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

Te Marua Pump Station : Standby Generation

1 Purpose

To obtain approval to proceed with a standby generation project in 1998/99 which is not on the Capital Works Programme for the current financial year.

2 Background

The mission statement of the Water Group is; to provide a quality, cost effective water supply service for the benefit of the people of the region. Some of the obligations inherent in this statement have been included in the draft wholesale water supply contract.

We have made several commitments to our customers. One of these is to use our best endeavours to ensure that water is available for delivery.

Water supplied to our customers and onto consumers is used for many purposes. However, the prime purpose is the provision of public health. This requires that the water supply system continues to operate under a range of adverse circumstances.

Customer's storage reservoirs at the point of sale usually hold sufficient water for between half a day and one day of normal supply. This means that short term stoppages in the wholesale water supply system are possible without affecting the end consumer. Also, the wholesale water supply system is reasonably robust such that if one treatment plant is shut down water can be supplied to the customer's reservoir from another treatment plant. This flexibility can only be achieved if power is available at treatment plants and key pump stations.

3 Proposal

It is proposed to install a standby generator, fuel tank and associated equipment at the Te Marua pumping station.

The generator size is governed by the likely requirements during a standby situation. A nominal 1,800 kVa unit has been chosen. This will cope with the following scenarios.

- Water from the Hutt river is not available, the treatment plant is then supplied from Lake 1.
  Output 45 ML/day.

- Hutt river intake and delivery pipeline is available and sufficient raw water is also available from the river.
  Output 80 ML/day (maximum output from the treatment plant using Stream 1 only).

  or

  120 ML/day if Haywards pumps are operational and Stream 2 operates at the treatment plant.

  During 1997/98 the Te Marua treatment plant averaged 70 ML a day.

  With the first scenario it is assumed that a seismic event has disrupted water supply from the Hutt river to the treatment plant. Under these circumstances there is likely to be property damage throughout the region. Hence, demand for water will have been reduced. The scenario of a power failure and also having to use lake water because of the river conditions may result in a shortfall between production and demand. River conditions which are unsuitable for water extraction occur on only a few days a year.

4 Justification

It is difficult to arrive at a firm economic justification for a standby generation plant. Essentially there is incomplete information on a number of issues. A decision can be made based on assessed risk and prudent management taking into account the capital cost. The Te Marua site is in a rural area and therefore is electrically less secure than a central city site where a power company has multiple feeders.

Trans Power's Upper Hutt substation supplies Upper Hutt City and is located at Brown Owl. The reticulation is cabled from the United Network's Upper Hutt substation, which is almost adjacent to TransPower's substation at Brown Owl, to the Te Marua pump station. Overhead lines connect the Te Marua pump station with the treatment plant. This overhead line connects back into United's Network at Kaitoke. Hence a second feeder is available to supply energy to the treatment plant and pump station. To do so though requires manual switching.

Over the last four years there has been 15 power outages at Te Marua ranging from nine minutes to 184 minutes. On this basis United Networks suggest planning for four outages a year of up to three hours duration. One outage was caused by TransPower, two were unplanned by United Networks and one was a planned interruption.

Although there would be sufficient water in the system to cope with the likely duration of these outages, it is probable the generator would be started each time. Apart from planned outages, the length of the outage may not be known.

Single cable breaks and damage to overhead powerlines can normally be repaired within about 6 hours. Outages of greater duration are more likely to involve problems with the national grid or substation failure. Incorrect maintenance procedures at a substation in Whakatane in 1998 resulted in an outage for about two days. The failure of cables in Auckland in early 1998 has been well documented. This caused an outage for several weeks.

A factor influencing the timing of this project is the Year 2000 issue and whether power will be available through the national grid at the local network at the start of the next millennium.

Past decisions have resulted in standby facilities being installed at several facilities;

- Waterloo Treatment Plant and pumping station - two diesel driven pumps and a generator set for the treatment plant and building services
- Waterloo well field - two mobile generator sets
- Te Marua Treatment Plant
- Wainuiomata Treatment Plant, for plant operation only (water from the plant flows to Wellington by gravity).

There is no standby power at the Gear Island treatment plant and well field.

Output from the Te Marua plant flows at about 30 ML/day by gravity. The Te Marua pump station boosts this to a higher quantity, as required by demand.

From a security of supply point of view if there was a power outage in the region, water cannot be transferred from the Wainuiomata/Waterloo system to the Te Marua system as there is no standby power at the Ngauranga pump station. The converse is possible, water can transfer by gravity from the Te Marua system to the Wainuiomata/Waterloo system.

If there is no power in the region the maximum output from the various treatment plants, assuming a generator is installed at Te Marua pumping station and other standby generators are operational, is as follows:

Treatment Plant	**Output ML/D**	**Comment**
Te Marua	45	With lake water

	80	With river water
Waterloo	40	Supplies to Naenae, Gracefield and the new Rahui reservoir only
Wainuiomata	58	This is the plant capacity. Raw water supply may be less than this amount
Gear Island	nil	No standby generation

The total output is likely to be sufficient to supply customer reservoirs which are fed directly without the need for additional pumping.

5 Financial

A preliminary report by our consultants estimates the cost of installing a standby generator is likely to be between $550,000 and $650,000. Costs will be refined once the installation design is completed. The estimate is also based on a new generator set. However, second hand sets are available from time to time. A second hand set could offer a saving of up to $150,000.

A new standby generator set would be expected to have a life of at least 40 years. Using a seven percent discount rate this equates to an annual cost of $49,000 with a 40 year life and a maximum capital cost of $650,000. Annual operating costs are expected to be relatively minor.

Provision has been made for the work in the 1999/00 Capital Works Programme. There is no allocation in the 1998/99 programme.

For reasons outlined in the justification section, there are benefits in installing the generator set before the end of the 1999 calendar year. This will require construction to start early next financial year with design, resource consent processes, and the calling of tenders in the current financial year. Costs in 1998/99 would not exceed $40,000. Funding of this sum is available within the budget allocation for 1998/99.

6 Other Issues

About two thirds of our customer's reservoirs are filled by gravity, or because there is sufficient pressure at the treatment plant pumping stations. The remainder require filling by secondary pumping. None of the secondary pumping stations have standby power. The larger secondary pump stations are shown in the schedule below.

Pump Station	**Capacity of Pumps kW**
Johnsonville	343
Kelburn & Messines Road	347
Wainuiomata No. 1	300
Wainuiomata No. 2	330

Kaiwharawhara	560

In addition, there are six smaller pumping stations in regular use ranging from five to 150 kW. If some of these pumping stations are not operating a few reservoirs will fill by gravity, but at below optimum flow rates.

A strategy will be developed for these pumping stations as part of a separate risk management project.

7 Recommendations

That the Committee approves:

(i) the standby generation project for the Te Marua pump station in the years 1998/99 and 1999/00;

(ii) expenditure not exceeding $40,000 in 1998/99 and total project expenditure not exceeding $650,000.

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