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Committee       Utility Services  
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## Relocation of Karori Pumping Station

### 1. Purpose

To background the seismic risks associated with the Karori Pumping Station situated below the Lower Dam at Karori Reserve and gain approval to relocate the building to a less vulnerable site.

### 2. Introduction

The pumps located in the Karori Pumping Station supply water to the Kelburn and Messines Road Reservoirs. These reservoirs provide water for about 19,000 people in Kelburn and Karori. The pumps and electrical equipment are in need of replacement and the opportunity has been taken to evaluate the security of the current pumping station site.

The pumps were originally used to back pump water from Karori Dam along the Kaitoke pipeline and have been in use since about 1956.

Sinclair Knight Merz Ltd (SKM) was commissioned to carry out a seismic evaluation of the site. Because of the location of the Wellington Fault and potential damage resulting from a major movement of the fault, SKM recommended that the pumping station be relocated to a less vulnerable site.

A preliminary assessment has been made of potential sites for the new pumping station. Sites within 1 km of the existing pumping station have been considered. Boosting the pressure in the supply pipeline from Ngauranga has also been considered. The most favourable site is located on the southwest side of Appleton Park. Discussions are under way with Wellington City Council for approval to occupy this site.

The site and connecting pipelines are shown on Drawing No. A4-10105/01-BS, included with this report as Attachment 1.

This report compares the seismic risks of the existing site and the proposed new site.

### **3. Seismic Hazard at Existing Site**

The Institute of Geological and Nuclear Sciences was commissioned to investigate the location of the Wellington Fault through the Karori Waterworks Reserve adjacent to the pumping station. This investigation included inspecting the pipeline tunnels on the site.

Attachment 2 details the location of the fault through the site. The fault passes within 20 m of the pumping station building, which is closer than previously thought.

SKM's report states that there is a 10 percent probability of a major movement on the Wellington/Hutt Valley segment of the Wellington Fault in the next 50 years. The expected movement is of the order of 5 m horizontal and 1 m vertical.

Fault rupture is likely to lead to structural damage to the building and equipment, as well as overtopping or failure of the Lower Dam and consequential inundation of the pumping station. There are no realistic mitigation measures available to avoid very serious damage.

### **4. Consequences of Serious Damage to the Existing Karori Pumping Station**

The pumping station supplies water to the suburbs of Kelburn and Karori. In the event of damage to the pumping station, the Kelburn water supply zone could be temporarily supplied with water from the interlinking Wadestown water supply zone. An alternative supply to Karori (with a population of 13,000) is not readily available.

Rebuilding a pumping station and replacing pumps and/or motors will take months. Being unable to supply Karori with reticulated water for some months after a significant movement along the Wellington Fault is highly undesirable.

### **5. Proposed Pumping Station Site**

It is expected that the proposed site, situated at the southwest corner of Appleton Park, will be founded on solid rock. Negotiations are under way with Wellington City Council's Parks and Gardens Business Unit to arrange permission for a detailed site investigation and approval in principle for the use of this land. Final approval to use the site will need to be obtained from Wellington City Council. The site is 150m from the fault and will be unaffected if the lower dam fails.

### **6. Comparison of the Existing and Proposed Sites**

The existing building is located very close to the Wellington Fault, while the proposed site on Appleton Park is 150 m away from it. There is a high risk of damage to the existing pumping station and power supply from movement of the Wellington Fault. A new pumping station on the proposed site is unlikely to be significantly damaged in this event.

The existing pipelines are laid along and across the Wellington Fault at the southern end of Waiapu Road and in the Karori Reserve.

The water supply pipelines to both Kelburn and Karori from the existing pumping station are very vulnerable to damage in an earthquake.

The proposed new pipeline to Kelburn must also cross the fault and remains very vulnerable. Though as noted previously, there is a limited alternative water supply available to Kelburn. However, the proposed new main to Messines Road Reservoir does not cross the fault and will be less vulnerable than the existing pipeline.

## 7. Cost Estimates

The preliminary estimated cost to relocate the pumping station is \$1,300,000.

A breakdown of the cost is as follows: \$

Demolition of all or part of the existing building	25,000
Rationalisation of existing water mains	75,000
New building, including design	200,000
New pumpsets, electrical equipment and internal pipework	450,000
New pipelines	325,000
Engineering Consultancy Group	75,000
Contingencies	150,000
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	1,300,000
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These estimates will be firmed up following preliminary design.

The project will be funded over two years and provision has been made in the 2003/4 draft annual plan for \$600,000 for investigation, design and purchase of equipment.

Replacement of the existing pumps and switchboard would cost \$440,000.

## 8. Summary

The existing Karori Pumping Station is very close to the Wellington Fault and the pumping equipment is in need of replacement. In the event of movement of the Wellington Fault, which has a 10 percent probability in the next 50 years, it is expected that the pumping station will be seriously damaged. The water supply to Karori will be disrupted for a significant period and the flow and pressure available in Kelburn reduced.

A relocated pumping station on a new site at Appleton Park would have a low risk of damage from movement of the Wellington Fault and would provide a much more secure water supply to Karori and Kelburn

## 9. Recommendations

*That the Committee:*

- (1) **approve** the relocation of the Karori Pumping Station because of the risk to the existing facility.
- (2) **note** the inclusion of \$600,000 in the draft Capital Works Programme for 2003/4 for the commencement of the project.
- (3) **note** the proposal to include \$700,000 in the draft Capital Works Programme for 2004/5 to complete the project.

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**Attachment 1:** Drawing No. A3-10105/01-BS

**Attachment 2:** Fault Location at Lower Karori Dam Site