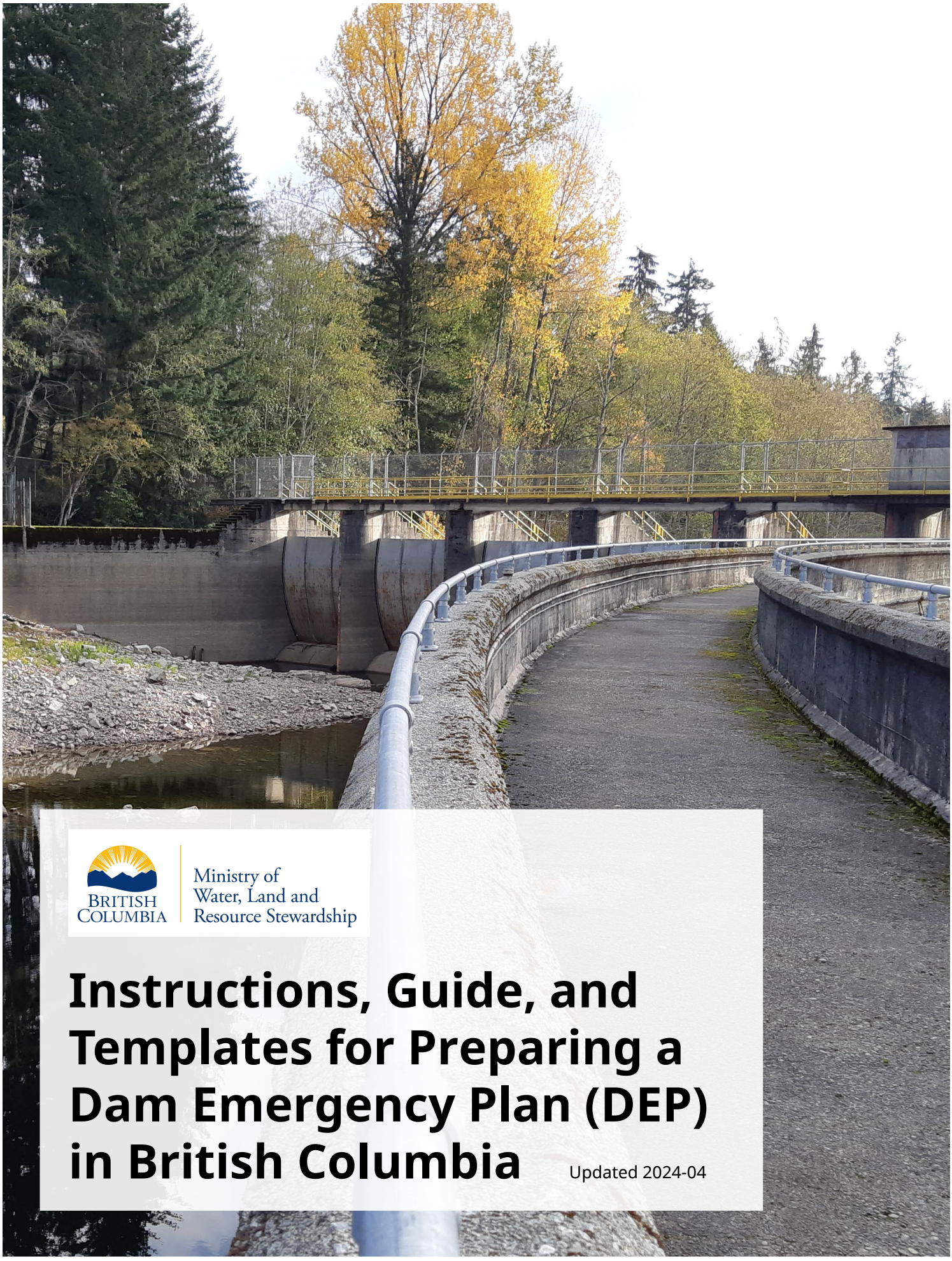


BRITISH COLUMBIA

Ministry of Water, Land and Resource Stewardship

Instructions, Guide, and Templates for Preparing a Dam Emergency Plan (DEP) in British Columbia

Updated 2024-04

Background:

Emergency response procedures and emergency preparedness plans have been a recommended best dam safety management practice since 1984 in British Columbia. The previous British Columbia Dam Safety Regulation required all owners of dams with a consequence classification of "Significant" or higher to an Emergency Preparedness Plan (EPP) for their dams.

In 2016, the Water Sustainability Act and revised Dam Safety Regulation replaced the Water Act and Dam Safety Regulation. The new regulation still requires owners of dams to prepare an emergency plan, now called a **Dam Emergency Plan (DEP)**. The dam owner may modify the existing DEP and submit it to the DSO for acceptance.

For an overview of the Dam Safety Regulation, please review this Information Sheet

Requirement:

As per Sections 9 and 33 of the Dam Safety Regulation, an owner of a dam that has a dam failure consequence classification of significant, high, very high or extreme must prepare a **Dam Emergency Plan (DEP)** that includes:

(i) a record describing the actions to be taken by the owner if there is an emergency at the dam, and

(ii) a record containing information for the use of the local emergency authorities for the dam for the purpose of preparing local emergency plans under the *Emergency Program Act*.

This guideline and the accompanying DEP template and example DEP were developed to assist dam owners in preparing their DEP.

Privacy:

This information is being collected under the authority of the *Water Sustainability Act Dam Safety Regulation*, and the *Freedom of Information and Protection of Privacy Act*. The Information will be used to administer provisions under the *Water Sustainability Act*. Questions can be directed to: dam.safety@gov.bc.ca.

Template Origin:

The Canadian Dam Association (CDA) provides guidance, in their Dam Safety Guidelines, on Emergency Preparedness for dam owners, local emergency authorities and communities. As well as this, the Association of State Dam Safety Officials (ASDSO) and the National Dam Safety Review Board (NDSRB) in the United States have developed an EAP Resource Center to provide dam owners with simple and low cost tools for creating and implementing an Emergency Action Plan (EAP) at their dam(s).

The *Guide & Template for Preparing a Dam Emergency Plan (DEP) in British Columbia* has been adapted from the CDA guidelines and ASDSO EAP Resource Center for use by dam owners in British Columbia to assist in the preparation of their mandatory Dam Emergency Plan. **The DEP template is intended for smaller to mid-sized dams but could also be adapted to larger dams.**

What's New?

The new DEP is similar in part to the former Emergency Preparedness Plan(EPP) as it must describe the actions to be taken by the dam owner if a hazardous condition or potential safety hazard at the dam is detected. However, in addition, Section 9(1)(a)(ii) of the Regulation now requires that the DEP include a *record* containing specific information about the dam to be used by *local emergency authorities* (as defined in Part 1, Section 1(2) of the Regulation) for their local emergency plan; a plan mandated under the Emergency Program Act. To prepare this record, the DEP template is designed so that several parts of the DEP can be easily separated to become the record described under Section 9(1)(a)(ii) of the Regulation for provision to local emergency authorities.

Those portions of the DEP that make up this record from the template are:

Sections 1, 2, 4.1 and Appendix A (A-1, A-2 & A-3).

It is recognized that many dam owners currently have Emergency Preparedness Plans in place. Section 33 (Transition – Dam Emergency Plan) of the Regulation outlines the date of the next review of this document and when changes, if any, must be submitted to the Dam Safety Officer for acceptance. Existing EPP's may be acceptable providing the Regulation requirement outlined in section 9(1)(a)(ii) is fulfilled. The DEP template is only a suggested model of an acceptable DEP and there is no requirement to follow it providing the information contained in the DEP is acceptable to the Dam Safety Officer (Section 9(1)(b)). For owners of previously unregulated dams, Section 33(1) of the Regulation provides timelines for submission of the DEP.

What to do once the DEP template has been completed:

Once the dam owner has completed the DEP, the DEP needs to be forwarded to the Dam Safety Officer for acceptance. The Dam Safety Officer may return the DEP to the owner with suggestions for improvement if not satisfied with the DEP. Once accepted by the Dam Safety Officer, and as per Section 9(10) of the Regulation, the dam owner must then forward the relevant sections of the DEP to the local emergency authority for the purpose of the local emergency authority's preparation of their own local emergency plans under the *Emergency Program Act*.

Once again, those portions of the DEP that make up this *record* from the template are:

Sections 1, 2, 4.1 and Appendix A (A-1, A-2 & A-3).

Using the DEP Template:

As every dam owner and their dam are unique, so are DEPs. Therefore, the DEP template must be modified to reflect your dam's requirements. To assist dam owners, the main components of an acceptable DEP are laid out in the DEP template.

To complete the DEP, simply follow the instructions after the FAQs and the fields will auto populate throughout the template.

Hyperlinks have been added to all key documents that all dam owners should be aware of.

