

CONFIDENTIAL MINUTES
COLLIERY DAMS TECHNICAL COMMITTEE
MONDAY, 2014-MAY-12 AT 1:00 P.M.
BOARD ROOM, SERVICE & RESOURCE CENTRE, 411 DUNSMUIR STREET

PRESENT:

Snuneymuxw First Nation:

Chris Good
Raymond Lamont

Colliery Dam Park Preservation Society:

Jeff Solomon
Geraldine Collins
Lorne Gale
Leon Cake

Golder Associates:

Bruce Downing, Principal

City of Nanaimo:

Toby Seward, Director, Social & Protective Services
Holly Pirozzini, Recording Secretary

Katherine Gordon, Facilitator

1. Call to Order

The meeting was called to order at 1:00 p.m.

2. Dam Safety Section Classification Decision for the Lower and Middle Dams

Discussion respecting an email to Toby Seward, City of Nanaimo, from Scott Morgan, Dam Safety Section, dated 2014-May-08, *Middle Chase River Dam and Lower Chase River Dam – consequence classification* [**email was forwarded to all Technical Committee members on 2014-May-08**]. Excerpt from the email stated:

*Based on Golder Associate's recent field investigation on Lower Chase River Dam and their subsequent engineering studies and risk analysis on both Middle and Lower Chase river Dams, our office expects it is appropriate to lower the failure classification of the Middle Chase river Dam from extreme to **high** and the classification of the Lower Chase River Dam from extreme to **very high**.*

Golder Associates (GA) stated that Dam Safety Section (DSS) making a final decision on the classification and approving the proposed approach to remediating the Middle and Lower Dams are subject to a review of GA's final report (studies and analysis documents). DSS won't officially confirm consequence classification of the dams without this information, but does consider it reasonable for planning of the remediation work to begin, based on the expected changes. DSS has stated the next steps are: completion of the analysis, conceptual design work and preliminary pricing, and provision of proposed design hazard frequency levels, followed by a discussion and agreement upon what will be acceptable design levels.

Question: Should DSS be asked why they have proposed a **very high** classification of the Lower Dam after GA requested a **high** classification at the presentation in Victoria on 2014-Apr-24? GA responded that the dam behavior is similar for **high** to **very high** classifications; the classification doesn't really affect the design, as will be shown in the following presentation.

Question: Can the classification be further pursued with DSS? GA responded that this would not be the best use of their time because the inputs used with a **high** or **very high** classification have almost the same consequence.

Question: Can some signage in and around Colliery Dam Park be removed because of the reduction in the dam classifications? City responded that this will be reviewed and will report back to the Committee.

CDPPS stated that the classification for the dams is meaningful to the community. DSS should be asked why the Lower Dam has been given a **very high** classification because the community's perception would be to have this classification reduced. DSS will be asked to provide a rationale at the next meeting.

4. Update on Seismic Analysis for Lower and Middle Dams

GA provided a power point presentation of their seismic analysis of the Lower Dam concrete core wall for Maximum Credible Earthquake (MCE) and 2475 return period earthquakes, based on site investigation data and supported by analysis from a seismic-structural specialist. **[Copies to be distributed to Committee Members]**.

GA stated that a Structural Engineer from UBC who specializes in seismic analysis, was hired to conduct the study on the Lower Dam only (using FLAC software). The core wall data from the Lower Dam was then applied to make predictions about the Middle Dam based on the same assumptions.

Seismic results of the Lower and Middle Dams:

- extremely low likelihood of concrete core wall toppling (which would lead to overtopping);
- more likely to fail by internal cracking and become 'leaky';
- less likely to lead to a rapid breach; and
- currently evaluating the post seismic condition using SEEP/W software which will change the design parameters.

Note: The seismic analysis of the dams focused on the safety of the dams, rather than the ability for the dams to remain functional after an earthquake. This is consistent with the risk assessment approach.

5. Options Update – Lower and Middle Dams: Direction for Golder from Committee

GA reviewed the DSS Findings - Table 6-1 B – Flood and Earthquake Hazards, Standards-Based Assessments and stated that there would be a measurable improvement in safety with remediation work being done on the Lower Dam, as well as a Middle Dam spillway. Without extra work being done on the Middle Dam, the risk falls in the lower part on the ALARP graph.

