

From: "Bill Sims" <[Bill.Sims@nanaimo.ca](mailto:Bill.Sims@nanaimo.ca)>  
To: B. T.  
Cc: "Mayor&Council" <[Mayor&Council@nanaimo.ca](mailto:Mayor&Council@nanaimo.ca)>, "GENERAL MANAGERS" <[GeneralManagers@nanaimo.ca](mailto:GeneralManagers@nanaimo.ca)>  
Sent: Tuesday, March 22, 2011 12:20:45 PM  
Subject: RE: safety of collier dam during earthquake

Hello B.T.

Thank you for your email. I apologize for the delay in responding – as you may have heard, the City's computer system has been down for several days. As you might expect, there is never a simple answer when it comes to predicting the results of seismic activity. Here's what we know about the Colliery Dams:

The City operates a total of 9 dams – 3 of them are for water supply and the remainder are for recreational purposes. In the Chase River system, there are four dams; one is for water supply – the City's Number 1 Reservoir; three of them are left over from Nanaimo's coal mining history, and serve as recreational ponds within Colliery Dam Park. Collectively they are known as either the Colliery Dams, or Lower, Middle and Upper Chase Dams.

The Lower and Middle dams were built by the Western Fuel Company in 1911 to store water for washing coal at their docks on the harbour. The dams' construction includes some of the first concrete poured in the Nanaimo area, in the form of a core wall. On either side of the core wall, generally compact rock fill provides the mass of the dam, along with some zones of loose cinders and coal slag. We have no records of their original construction, but inferred this information through test drilling, and historic research. After the 1950's, the dams were no longer used for coal washing. In the late 1970's, since residents were using the ponds retained by the dams for swimming, the City was required to apply for water licences. In the early 1980's, some minor upgrading was done to the dams. Since then, the City has developed a progressive approach to dam safety management for all its dams, and is diligent in complying with the legislation and guidelines around dam safety.

The City's dam safety program as it relates to the Colliery dams include:

- Weekly inspection and monitoring by trained operators of the dams
- Monitoring of seepage at the base of dams, for changes in characteristics – either quantity or quality
- Ongoing and annual maintenance work, such as brush clearing, or spillway cleaning, or repair of damaged areas

- Annual independent engineering inspection of each dam, with a major engineered dam safety review every 10 years
- Ongoing study of major dam safety issues on each dam
- Production and update of Emergency Preparedness Plans and Operation, Maintenance & Surveillance Manuals for each dam
- Immediate repairs in case of observed deficiency
- Ongoing upgrades if economically viable

As part of the ongoing study of major issues associated with each dam, the City recently commissioned a seismic assessment including modelling of the Middle and Lower Dams. The modelling is based on a number of assumptions, such as the 'peak ground acceleration' that would be experienced by the dams, the construction and foundation conditions. The modelling showed that the Lower Dam (the one closest to Howard) would continue to stand up in the case of an earthquake, although it would likely slump and become less stable. The modelling showed the Middle Dam's concrete wall would break and partially erode the dam's shell. This would cause water to run into the Lower reservoir.

At this time, it is not clear the extents of the inundation (flooded) area, if the dams were to fail due to a major flood event or subsidence in an earthquake. This is the subject of ongoing work. It is very difficult to determine the true effect of an earthquake on these structures; the seismic study only modelled one scenario. There are so many variables that could occur – magnitude, location, depth, direction of shaking. If your question referring to 'major' is in the range of a nearby 9.0 earthquake that the media has been telling us to expect here, it is likely that damage and devastation would be widespread across a good part of the Island, with unfortunate loss of life, property and environmental values, and extensive damage to much of the City's infrastructure. The contribution to this damage by these dams is likely to be relatively small in comparison to the overall damage. Failure of dams due to seismic activity are very rare based on world-wide experience.

In the near future, we will be initiating further dialogue with Council and seeking community input on future plans for these dams.

Please feel free to call me at 250-756-5302 if I can help any further.

Regards,

Bill

Wm. D. Sims, AScT

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City of Nanaimo

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[Bill.Sims@nanaimo.ca](mailto:Bill.Sims@nanaimo.ca)

From: Kimberley Robson  
Sent: 14-Mar-11 8:55 AM  
To: Bill Sims  
Subject: FW: safety of collier dam during earthquake

Good Morning Bill,

Is this something you would respond to?

Thanks!!

Kimberley

From: B. T.  
Sent: Saturday, March 12, 2011 12:28 PM  
To: ENGINEERING INFO  
Subject: safety of collier dam during earthquake

Hello. I live downhill from the collier dam. In the case of a major earthquake could you tell me what the chances are that the dam will hold together?

Thanking you in advance for this information.

B. T.