Contact information and useful links:

BC Dam Safety general inquiries	dam.safety@gov.bc.ca
Locate the DSO for your dam	Dam Safety Officers
Locate your local Emergency Management and Climate Readiness(EMCR) office	EMCR

FAQs:

Q: **I am required to notify "persons in the immediate vicinity of the dam to be evacuated" if I discover a potential dam failure situation or a dam failure appears imminent or is in progress. How do I determine who these persons in the immediate vicinity are?**

A: First understand that "persons in the immediate vicinity of the dam to be evacuated" are defined by the CDA as the *persons located immediately downstream and adjacent to the dam where available warning time is very limited and where local emergency authorities could not be expected to respond in time.* Therefore, these would include persons living, recreating or otherwise close to the dam that would have very little warning time should evacuation be required. The distance below the dam that might be considered immediate vicinity depends on factors such as reservoir size, local topography, and stream slope (steepness), and local use and ease of access by persons to areas close to the dam.

Although there is no 'absolute right answer', the best way to determine who these persons in the immediate vicinity may be is to either; drive downstream of your dam and note persons living (or working) in the areas along the stream (taking note of who they are) or use Google Earth (or some other map with imaging) and look for homes or businesses located along the stream downstream of the dam. In both cases best judgment should be used to determine how far downstream you need to go (i.e., would a call from the dam owner be timelier than from the local emergency authority?). You must also consider others, for example, those who may be cut off by loss of their access road or owners of downstream dams. Every dam is unique, and you will need to consider your dam's specific situation.

As well as contact persons in the immediate vicinity you are responsible to notify the local emergency authority if you discover a *potential dam failure situation* or a *dam failure appears imminent or is in progress*, and it is the local emergency authority that is then responsible to notify and, if necessary, evacuate persons in imminent danger from an endangered area. The reason it is recommended that the dam owner take on the role of notifying persons close to the dam is because the local emergency authority may not have the time or *immediate* resources to undertake this function in as timely a manner as the dam owner.

Your Dam Safety Officer may be able to assist you in determining the "immediate vicinity" if required.

Note: if your dam has a consequence of failure classification of significant, you may not have persons that would be considered in the endangered zone and therefore this list may not be required in your DEP. Please confirm with your Dam Safety Officer.

Q: **I am required to prepare an "evacuation area map" but I am not sure how to do this.**

A: Evacuation area maps are different from dam break inundation maps. The CDA discusses inundation mapping which includes peak flood arrival times, depth of flow, velocity of flow along with impacted infrastructure including roads. Although these are all extremely useful information for emergency planning and decision-making, this information requires considerable expertise to develop. Dams with a consequence of failure classification of high, very high, and extreme are required to undertake a Dam Safety Review where the owner's engineering consultant may have prepared a detailed inundation or evacuation area map. If not, however, these dam owners can develop a basic evacuation area map by first erforming a simplified dam break analysis to estimate

FAQs:

flood flow, then estimating the possible flooded area through both investigating the downstream area of the dam both on the ground and using Google Earth (or some other map with current imaging) and using your best judgment.

Remember to think about access roads that may be washed out and persons that may be stranded as well as homes located in the valley bottoms close to the stream. Don't focus on the entire flood zone but on homes that most likely will be impacted.

Again, your Dam Safety Officer may be able to assist you on how to prepare an "evacuation area map" if required.

Note: if your dam has a consequence of failure classification of significant, you may not have persons that would be considered in the endangered zone, however access roads may be impacted and is something to consider on the evacuation map. Evacuation area map would be a very simple look at possible areas that could be impacted by a dam failure.

Q: **I am required to send a portion of the DEP to the Local Emergency Authority. How do I get more information about my Local Emergency Authority and how do I determine who my contact person is?**

A: The "Emergency Management and Climate Readiness" web site has a section called "Local Authority Emergency Management Programs". This section describes how local governments have the responsibility to lead the initial response to emergencies and disasters in their communities. Local governments prepare emergency plans and maintain an emergency management organization. From this web site you can also access information about the BC Emergency Management System including applicable legislation. There is also a link to the Civic Info BC Directory from which you can search for the Local Emergency Authority(s) responsible for the area around your dam and the downstream area.

Q: **What if I notice an error in the auto-filled fields imported into the sections of the DEP template that are to go to my local emergency authority? Can I simply type over the correct information?**

A: Please go back and review the information filled in Steps 1-6 and change the information there so it can correctly populate into the auto fields throughout the DEP template. If you change information in the actual template, it will impact other information provided.

Q: **If I am having problems filling out my DEP, who can I contact for help?**

A: Please contact your DSO (Dam Safety Officer). *Look for the PDF with all the names that is located at the middle of the page.*

Instruction on completing your DEP Package

Simply follow the steps below – all fields filled in will auto-populate throughout the document where required. **After completion, PLEASE review your entire DEP document to ensure everything been entered correctly and the information provided is clear and concise.**

1. Fill out the fields in the forms on the following pages:
   - ❏ Page 8 Basic DEP Data
   - ❏ Page 9 Directions to Dam
   - ❏ Page 11 Emergency Contacts
   - ❏ Page 13 List of Persons Located in the Immediate Vicinity of the Dam
2. Follow the instructions in the fields to upload maps:
   - ❏ Page 10 Access Map
   - ❏ Page 12 Upload Evacuation Area Map
3. Submit full document to your DSO for approval. Following DSO approval, submit following sections to local emergency authorities:
   - ❏ **Sections 1, 2, 4.1 & Appendix A (A-1, A-2, A-3)**
4. Complete the forms on pages and keep for future reference:
   - ❏ Page 43 Appendix B-2 – Emergency Services Contacts and Other Agencies
   - ❏ Page 44 Appendix B-3 – Emergency Response Resources
   - ❏ Page 45 Appendix C – Plan View of Dam
5. These additional forms below should also be completed but are not required to be submitted with the above sections to the DSO and your local emergency authority.
   - Section 4 – *Notification and Communication* (includes example messages for Emergency Situations)
   - Section 6 – *Records of Holders of Control Copies of the DEP*
   - Section 7 – *Records of Revisions and Updates Made to DEP*
   - Appendix B-1 – *Notification Charts*
   - Appendix B-2 – *Emergency Services Contracts and Other Agencies*
   - Appendix B-3 – *Emergency Response Resources*
   - Appendix C – *Plan View of Dam*
   - Appendix D – *Guidance for Determining Emergency Level*
   - Appendix F – *Dam Emergency Situation Report*

Completing your DEP package

Fill out all the fields below. They will auto-populate throughout the DEP package so once you have completed all the forms, the DEP will be ready for distribution to your Dam Safety Officer. Please contact your DSO if there is any information that cannot be captured in this DEP template.

Basic DEP Data: (Part of Section 1 and 2)

DAM NAME			
STREAM NAME			
LOCATION			
NEAREST POPULATION CENTER			
DISTANCE FROM NEAREST POPULATION CENTER (KM)	CARDINAL DIRECTION FROM NEAREST POPULATION CENTER		
IS THE DAM LOCATED ON A ROAD? IF SO PLEASE IDENTIFY			
CONSEQUENCE CLASSIFICATION			
DAM TYPE:	PROVINCIAL DAM FILE NUMBER		
HEIGHT (M)	LIVE STORAGE VOLUME (M^3)	DRAINAGE AREA (KM^2)	
SPILLWAY TYPE	LOW LEVEL OUTLET		
COORDINATES (LAT/LONG OR UTM)			
OTHER DESCRIPTION			
DAM OWNER	DEP AUTHOR		
COPY #	TOTAL # OF COPIES	REVISION #	DATE COMPLETED (YYYY-MM-DD)

Directions to Dam (Part of Section 2)

1. Main and access routes

MAILING ADDRESS			
ACCESS ROUTE 1:		ALL-WEATHER / SEASON ACCESS: ☐ Yes ☐ No	IMPACTED BY WEATHER: ☐ Yes ☐ No
ALTERNATE VEHICLES REQUIRED FOR ACCESS:	LIST:		
ACCESS ROUTE 2:		ALL-WEATHER / SEASON ACCESS: ☐ Yes ☐ No	IMPACTED BY WEATHER: ☐ Yes ☐ No
ALTERNATE VEHICLES REQUIRED FOR ACCESS:	LIST:		
ACCESS ROUTE 3:		ALL-WEATHER / SEASON ACCESS: ☐ Yes ☐ No	IMPACTED BY WEATHER: ☐ Yes ☐ No
ALTERNATE VEHICLES REQUIRED FOR ACCESS:	LIST:		

2. Access restrictions

DESCRIBE IN DEPTH ANY LOCKED GATES, CODES, ETC. REQUIRED FOR ACCESS

3. Persons with access to locked or restricted access routes

ACCESS RESTRICTIONS (LOCKED GATES, CODES, ETC.) — DESCRIBE IN DEPTH

Access Map (Part of Section 2)

Please click the blank box below to select and insert an image of a dam access map

Emergency Contacts

(Include all address information) (Part of Section 4 and Appx A-1)

DAM OWNER		EMAIL
OFFICE PHONE	HOME PHONE	MOBILE PHONE

EMERGENCY DAM CONTACT		EMAIL
BUSINESS NAME		BUSINESS ADDRESS
OFFICE PHONE	HOME PHONE	MOBILE PHONE

DAM OWNER'S TECHNICAL EXPERT		EMAIL
OFFICE PHONE	HOME PHONE	MOBILE PHONE

DAM SAFETY OFFICER		EMAIL
OFFICE PHONE	HOME PHONE	MOBILE PHONE

PRINCIPAL DAM CONTACT		EMAIL
OFFICE PHONE	HOME PHONE	MOBILE PHONE

ALTERNATE DAM CONTACT		EMAIL
OFFICE PHONE	HOME PHONE	MOBILE PHONE

LOCAL EMERGENCY CONTACT		EMAIL
OFFICE PHONE	HOME PHONE	MOBILE PHONE

Upload Evacuation Area Map (Part of Appx A-2)

Please insert image of evacuation area map here. Take a screenshot and ensure it fits within the page boundaries

To prepare an evacuation map refer to “Estimating Dam Break Downstream Inundation” available on the BC Dam Safety webpage and “Simplified Inundation Mapping (SIMS)” on the ASDSO ‘s EAP Resource Center for guidance. Include approximate location of persons in immediate vicinity.

