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Report to Utility Services Committee
from Murray Kennedy, Strategy and Asset Manager

Wholesale Water Supply During a Water Shortage

1. Purpose

To advise the Committee of contingency planning for the situation when there is not sufficient water available to meet demand.

2. Introduction

The wholesale water supply system has been built so that it normally operates with spare capacity. This includes an excess of available raw water and water treatment plant capacity. Technically it is operated within an n-1 risk policy. In effect any one of the three main water treatment plants (WTPs) could be unavailable and the basic water needs of the community still met. Gear Island WTP is only used when water is not available from one of the other WTPs.

This paper considers how much water could be available under various shortage situations and how it can be allocated. There will be some occasions when there is sufficient water available to meet demand, even though one of the three main water treatment plants is not operating. During scheduled winter maintenance for example, this situation can occur.

Renewal of the surface water resource consents in August this year has resulted in less raw water being available. Previously there was no minimum flow restrictions at the Kaitoke Weir, or for the Orongorongo River near the intake structures. Now there are minimum flows of 600 and 100 litres per second respectively. Accordingly, although there is still surplus capacity in the system for raw water abstraction, there is less than there was previously.

3. Water Production Capability

Assuming adequate raw water is available, the maximum daily output from the three main water treatment plants (WTP) is:

Water Treatment Plant	24 Hour Output ML
Te Marua	130
Waterloo	105
Wainuiomata	55
	290

Gear Island is available for emergency use and can output 27 ML/d. However, the resource consents require that the combined output from Waterloo and Gear Island WTPs is not to exceed 115 ML per day.

Peak summer demand is about 220 ML/d, though over the last two years it had been around 210 ML. Hence, the water treatment plant capacity exceeds maximum demand by about 70 ML/d..

4. Water Availability

In summer after a prolonged dry period, the amount of untreated water available because of source constraints, could be as follows:

WTP	24 hour Output
Te Marua	80 – 120 (1)
Waterloo	105 (2)
Wainuiomata	Nil (3)
Gear Island	27 (2)

Notes (1) The minimum figure of 80 ML is when all the water is sourced from the lakes and it contains a high algae content. With 120 ML, it is assumed there is a blend of river water and lake water with a low algae content.

(2) Combined total not to exceed 115 MLd.

(3) No water is available from the Wainuiomata and Orongorongo catchments because of resource constraints.

5. Shortage Situations

Two shortage situations are possible, one is evaluated. Assume both occur separately during garden watering periods.

(i) Te Marua or Waterloo WTPs become inoperable.

(ii) A drought of greater than a return frequency of 1 in 100 years occurs, resulting in the storage lakes being near empty.

Case (i) is likely to occur without warning and is therefore an emergency event. The Water Group’s Incident Management System is designed to address this, all four cities have a copy. This case is not considered further in this report.

Case (ii) is a source water shortage resulting from a drought with a return period in excess of 100 years.

Required water	Up to 220 MLd
Available water (Waterloo and Gear Island available, no water from Te Marua when the lakes empty)	115 MLd
Shortage	up to 105 MLd

6. Allocating Available Water

A decision is required as to how the total treated water available could be allocated to each city when there is a water shortage.

During a summer water shortage, a large part of the conservation required will come from reduced garden watering. On this basis, it could be argued that any allocation between the cities should be calculated on base demand. On the contrary, even if there is a complete ban on garden watering, there is unlikely to be 100 percent compliance.

A pragmatic approach is to set a target allocation after discussion between representatives of the four city councils and the Regional Council’s Water Group. Target percentages can be formulated at the time, taking into account up to date information.

It is particularly important that demand is curtailed to match available supply. If this does not occur, the following are possibilities:

- water is not supplied to critical users
- failure to supply water to key account customers of the cities
- failure to supply other users
- lack of water for firefighting
- back flow as water pipes are drained at various properties
- public health issues

Although supply and demand may be balanced, most reservoirs would, as the drought bites, be well below their normal minimum operating level. An outcome from this is low pressure in a few areas and the possibility of no water at elevated properties some distance from a reservoir.

7. Emergency Water Consent

It is possible to apply for an emergency water consent if very adverse circumstances develop. Prior to doing so, extensive conservation measures would need to be put in place. These measures can be used in support of the application.

As noted in the Introduction, the minimum flows in the rivers at some of the abstraction points are greater with the new consents than those previously held. In particular, the minimum flow for the Hutt River at the Kaitoke intake is 600 litres a second. Previously, there was no minimum flow. This means that in an emergency or a severe drought, additional water could be sought. Any emergency water take would be considered on its merits. An application though would have to include full details of the conservation measures in place, or proposed. Preparing conservation plans in advance will speed up the application process.

8. Water Conservation

Conservation measures can be introduced gradually as the drought situation develops. Also, the Water Group's sustainable yield model is being enhanced to assist with predicting a possible water shortage on a probabilistic basis. This will assist in deciding when to implement various conservation measures.

Since the Water Group of the WRC is a wholesaler, the need for conservation, because of a severe drought, would be announced by the city councils or jointly with the Water Group.

There is a trade off between calling for mild conservation early in the drought process, and calling for heavy conservation late in the process. In the former case, the drought may not be as severe as allowed for. When the conservation process should start is a judgement call and representatives of the four cities need to be involved in the decision making.

It is essential though that the WRC and the four city customers are ready to act as the availability of treated water decreases.

A staged approach is one way of achieving the conservation. Suggested stages are:

Stage	Max. Daily Volume Available Target ML	Response
Status Quo	210	Scheduled TV conservation advertisements and normal city council paid newspaper advertisements / public notices.
1	180	City Customers to prepared conservation plans in advance of any reduced allocation.
2	160	
3	140	
4	120	

9. Next Step

It is proposed to discuss the concept of a staged process with the four city customers and obtain their agreement on how the conservation plans are prepared.

10. **Environmental**

One of the benefits of managing the conservation process is to achieve a better environmental outcome.

11. **Communications**

No media communication is required at this stage. Customers will be contacted following the Committee meeting.

12. **Recommendation**

It is recommended that the report is received and the contents noted.

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