Question: Is GA changing its previous recommendation to not do anything to the Middle Dam? GA responded that the risk assessment has been updated since March and further modifications have been done. We now know that DSS want both a deterministic and a risk-based approach considered. We can't ignore the classification and what's driving that.

CDPPS stated that the City is the dam owner and they make the decision on remediation and design levels for the dams. GA responded that a decision needs to be made in consultation between the dam owner and the regulator (DSS), but the regulator will have the final call on approving or not approving.

SFN stated that the ideal outcome is that both the owner and the regulator reach agreement on the remediation plan.

City stated that GA was requested to take a risk-based approach forward to DSS. To take both deterministic and risk-based approaches would have been a lot more work.

Question: Does Dr. Bill Roberds support both approaches? GA responded yes, he supports both methods of analysis being pursued because DSS have stated that they want both to be considered and that they won't support only a risk-based approach. DSS want to use both approaches as a benchmark.

Question: With respect to the inundation area, will some work have to be done to the spillway regardless? GA responded yes.

Question: Is it practical to try to achieve a solution that is below the ALARP risk line? GA responded that if remediation work is only done on the Lower Dam, the risk is placed between the two lines on the graph (below unacceptable and above acceptable). Based on property values, it may not be practical to achieve getting below the acceptable line. The annual property loss isn't built into the Canadian Dam Association (CDA) Guidelines.

Discussion occurred about whether remediation of the Middle Dam is required.

Agreed: To return to this issue later in the meeting after reviewing the rest of the ppt presentation.

GA presented diagrams on deepening the Middle Dam spillway. These are conceptual only with a view to establishing what might be required and costs should remediation work have to be done to the Middle Dam and are being brought to the Committee for discussion on the approach to the Middle Dam.

Question: Is DSS willing to accept the risk analysis study that has been done? GA responded yes, this was stated in the email from Scott Morgan, dated 2014-May-08 (Item 2. above). He referred to (Table 6-1-A) in the CDA Guidelines which is the risk analysis approach. We should put the documentation together (complete the analyses, conceptual design work and preliminary pricing) and provide DSS with proposed design hazard frequency levels.

Question: What are the frequency levels? GA responded it's the 1/100 yrs vs. 1/1,000 yrs vs. 1/2475 yrs.

Question: If the risk model indicates that the risk is As Low as Reasonably Practicable (ALARP) without doing anything to the Middle Dam, what justification do we need to provide to DSS to be able to mutually agree that this is acceptable? Why are we considering doing any remediation work at the Middle Dam? GA responded that being within the ALARP means that we have to show that it is impractical based on pricing, which is why DSS has requested preliminary pricing and a conceptual design to determine if that is reasonable.

Question: If it ends up costing \$1 million extra to do work at the Middle Dam and it doesn't make any difference to the ALARP risk, will that be part of the discussion with DSS? GA responded yes.

Facilitator – Need to have a sense of what the impact of the options for the Middle Dam would be. Will work on the Lower Dam affect the work on the Middle Dam? The two are correlated. GA agreed.

Question: How do you put a value in losing 50% of the water and the environmental effect of that? GA responded by providing the pros and cons of options for the Middle Dam:

- widening the spillway (fraction of what Lower Dam is because the grade is not as steep and it's in rock);
- adding a swale (not possible at Middle Dam if deepening the spillway);
- building a labyrinth with a weir at the front (extra expense);
- armouring the shell (more attractive and feasible due to smaller surface area).

GA stated that it is much easier to address remediation options for the Middle Dam than the Lower Dam. The cost of armouring at the Middle Dam is unknown, but assumed to be much less.

Question: The main concern with lowering the spillway in the Middle Dam is the potential reduction in water levels in the lower lake, so would installing a weir at the Middle Dam address this? GA responded yes, a weir would bring the water level up.

CDPPS stated that the difference between not doing something at the Middle Dam and doing something was an order of magnitude difference. The gain in doing work in the Middle Dam would be going from 1/100,000 yrs to 1/million yrs chance of fatality. Need to decide if there is a great value in spending money on the Middle Dam.