(Note: if your dam has a consequence of failure classification of low or significant, by definition you will most likely not have person’s that would be considered in the endangered zone, however access roads may be impacted and therefore they are something to consider for inclusion on the evacuation map.)

List of Persons located in the immediate Vicinity of the Dam (Part of Appx A-3)

Complete

(Including residents and/or property & business owners)

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

PRIMARY CONTACT		ADDRESS
PRIMARY PHONE	MOBILE PHONE	DISTANCE FROM DAM

If you require more fields than allotted above, please include additional information when submitting DEP package to your DSO.

Table of Contents

Sections 1,2,4.1 and Appendix A (to be forwarded to local emergency authorities)

Dam Emergency Plan (DEP)

Dam Owner:

Prepared By:

Date:

Revision #:

1. DEP Overview

The purpose of this Dam Emergency Plan (DEP) is to reduce the risk of human life loss and injury and minimize property damage during an unusual or emergency event at:

This DEP has been prepared with the intent of meeting the requirements of the *Water Sustainability Act*, Dam Safety Regulation (Regulation). The dam owner and local, regional, and provincial response agencies all play a role in responding to an emergency under the *Emergency Program Act*.

Notifications regarding an unusual or emergency event at the dam are based on the three emergency levels which are determined by the dam owner:

The notification charts for each of the three emergency levels, located in *Appendix B-1*, must be reviewed, and if necessary, revised annually.

Section 9 (1) (a) (ii) of the Regulation requires the dam owner's DEP to include a record containing specific information on their dam to be used by local emergency authorities for their own local emergency plan; a plan mandated under the *Emergency Program Act*. Therefore, to fulfill this requirement, following approval by the Dam Safety Officer, the dam owner must provide ***Sections 1, 2, 4.1***, and ***Appendix A (A-1, A-2 & A-3)*** to relevant local emergency authorities. Subsequently, these sections are reviewed annually by the dam owner and, if required, updated and copies sent to the Dam Safety Officer and all local emergency authorities for that area.

2. Basic DEP Data

2.1 Dam Description

Dam Name:	
Stream Name:	
Consequence Classification:	
Dam Type:	
Provincial Dam Number:	
Height:	m
Storage Volume:	m^3
Drainage Area:	km^2
Spillway type:	
Low Level Outlet:	
Coordinates: (i.e. lat/long or UTM)	
Other description:	

See Plan View of Dam, Appendix C.

2.2 Directions to

MAILING ADDRESS			
ACCESS ROUTE 1:		ALL-WEATHER / SEASON ACCESS: ☐ Yes ☐ No	IMPACTED BY WEATHER: ☐ Yes ☐ No
ALTERNATE VEHICLES REQUIRED FOR ACCESS:	LIST:		
ACCESS ROUTE 2:		ALL-WEATHER / SEASON ACCESS: ☐ Yes ☐ No	IMPACTED BY WEATHER: ☐ Yes ☐ No
ALTERNATE VEHICLES REQUIRED FOR ACCESS:	LIST:		
ACCESS ROUTE 3:		ALL-WEATHER / SEASON ACCESS: ☐ Yes ☐ No	IMPACTED BY WEATHER: ☐ Yes ☐ No
ALTERNATE VEHICLES REQUIRED FOR ACCESS:	LIST:		
DESCRIBE IN DEPTH ANY LOCKED GATES, CODES, ETC. REQUIRED FOR ACCESS			
PERSONS WITH ACCESS TO LOCKED OR RESTRICTED ACCESS ROUTES			

2.3 Access Map to

3. General Roles and Responsibilities

The following are the basic emergency planning and response roles and responsibilities for the five key agencies involved when a level 2 or 3 emergency occurs. For more detailed information regarding emergency planning, preparedness, response, and recovery refer to the document, *British Columbia Emergency Management System* (BCEMS) 2016.

3.1 Dam Owner

- As soon as an emergency event is observed or reported, immediately determine the emergency level (see Guidance for Determining the Emergency Level, *Appendix D*).
  - » Level 1: unusual event, slowly developing
  - » Level 2: potential dam failure situation, rapidly developing
  - » Level 3: dam failure appears imminent or is in progress
- Imediately notify the personnel in the order shown on the Notification Chart (*Appendix B-1*) for the appropriate emergency level. This includes "persons in the immediate vicinity of the dam to be evacuated", Appendix A-3.
- Undertake appropriate remedial actions during Level 2. Remedial actions may be recommended by the Dam Owners Technical Representative or required by the Dam Safety Officer.
- Provide updates of the situation to the local emergency authority to assist them in making timely and accurate decisions regarding warnings and evacuations.
- Provide leadership to assure the DEP is reviewed and updated annually and copies of the revised DEP are distributed to all who received copies of the original DEP including the records for the local emergency authorities. Undertake DEP exercises as appropriate.

3.2 Local Emergency Authorities

Local emergency authorities support and coordinate the overall emergency response activities within its geographical or functional jurisdiction.

- Serve as the primary contact responsible for coordination of all emergency actions for potentially affected communities.
- When a Level 2 situation occurs:
  - » Prepare emergency response personnel for possible evacuations that may be needed if a Level 3 situation occurs.

3.2 Local Emergency Authorities (continued)

  - » Consider drafting a State of Local Emergency in preparation for Level 3.
  - » Provide resources as necessary to the dam owners.
- When a Level 3 situation occurs:
  - » Initiate warnings and order evacuation of people at risk downstream of the dam.
  - » Declare a State of Local Emergency if required.
  - » Direct local emergency response services (may include local law enforcement) to carry out the evacuation of people and close roads within the evacuation area (see Evacuation Area Map, Appendix A-2).
  - » Provide resources as necessary to the dam owners.
- Decide when to terminate the emergency.
- Participate in review, updates, and exercises of the DEP.

3.3 Emergency Management and Climate Readiness (EMCR)

Emergency Management and Climate Readiness (EMCR) is the lead agency in the provincial government for all emergency management activities. EMCR works with local governments, First Nations, federal departments, industry, non-government organizations and volunteers to support the emergency management phases of mitigation/ prevention, preparedness, response, and recovery. **EMCR has its headquarters, the Provincial Emergency Co-ordination Centre (PECC) and the 24/7 Emergency Call Centre (ECC) in Victoria. Six Provincial Regional Emergency Operations Centres (PREOCs) are in Terrace, Prince George, Kamloops, Nelson, Surrey and Victoria (co-located with the PECC).**

- When a Level 2 or Level 3 situation occurs, provide support as requested or required. For example:
  - » Assist local emergency authority when notified of the activation of local emergency plans with issuance of an emergency task number.
  - » Propagate the emergency information to other relevant stakeholders.
  - » Support the communication needs of local emergency authority.
  - » Declare a Provincial State of Emergency if required.
- Participate in exercises of the DEP.

3.4 Dam Owner's Technical Representatives

- Undertake an engineering assessment of the safety hazard at the dam.
- Assist the dam owner to determine the emergency level if time permits.
- Advise the dam owner of remedial actions to take if Level 2 event occurs, as required.

