



Report **04.290**
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Committee **Utility Services**
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Wainuiomata Lower Dam : Decommissioning

1. Purpose

To advise the Committee of the possible options for decommissioning the Wainuiomata lower dam and subsequent development of the area adjacent to and immediately upstream of the dam.

2. Background

In the 1880s, the Wainuiomata dam was commissioned together with 27km of pipeline to provide water to a growing Wellington City.

Some 70 years later in the 1950s, the dam was taken out of service for water supply purposes leaving the Morton dam and the Orongorongo weir to continue to supply Wellington.

Then in 1969 or 1970, the spillway on the Wainuiomata lower dam was lowered by approximately a metre to improve the safety margin and the sluices under the dam were opened.

Now, under normal river flows, the sluice pipes are adequate to take the total river flow. About once a year though, a fresh in the river creates sufficient flow for the dam to fill and for excess water to then pass over the spillway.

Attachment 1 is an early (1932) photo of the dam and it shows the relatively porous concrete construction. The dam is either unreinforced or there is minimal reinforcing.

It was decided to commission a review of the dam and associated infrastructure as a result of the adoption of higher dam safety guidelines adopted in 2000 by the New Zealand Society on Large Dams (NZSOLD) and pending dam legislation which is expected to make these or similar guidelines mandatory.

The dam is no longer required by Greater Wellington Water (GWW) for water supply purposes but there is the opportunity to use it for environmental purposes.

3. Dam investigations

A number of consultants were invited to submit proposals to review the safety of the dam and investigate decommissioning options. DamWatch Services Ltd was awarded the contract and they carried out their investigations earlier this year. The review addressed what action is needed long-term in order that the dam satisfies the NZSOLD “Dam Safety Guidelines”. Evaluation included assessment of solutions that preserve the historical significance of the dam and also potentially to create a lake/wetland upstream.

Investigations revealed that:

- The dam has a low potential impact category in terms of the NZSOLD Guidelines. That is, if the dam were to breach, the residential population downstream of the dam is not in significant danger.
- The present spillway has sufficient capacity in accordance with the NZSOLD Guidelines for a low impact category dam.
- The upstream concrete wall is extremely vulnerable to earthquake shaking and requires strengthening or supporting in order to withstand earthquake loads.
- The energy dissipater downstream of the existing spillway, consisting of a series of two plunge pools, needs repairing and reinstatement.
- The instability of the upstream concrete wall during earthquake loading means that continuing to operate the dam as at present with the lake normally dewatered is not a viable long-term solution for this dam. A earthquake could cause the embankment material behind the concrete wall to scour out, post the event
- The 900mm diameter “Sinclair’s Tunnel” which provides most of the low level outlet flow capacity has local damage which requires repair.
- Upgrading of the dam is necessary for the dam to comply with NZSOLD Dam Safety Guidelines.

Bullet point one above means that the wave of water from a dam failure, if the dam is full, can be contained within the existing downstream river channel without endangering houses. A person, say fishing in the river channel though, may be in danger.

4. Options for the future of the dam

A number of options were evaluated, and these fall within three categories. The first two categories were evaluated by DamWatch and the third category is a late addition derived internally. Categories are:

- (i) Remedial works to the dam, spillway, sluices and other structures to enable a lake to be created behind the dam.

- (ii) Lower the existing spillway and create a lesser lake than option (i) behind the dam. Carry out repairs to several structures.
- (iii) Cut a channel through the face of the dam so the river is restored to its natural gradient.

With the first two categories, the existing dam remains and the historical significance is retained. With category (iii), most of the dam is demolished when the new river channel is created.

The extent of the lakes created with options (i) and (ii) are shown in **Attachment 2**.

4.1 Costs

		Initial cost \$000	Annualised operation and maintenance cost \$000
(i)	Retain dam, create a lake wetland	669	7
(ii)	Lower dam spillway and create a small lake*	310	5
(iii)	Cut a channel	634	Nil

* Note to create a fish passage adds an additional \$100,000.

4.2 Discussion on options

4.2.1 Retain dam

This option is the most expensive but it does create the opportunity for a lake and an associated wetland. If this option is adopted, then the initial dam remedial work would be carried out by Greater Wellington Water. It retains the existing structures and therefore the historical significance is maximised. Eventually the lake would silt up unless material is removed from time to time. Without this remedial work, silting will take up to 50 years.

A scour valve to enable de-watering of the dam if necessary would be installed.

4.2.2 Lowering spillway

While it is the lowest cost option, it is a 'halfway house'. The lake created will not be very deep and will possibly silt up in about 20-30 years. Apart from the spillway, the other structures are largely retained intact. Because the volume of stored water is small, a scour with its attendant maintenance issues is not required. A large earthquake could damage or collapse the facing wall resulting in repair costs at that time.

4.2.3 Cut a channel

Cutting a channel destroys the dam and therefore its historical significance. Of the three options, it has the least ongoing cost. However, it removes the

opportunity to enhance the recreation area by creating a lake and an associated wetland. Restoring the river channel though does return the river to its natural state. It would enable migrating fish species, including trout, to travel upstream.

The Water Supply Managers of the four customers have been consulted about the need to carry out work on the dam and did not raise any objections.

4.3 Preferred option

The option of lowering the spillway achieves a number of objectives. It retains a significant part of the original structure. Following a major earthquake, the dam wall may fail but because of a relatively low water level, there would not be any significant ongoing risks.

5. Quality for Life

One of the targets under the Council's "Quality for Life" initiative is to achieve 50 wetlands on private land legally protected by 2013. There are currently 24. While the wetland that will be created will be on Council and not private land, it signals further Council endorsement of its own initiative.

6. The future of any wetland

Landcare staff are currently working on a number of options for a wetland and development of the area. These will be reported to a future Landcare Committee meeting. Even so, if the Council decided not to actively manage the wetland for its ecological and recreational values, it could develop naturally, though in a much slower way than would otherwise be the case.

7. Public access

Following decommissioning of the dam, it may be possible to extend public access further towards the water treatment plant but some water supply buildings will remain within the new "open access" area. Effectively, the extent of the recreation area will increase.

8. Finance

The 2004/5 GWW Capital Works programme allows \$300,000 for remedial works to secure the structures.

From the initial estimate, it is apparent that the preferred option will cost just over the budget sum. This issue can be addressed when the budgets for 2005/6 are prepared later this year. The appropriate works can then be undertaken over two financial years.

9. Communications

A media release from the Council may be appropriate once a decision is made on which option to adopt and the extent of Landcare's involvement is known.

10. Recommendations

That the Committee:

1. **receive** the report and note its contents.
2. **note** that the do nothing option with respect to the lower dam is not an acceptable outcome, as the structure is not expected to comply with the dam legislation currently being considered by Parliament.
3. **approve** the lowering of the spillway to create a wetland, this being the lowest cost option.
4. **note** that the Landcare Committee will consider the potential for wetland development and associated issues (including costs) at its next meeting.

Report prepared by:

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Attachment 1: Photo of Wainuiomata dam

Attachment 2: The extent of the lakes created with options (i) and (ii)