

Chairperson and Committee Members
CORPORATE BUSINESS COMMITTEE

22 SEPTEMBER 2011

Meeting Status: **Public**

Purpose of Report: For Information

WATER SUPPLY PROJECT - RIVER INVESTIGATION FINDINGS

PURPOSE OF REPORT

- 1 This report provides the findings of NIWA's river investigation for the Water Supply Project's River Recharge with Groundwater solution.

BACKGROUND

- 2 Council's resolution on 19 August 2010 (refer to report AS-10-967):

...approves further drilling, testing, monitoring, modelling and assessment work on the River Recharge with groundwater option with results being reported back to Council and community stakeholders before applying for resource consents.

- 3 After Council selected its preferred solutions in August 2010, a hui was held with key stakeholder groups at Whakarangotai Marae. The groups were asked what their concerns were regarding the River Recharge with Groundwater and Maungakotukutuku Dam solutions. This information was used to help design further investigations that NIWA used to develop an experiment in the Waikanae River.
- 4 The Friends of the Waikanae River provided a review of the experiment design, resulting in subsequent amendments, before the experiment commenced.
- 5 This report and the **attached** NIWA report (see Appendix 1) present the findings of that work.

CONSIDERATIONS

- 6 Under the River Recharge with Groundwater solution, the recharge will generally occur during low flow periods typically caused by drought. NIWA's experimental work was conducted between 16 January 2011 and 14 April 2011 during the Waikanae River's natural low flow period. During this period the median flow was 1593 l/s, about half the river's natural median flow.
- 7 First NIWA captured baseline data on the state of the river ecology before experimental discharge began. The experiment was conducted with a control channel and an experimental channel. The experimental channel replicated the anticipated demand in 2060 with a one in fifty year drought with 70% groundwater to 30% river water.
- 8 The control channel attempted to replicate the conditions in the experimental channel without the groundwater discharge. The control channel was used to monitor naturally occurring changes.

9 The experiment measured the effects on three ecological aspects:

- algal growth;
- invertebrate communities; and
- fish communities.

Algal growth

- 10 Higher algal biomass was observed in the experimental channel and the main river outside the experimental channel when compared to the control channel. This difference in effect has been attributed to larger substrates (ie. the rocks that make up the river bed) being present where the higher algal biomass was observed, and normal summer increases in algal cover.
- 11 The normal summer increase has been attributed to periods of low flow and warm temperatures. This is supported by monitoring work done by Greater Wellington Regional Council and Environment Canterbury where they have found high biomass is not a response to nutrients, but to low stable flow and warm temperatures. Recently published work by *Heath et al* (2011), which monitored the Hutt and Wainuiomata rivers found:

No correlation between the presence/absence of [cyanobacterial] mats and water soluble nutrients.

- 12 NIWA concluded that it is highly unlikely that the groundwater discharge during low flows will increase the frequency or magnitude of algal growth.

Invertebrate communities

- 13 Baseline data on invertebrate distribution, diversity and numbers indicate that the Waikanae River is currently in good condition.
- 14 The invertebrate communities between the control and experimental channels at the start of the experiment were different possibly reflecting the difference in substrates. However, similar changes in invertebrate behaviour and makeup were observed in both channels during the period of the experiment.
- 15 Additional monitoring on invertebrate communities was also conducted well downstream of the discharge where the effect of groundwater was dissipated within the wider river flow. The change in the invertebrate community downstream was found to be similar to the experimental and control channels.
- 16 NIWA concluded that the river recharge will have negligible effect on the invertebrate communities.
- 17 In addition, NIWA assessed the effect of pumping groundwater from the existing borefield on three wetland invertebrate communities. NIWA concluded that any potential draw down effects on wetland water levels is less than the natural seasonal variation that invertebrate communities can quickly re-establish, and therefore regarded as insignificant in the long term.

Fish communities

- 18 The fish communities were measured using three methods: electric fishing in the river, fish cages in the river, and aquarium trials. Three species of fish were monitored: inanga (a whitebait species), red fin bullies and eels. The aquarium trials replicated natural river water, experimental channel water composition, and 100% groundwater.
- 19 Fish densities were found to have increased in both channels over time. There was no difference measured in growth rates in the different conditions. Fish were not found to be moving away from groundwater.
- 20 NIWA concluded from the three independent sets of results that groundwater has no effects on fish survival or growth.

Consultation

- 21 The New Zealand Fish & Game Council suggested that Council obtain an independent peer review of the results. The Council commissioned Dr Russell Death to peer review the findings and this has been incorporated into NIWA's final report (see Appendix 1).
- 22 It was agreed as part of the peer review process to further minimise the risk of algal growth by developing adaptive management measures that could be included as resource consent conditions. The measures being considered are; developing a hierarchy of bore preference so that bores with the lowest phosphorus concentration are used first, monitor the river for algal growth over and above what naturally occurs, employ active management techniques that provide for the active removal of any excessive algal growth if it occurs. These would further minimise the risk of adverse effects caused by unexpected algal growth.
- 23 The findings of the report have been presented to the Technical Advisory Group. They were comfortable with the approach proposed to address concerns raised about algal growth identified by the peer review. They further suggested that over the next few years, Council and Greater Wellington Regional Council should work together to better understand the natural variations in algal growth in the Waikanae River.
- 24 The project's key stakeholders have been contacted and it was agreed to provide a copy of NIWA's report to each.

Tāngata Whenua

- 25 Te Ati Awa Water Working Group participated in the hui at Whakarongotai Marae before the experiment design was finalised. The results of the experiment were presented to the Water Working Group on 1 September 2011. This information will help inform the Water Working Group's cultural impact assessment currently being conducted.
- 26 The experiment was blessed by kaumatua before it commenced and on its conclusion.

Publicity

- 27 A project newsletter will be circulated to our registered stakeholder members informing them of the findings of the NIWA report. It is also expected that an article will be included in the next 'Kāpiti Update'.
- 28 The report will be made available on the Council website.
- 29 A technical briefing by NIWA was provided to local media agencies on the results of the experiment.

CONCLUSION

30 NIWA's conclusions are:

- River Recharge with Groundwater is unlikely to increase algal growth.
- River Recharge with Groundwater will not affect invertebrates.
- River Recharge with Groundwater had no adverse effects on fish survival or growth.

RECOMMENDATIONS

- 31 That the Committee receives report IS-11-349 on the Water Supply Project – River Investigation Findings and note that the findings support Council's resource consent application for River Recharge with Groundwater solution.

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**GROUP MANAGER
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ATTACHMENTS:

Appendix 1: The effects of groundwater discharge on the algal, invertebrate and fish communities of the Waikanae River, August 2011, NIWA.