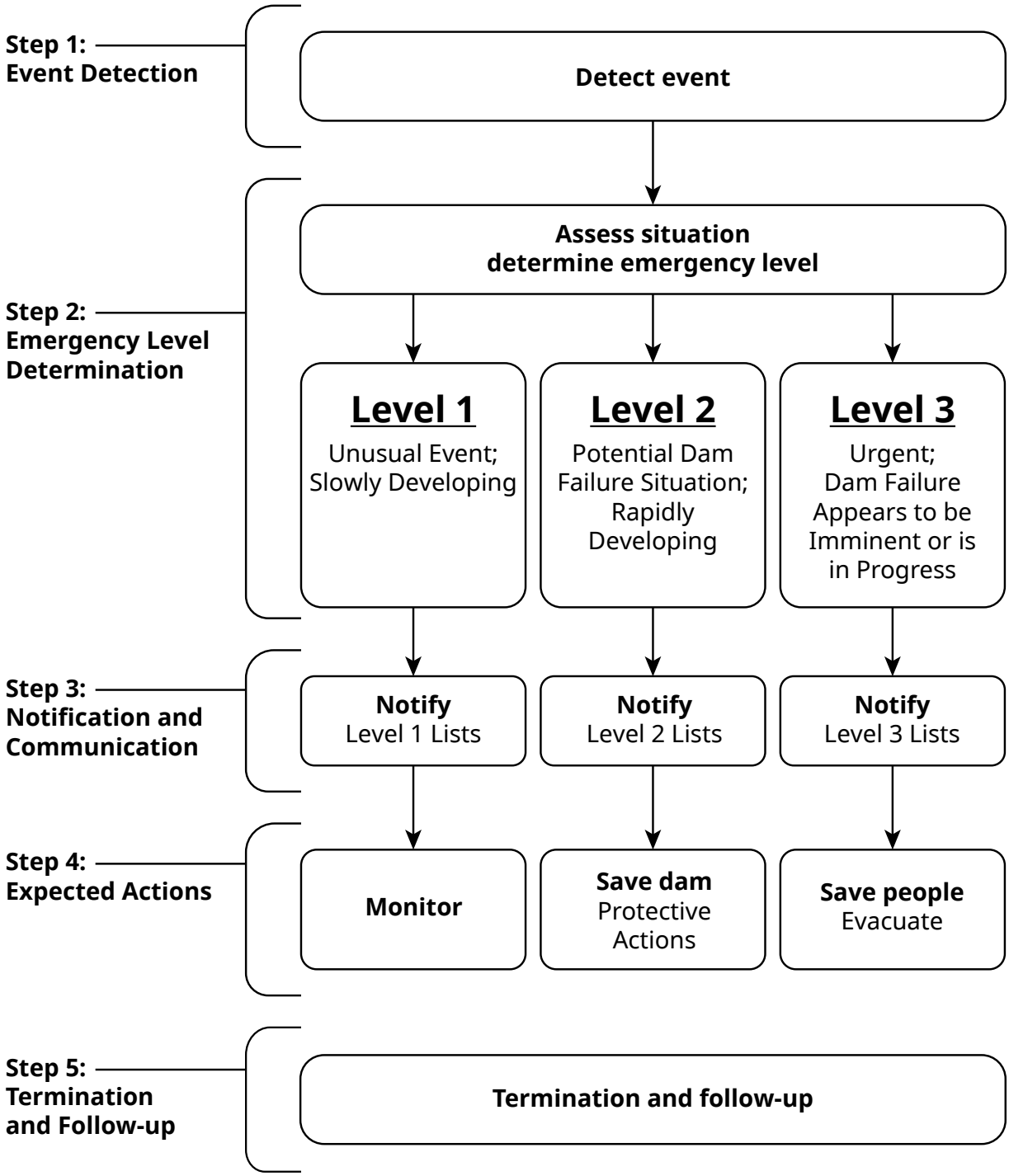
3.5 Ministry of Water, Land and Resource Stewardship (WLRS)

- WLRS is the ministry responsible for the provincial government's Dam Emergency Response Plan (DERP). The BC Dam Safety Program administers the DERP and has an active role in all levels.
- The Dam Safety Office (DSO) is the first point of contact in WLRS for Level 1 and is required to inform EMCR if a dam is at Level 1. EMCR may contact the local emergency authority at their discretion.
- The DSO may have an active role in Levels 2 and 3. The DSO may advise the dam owner of the emergency level determination.
- The DSO may advise the dam owner of remedial actions to take if a Level 2 event occurs.
- Support EMCR, local emergency authorities, and other agencies. The DSO may be called on to be the Subject Matter Expert at an emergency response center.
- The DSO is responsible for reviewing and accepting the DEP.

4. Five-Step DEP Process

4.1 DEP Overview

EAP Overview



4.2 Five Steps

Step 1 - Event Detection

This step describes the detection of an unusual or emergency event and provides information to assist the dam owner in determining the appropriate emergency level for the event.

Unusual or emergency events may be detected by:

- Observations at or near the dam-by-dam owner, government personnel (local, Provincial, or Federal), landowners, visitors to the dam, or the public
- Dam safety review, formal inspection, or site surveillance
- Evaluation of instrumentation data
- Earthquakes felt or reported in the vicinity of the dam
- Forewarning of conditions that may cause an unusual event or emergency event at the dam (for example, a severe weather or flash flood forecast)

Step 2 - Emergency Level Determination

After an unusual or emergency event is detected or reported, the dam owner or his alternate is responsible for classifying the event into one of the following three emergency levels *(See table* Guidance for Determining the Emergency Level *(Appendix D) for guidance in evaluating specific events to determine if they are unusual or emergency situations):*

Emergency Level 1 – *Non-emergency, unusual event, slowly developing:*

This situation is not normal and has not yet threatened the operation or structural integrity of the dam, but possibly could if it continues to develop (corresponds to Section 15 - *Potential safety hazard of the Dam Safety Regulation, Water Sustainability Act).*

Emergency Level 2 – *Potential dam failure situation, rapidly developing:*

This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure (corresponds to Section 14 – *Hazardous conditions* of the Dam Safety Regulation, *Water Sustainability Act*).

Emergency Level 2 is also applicable when flow through the spillway has caused or is expected to cause flooding of downstream areas and people near the stream channel could be endangered. The dam owner may need to refer to flood release operations as outlined in the Operation, Maintenance and Surveillance manual.

Emergency Level 3 – *Urgent; dam failure appears imminent or is in progress:*

This is an extremely urgent situation where a dam failure is occurring or obviously is about to occur and cannot be prevented. This situation is also applicable when flow through the spillway is causing downstream flooding and creates a hazardous condition that places persons in danger.

See Examples of Emergency Situations (*Appendix F*).

Step 3 – Notification and Communication

Notification

After the emergency level has been determined, the people on the Notification Chart (*Appendix B-1*) for the appropriate emergency level shall be notified immediately.

Communication

Attention: This is an emergency message from the

.

Listen carefully. Your life may depend on immediate action.

...located kilometers of

...is failing. Repeat.

...located kilometers of

...is failing.

If you are in or near this area, proceed immediately to high ground away from the valley.

Do not travel on

... of

...or return to your home to recover your possessions. You cannot outrun or drive away from the flood wave. Proceed immediately to high ground away from the valley.

Repeat message.

Step 3 – Notification and Communication (continued)

Emergency Level 3 – ***Urgent; dam failure appears imminent or is in progress:***

The following actions should be taken:

1. Contact all Persons in the Immediate Vicinity of the Dam (Appendix A-3) to advise them to vacate the endangered area and call the Local Emergency Authorities. Be sure to say, "This is an emergency." The Local Emergency Authority will implement their mandated emergency plan and begin the evacuation.

The following message may be used to help describe the emergency:

This is .

We have an emergency condition at ,

...located kilometers of .

We have activated the Dam Emergency Plan for this dam and are currently under Level 2.

We are implementing predetermined actions to respond to a rapidly developing situation that could result in dam failure.

Please be prepared to evacuate the area along low-lying portions of

... .

Reference the evacuation map in your copy of the Dam Emergency Plan.

We will advise you when the situation is resolved or if the situation gets worse.

I can be contacted at the following number – .
If you cannot reach me, please call the following alternative number .
You may also reach my emergency dam contact with the following phone numbers:

/ /

2. Notify Emergency Management and Climate Readiness and the Dam Safety Officer of this emergency (see Regulation, Section 14, *Hazardous conditions*).
3. Do whatever is necessary to bring people in imminent danger (anyone on the dam, downstream from the dam, boating on the reservoir, or evacuees) to safety.
4. Keep in frequent contact with the Local Emergency Authorities and to keep them up to date on the condition of the dam. They can help handle the emergency.
5. If all means of communication are lost:
   (i) try to find out why,
   (ii) try to get to another radio or telephone that works, or
   (iii) get someone else to try to re-establish communications.

If these means fail, handle the immediate problems as best as you can, and periodically try to re-establish contact with Local Emergency Authorities.

Step 3 – Notification and Communication (continued)

The following message may be used as a guide for the Local Emergency Authorities to communicate the status of the emergency with the public:

This is an emergency. This is .

,

...located kilometers of

...is failing. The downstream area must be evacuated immediately.

Repeat,

...is failing; evacuate the area along low-lying portions of

... .

We have activated the Dam Emergency Plan for this dam and are currently under Level 3. Reference the evacuation map in your copy of the Dam Emergency Plan.

I can be contacted at the following number – .

If you cannot reach me, please call the following alternative number .

Step 4 – Expected Actions

If the dam owner becomes aware of an unusual or emergency event at their dam, they should immediately determine the emergency level and the following actions should be taken. If time permits, the dam owner's Technical Expert should be contacted for technical consultation

Emergency Level 1 – ***Non-emergency, Unusual event, slowly developing:***

A. The dam owner should inspect the dam; at a minimum, inspect the full length of the upstream slope, crest, downstream toe, and downstream slope. Also, check the reservoir area, abutments, and downstream channel for signs of changing conditions. **If increased seepage, erosion, cracking, or settlement is observed, immediately report the observed conditions to their Technical Expert; refer to the table Guidance for Determining the Emergency Level (*Appendix D*) for guidance in determining the appropriate event level for the new condition and recommended actions.**

   The condition of the dam should be closely monitored, especially during storm events, to detect any development of a potential or imminent dam failure situation.