Question: Are we trying to show DSS that the work being done on the Lower Dam is sufficient and that doing work on the Middle Dam won't make a significant difference; work there would be invasive and unreasonable due to costs? GA responded yes, but spillway upgrades could be done for not much money.

SFN stated that the work GA has undertaken is critical to have a complete conversation with DSS respecting remediation work. Knowing the costs for preliminary design work at the Middle Dam is necessary because it's the only way to satisfy DSS.

Question: Can we be certain that providing costing and preliminary designs for the Middle Dam will be enough to prove to DSS that it's not good use of our dollars or will they also require remediation work on the Middle Dam? GA responded that it's a possibility, but DSS cannot be bypassed because they are the regulators.

Question: Can DSS be convinced that overtopping of the Middle Dam is acceptable because we have analyzed the number of fatalities impacted downstream and we can accept the consequence? We will still provide pricing of the work to show the worst case scenario and whether work has to be done at the Middle Dam. GA responded that the timetable for completing work this year could be affected unless these deliberations occur in parallel with work agreed to be done on the Lower Dam.

CDPPS expressed concern about spending time and money on doing work on the Middle Dam when it has no consequence.

Facilitator advised that DSS was asked if work on the Lower Dam can be done this year and the Middle Dam addressed next year. DSS stated that they would be open to having this discussion. Now the Committee needs to focus on options for the Lower Dam.

Question: After the risk assessment meeting in Vancouver and the meeting with DSS in Victoria, we still didn't get an answer to whether it's acceptable to do nothing at the Middle Dam. Is it necessary to price out options for conceptual design work at the Middle Dam to reach an ALARP level of acceptance? GA repeated that their interpretation is that if DSS sees fixes are expensive and invasive with minimal impact they may not require the work to be done.

SFN stated that the information provided to DSS is incomplete and until they receive all the information, it is unrealistic to assume that they will commit to whether they will accept work being done on only the Lower Dam.

CDPPS stated that it is unclear at this point what DSS wants? It can't be assumed that they will accept the options that we provide them with.

City stated that we know we have to remediate the Lower Dam and we may also have to remediate the Middle Dam, so we need GA to provide pricing for both.

Question: Is GA in a position by next week to provide hard costs for remediation of the Lower Dam and rough costing for the Middle Dam? GA responded yes, we can provide conceptual level costing for remediation of the Middle Dam. DSS is asking for more information, so we need to prepare pricing on remediation of the Middle Dam and it may demonstrate that it may not be cost effective.

Facilitator – Is it possible to have a two-phase approach discussion with DSS? Can we provide all the information respecting the Lower Dam remediation plan and get this moving forward with a set timeline? Then we may be able to provide further information on the Middle Dam at a more leisurely pace, including demonstrating that the risk associated with the Middle Dam may not be significantly improved by doing remediation work. GA suggested asking DSS at the meeting on May 20 if this would be acceptable.

City stated that on May 20 DSS needs to hear the Committee's presentation respecting the Lower Dam remediation and then advise DSS that remediation of the Middle Dam is not desirable for various reasons. We can arrange a conference call with DSS, prior to May 20 to have this discussion with Scott Morgan, Bruce O'Neill and Glenn Davidson because Glenn will not be attending that meeting.

CDPPS stated that we know the Lower Dam needs to be addressed, but we don't know if we need to do work on the Middle Dam; it may be political.

City stated that the whole project needs to be priced before beginning. Need to get approval for the entire amount of money now, even if remediation work is done on the Lower Dam this year and the Middle Dam later.

Question: Why would money be set aside to do Middle Dam remediation work in future years? City responded that it will not be possible to do the Middle Dam work this year, and it may not be needed in future, but the money needs to be set aside.

Question: Will all three costings be provided at the May 20 meeting? GA responded no, but will provide costing for the armouring/hardening of the downstream shell and adding a labyrinth weir.

