

**City of Nanaimo**  
**REPORT TO COUNCIL**

DATE OF MEETING: 2013-SEP-09

AUTHORED BY: TOBY SEWARD, ACTING GENERAL MANAGER,  
COMMUNITY SAFETY & DEVELOPMENT

RE: MIDDLE AND LOWER CHASE RIVER DAMS SHORT-TERM MITIGATION PLAN

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**STAFF RECOMMENDATION:**

1. That Council adopt the following recommendations as a comprehensive policy to mitigate, in the short term, the risk of injury or loss of life in the event of one or both of the Middle and Lower Chase River Dams in Colliery Dams Park failing:
  - (a) the Council policy, "Dam Safety", dated 2009-OCT-19 (Appendix "A"), to include the City of Nanaimo Dam Safety Management Program dated February 2013 (Appendix "B"); and
  - (b) the Middle and Lower Chase River Dams Emergency Action Plan (Appendix "C").
2. That Council direct staff to undertake the following steps to support the above-noted policies:
  - (a) Take the necessary steps to fulfil the requirements of this comprehensive policy outlined in this report, adopted by Council above, by 2013-OCT-31.
  - (b) Authorize staff to proceed with sole-source contracts to supply and install electronic notification/siren system, signage and miscellaneous services and equipment to fulfill the policy requirements.
  - (c) Proceed with a communication plan that is consistent with the policy adopted above to coincide with the implementation.
  - (d) On 2013-SEP-10, submit the comprehensive policy, if adopted by Council, to the Dam Safety Section.

**PURPOSE:**

The purpose of this report is to establish policy and processes to outline a monitoring and risk-mitigation action plan as a short-term strategy for the Middle and Lower Chase River Dams, located in the Colliery Dams Park. Further, in the event of the dams failing through an extreme weather condition or seismic event, establishing a warning system in the area below the Chase River Dams to evacuate all people in the previously-defined inundation area.

## BACKGROUND

At its meeting of 2013-AUG-07, Council directed staff to:

- (1) cancel the tender to remove the middle and lower Colliery Dams;
- (2) allocate \$2.5 million to work associated with risk mitigation of the Colliery Dams;
- (3) develop a short-term risk-mitigation plan;
- (4) engage the Snuneymuxw First Nation, the Colliery Dam Preservation Society, and the public and return to Council with a use strategy to deal with the long-term mitigation risks associated with the dams; and
- (5) direct staff to provide a recommended process that outlines the key steps and estimated completion dates of each step that will focus on the organization of addressing the life-safety and property concerns.

This report outlines key steps to deal with life-safety and health concerns associated with the Middle and Lower Chase River Dams (also known as the Colliery Dams) remaining in place into the near future. A number of systems are currently in place and these additional steps are intended to further improve the awareness of residents in the inundation area, improve the monitoring and notification processes, and further enhance appropriate evacuation behavior and response capacity, to assist in managing risk.

To manage what was originally planned to be a relatively short-term risk at the time (anticipated dam removal in the summer of 2013), a significant amount of response preparation work was undertaken in fall of 2012 and into 2013 to ensure residents were aware of the hazard and an evacuation could be conducted in an organized and effective fashion. All residents within the evacuation zone were notified of the risk of the dams as well as the proposed evacuation routes, muster points, and reception centres.

The Middle and Lower Chase River Dams Emergency Action Plan was developed in October 2012 and updated in the spring / summer of 2013. It outlines conditions consistent with the response level required, identified areas requiring evacuation and provided geographical organization in the assignment of branches and divisions within the incident command system. Pre-determined evacuation routes, assembly points, and access control points were established to ensure an evacuation could be carried out effectively. Based on a vulnerability analysis of affected homes, two Reception Centres were established to provide short-term assistance to those forced to evacuate their homes. The plan was distributed to first responding agencies and familiarization sessions were scheduled to identify roles, responsibilities, and communications. In addition, two half-day exercises of the Emergency Coordination Centre were completed.

Building off the current plan, a number of objectives have been established to manage the risk created by the aging dams. The objectives follow six general themes: the dam monitoring and sensing systems, notification strategy, information signs, public information, evacuation and response, and exercises as presented below.

### Monitoring and Sensing Systems

A series of flow monitors and motion sensors may provide notice of the risk of a dam breach in the event of an extreme rainfall event or a seismic event. The following objectives are associated with these systems and provide greater protection to the community.

1. To Establish Flow Thresholds

In heavy rainfall events, dam spillway water flow thresholds are an important component in monitoring water levels and ensuring the safety of residents. Staff have established thresholds that would trigger emergency action. Details of the thresholds and the response process are documented in the Middle and Lower Chase River Dams Emergency Action Plan and a Middle and Lower Chase River Dams Department Operational Plan.

2. To Provide a Monitoring Process

Continuous monitoring of the water level at four locations along the Chase River, including the spillways at the upper, middle and lower dams will be maintained. When flows are nearing thresholds, an alert process of key staff will commence. Other forms of monitoring include continuous monitoring of seepage downstream of the lower and middle dams; weekly inspections of the dams that include seepage quality, debris clearing, inspections after a nearby earthquake; and weather monitoring.