B. The dam owner must notify the Dam Safety Officer and prepare a plan, through their Technical Expert, that sets out any actions required to rectify this potential safety hazard (see Dam Safety Regulation, Section 15, *Potential Safety hazard*).

C. Record all contacts that were made on the Notification Chart (*Appendix B-1*). Record all information, observations, and actions taken. Note the time of changing conditions. Document the situation with photographs and video, if possible.

D. The Local Emergency Authority should be informed if it is determined that the issue may possibly develop into a worse condition that may require emergency actions.

Emergency Level 2 – ***Potential dam failure situation, rapidly developing:***

A. The dam owner should contact their Technical Expert, if time permits, to report the situation and request technical staff to investigate the situation and recommend corrective actions.

B. The dam owner must contact EMCR, the Local Emergency Authorities and Persons in the Immediate Vicinity of the Dam to inform them that the DEP has been activated and if current conditions gets worse an emergency situation may require evacuation. Preparations should be made for possible road closures and evacuations.

C. Provide updates to the Persons in the Immediate Vicinity of the Dam and Local Emergency Authorities to assist them in making timely decisions concerning the need for warnings, road closures, and evacuations.

D. If time permits, the dam owner should inspect the dam. At a minimum, inspect the full length of the upstream slope, crest, downstream toe, and downstream slope. Also, check the reservoir area, abutments, and downstream channel for signs of changing conditions.

   If piping, increased seepage, erosion, cracking, or settlement are observed, immediately report the observed conditions to the Technical Expert; refer to the table Guidance for Determining the Emergency Level (*Appendix D*) for guidance in determining the appropriate event level for the new condition and recommended actions.

   The dam owner should closely monitor the condition of the dam, if needed, modify the operation of the dam and undertake other appropriate hazard response activities.

Step 4 – Expected Actions (continued)

E. Record all contacts that were made on the Notification Chart (*Appendix B-1*). Record all information, observations, and actions taken. Note the time of changing conditions. Document the situation with photographs and video, if possible.

F. If time permits, follow the Emergency Remedial Actions for Level 2 Conditions (*Appendix E*) as appropriate.

Emergency Level 3 – ***Urgent; dam failure appears imminent or is in progress:***

The dam owner shall immediately advise the Local Emergency Authorities of the urgent condition of the dam and request that they lead the efforts to evacuate persons in the endangered area, carry out warnings and close roads (see Evacuation Area Map, *Appendix A-2*) to safeguard persons in imminent danger. The dam owner shall also

A. Immediately advise Persons in the Immediate Vicinity of the Dam (*Appendix A-3*) to vacate the endangered area.

B. The dam owner shall immediately contact others shown on the Notification Chart (*Appendix B-1*).

C. The dam owner shall maintain continuous communication and provide the Local Emergency Authorities with updates of the situation to assist them in making timely decisions concerning warnings and evacuations.

D. The dam owner should record all contacts that were made to Persons in the Immediate Vicinity of the Dam and record all information, observations, and actions and note the time of changing conditions. Document the situation with photographs and video, if possible.

E. Advise people monitoring the dam to follow safe procedures. Everyone should stay away from any of the failing structures or slopes and out of the potential breach inundation areas.

Step 5 – Termination

Whenever the DEP has been activated, an emergency level has been declared, all DEP actions have been completed, and the emergency is over, the DEP operations must eventually be terminated, and follow-up procedures completed.

Termination responsibilities

The Local Emergency Authority is responsible for terminating DEP operations and relaying this decision to the dam owner. It is then the responsibility of each person to notify the same group of contacts that were notified during the original event notification process to inform those people that the event has been terminated.

Prior to termination of a Level 3 event that has not resulted in an actual dam failure, the dam owner's Technical Expert or the Dam Safety Officer will inspect the dam or require the inspection of the dam to determine whether any damage has occurred that could potentially result in loss of life, injury, or property damage. If it is determined those conditions do not pose a threat to

people or property, the Local Emergency Authority will be advised to terminate DEP operations as described above.

The dam owner shall ensure that a final Dam Emergency Situation Report (*Appendix F*) is completed and document the emergency event and all actions that were taken. The dam owner shall distribute copies of the completed report to the Dam Safety Officer.

5. DEP Maintenance

5.1 Annual Review of DEP

Update the emergency contact information in the DEP at least once a year as per the Regulation, Schedule 2. The DEP should be revised if any of the contacts have changed.

The DEP annual review will include the following:

- Verifying that all contact information is current in:
  - » Emergency Contacts for the Dam (Appendix A-1),
  - » Evacuation Area Map (Appendix A-2) and
  - » Persons in the Immediate Vicinity of the Dam to be Evacuated (Appendix A-3)
- Verifying that all contact information is current in:
  - » Notification Chart (Appendix B-1),
  - » Emergency Services Contacts and Other Agencies (Appendix B-2)
  - » Emergency Response Resources (Appendix B-3),

5.2 Revisions

Update the DEP document at least every 10 years for significant and high failure consequence classification dams and every 7 years for very high and extreme failure consequence classification dams as per Schedule 2 of the Regulation. The DEP document held by the dam owner is the master document. When revisions occur, the dam owner will provide the revised pages and an updated revision summary page to all the DEP document holders. The document holders are responsible for revising any outdated copy of the respective document(s) whenever revisions are received. Outdated pages shall be immediately destroyed to avoid any confusion with the revisions.

5.3 Exercises

The province of British Columbia along with the Canadian Dam Association recommends DEP training for all dam personnel and testing the DEP through internal exercises and periodic review and/or exercise of the DEP. Periodic exercise may consist of a simple review by the dam owner(s) and key dam owner personnel (i.e. emergency, principal, alternate contacts the dam owner's technical experts) or a more thorough exercise that could include external organizations such as the local emergency authorities (who may want to include emergency responders), persons in the immediate vicinity of the dam, the Dam Safety Officer, EMCR and others with responsibilities listed in the DEP. Other organizations that may be involved with an unusual or emergency event

5.3 Exercises (continued)

at the dam may also be encouraged to participate. It is recommended that before the tabletop exercise begins, meeting participants visit the dam to familiarize themselves with the dam site.

A tabletop exercise usually involves a facilitator presenting a scenario of an unusual or emergency event at the dam. The scenario should be developed prior to the exercise. Once the scenario has been presented, the participants will discuss the responses and actions that they would take to address and resolve the scenario. The facilitator controls the discussion, ensuring realistic responses and developing the scenario throughout the exercise.

After the tabletop exercise, the five-step DEP response process should be reviewed and discussed. Any recommendations for improvements should be documented.

6. Record of Holders of Control Copies of this DEP

Copy Number	Entity or Organization	Person recieving copy	Whole DEP or Part[1]
1	Dam Owner		Whole
2	Emergency Dam Contact		Whole
3	Local Emergency Contact		Part
4	Dam Safety Officer		Whole
5	Dam Owner's Technical Expert		
6	Principal Dam Contact		
7	Alternate Dam Contact		

Copies of the DEP should be provided to appropriate Dam Owner personnel and outside agencies and updates provided as the original is updated.

1. Sections 1, 2 & 4.1 and Appendix A (A-1, A-2 & A-3) only

7. Record of Revisions and Updates Made to DEP

Revision Number	Date (YYYY-MM-DD)	Revisions made	By whom	Provided to Holders of Control Copies
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				

Appendix A

(Appendix A to be forwarded to local emergency authorities)

1. Appendix A-1 – Emergency Contacts for Dam
2. Appendix A-2 – Evacuation Area Map
3. Appendix A-3 – Persons in the Immediate Vicinity of the Dam to be Evacuated

Appendix A-1 Emergency Contacts for the

Dam Owner:	
Emergency Dam Contact:	
Business Name:	
Address	
Business Phone	
Mobile Phone:	
Fax:	
Email:	
Other:	
Principal Dam Contact:	
Business Phone:	
Mobile Phone:	
Email:	
Other:	
Alternate Dam Contact	
Business Phone:	
Cell Phone:	
Email:	
Other:	

Appendix A-2 Evacuation Area Map

Appendix A-3 Persons in the Immediate Vicinity of the to be Evacuated

(Note: If your dam has a consequence of failure classification of low or significant, you will most likely not have persons that would be considered in the endangered zone and therefore this list would not be required in your DEP.)