GA presented diagrams of the Middle Dam spillway deepening and a Lower Dam labyrinth spillway plan (18m), as well as cost inclusions / exclusions for both 12 m and 18 m labyrinth weirs. He stated that the costs have doubled from earlier estimates because of the heavy concrete walls and foundations:

- Large spillway - 18 m labyrinth weir (\$5,432,185.68);
- Small spillway - 12 m labyrinth weir (\$5,214,769.41).

Question: Will you be able to provide pricing for lock block walls or other alternatives for the concrete foundations by May 20? GA responded yes.

Question: Can we rely on the overtopping projection/costs? GA stated that costing is subject to design and will provide that information at the May 20 meeting.

Question: If work is also done on the Middle Dam, will it make a difference on the costs for the Lower Dam option? GA responded no, there will hardly be any difference in the cost.

GA stated that further information will be provided on the Lower Dam spillway (alternate wall designs/cofferdam options and layout), on the Middle Dam spillway (cost estimating), and reporting.

Bruce Downing left the meeting at 3:15 p.m.

6. Public Information/Update

CDPPS requested that a formal statement be prepared by the Technical Committee indicating that the risks associated with the dams is significantly less than previously stated. The last public update was a 2014-Mar- 24 report to Council, including a financial update. The public has been put on alert and haven't received any feedback regarding the actual risk. \$750,000 has been spent assessing the risk and the public haven't received any feedback. We have a complete risk analysis and it's very clear now that the risk has been overstated. We could live with having one sign before the bridge on Howard Avenue (entering) and one sign after the bridge (leaving). The Probable Maximum Flood (PMF) is now a 1 in 50,000 yr event. The public has only seen the inundation area map indicating a huge consequence. Now there is seismic information and an analysis of the Lower Dam. GA has stated that the structures are not as vulnerable as previously thought and even if there was a big event, the dams are not going to disintegrate.

Question: What do you want to communicate to the public? CDPPS responded that the public should be advised of the reduced risk.

Facilitator – Suggested that the authors of the risk assessment could provide a summary of the risk profile of the dams now as compared to what was known earlier.

City stated that a public statement be provided after next week's meeting that contains the whole package of information (assessment is complete, and next steps).

CDPPS stated that the public message needs to be corrected because people were told that there was a 40% probability of the dams failing in a 50-year timeframe; that 150 people could die with both dams disintegrating; and there's a very high chance of people downstream being affected. We now know that 150 people have been reduced to lower than 11 people could die.

City stated that no matter how many deaths, the preference is to provide the whole package instead of piece-meal information to the public. SFN was in agreement.

City stated that the presentation from GA on May 20 will be short and to the point. Ted Swabey and Ian Howat (Executive Committee) will be invited to attend, as well as DSS representatives.

CDPPS stated that this process has provided training for DSS in the risk assessment approach and now it appears that they haven't really accepted the approach. City disagreed with this statement.

Facilitator – GA believed it was beneficial for DSS to be present all along in the process.

Agreed: DSS will be asked to come later in the meeting to allow the Committee to have an initial discussion.

Discussion continued respecting the timing of a public statement.

Agreed: There is a commitment to communicating a message to the public from the Technical Committee about the current risk and will consult with GA to prepare a joint press release which will be drafted for the next meeting on May 20.

Question: When can signage be removed from the park area? City responded that the signs may have to remain until there is a solution in place, but will discuss with the City Manager the possible removal of some of the signs.

CDPPS stated that the conclusion after today's presentation is that seismic analysis of the dams has shown a significant increase in the breach time and achieves a better curve on the (Societal Safety Criteria – CDA 2013) graph than previously believed.

7. Names of Members

The Facilitator advised that a reporter from the Nanaimo Daily News has requested the names of the individuals on the Technical Committee. The Committee previously decided (2013-Dec-05) that there would be one contact for the whole Committee and that the Facilitator would take that role.

Agreed: Not to provide the individual names of the Technical Committee to the Nanaimo Daily News and to advise that the Facilitator is the contact to respond to questions on behalf of the Technical Committee.

8. Next Meeting

Tuesday, 2014-May-20, at 9:00 a.m. in the Board Room, Service and Resource Centre.

9. Conclusion

The meeting concluded at 3:45 p.m.