3. To Investigate Feasibility of a Ground Movement Sensor System

Although a significant seismic event may cause the dams to fail quickly and catastrophically; this may not necessarily be the immediate scenario. A seismic event may create a slower failure providing time to manage the situation and evacuate residents to safe areas. Sensors attached to the dams could detect movement of the structure and thus provide advance notification of a possible dam breach due to structural failure. Interconnection into the City's SCADA system, along with the monitoring/alarming of levels, could provide for immediate action by City staff and/or activation of the Emergency Coordination Centre (ECC).

4. To Develop a Departmental Operational Plan

To coordinate specific steps in various potential emergency conditions, the Public Works & Engineering Department will establish a specific Middle and Lower Chase River Dams Department Operational Plan. It will coordinate Public Works departmental actions in response to adverse conditions, outlining specific information related to inspection, the conditions present, a notification flow chart and thresholds for callouts and ECC activation, evacuation alerts, and evacuations. As an example, the plan would include mandatory inspection after significant seismic events within 300km. It would also assign staff to monitor levels in high-rainfall events.

5. To Formalize an Early ECC Activation Process

With completion of the above objectives, it is possible to activate the ECC early in the process. In conjunction with the Middle and Lower Chase River Dams Department Operational Plan, a streamlined approach to activation will improve the response to adverse conditions. This will help provide the required time to staff the required positions and initiate appropriate actions, including liaison with Emergency Management BC (EMBC) and issuing an evacuation alert or order. In seismic events, activation will commence immediately when situation status reports from personnel assigned to dam inspection provide direction.

6. To Update the Emergency Action Plan – Notification

The specifics of monitoring and sensing systems, as well as benchmarks for activation of the ECC, are information components that will be updated in the Emergency Action Plan. Specific steps and timelines are essential to ensure action is expedited and the

plan describes the steps to protect the general public should an unforeseen event with the dams occur.

#### Notification Strategy

The challenge in the evacuation and response process is providing warning as early as possible to residents within the area. The following objectives enhance early notification.

1. To Research Audible Systems

Research of an alternative siren warning system has been performed. Tsunami systems in Tofino and Port Alberni have been viewed and web research on similar systems is complete. One alternative that could expedite the process and place a system in operation by October 2013 is through the Fire Rescue Department's dispatch and radio communication contractor. Within 30 days, they could procure, install and test a system that will provide coverage to the inundation area with a number of automated activation methods. The system utilizes four sirens, each capable of alerting in a 1 mile radius. Sound penetration tests would need to be conducted to ensure penetration from the desired location. Additional sirens may be necessary, adding to the overall system cost.

2. To Identify and Secure Suitable Location(s) for Sirens

A number of potential siren sites have been assessed. Currently, the most appropriate site is Harewood Centennial Park near Howard Avenue and Seventh Street. Poles are in place that could be utilized to mount and power the system cost effectively.

3. To Purchase / Install a Notification System

It is of utmost importance that the siren notification system is operable as soon as possible, prior to fall rainfalls. In that light, there is little time for studies and tender call as notification of residents is now top priority. Because the purchase price will exceed the Purchasing Policy for a single-source purchase, staff recommend that, in this circumstance, purchase from a local radio communication contractor, Island Communications, be approved.

4. To Organize Testing of the Notification System

Once installed, the siren notification system will need to be extensively tested to ensure operation. This must be coordinated with door-to-door information so area residents understand the purpose of activations. A system of extended activation may be needed for actual emergencies, should they occur.

5. To Establish Operational Procedures

A number of procedures will be necessary to define the siren notification system activation and the applicable level of emergency. Such procedures will be documented and accessible in the appropriate operational areas. Public notification will be coordinated and specific to the adverse conditions where increased risk to public safety is identified.

6. To Promote Emergency Call Alert Within Inundation Area

Emergency Call Alert can provide immediate information to the public on incidents that are occurring. A separate database of affected properties will be developed to include inundation area residents. Sign up would also need to be done through door-to-door information session with residents. The system is capable of sending text, email or thousands of phone calls per minute.

7. To Establish a Media Communication Backup Plan

Staff have been working on a media plan to provide information to the public. Should primary communication systems be down (cell, landlines, etc.), as an example through a seismic event, back-up is required. Discussions have taken place with Island Radio to provide broadcasts through a radio link. Given the risk associated with the dams, staff recommend that this initiative be funded to provide the necessary back up for communications to expedite an evacuation.

Information Signs

Inundation areas, access/egress points, and evacuation routes have been established and reviewed by response agencies. The purpose of the following objectives is to provide greater awareness within the community, particularly the affected residents and those working, playing, schooling, or travelling through the inundation area.

1. To Research and Determine Dam Flood Area Sign Format

Appropriate signage format that meets established standards is necessary to identify the inundation area and evacuation routes on the ground. Research is underway and the next step is to complete the design and produce signs. This will be a significant commitment and require additional contract resources.

2. To Identify Specific Sign Locations

Specific sign locations near the perimeter of the inundation area that do not conflict with existing signage and meets the appropriate standards will be identified by staff.

