Krestova Improvement District East McDermid Dam

Review of Management Options

Introduction

The Krestova Improvement District (KID) owns and operates the East McDermid Dam as part of the water supply infrastructure for the KID. The East McDermid Dam is ~ 5 m high, has a crest length of ~ 30 m, and creates a small reservoir with an area of ~ 2,500 m^2 and a storage volume of ~ 7,500 m^3. The dam was assigned a consequence rating of "High" by the Province in a rapid assessment completed in 2010. The rating was based on the presence of residences on the alluvial fan of McDermid Creek ~800 m downstream of the dam, and the potential for dam failure to lead to a debris flow event, which could significantly increase the volume of material entrained within any flood flows.

The *Dam Safety Regulation* regulates dams within the Province of BC, and imposes various monitoring and reporting requirements on dam owners. For a small organisation like the KID, these can become increasingly difficult to meet and can require financial resources that may not be available. The KID is considering options for the East McDermid Dam in order to comply with the Regulation, reduce potential risk to downstream values, and reduce long-term liabilities associated with maintenance and operations.

Current Operations

Water in the East McDermid reservoir can be used to supplement the KID water supply. Water can be released from the East McDermid Reservoir by manually opening the lower valve to temporarily increase downstream flows.

The reservoir is located in a small draw and does not have any natural inflows. The reservoir can be filled from Langill Lake when water levels in Langill Lake allow. Current operations are to fill the reservoir in late May (Photo 1) and maintain this until September. The reservoir is emptied in September (Photo 2) and kept empty through the winter.

The primary water supply for the KID during the low flow period is from the Langill Lake siphon, which contributes ~ 180 - 220 L/min to McDermid Creek downstream of the East McDermid Dam, and is sufficient to fill the KIDs water box overnight. This is sufficient to meet domestic needs, but when irrigation demand is high the water box is quickly drained, lowering water pressure and/or limiting water supply to the community. This is usually from late July – early September when demand for irrigation exceeds the storage capacity of the existing water box (~ 90 m^3).

Photo 1. East McDermid Reservoir when full

Photo 2. East McDermid Reservoir when empty

Summary of Options

Three options were considered for the East McDermid Dam.

Option 1.

Maintain the dam as is. The benefit of this option is that it maximises potential water storage. The costs of this option include higher frequency of monitoring and reporting, additional costs associated with dam safety reviews, and maintenance requirements. The dam will also require some upgrades to the spillway and LLO.

Cost estimates to complete a DSR are $20,000-$50,000. Annual monitoring, reporting, and maintenance costs are expected to be $5,000 - $10,000/year. Detailed costs estimates have not been compiled and these are subject to change. Funding opportunities to offset some of these costs are unlikely.

Option 2.

Remove the dam. This would remove risks associated with the dam and any ongoing monitoring and maintenance costs. The cost is no water storage to supplement the KID water supply when demand exceeds supply during the late summer.

This option would require ~ 2,000 m^3 of material removed from the top of the dam in order to remove it completely, although some of the material may be left if only a breach is required.

Removal of the dam would incur a large initial cost ($200,000-$300,000 including the permitting, design and consultation requirements under the DSR), but would not require any ongoing maintenance or monitoring. Decommissioning may be able to receive funds to offset the costs. For example, Emergency Management BC is currently accepting applications for projects that reduce flooding risks.

Option 3.

Lower the dam to reduce storage volumes and the consequence classification to Significant or lower. Nominally, this is assumed to correspond to a height of <2.5 m. The benefit of this option is that it would reduce the risk to downstream users, reduce the KIDs ongoing operating and maintenance liabilities, and retain some water to supplement the KID water supply. The costs include reduced volume of water for storage, one-off costs associated with lowering the dam, and some ongoing monitoring and maintenance requirements.

This option would require ~ 800 m^3 of material removed from the top of the dam in order to lower it. The spillway would be rebuilt at a lower elevation.

Note that after further consideration, Option 3 was removed, for the following reasons:

- it would still need KID to justify that the downstream risk is acceptable and therefore still require a DSR
- building and maintaining a small dam that provides meaningful storage volumes and still meets Canadian Dam Associations standards would be difficult.
- Costs may be similar to both Option 1 and 2, and limited funding opportunities would be available to offset any costs.

Summary of obligations under the current Dam Safety Regulation

Option	**1 – retain**	**2 - remove**
Assumed consequence classification	High	not applicable
Dam Safety Review	Every 10 years	not applicable
Site surveillance	Weekly unless otherwise specified	not applicable
Formal Inspection	Annually	not applicable
Review OMS/DEP	Annually	not applicable

Summary

- the East McDermid Dam is not an essential part of the system, and only supplements water supply for a short period of time when irrigation demand is high and inflows are low. To supply additional water, the dam needs to be manually operated. Once the water box is full, any excess water spills downstream and isn't used by the KID. The costs associated with maintaining this dam are extremely high for the amount of water it provides.
- Water shortages in the summer are due to demand (mostly irrigation) exceeding supply and the limited capacity of the water box. There may be other ways to address water shortage or low pressure in the summer, including changes to the water use regulations or additional storage elsewhere.
- The East McDermid dam is regulated under the Dam Safety Regulation (DSR) and was given a "high" consequence rating by the Province.
- This imposes certain monitoring conditions on the owner, including engineering reviews, frequent inspections, and regular maintenance. The current user fees do not cover the costs for these requirements. Grant opportunities to offset these costs are not currently available.
- Removal of the dam is regulated under the DSR and would incur a large one time cost. Funding opportunities may be available to offset most or all of the costs associated with this.