



April 9, 2015

File: 76915-20/D720001-00 & D720002-00

E.C. (Ted) Swabey
City Manager
City of Nanaimo
455 Wallace St
Nanaimo BC V9R 5J6

Dear Mr. Swabey:

Re: Middle Chase River Dam and Lower Chase River Dam – Order

Thank you for your letter, dated March 17, 2015, advising of the City of Nanaimo's (the City) March 16, 2015 Council Motion on Colliery Dams. We are also in receipt of the letter from Toby Seward, Acting City Manager, dated March 27, 2015, confirming that this motion remains Council's direction and providing a copy of the City's revised Colliery Dam Emergency Preparedness Plan (October 2014) along with the Operation, Maintenance and Surveillance manual for the Chase Dams (April 2004).

On February 25, 2015, a letter was sent to the City granting a one month extension to undertake the following steps by March 27, 2015:

- Select an option for remediation of Lower Dam;
- Prepare and submit to this office, a revised plan that clearly identifies and prioritizes all actions required to correct the potential safety hazard with Lower Dam. The plan must outline the timeline for taking those actions to address the recommended dam remediation requirements, as described by Golder Associates, within a reasonably expeditious time frame;
- Prepare and submit to this office, a revised conceptual plan that identifies and prioritizes any actions required to correct the potential safety hazard with Middle Dam, along with a timeline for taking those actions within a reasonably expeditious time frame, timed to follow after completion of actions to correct the potential safety hazard with Lower Dam; and,
- Implement both revised plans, based on the priorities identified in the plans, within a reasonably expeditious time frame and in accordance with Section 4 of the BC Dam Safety Regulation, as applicable to any alteration, improvement or replacement to all or any part of a dam intended to correct a potential safety hazard and which must be implemented in a timely manner.

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To date, this information has not been received and as a result, the City of Nanaimo is not in compliance with the B.C. Dam Safety Regulation, *Water Act*. Therefore, please find attached an Order, issued pursuant to Section 88(1)(d) of the *Water Act*, requiring the City of Nanaimo to correct the potential safety hazard of Middle and Lower Dam.

A right of appeal to my Order lies to the Environmental Appeal Board. Notice of any appeal must (1) be in writing, (2) include grounds for the appeal, (3) be directed by registered mail or personally delivered to the Chair, Environmental Appeal Board, 4th Floor, 747 Fort Street, PO Box 9425 Stn Prov Govt, Victoria, BC V8V 9V1, (4) be delivered within 30 days of receiving this Order; and (5) be accompanied by a fee of \$25, payable to the Minister of Finance.

You are also reminded that Section 92(9) of the *Water Act* states that: "An appeal does not act as a stay or suspend to operation of the Order being appealed unless the appeal board orders otherwise".

Sincerely,

A handwritten signature in black ink, appearing to read 'G. Davidson', written in a cursive style.

Glen Davidson, P.Eng.
Comptroller of Water Rights

pc: John Baldwin, Dam Safety Officer, Regional Operations, FLNR, Nanaimo
Toby Seward, A/City Manager, City of Nanaimo

ORDER

Section 88

Water Act of British Columbia

Dam File No.: 76915-20/D720001-00 & D720002-00

Water Licence File No.: 0355097 & 0355174

IN THE MATTER OF Conditional Water Licences C061424 and C061423, held by the City of Nanaimo (the City), which authorize the storage of 75 acre feet of water behind the Middle Chase River Dam (Middle Dam) and 140 acre feet of water behind Lower Chase River Dam (Lower Dam), as part of the Colliery Dam system on Chase River.

WHEREAS engineering consultant, Golder Associates (Golder), was retained by the City to be technical advisor to the City's Colliery Dam Technical Committee (TC). The TC's mandate was to identify an environmentally minimally invasive, cost and time effective remediation solution for the Colliery (Middle and Lower) Dam system that meets safety standards, among other things. The mandate also included the development of a permanent solution to be put in place in 2014 if possible, but not later than 2015, with shorter term mitigation put in place, if required, in 2014;

WHEREAS the focus was primarily on the remediation of Lower Dam as Golder had determined that Middle and Lower Dams act together as a system, with Lower Dam largely controlling downstream consequences. For this reason, Golder determined that the remediation of Lower Dam would provide greatest reduction in risk to those living downstream of the dams, and remediation of this dam should be given highest priority. Golder indicated, in its report, Dam Remediation Options (August 29, 2014), that the remediation of the Middle Dam would be addressed separately at a later date;

WHEREAS Golder undertook a number of studies and produced several reports including their Hydrology, Hydraulics and Middle Dam Breach Analysis (July 25, 2014) which determined that Middle and Lower Dam's spillways both have inadequate flood routing capacity to pass the design flood event which could result in the dams overtopping. The report states (pg i, Executive Summary):

"These calculations have determined that the spillway for the Middle Dam has the capacity to convey the flows associated with approximately the 50-year (2% annual exceedance probability) rainfall event. Storms larger than the 50-year overtop the dam embankment. The spillway for the Lower Dam has the capacity to convey the flows associated with approximately the 25-year (4% annual exceedance probability) rainfall event. Storms larger than the 25-year overtop the dam embankment."

