

CONFIDENTIAL MINUTES
COLLIERY DAMS TECHNICAL COMMITTEE
WEDNESDAY, 2014-MAR-05 AT 2:00 P.M.
ROOM 233, SERVICE & RESOURCE CENTRE, 411 DUNSMUIR STREET

PRESENT:

Colliery Dam Park Preservation Society:

Jeff Solomon

Leon Cake

Geraldine Collins

Lorne Gale

Snuneymuxw First Nation:

Chris Good

City of Nanaimo:

Toby Seward, Director, Social & Protective Services

Holly Pirozzini, Recording Secretary

Katherine Gordon, Facilitator

John McCormick, Alternate Facilitator

1. Call to Order

The meeting was called to order at 2:05 p.m.

2. Review of Options:

Facilitator - Recapped the Technical Committee's achievements to date. Four viable remediation options have been proposed by Golder Associates (GA), which look like they meet the Committee's objectives and estimated costs. The Committee has worked hard during the process and respected it. The key topics for today are:

- decide on content and process for report to the Executive Committee
- discuss public update

CDPPS stated that in Dec. 2012, information was provided that affects all the options. All work being done so far is based on dealing with a probable maximum flood (PMF) because of the classifications of the dams. We know now that the risk is far less than previously advertised. We should pursue reducing the dam classification and if it can be reduced by even one category, we will have very different design parameters and will no longer have to consider a PMF; therefore, the four options don't apply. There is enough information from GA now that will dramatically change the classification of the dams. Suggested phoning GA and ask why we haven't pursued reducing the dams' classification which would result in less cost and less work.

CDPPS stated that the classification was built on the premise that the worst case scenario is if the Middle Dam failed and knocked the Lower Dam out. With GA findings, even if the Middle Dam fails dramatically, it would not destroy the Lower Dam. The classification was based on each of the dams failing within 3 minutes and all the water cascading downstream at one time. GA has stated that this will not happen.

City stated that GA didn't say it couldn't happen. GA has provided more information on the Lower Dam and in most situations it should hold, but it is not known if the classification can be changed from *extreme* to *high* and if this would affect the dam design parameters.

Question: Why hasn't GA been asked about lowering the dam classification? City responded that Dam Safety Section (DSS) has stated that there are many *extreme* classification dams in the province, but the risk is very low, so they are prepared to accept that. We need to get to a point where DSS accepts GA's proposal.

CDPPS stated that GA has provided information that the dams were stable, solid and the Lower Dam is significantly smaller than originally thought; approximately one-third the size. These are significant differences that may affect the dam classification.

Facilitator – DSS were asked specifically if they would consider reducing the classification previously and their response was that they would be open to reviewing the classification if there is new information. The Probable Maximum Flood (PMF) is relevant to the Canadian Dam Association (CDA) Dam Safety Guidelines regardless of the classification of the dam. When GA was asked if the Lower Dam can be left untouched because of a reduction in the risk, their response was that some remediation has to be put in place for the Lower Dam.

CDPPS provided an explanation for PMF and dam classifications and also clarified that a *high* dam classification has to allow for a 1 in 1,000 year flood, which is about 65m³ instead of 175m³. The consultants are hired as the experts in this field and they will only provide options that are viable. GA makes the recommendations and they are then sent to DSS who either accepts it or they will do their own internal review and decide if it should be different.

CDPPS stated that the dams were originally thought to be crumbling, but GA has now produced data to prove that the dams were well constructed with steel reinforcing in core. There are unanswered questions respecting the possibility of expanding the spillway to compensate the strength of the dam for the failure to go from 3 mins, to 1 hour. The Committee could ask GA to pursue reclassification, based on the new information. A reduced classification may allow for fewer improvements to be made at less cost.

Question: Does the Technical Committee want to propose as one of the recommendations to the Executive Committee to consider trying to reduce the dam classification? City responded that GA was asked if there is any scenario where there would need to be no improvements to the Lower Dam and the answer was no. We need to ask the question if there is a scenario to reduce the classification, which would reduce the design standards for the options being pursued.

CDPPS stated that it's important that the various engineering firms (GA, AE, Herold), DSS, City and CDPPS representatives involved in the risk analysis workshop reach consensus on whether this is the proper approach.