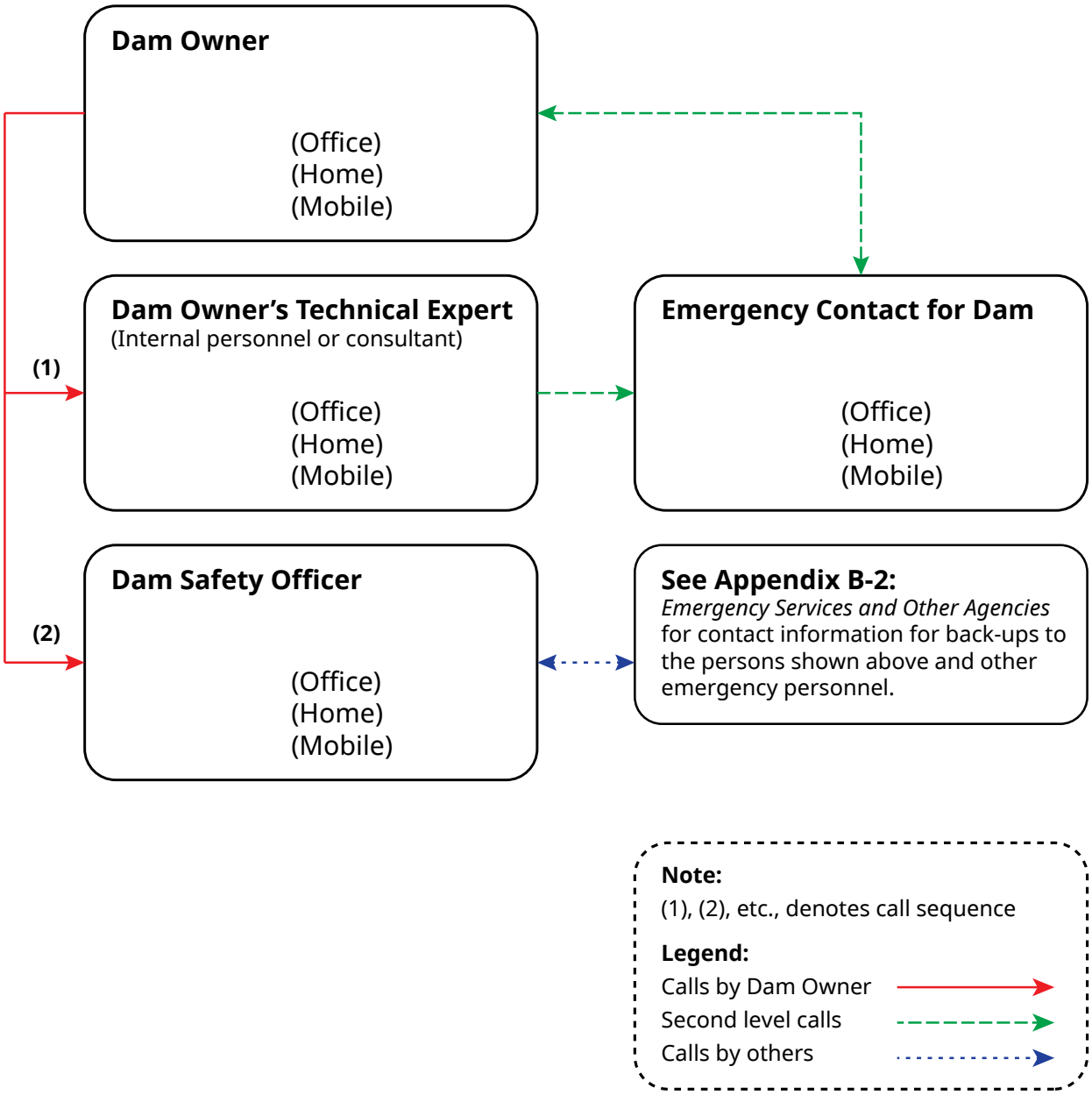
Persons (including residents and / or property & business owners)	**Address**	**Phone numbers**	**Distance from dam (m)**

A major flood caused by a sudden uncontrolled release of water from the dam is estimated to inundate describe location and estimated number of persons located in the immediate vicinity of the dam. *'Persons in the immediate vicinity of the dam'* means persons located immediately downstream and adjacent to the dam where available warning time is very limited (where local emergency authorities could not be expected to respond in time). The persons, including residents and/or property and business owners (marked on the evacuation map) that will need to be on *notice to evacuate* at Level 2 or *to be evacuated* at level 3 are listed below.

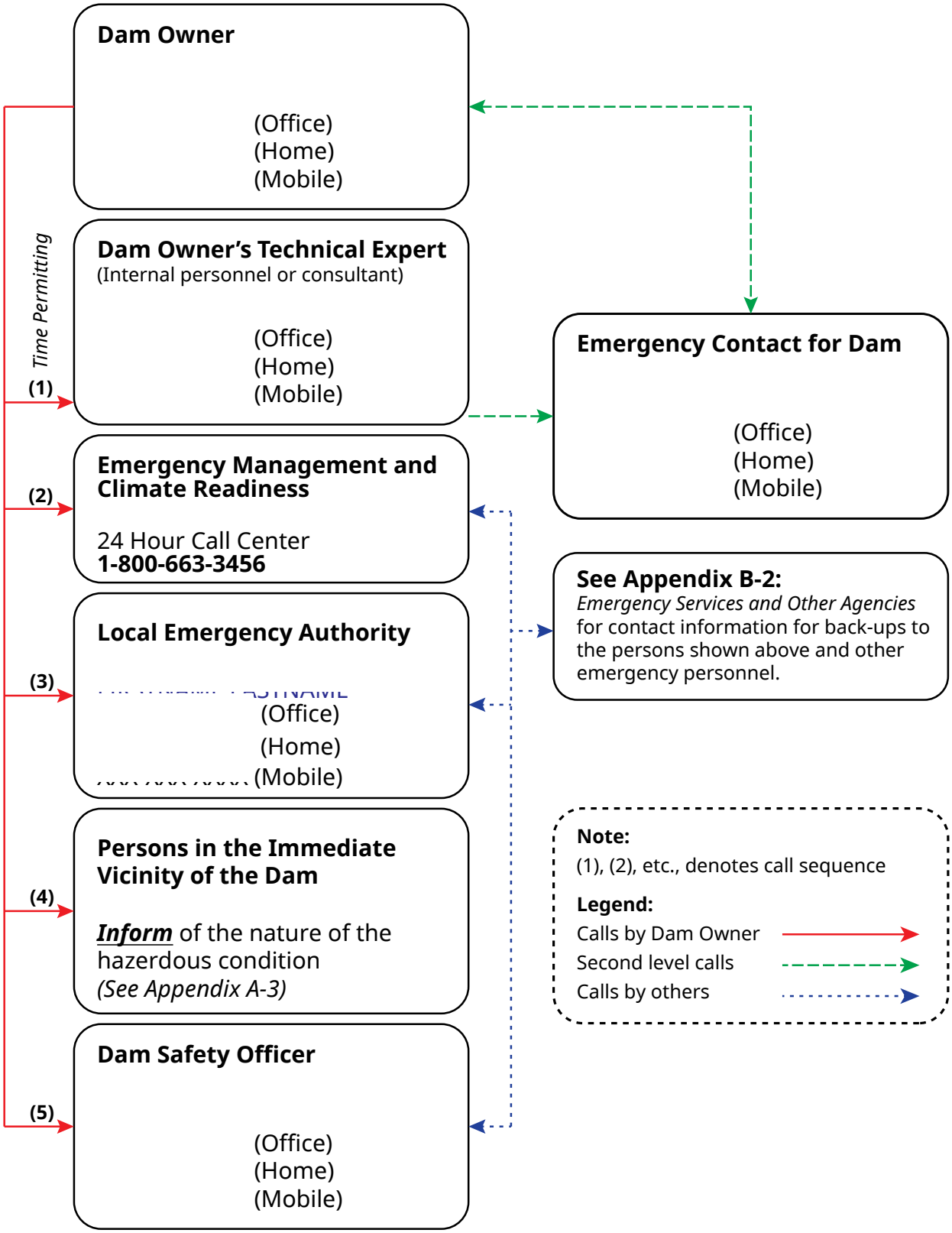
Appendix B

1. Appendix B-1 – Notification Charts
2. Appendix B-2 – Emergency Services Contacts and other Agencies
3. Appendix B-3 – Emergency Response Resources

