process will allow full public participation through submissions and the hearing before an independent and expert panel.