CDPPS stated that small adjustments to the Lower Dam may be all that is required. Referred to a ppt presentation, *Colliery Dam Preservation Society* (Dec.17, 2012) and reviewed the Dam Classification by number of possible fatalities.

Question: From a seismic perspective, will increasing the overtopping to deal with the PMF, take away the stress on the Lower Dam? CDPPS responded that the likelihood of both of these events occurring together is highly unlikely (1 in a billion).

City stated that an *extreme* classification can be acceptable if the risk is low (e.g. Bennett Dam).

City stated that GA needs to determine the uncertainties for each option so that additional costs [i.e. re-vegetation in Option 2 (swale)] can be budgeted for now.

CDPPS stated that the design parameters cannot be done in parallel with pursuing ways to reduce the dams' classification. We need to know the status quo and the risk of the situation right now so that we don't jump to a conclusion that something has to be done.

City stated that there are two or three options that are considered viable, but if the classification changes, then how will that affect those options? With a lower classification, one option may be better than another.

CDPPS stated with a lower classification, Options 2 (swale) and 3 (labyrinth) may become very viable because they will be greatly reduced. Additional information and further site work from GA is required before a decision can be made.

Agreed: There are questions that need to be answered by Golder Associates, prior to being able to recommend an option(s) for dam remediation to the Executive Committee.

Telephone call to Bruce Downing, Golder Associates - Questions & Answers:

Q: The four options were based on a design parameter of $175 \text{ m}^3/\text{sec}$ which was your new revised PMF of $165 \text{ m}^3 + 10$. Is the reason we are working with that PMF because the dams are being classified as *extreme*?

A: No, that's not the case. That number is being determined by the risk assessment. We were working on these designs before the risk assessment was done. We had to assume criteria, such as the PMF plus a slow breach of the Middle Dam. It was semi arbitrarily, but we had to start with something.

Q: Now that we know that the risk is substantially less than what was known previously, how much can we reduce the classification by, which reduces the design parameters?

A: It doesn't reduce the design parameters. Design parameters only apply if you are using a deterministic approach. The deterministic approach has different criteria for different classifications and for an *extreme* classification, the spillway has to be designed to pass a PMF and the dam has to be designed to sustain a maximum credible earthquake. We are not going that route. We are taking a risk-based approach.

Q: How do you decide what that design number is and why do you start with a PMF instead of something less?

A: We started with a conservative number. The principles are the same. The spillway would become a little narrower if we used a PMF vs $175 \text{ m}^3/\text{sec}$, but we needed a starting point. We wanted to present feasible options at yesterday's meeting. We had a wide range on the estimate of the costs we provided yesterday that will cover the range in sizing that we might end up with.

Q: If we can reduce the classification, will it affect the design parameter?

A: If you reduce the classification, you do it for different reasons. The classification is symbolic and has ongoing meaning to the City because it can trigger different inspection criteria. Don't worry too much about the classification right now in terms of design. It doesn't hurt to make that determination in the design process, but you're not going to be bound by those criteria.

Q: If the classification was reduced to *high*, which is less than 10 lives, is the design parameter dramatically less than the 175m³/sec?

A: We used 175m³/sec because we are not doing anything with the Middle Dam. It's entirely different if you were to upgrade/remediate the Middle Dam. The reason it's so high is that this dam has to do more than just hold itself up. It has to be able to withstand loading from upstream. Even if the classification was changed to *high*, we would still need to consider the upstream failure.

Q: If the Middle Dam fails, does it have to be able to flow through the Lower Dam?

A: Yes, you don't want to trigger cascading failures. You have to design the Lower Dam to withstand the cascading failure.

Q: The fatalities were estimated at over 100, the new information we have received from the risk assessment talked about one-half a person; what are we now talking about?

A: We didn't look at a twin failure of the two dams. We looked at failure of the Middle Dam and routing of that flood through the Lower Dam. You can't use that data to establish the consequence and the people at risk. There is a certain level of flood that will trigger the failure of both (a PMF or larger, plus a very fast breach of the Middle Dam). You can have a very safe dam with an extreme classification because of the downstream consequences.

Q: If we choose an option and do the remediation work, is there an ability to come back and request a change in the consequence rating after the improvements are done?