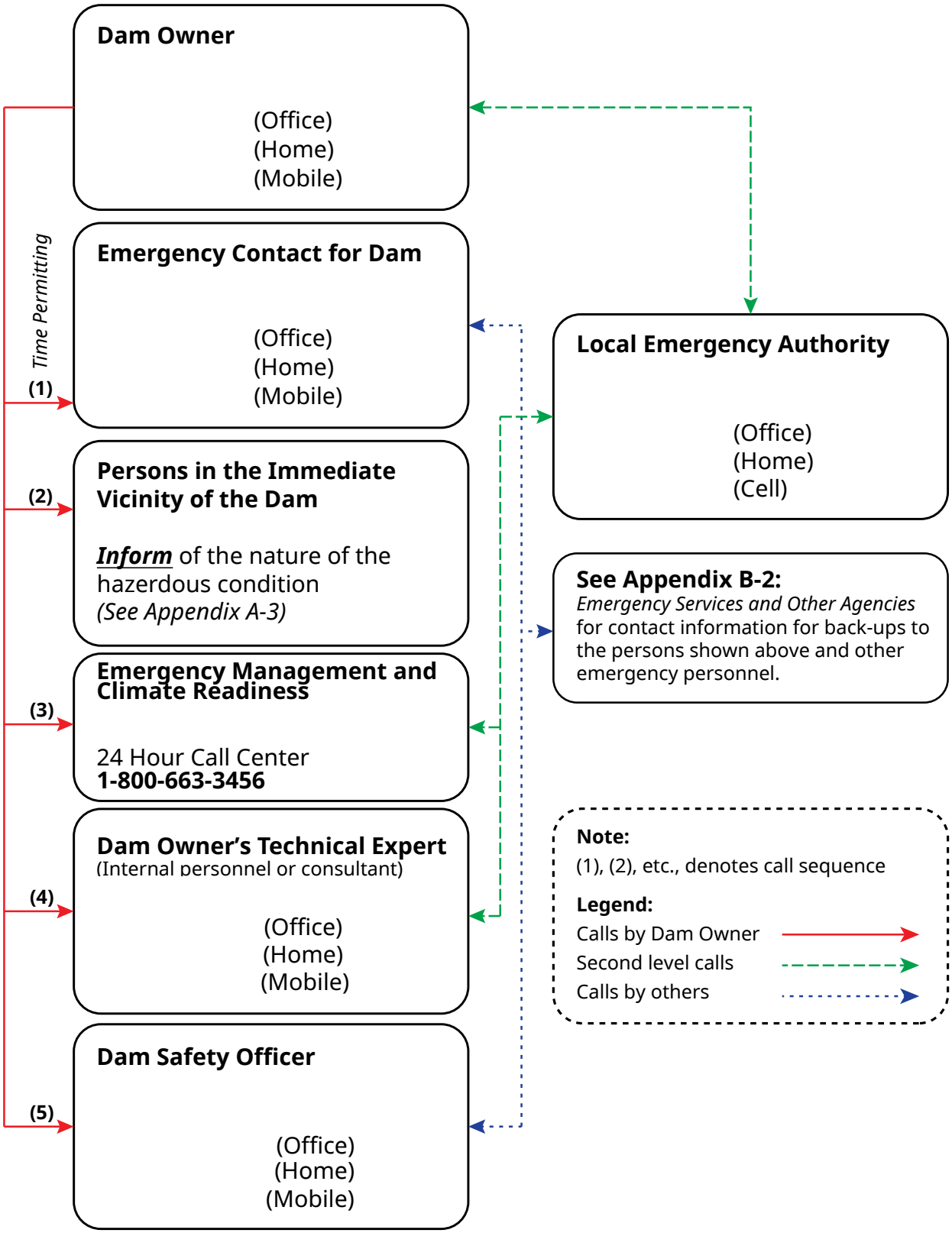
Appendix B-1 Notification Charts
Emergency Level 1 Notifications
Non-emergency unusual event; slowly developing



Emergency Level 2 Notifications
Emergency event, potential dam failure situation; rapidly developing



Emergency Level 3 Notifications
Urgent event, dam failure appears imminent or is in progress



Appendix B-2 Emergency Services Contacts and Other Agencies

Agency / Organization	Principal contact	Address	Office telephone number	Alternate telephone numbers
Dam Owner's Technical Expert (alternative)				
RCMP or Police				
Local Search and Rescue				
Ministry of Transportation and Infrastructure				
EMCR Regional Manager				
Env. Canada Weather				
GSC Pacific Earthquakes				
River Forecast Center				
Other Agency or Organization				
Other Agency or Organization				
Other Agency or Organization				

Other possible notifications depending on what is downstream of the dam: railway, power utilities, gas or oil pipelines, parks agencies.

Appendix B-3 Emergency Response Resources

Locally available equipment, personnel, and materials.

The dam owner has the following resources that can be utilized in the event of an emergency:

Other locally available resources may include:

Resource	Company	Address	Phone number(s)
Heavy equipment service and rental			
Sand and gravel supply			
Ready-mix concrete supply			
ATV Rental			
Boat Rental			
Helicopter			
Pumps			
Diving contractor			
Sand bags			

Appendix C Plan View of

At minimum, a plan view of the dam showing pertinent design details and site map of the dam should be included for reference. Refer to any additional plans or pertinent information included in the dam's Operation Maintenance & Surveillance (OMS) manual.

Appendix D Guidance for Determining Emergency Level

Event	Situation	Emergency level
Earth spillway flow	Reservoir water surface elevation at spillway crest or spillway is flowing with no active erosion	1
	Spillway flowing with active gully erosion	2
	Spillway flow that could result in flooding of people downstream if the reservoir level continues to rise	2
	Spillway flowing with an advancing head cut that is threatening the control section	3
	Spillway flow that is flooding people downstream	3
Embankment overtopping	Reservoir level is 1 foot below the top of the dam	2
	Water from the reservoir is flowing over the top of the dam	3
Seepage	New seepage areas in or near the dam	1
	New seepage areas with cloudy discharge or increasing flow rate	2
	Seepage with discharge greater than 10 gallons per minute	3
Sinkholes	Observation of new sinkhole in reservoir area or on embankment	2
	Rapidly enlarging sinkhole	3
Embankment cracking	New cracks in the embankment greater than ¼-inch wide without seepage	1
	Cracks in the embankment with seepage	2
Embankment movement	Visual movement/slippage of the embankment slope	1
	Sudden or rapidly proceeding slides of the embankment slopes	3
Instruments	Instrumentation readings beyond predetermined values	1
Earthquake	Measurable earthquake felt or reported on or within 50 kilometers of the dam	1
	Earthquake resulting in visible damage to the dam or appurtenances	2
	Earthquake resulting in uncontrolled release of water from the dam	3
Security threat	Verified bomb threat that, if carried out, could result in damage to the dam	2
	Detonated bomb that has resulted in damage to the dam or appurtenances	3
Sabotage/ vandalism	Damage to dam or appurtenance with no impacts to dam function	1
	Modification to the dam or appurtenances that could adversely impact the functioning of the dam	1
	Damage to dam or appurtenances that has resulted in seepage flow	2
	Damage to dam or appurtenances that has resulted in uncontrolled water release	3

Emergency Levels

Level 1: Nonemergency unusual event, slowly developing

Level 2: Potential dam failure situation, rapidly developing

Level 3: Urgent; dam failure appears imminent or is in progress

Appendix E Emergency Remedial Actions for Level 2 Conditions

If time permits, the following emergency remedial actions should be considered for Level 2 conditions. Immediate implementation of these remedial actions may delay, moderate, or prevent the failure of the dam. Several of the listed adverse or unusual conditions may be apparent at the dam at the same time, requiring implementation of several modes of remedial actions. Close monitoring of the dam must be maintained to confirm the success of any remedial action taken at the dam. Time permitting, any remedial action should be developed through consultation with the Dam Owner's Technical Expert. See Emergency Response Resources (*Appendix B-3*) for sources of equipment and materials to assist with remedial actions.

Embankment overtopping

1. If the water level in the reservoir is no longer rising, place sandbags along the low areas of the top of the dam to control wave action, reduce the likelihood of flow concentration during minor overtopping, and to safely direct more water through the spillway.
2. Cover the weak areas of the top of the dam and downstream slope with riprap, sandbags, plastic sheets, or other materials to provide erosion-resistant protection.

Seepage and sinkholes

1. Open the low-level outlet gate to lower the reservoir level as rapidly as possible to a level that stops or decreases the seepage to a non-erosive velocity. If the gate is damaged or blocked, pumping or siphoning may be required.

   Continue lowering the water level until the seepage stops.
2. If the entrance to the seepage origination point is observed in the reservoir (possible whirlpool) and is accessible, attempt to reduce the flow by plugging the entrance with readily available materials such as hay bales, bentonite, soil or rockfill, or plastic sheeting.
3. Cover the seepage exit area(s) with several feet of sand/gravel to hold fine-grained embankment or foundation materials in place. Alternatively, construct sandbag or other types of ring dikes around seepage exit areas to retain a pool of water, providing backpressure and reducing the erosive nature of the seepage.
4. Prevent vehicles and equipment from driving between the seepage exit points and the embankment to avoid potential loss from the collapse of an underground void.

Embankment movement

1. Open outlet(s) and lower the reservoir to a safe level at a rate commensurate with the urgency and severity of the condition of the slide or slump. If the gate is damaged or blocked, pumping or siphoning may be required.
2. Repair settlement of the crest by placing sandbags or earth and rockfill materials in the damaged area to restore freeboard.
3. Stabilize slides by placing a soil or rockfill buttress against the toe of the slide.

Earthquake

1. Immediately conduct a general overall visual inspection of the dam.
2. Perform a field survey to determine if there has been any settlement and movement of the dam embankment, spillway, and low-level outlet works.
3. Drain the reservoir, if required.

Appendix F Dam Emergency Situation Report

To be completed by the owner at regular intervals during the emergency.

DAM NAME	PROVINCIAL DAM FILE NUMBER
	SITUATION REPORT #

DAM LOCATION		
DATE (YYYY-MM-DD)	TIME	WEATHER CONDITIONS

GENERAL DESCRIPTION OF EMERGENCY SITUATION

AREAS OF DAM AFFECTED
EXTENT OF DAM DAMAGE
POSSIBLE CAUSE(S)
EFFECT ON DAM'S OPERATION

INITIAL RESERVOIR ELEVATION	TIME	MAXIMUM RESERVOIR ELEVATION	TIME	FINAL RESERVOIR ELEVATION	TIME

DESCRIPTION OF AREA FLOODED DOWNSTREAM/DAMAGES/INJURIES/LOSS OF LIFE
OTHER DATA AND COMMENTS:

OBSERVER'S NAME	TELEPHONE NUMBER

REPORT PREPARED BY	DATE (YYYY-MM-DD)

Appendix G Examples of Emergency Situations

The following are examples of conditions that usually constitute an emergency situation that may occur at a dam. Adverse or unusual conditions that can cause the failure of a dam are typically related to aging or design and construction oversights. Extreme weather events that exceed the original designed conditions can cause significant flow through the spillway or overtopping of the embankment. However, accidental, or intentional damage to the dam may also result in emergency conditions. The conditions have been grouped to identify the most likely emergency-level condition. The groupings are provided as guidance only. Not all emergency conditions may be listed, and the dam operator is urged to use conservative judgment in determining whether a specific condition should be defined as an emergency situation at the dam.

