

Cost Estimate Peer Review – Colliery Dams

Hatch was retained by the City of Nanaimo in late Feb to undertake a peer review of KCB's report on conceptual designs and cost estimates for Rehabilitation or Replacement of the Middle and Lower Colliery Dams.

Hatch's Scope of Work

- review of the rehabilitation / re-build options, based on technical considerations and overall viability
- undertake a screening review, in conjunction with KCB, to arrive at a short list of options to be developed by KCB to a conceptual design level and have their costs estimated
- review the estimates prepared by KCB to ensure that the costs are reasonable



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Chronological Sequence of Work

- March 6 – Hatch met with the Colliery Dams Preservation Society (CDPS) and city staff to receive CDPS's input on options that they considered worthy of review. These included options related to: i) rehabilitation of the dams, ii) lowering the dam's hazard consequence classification and iii) installation of hydro generation
- March 12 – Hatch met with KCB to discuss CDPS's options, as well as other viable options proposed by Hatch or KCB. A short list of technically feasible and potentially least cost options was agreed upon for further study by KCB.
- April 9 - KCB's draft report was received for review



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Chronological Sequence of Work (cont'd)

- April 12 - Hatch's comments/questions on KCB's report presented to KCB and city staff.
- April 19 – received clarifications and revised cost data from KCB as a follow-up Hatch's questions. These involved some modifications to the design details of the Roller Compacted Concrete (RCC) option and some decreases to the material unit rates being utilized by KCB.
- April 30 - Received KCB's final report for review
- May 1 - Issued Hatch's final report to the City



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Dam Consequence Classification

- The BC Dam Safety Regulation is designed to protect the public from risk of dam failure.
- 2012 Flood Inundation Study determined the dam's Consequence Classification to be Extreme.
- Both dams are deficient relative to their ability to pass the design flood and to withstand an earthquake of required severity.
- KCB Study reviewed options to decrease volume of stored water as a potential method of lowering the Consequence Classification to Very High and thus subsequently lowering the design criteria for both the flood and seismic events.
- Hatch concurs with KCB that options reviewed to date are speculative until further proven by a new flood inundation analysis.



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Review of Conceptual Designs

As previously discussed, there are 2 issues that need addressing in any rehab or replacement option – Flood Passage and Seismic Withstand

A) Flood Discharge Enhancement

- Hatch concurs with KCB that remediating the downstream slopes of the existing dams to permit flood flows to safely pass over them is unlikely to be completely effective or acceptable to the BC Dam Safety Branch.
- Hatch agrees that deepening or widening the existing spillways is the only viable solution related to any option that is based on remediation of the dams.
- Utilization of overtopping is an acceptable option for flood passage for concrete replacement dam options.



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B) Seismic Withstand Capability

- 7 options were initially reviewed, including those proposed by CDPS.
- Hatch agreed with KCB at the initial screening meeting that the options that best met the criteria of being technically feasible and having potentially acceptable costs were:
 - Buttressing the dams with earth or rockfill berms
 - Jet grouting to strengthen the existing dam shells
 - Replacing the dams with new roller compacted concrete dams

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Comments on Cost Estimates

- Hatch considers the cost estimates prepared by KCB to be conceptual level estimates and to be at the Class 4 level, as defined by the Association for the Advancement of Cost Engineering.
- In consideration of the unit rates utilized by KCB, Hatch considers the level of contingency provided by KCB to arrive at the base cost estimates to be appropriate to arrive at an estimate that has an equal probability of being under-run or over-run.
- Hatch is of the opinion that the cost estimates presented by KCB are consistent with the current conceptual level of the designs.



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Hydro Generation Alternative

- The CDPS proposed the addition of hydro generation facilities at each of the dams as a revenue source to help offset construction costs. The City requested Hatch to review and comment on the viability of this option.
- Hatch's review concluded that the energy generation and revenue projections presented by CDPS appeared to be reasonable, given the level of flow data available for the Chase River and current BC Hydro rates.



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Hydro Generation Alternative (cont'd)

- Hatch concluded that the capital cost estimates presented by CDPS appeared to be lower than would be anticipated for facilities of this size, but that it would require a more detailed analysis to confirm this.
- It is recommended that provision for future installation of generation be included, should the City decide to proceed with the Rehabilitation option or the construction of new RCC Dams.
- Hatch recommends that prior to making a business decision to proceed with the addition of hydro generation, a more detailed study be undertaken to firm up the costs and revenue projections.