A: No, you wouldn't do it because of the improvements made. The consequence rating is what it is. Any improvements you do will not change the consequence rating. You could ask for a change in the consequence rating because you have new information of people at risk from the failure of the dams.

Q: What does that involve? A complete re-run of the information in the inundation area? You said you haven't done this because you were concerned with improvements to only the Lower Dam.

A: The study has already been done by AE (2013). AE was clear that certain aspects of that study were beyond their scope of work; they didn't consider breach times which are incredibly important. They took a very conservative number. If you are determined to change the classification, you could do it on that premise.

Q: AE based it on 1,800 people and now the total number is believed to be 25% less, which may affect that. I am hearing that that's a whole different approach that may not meet our goal anyway, so does our goal go back to one of the recommendations? Do you have a sense of what it would take to do a re-evaluation to determine if the fatalities fall under 100 and therefore fit into the *very high* classification or less?

A: It wouldn't take that much; AE has done a number of inundation runs already as part of the risk assessment. We could look at scenarios for the Lower Dam to assess the number of people at risk.

Q: GA has been retained to recommend options. To pursue a reclassification of the dams steers us in a different direction which is not the mandate of this Committee. From a timing perspective, would we be unable to do improvements in 2014 if we started to re-evaluate the classification?

A: DSS is engaged already and they are familiar with the system, so you could use the information from AE and apply more analysis (look at a range of breach times and new population numbers). There are not near as many people at risk which is the basis for a review of the classification.

Q: Will the improvements to the dam, combining probabilistic and deterministic approaches, allow us to decrease the design parameters that have been provided?

A: You do not want to mix the two; you either go with risk based or deterministic. We have made a decision to go with the risk-based approach.

Q: Does the current classification affect the risk-based approach remediation options?

A: No, usually the classification of the dams is assessed during the Dam Safety Review (DSR).

Q: If the City decided as an ongoing cost liability issue that it was worth pursuing a reduction of the classification, then is this something that the Technical Committee would want to recommend to the City to pursue?

A: Yes.

Q: If some buffering work was done to the Middle Dam, would this reduce the work required in any or all of the options for the Lower Dam?

A: The Middle Dam will be affected during an earthquake, but it's not a very big reservoir so it doesn't trigger very much water going downstream. Under the conservative scenario, it only results in 75m³ having to be passed by the Lower Dam. If you buttress the Middle Dam it will withstand a much larger earthquake, but it wouldn't make any difference. The Middle Dam will fail in a pretty good storm and a buttress won't help there.

Q: If the Middle Dam fails due to seismic or flood, would the Lower Dam fail and what would be the impact downstream?

A: Yes it would trigger overtopping of the Lower Dam and it doesn't have a large enough spillway. The impact on the downstream would have to be analyzed using different breach parameters based on a slower release. Another hydrograph would be necessary.

Q: The four options have approximate costs, but with additional costs added to some of them, they could be equivalent to the higher end options. How can you help us determine the uncertainties respecting additional costs?

A: Some options have more uncertainty than others. You could recommend more than one option. There are uncertainties that will change the costs.

Q: Will information in the DSR affect your review of the dams? If we came to the conclusion that the classification isn't as valid because some of GA's findings have not been incorporated. Have you ever done an Addendum to a DSR with the possibility of updating the DSR and possibly the classification?

A: It's not unusual to issue a DSR and in the process of that, find deficiencies in the dam and revise the DSR so those are struck off.

The telephone call with GA ended at 3:30 p.m.

Question: When the DSR is complete, will it have to be presented to the Provincial Government and can GA's information be attached to? City responded yes. The DSR has been completed by NWH. Once this process is finished and we have the information from GA, we could ask for the DSR to be reviewed to determine if the classification may change.

Question: Does the dam classification impact the assessment of the value of the homes in the Harewood area? City responded that the BC Assessment Authority assesses homes (not the City).

Committee Members' Preferred Options:

City – Option 3; Option 4 is secondary.

CDPPS (Lorne Gale) – Option 4 with a permanent siphon installed; Option 2 is secondary [provided reasoning in a document (a copy will be emailed to the Committee – **done**)]

CDPPS (Leon Cake) – Option 4

SFN (Chris Good) – Option 3 with the installation of a low flow valve and this option remains within the existing footprint in the park. Option 4 is secondary, but more information is required. Also, need to prove that contaminants won't flow downstream.

