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Report to Utility Services Committee
From Alastair McCarthy, Asset and Quality Manager

Wholesale Water : Proposed Additional Capital Works Projects

1. Purpose

To provide additional information to the Committee about two new capital work projects at the Waterloo Water Treatment Plant; the installation of a new switchboard, and work to reduce noise and vibration.

2. Overall Funding Situation

Financial approval for the two new projects has been sought from the Council's policy and Finance Committee prior to the Utility Services Committee meeting in conjunction with the Councils overall six monthly review process. The current forecast of capital expenditure for the 2000-2001 financial year is $3,619,570. The approved full year budget is $4,047,000. Committing the new projects as proposed would increase the forecast expenditure to $3,764,570.

Proceeding with the noise reduction work would increase the draft 2001-2002 Annual Plan capital budget from $3,545,000 to $3,745,000.

3. Project Details

3.1 New Switchboard at Waterloo

The recent capacity upgrading at Waterloo incorporated a new main switchboard. This switchboard contains modern circuit breakers, which provide protection to the electrical equipment by tripping out if they sense dangerously high currents, just like a household fuse. An unexpected outcome of the modern technology incorporated in these circuit

breakers is that they are more sensitive and respond more quickly than other circuit breakers in older existing switchboards in the plant.

The outcome of this has been that on several occasions, failure of the Naenae/Gracefield pumps has led to the main circuit breakers tripping, rather than the local circuit breakers located in the switchboard servicing just these pumps. This means that the plant operators have no idea where the problem is, with the consequence that re-closing the main circuit breaker could damage equipment by applying current across an already existing short circuit or even result in a hazardous situation being created.

A second shortcoming in the Naenae/Gracefield switchboard is that it starts the pumps "Direct on Line" or DOL. This means that full voltage is applied to the pumps immediately the start switch is thrown, and causes high electrical and mechanical stress in the pumps, motors and electrical equipment. A more modern approach, and one universally adopted on larger electric motors is to use reduced voltage or "soft" starting. This applies the voltage more gently and creates less stress. A recent detailed analysis of a number of our larger pumps concluded that DOL starting of pump motors would shorten the life of these motors.

The switchboard that controls the Naenae and Gracefield pumps was installed in 1980. It is considered to have an economic life of about 25 years, and is therefore due for replacement in five to six years' time. Replacement is estimated to cost $115,000 and can be achieved by 30 June 2001.

Partial upgrading of the switchboard has been considered, but would be about half the replacement cost and difficult to achieve because of the need to keep the pumps operating. Early replacement is preferred because of the advanced age of the switchboard and the cost and difficulty of partial upgrading.

3.2 Mitigation of Noise and Vibration

In mid 1999 the capacity of the Waterloo Water Treatment Plant was significantly increased by the installation of three large pumps to pump water to Wellington. These pumps are mounted vertically with the pumps located in the basement and the motors vertically above on the motor floor. The installation of these pumps has generated high frequency noise and vibration in the building. The noise creates uncomfortable working conditions for the staff, and the vibration has potential to damage the structure in the longer term.

A substantial amount of checking, testing, balancing and adjustment has been carried out, and some improvement achieved. A recent dynamic analysis report recommends lowering two of the motors so that they are positioned directly above the pumps and supported from the basement floor, and stiffening the motor floor to minimise vibration from the third pump. It is not propose to lower all motors, as this action subjects the motors to the risk of flooding.

It is proposed to spend $30,000 this financial year on analysis and design work, and carry out the physical modifications next financial year. On the basis of current information, the modification work is expected to cost a further $200,000.

4. Environmental Aspects

Elimination of DOL starting of the Naenae and Gracefield pumps and the installation of a more modern switchboard may mean a slight increase in efficiency and a small reduction in power use.

Noise reduction at Waterloo will have definite environmental benefits for staff, and will slightly reduce noise levels outside the plant.

5. Communications

There are no communications opportunities associated with either of these projects.

6. Recommendation

That the report be received and the information noted.

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