3. To Design, Develop Information Signs in Key Locations

There are a number of areas within the inundation area where people from outside the area congregate. For example, John Barsby School and Harewood Centennial Park are two areas where non-residents may be in the event of a failure. Information signs regarding dam failure potential, siren activation, evacuation routes, and assembly areas need to be communicated.

4. To Erect Signs

Once signs have been developed, staff will erect them in the specified areas. Approximately 80 signs will be required. This will be a significant commitment and require additional contract resources.

Public Information

1. To Assemble an Information Package for Resident Distribution

An information package was previously delivered to residents in the fall of 2012 outlining the risk and evacuation procedures. With the achievement of other objectives, particularly the siren notification system, materials will require upgrading and redistributed. A one-page synopsis will provide an overview and reduce confusion of the considerable information that will be included. Through the review of the EMBC Evacuation Guideline, additional or alternate materials may be necessary. Previous address lists will be re-generated to establish the number of packages.

2. To Organize a Strategy to Outreach All Affected Residents

Improving the awareness of the affected community will enhance the response behavior of residents should an event occur. Initial door-to-door contact was made with residents in the fall of 2012 with use of part-time employees. Now that it is expected that the dams will remain in place into the foreseeable future, plus the addition of a number of risk reduction strategies, information will be distributed door-to-door. Further, a vulnerability

analysis will also be performed at that time to ascertain mobility, pets, and other factors associated with the evacuation.

3. To Determine Resources and Make Assignment for Delivery

The door-to-door outreach effort is an onerous task. In October 2012, City employees were utilized to reach out to the near 300 - 400 homes within the inundation area. Emergency planning staff believe that greater impact could be achieved by using uniformed personnel. An assessment of potential resources will be considered. Once identified, a distribution plan will be developed and implemented

4. To Consult with Other Organizations

As the City takes reasonable steps to manage the risk identified in engineering studies, it is prudent that consultation continue with the various emergency levels in the community, as well as emergency response actions and other components of the Action Plan. Discussions will continue with Snuneymuxw First Nation, School District 68, and the Colliery Dams Preservation Society. In addition, there is also opportunity to communicate with other affected parties such as the Harewood Neighbourhood Association, Regional District of Nanaimo (Transportation and Sewage Treatment), Southern Rail, and the Ministry of Transportation as each could be affected as a result of dam failure.

5. To Conduct a Public Meeting to Review Risk, Notification and Evacuation Procedures

A second opportunity to outreach the population within the inundation area is to hold a public meeting for affected residents. The session would provide all necessary information to minimize the risk to residents in the event of a failure.

Evacuation and Response

The initial Emergency Action Plan focused on the response levels appropriate for the risk at the time and provided for responders to “get in, alert and get out” expeditiously. With additional dam risk mitigation strategies in place, it may be possible to alter some evacuation procedures. The following objectives outline this review.

1. To Review EMBC Evacuation Guidelines

EMBC is considered a knowledgeable and professional source of information on emergency management issues. A comprehensive review of the Emergency Evacuation Guidelines is important to identify any potential gaps within the current Colliery Dams Emergency Action Plan. Any gap will require collaboration to ensure all reasonable steps are taken to achieve an effective evacuation.

2. To Update and Revise Emergency Action Plan

The initial Colliery Dams Emergency Action Plan was expeditiously assembled when the risk, hazards, and vulnerability of the dams were identified. Additional information is now being added to the plan. This will ensure all responders are knowledgeable in all aspects of the plan. As discussed in another objective above, critical steps in notification and activation procedures will be added.

Exercises

1. To Provide Evacuation Process Training to all Potential Responders

A lesson plan will be developed to ensure that all first responders executing an evacuation alert or an evacuation order are performing to an acceptable standard.

This also includes the safety and communication components of implementation. Training sessions will be scheduled with all potential assigned staff.

2. To Conduct Emergency Coordination Centre Exercises  
To ensure there is a high level of knowledge within assigned ECC staff, a series of exercises shall be conducted using a multitude of scenarios to reinforce site support level activities. Specific processes will be reinforced to expedite an incident action plan and evacuation plan that meets established requirements.
3. To Implement Interagency Incident Command Exercises  
An evacuation requires strict compliance with the principles of the Incident Command System. While Branches and Divisions are pre-established, supervisors must insure that an effective assignment and communications is conducted. Practicing the plan will ensure smooth implementation of an evacuation at the site level.
4. To Implement an Inundation Area Alert and Exercises  
To enhance appropriate evacuation behaviors, and identify any potential gaps within the *plan* an inundation area alert and exercise could be completed. This would solidify the appropriate actions of residents and re-distribute responsibility to achieve a faster more effective response in the event of a dam breach. It would also be coupled with a siren notification test. This is a difficult objective to achieve and will require information when door-to-door contact is made with residents. An exercise design team will be assembled to establish exercise inputs.

Respectfully submitted,



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CITY MANAGER COMMENT:

I concur with the staff recommendation.

Drafted: 2013-AUG-21  
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TS/kb/hp