CDPPS (Geraldine Collins) – Option 4; least intrusive

CDPPS (Jeff Solomon) – Option 4; least intrusive

It was noted that a reverse siphon will need to be incorporated into the design for fish flow to satisfy SFN (Option 4). SFN prefers Option 3, but could suggest to its Council that the Technical Committee be invited attend a SFN Chief and Council meeting to explain their preferred options.

Question: (Option 4) Are there other companies in BC that have the machinery to mix and stabilize the soil? City responded that prior to GA being retained for the engineering work, they were advised that they could not design and construct the remediation work. They chose to design. There is at least one other company in the province that can do this work.

3. Content and Process for Report to Executive Committee on Phases 1 and 2

CDPPS stated that the Technical Committee needs to agree on the options presented to the Executive Committee.

City stated that there may not need to be a unanimous decision on the options, but the Report to the Executive Committee can provide the various options chosen by all three parties (CDPPS, SFN and the City) and their reasons for supporting one option over another.

CDPPS expressed concern with making a recommendation to the Executive Committee without receiving further information (the unknowns) from GA. City responded that we won't have all the answers until a detailed design is done. Two concerns are how long the approval process will take for Dam Safety; and the risk-based analysis is an unproven method.

Facilitator – You are not making a recommendation on one option or the other. The Technical Committee will be recommending that further work should be done and a timeline and process for that.

Question: Will the Technical Committee have an opportunity to review the preferred option(s) again after further information from the risk workshop and other unknowns are received from GA? The Facilitator responded that the Technical Committee can recommend to the Executive Committee that the term of the Technical Committee be extended to allow it to receive the additional information from GA necessary for a final report by the end of April.

City stated that until there's a detailed design in place and reviewed by DSS, we won't have all the information. These are only estimates for costs. GA needs to continue with conceptual designs of the options we are recommending.

CDPPS stated that there are questions that need to be answered before we can go forward with a recommendation that we feel comfortable with.

Facilitator – The Recommendations in the Executive Report will identify that additional work is required, as well as a proposed timeline for design work, permitting, tendering and construction.

Question: Is everyone in support of Option 4 (overtop dam) and then Option 3 (labyrinth) as secondary, although a tender will be required for the actual costs? CDPPS stated that Option 3 may have Ministry of Environment (MoE) issues and Option 4 has other unknowns. We need to hear the rest of the information from GA in order to make the right decision. Don't feel comfortable with not being involved further because it doesn't feel like the Technical Committee has finished its job.

Agreed: To recommend to the Executive Committee that the term of the Technical Committee be extended to allow it to receive the additional information from GA and to make a final report to the Executive Committee by the end of April 2014.

CDPPS suggested that the *Long-Term Mitigation Processing Structure* chart (Appendix B) to the Council Report dated 2013-Oct-21 be amended to include the Technical Committee in reviewing the technical information.

SFN again recommended that a low level valve/siphon be included in the design for both Options 3 and 4 and cannot support Option 4 completely until more information is received.

City stated that Option 4 may not be viable because of the length of time required for the approval process.

Facilitator – We will have more information from GA and a better understanding of the options in 8 weeks' time. The Executive Report will state: that very preliminary cost estimates have been provided by GA, but it seems possible to implement a remediation option that will meet the objective of cost-effectiveness (in line with the original budget) and will not trigger the need for long-term borrowing by the City; and also that further substantive work is required in order for the Technical Committee to make a clear recommendation on Options 3 and 4.

Agreed: Facilitator will draft a report to the Executive Committee for the Technical Committee to review Friday and finalize.

Agreed: The Technical Committee will review the content of the Council Report and a separate public update.

Question: Can a public forum including the engineers be held to satisfy the community's questions? City responded that this may happen in a Council meeting and a meeting open to the public could be held in future.

4. Next Meeting

The facilitator may call a meeting if required; otherwise the next meeting is scheduled for Tuesday, April 10, 9:00 a.m. - 4:00 p.m., City Board Room.

5. Conclusion:

The meeting concluded at 5:00 p.m.