WHEREAS Golder calculated the existing flood routing capacity of Lower Dam to be 55.0 cubic meters per second (cms), equivalent to a 1 in 25 year flood event;

WHEREAS Golder reviewed the failure consequence classification for Lower Dam and concluded that a *very high* classification was appropriate;

WHEREAS in Canada, current practice for selection of the design flood event for dam safety is suggested in Table 6-1B in the Canadian Dam Association's (CDA) Dam Safety Guidelines (2013);

WHEREAS, with respect to flood routing capacity for Lower Dam, Golder states (pg. 17, Colliery Dams, Nanaimo, BC, Report on Dam Remediation Options, Golder, August 29, 2014):

“...the risk of dam collapse due to flood events is significant and must be addressed by dam remediation to improve flood routing characteristics of the dam. The required flood routing capacity is given by the Table 6.1 CDA Guidelines, and is based on the Consequence Classification of the dam. For a Very High consequence dam, the dam must be able to pass a flood at least the equivalent of 2/3 of the way between a 1000 year and a PMF flood...”

WHEREAS in accordance with CDA Table 6-1B Golder calculated the design flood event of Lower Dam, a *very high* consequence dam, to be a total peak outflow of 144.0 cms. A total peak outflow of 144.0 cms is 2.6 times greater than the calculated 55.0 cms flood routing capacity of Lower Dam's current spillway;

WHEREAS insufficient flood routing capacity is considered a *potential safety hazard* as it may lead to overtopping and possible failure of the dams;

WHEREAS the City has completed numerous studies and now has sufficient information and options to make an informed decision on the course of action required to correct this potential safety hazard;

WHEREAS two of these options are conceptually acceptable to this office: the (a) labyrinth spillway design and the (b) auxiliary spillway design;

WHEREAS on February 25, 2015, under Section 7.1 of the B.C. Dam Safety Regulation, the City was requested to undertake the following steps by no later than March 27, 2015:

- Select an option for remediation of Lower Dam;
- Prepare and submit to this office, a revised plan that clearly identifies and prioritizes all actions required to correct the potential safety hazard with Lower Dam. The plan must outline the timeline for taking those actions to address the recommended dam remediation requirements, as described by Golder, within a reasonably expeditious time frame;

- Prepare and submit to this office, a revised conceptual plan that identifies and prioritizes any actions required to correct the potential safety hazard with Middle Dam, along with a timeline for taking those actions within a reasonably expeditious time frame, timed to follow after completion of actions to correct the potential safety hazard with Lower Dam; and,
- Implement both revised plans, based on the priorities identified in the plans, within a reasonably expeditious time frame and in accordance with section 4 of the B.C. Dam Safety Regulation, as applicable to any alteration, improvement or replacement to all or any part of a dam intended to correct a potential safety hazard and which must be implemented in a timely manner.

WHEREAS the City of Nanaimo did not comply with the above noted request and therefore is not in compliance with the B.C. Dam Safety Regulation, *Water Act*;

NOW THEREFORE, I, Glen Davidson, Comptroller of Water Rights, pursuant to Section 88(1)(d) of the *Water Act*, hereby order the City of Nanaimo to correct the potential safety hazard of Middle Dam and Lower Dam by:

1. Immediately undertaking the necessary steps to increase the flood routing capacity of Lower Dam to 144.0 cms, as calculated by Golder, in order to meet an annual exceedance probability design flood event level that is 2/3 of the way between a 1 in 1000 year flood and the Probable Maximum Flood (PMF) in respect of Lower Dam, by:
 - a. Selecting one of the two following Lower Dam remediation options (as described by Golder) in order to address the potential safety hazard of Lower Dam:
 - i. the Labyrinth Spillway Design (Report on Dam Remediation Options, Golder, August 29, 2014); or
 - ii. the Auxiliary Spillway Design (Auxiliary Spillway - Conceptual Design, Golder, January 16, 2015);
 - b. Notifying this office of the selected option **by May 1, 2015**;
 - c. Preparing and submitting a design report and construction plans, for approval under Section 4 of the B.C. Dam Safety Regulation **by May 22, 2015**;
 - d. Substantially completing the chosen remediation option **by October 15, 2015**; and
2. Once the chosen remediation option for Lower Dam has been completed (as required by Section 1 of this Order), the City must undertake the following actions:
 - a. Prepare and submit to this office **by the end of 2015**, a revised conceptual plan that identifies and prioritizes any actions required to correct the potential safety hazard with Middle Dam, along with a timeline for taking those actions within a reasonably

expeditious time frame, timed to follow after completion of actions to correct the potential safety hazard with Lower Dam; and,

- b. Implement the revised plan, based on the priorities identified in the plan, within a reasonably expeditious time frame **but no later than the end of 2017**, and in accordance with Section 4 of the B.C. Dam Safety Regulation, as applicable to any alteration, improvement or replacement to all or any part of the dam intended to correct a potential safety hazard and which must be implemented in a timely manner.

Dated at Victoria, British Columbia this 9th day of April, 2015.

A handwritten signature in black ink, appearing to read 'G. Davidson', with a long horizontal flourish extending to the right.

Glen Davidson, P. Eng.
Comptroller of Water Rights