



Report 04.398
Date 5 July 2004
File PK/07/02/03

Committee Landcare
Author Murray Waititi, Manager Parks and Forests

Wainuiomata Lower Dam : Decommissioning

1. Purpose

To advise the Committee of options for decommissioning the Wainuiomata lower dam and recommend the development of a wetland upstream of the dam.

2. Background

Greater Wellington Water (GW Water) proposes to decommission the Lower Wainuiomata Dam, constructed in the 1880's. The dam is no longer required for water supply purposes but there is the opportunity to retain its heritage values and develop the area for environmental and recreational purposes.

The matter was reported to the Utility Services Committee in June 2004 (Report 04.290). The resolution of that Committee is attached as attachment 1.

3. Background on options to decommission the Wainuiomata dam

In the 1880s, the Lower Wainuiomata Dam was commissioned, together with 27km of pipeline to provide water to a growing Wellington City. It is a 10m high earthfill embankment dam with a near vertical concrete wall on the upstream side. An overflow spillway is located in the old river channel on the left abutment. The earthfill embankment forming the dam is very untypical of dams of this type, in that the crest width is extremely large. The near vertical concrete wall on the upstream face of the dam is also an unusual feature.

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 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.

Dams have played a central role in the development of water supply in the Wellington area. Between 1874 and 1930, no fewer than nine dams were built (excluding Kaitoke weir – 1956) to supply the local water needs of various communities, which are now the cities of Hutt, Porirua Upper Hutt and Wellington. As one of the oldest dams in New Zealand there is interest in preserving the Lower Wainuiomata Dam structure for its historical significance.

4. Dam investigations

DamWatch Services Ltd was engaged to review the safety of the dam and investigate decommissioning options. The review addressed what action was needed long-term in order that the dam satisfies the New Zealand Society of Large Dams (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. An 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.

5. Options for the future of the dam

A number of options were evaluated, and these fall within three categories:

- (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.

5.1 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/wetland*	310	5
(iii)	Cut a channel	634	Nil

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

5.2 Discussion on options

5.2.1 Retain dam

This option is the most expensive but it retains the existing structures and the historical significance is maximised. It also creates the opportunity for a lake and associated wetland. 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 would be installed to enable de-watering of the dam if necessary.

5.2.2 Lower spillway

While it is the lowest cost option, it is a ‘halfway house’. 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. The lake/wetland created will not be very deep and will possibly silt up in about 20-30 years.

5.2.3 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 create 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.

5.3 Preferred option

GW Water prefers the lowest cost option of lowering the spillway, which achieves a number of objectives. It retains a significant part of the original structure, maintaining much of the historical significance. 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. It also provides the opportunity to create a shallow lake and associated wetland.

6. Other Factors to be considered

6.1 The Regional Council's "Quality for Life" Outcomes

Protecting, restoring and managing the region's most important ecosystems e.g. wetlands, contributes to Council's biodiversity objectives. 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.

Our regional parks and forests are important for their recreational, biodiversity and heritage values. The Council's objectives include providing a wide range of outdoor recreation opportunities, and protecting natural and cultural assets. Maintaining this cultural heritage structure and providing better recreational access to the lower dam is consistent with the Council's objectives.

6.2 Wetland Development

The GW Water cost estimate provides for remedial works to secure the dam structures, but does not include development of the wetland. If the Council decides not to actively manage the wetland for its ecological and recreational values, the wetland would develop naturally, though in a much slower way than would otherwise be the case.

However, to develop the wetland as an attractive recreational feature and provide greater ecological habitat, we will need to clear willows and other vegetation from the lake bed; form access tracks, re-shape the lake bed and margins; and plant the lake margins and surrounding area. Ongoing operational costs for track maintenance and vegetation control will be low.

It is desirable to carry out clearing and earthworks for the wetland in conjunction with de-commissioning the dam, before the lake is flooded. Planting can be completed in stages in future years.

6.3 Public Access to the wetland and dam

Currently the public can only access the recreation area and lower reaches of the Wainuiomata River. Entry to the Lower Wainuiomata Dam (and thus the proposed wetland), treatment plant and catchment is by guided tours only. Following decommissioning of the dam, it would be possible to extend public access to the newly created wetland. The additional public access area will not compromise the security of the water source as it will be downstream of both the intake and the treatment plant.

If public access is extended following decommissioning of the dam, some safety and security fences will also be required. Some water supply buildings will remain within the new "open access" area raising issues with securing facilities. GW Water have indicated that they are comfortable with public access to the proposed wetland.

We would anticipate that the additional area would be only opened to the public, once the appropriate infrastructure (fencing, wetland and visitor facilities) were put in place. In the future, having public access up to the wetland and dam area will have benefits for managing visitors and providing a development node associated “Super Key Native Ecosystem” project planned for 2006/07.

Discussions are currently underway to develop a concept plan that will address public access issues.

6.4 Proposed management of the wetland

If a wetland were to be created to retain the dam’s heritage values and to develop the area for environmental and recreational purposes, the ideal arrangement would be that the wetland be managed as part of the Wainuiomata Recreation Area.

6.5 How the proposal can be financed

The 2004/5 GW Water 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 2005/06 are prepared later this year. In addition, GW Water may also face additional fencing costs assuming the wetland is open to the public.

Parks & Forests are not requesting additional funding at this stage to develop the wetland for recreational use. The current LTCCP includes provision in 2006/07 for \$100,000 to develop visitor infrastructure in the Wainuiomata Recreation Area. This infrastructure development is associated with the Super KNE programme. While the creation of a wetland will alter the details of what we do, the basic infrastructure would suit both the Super KNE and proposed wetland. Hence, we can “kill two birds with one stone” and use that funding. The ongoing costs of \$5,000 p.a. will be looked at in the next LTCCP.

7. Conclusion

The decommissioning of the Lower Wainuiomata Dam and associated wetland development represents an opportunity for the Council to contribute towards achieving its quality for life outcomes at little cost. The proposed development will allow the decommissioning of the dam while retaining much of its heritage value. The associated development of a wetland will also enhance the *Biodiversity and Recreation and Parks* Take 10 elements of Towards a Sustainable Region.

8. Communications

A media release from the Council may be appropriate once a decision is made on which option to adopt and the extent of development of the wetland.

9. 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. *recommend to the Council that:*
 - (a) *the lowering of the spillway to create a wetland is the preferred decommissioning option, this being the lowest cost option.*
 - (b) *the wetland be open for recreational access following installation of visitor infrastructure.(including securing GW Water assets) This is programmed to occur in 2006/07.*
4. *note it is proposed that the visitor infrastructure associated with the proposed Super KNE project be configured so that it will also be appropriate for the proposed wetland.*

Report prepared by:

Report approved by:

Murray Waititi
Manager Parks and Forests

Rob Forlong
Divisional Manager
Landcare

Murray Kennedy
Manager Utility Services

David Benham
Divisional Manager
Utility Services