Pre-existing conditions on this dam: There has been a small seepage area near the downstream toe on the north side of the release channel. This was first noticed in the 1990s but has not changed since that time.

Earth Spillway Flows

Level 2—Potential dam failure situation; rapidly developing:

1. Significant erosion or head cutting of the spillway is occurring, but the rate does not appear to threaten an imminent breach of the spillway crest that would result in an uncontrolled release of the reservoir.
2. Flow through the earth spillway is or is expected to cause flooding that could threaten people, homes, and/or roads downstream from the dam.

Level 3—Urgent; dam failure appears imminent or is in progress:

1. Significant erosion or head cutting of the spillway is occurring at a rapid rate, and a breach of the control section appears imminent.
2. Flow through the earth spillway is causing flooding that is threatening people, homes, and/or roads downstream from the dam.

Embankment Overtopping

Level 2—Potential dam failure situation; rapidly developing:

1. The reservoir level is within 1 foot from the top of the dam.

Level 3—Urgent; dam failure appears imminent or is in progress:

1. The reservoir level has exceeded the top of the dam. Sandbags have been placed on the crest but flow is still occurring over the embankment.

Seepage and Sinkholes

Level 2—Potential dam failure situation; rapidly developing:

1. Cloudy seepage or soil deposits are observed at seepage exit points or from internal drain outlet pipes.
2. New or increased areas of wet or muddy soils are present on the downstream slope, abutment, and/or foundation of the dam, and there is an easily detectable and unusual increase in volume of downstream seepage.
3. Significant new or enlarging sinkhole(s) near the dam or settlement of the dam is observed.
4. Reservoir level is falling without apparent cause.
5. The following known dam defects are or will soon be inundated by a rise in the reservoir:
    - » Sinkhole(s) located on the upstream slope, crest, abutment, and/or foundation of the dam; or
    - » Transverse cracks extending through the dam, abutments, or foundation.

Level 3—Urgent; dam failure appears imminent or is in progress:

1. Rapidly increasing cloudy seepage or soil deposits at seepage exit points to the extent that failure appears imminent or is in progress.
2. Rapid increase in volume of downstream seepage to the extent that failure appears imminent or is in progress.
3. Water flowing out of holes in the downstream slope, abutment, and/or foundation of the dam to the extent that failure appears imminent or is in progress.
4. Whirlpools or other evidence exists indicating that the reservoir is draining rapidly through the dam or foundation.

Level 3—Urgent; dam failure appears imminent or is in progress: (continued)

5. Rapidly enlarging sinkhole(s) are forming on the dam or abutments to the extent that failure appears imminent or is in progress.
6. Rapidly increasing flow through crack(s) eroding materials to the extent that failure appears imminent or is in progress.

Embankment Movement and Cracking

Level 2—Potential dam failure situation; rapidly developing:

1. Settlement of the crest, slopes, abutments and/or foundation of the dam that may eventually result in breaching of the dam.
2. Significant increase in length, width, or offset of cracks in the crest, slopes, abutments, and/or foundation of the dam that may eventually result in breaching of the dam.

Level 3—Urgent; dam failure appears imminent or is in progress:

1. Sudden or rapidly proceeding slides, settlement, or cracking of the embankment crest, slopes, abutments, and/or foundation, and breaching of the dam appears imminent or is in progress.

Glossary of Terms

Abutment	That part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream from the dam.
Acre-foot	A unit of volumetric measure that would cover 1 acre to a depth of 1 foot. One acre-foot is equal to 1,234 cubic meters.
Berm	A nearly horizontal step (bench) in the upstream or downstream sloping face of the dam.
Boil	A disruption of the soil surface due to water discharging from below the surface. Eroded soil may be deposited in the form of a ring (miniature volcano) around the disruption.
Breach	An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.
Conduit	A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.
Control section	A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.
Cross section	A slice through the dam showing elevation vertically and direction of natural water flow horizontally from left to right. Also, a slice through a spillway showing elevation vertically and left and right sides of the spillway looking downstream.
Dam	A barrier constructed for the purpose of enabling the storage or diversion of water diverted from a stream or an aquifer, or both and other works that are incidental to or necessary for the barrier.
Dam failure	An uncontrolled release of all or part of the water impounded by the dam, whether or not caused by a collapse of the dam.
Dam Owner Representative	The person(s) with responsibility for the operation and maintenance of dam.
Drain	A water collection system of sand and gravel and typically pipes along the downstream portion of the dam to collect seepage and convey it to a safe outlet. The drains can be located in the toe, foundation, or drainage blanket.
Drainage area (watershed)	The geographic area on which rainfall flows into the dam.
Drawdown	The lowering or releasing of the water level in a reservoir over time or the volume lowered or released over a particular period of time.
Emergency	A condition that develops unexpectedly, endangers the structural integrity of the dam and/or downstream human life and property, and requires immediate action.

Glossary of Terms

Dam Emergency Plan	A formal document identifying potential emergency conditions that may occur at the dam and specifying preplanned actions to minimize potential failure of the dam or minimize failure consequences including loss of life, property damage, and environmental impacts. (BC Dam Safety Reg., Section 9)
Evacuation map	A map showing the geographic area downstream of a dam that should be evacuated if it is threatened to be flooded by a breach of the dam or other large discharge.
Filter	The layers of sand and gravel in a drain that allow seepage through an embankment to discharge into the drain without eroding the embankment soil.
Freeboard	Vertical distance between a stated water level in the reservoir and the top of dam.
Gate	A general term for any mechanical device to control the flow of water in intakes, outlet works and over controlled spillways.
Groin	The area along the intersection of the face of a dam and the abutment.
Consequence classification	A system that categorizes dams (extreme, very high, high, significant, or low) according to the degree of their potential to create adverse incremental consequences such as loss of life, property damage, or environmental impacts of a failure or mis operation of a dam.
Height of dam	The vertical distance between the crest of the dam and the lowest point at the downstream toe, which usually occurs in the bed of the outlet channel.
Hydrograph	A graphical representation of either the flow rate or flow depth at a specific point above or below the dam over time for a specific flood occurrence. It can include inflow, outflow or a breach flow.
Incident Commander	The highest predetermined official available at the scene of an emergency situation.
Instrumentation	An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and appurtenant structures.
Inundation area or map	The geographic area downstream of the dam that would be flooded by a breach of the dam or other large discharge.
Low-Level Outlet	A conduit through a dam to allow for controlled release of the reservoir contents. Also see “Outlet Works”
Notification	To immediately inform appropriate individuals, organizations, or agencies about a potentially emergency situation so they can initiate appropriate actions.

Glossary of Terms

Outlet works	An appurtenant structure that provides for controlled passage of normal water flows through the dam. Combination of intake structure, gates, conduits, tunnels, flow controls and energy dissipation devices to allow the release of water from the dam,
Persons in the immediate vicinity of the dam:	Considered the persons located immediately downstream and adjacent to the dam where available warning time is very limited (where local emergency authorities could not be expected to respond in time).
Piping	The progressive destruction of an embankment or embankment foundation by internal erosion of the soil by seepage flows.
Probable Maximum Precipitation (PMP) and Prob. Max. Flood (PMF):	The theoretically greatest precipitation (PMP) or resulting flood (PMF) that is meteorologically feasible for a given duration over a specific drainage area or at a particular geographical location.
Reservoir	The body of water impounded or potentially impounded by the dam.
Riprap	A layer of large rock, precast blocks, bags of cement, or other suitable material, generally placed on an embankment or along a watercourse as protection against wave action, erosion, or scour.
Risk	A measure of the likelihood and severity of an adverse consequence.
Seepage	The natural movement of water through the embankment, foundation, or abutments of the dam.
Slide	The movement of a mass of earth down a slope on the embankment or abutment of the dam.
Spillway (main)	The appurtenant structure that provides the controlled conveyance of excess water through, over, or around the dam.
Spillway (emergency)	An additional spillway, which usually has a crest elevation somewhat higher than the main spillway, designed to activate during extreme flood events to avoid overtopping the dam.
Spillway capacity	The maximum discharge the spillway can safely convey with the reservoir at the maximum design elevation.
Spillway crest	The lowest level at which reservoir water can flow over or into the spillway.
Tailwater	The body of water immediately downstream of the embankment at a specific point in time.
Toe of dam	The junction of the upstream or downstream face of an embankment with the ground surface.
Top of dam (crest of dam)	The elevation of the uppermost surface of an embankment which can safely impound water behind the dam.