

Photo: Revelstoke Railway

# B.C. DAM SAFETY PROGRAM

ANNUAL REPORT  
2022 – 2023



Ministry of  
Forests



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Photo: Bennett Dam spill

## Executive Summary

The Dam Safety Program, administered by the Dam Safety Section, is tasked with the regulation of freshwater dams in British Columbia.

In 2010, following the failure of the Testalinden dam in the south Okanagan, the Deputy Solicitor General released his report recommending, among other things, that

*“the Ministry of Environment should publish an annual Dam Safety Program report on its public website for the information of the public.”*

The B.C. Dam Safety Program Annual Report is our ongoing commitment addressing this recommendation.

In 2021, the Office of the Auditor General released their report on the “Oversight of Dam Safety in British Columbia”. The Dam Safety Section continues to make improvements to address the recommendations contained in the report as well as those imposed by changing environmental conditions, industry advancements and societal pressures.

Despite staffing challenges due to strong competition in the labour force, provincial program staff continue to work diligently to ensure dams are safe in B.C.



Photo: Seymour Falls Dam (credit Ian Manning)

# 1.0 Introduction

## 1.1 Purpose of the Report

This report is intended to provide the reader with an overview of B.C.'s Dam Safety Program (DSP). It is intended to summarize how the province regulates dams. The report outlines:

- The importance of the Dam Safety Program on public safety
- The state of dams in B.C.
- Role of the Dam Safety Program
- Program initiatives

As one of only 4 provinces in Canada with a formalized dam safety program, the DSP is seen as a leader in the regulation of freshwater dams. The DSP model is risk-based and aligns with the principle that dam owners strive to reduce risks to a level that is *as low as reasonably practicable* (ALARP). Active monitoring of dam risk levels allows for additional attention to be placed on those dams that might pose an unacceptable risk to the environment and public safety.

The Dam Safety Regulation (Regulation) governs dam owners' responsibilities in safety management. The objective of the Regulation is to mitigate loss of life and damage to property and the environment from a dam breach by requiring dam owners to inspect their own dams, undertake proper maintenance on them, and ensure that these dams meet engineering standards to minimize associated public safety, economic, social, and environmental risks.



## 2.0 B.C. Dams Overview

The Ministry of Forests is responsible for the oversight of freshwater dams in B.C. Other dams such as those associated with mining or municipal wastewater fall to other Ministries for permitting and oversight.

The Dam Safety Regulation defines a dam as a barrier constructed for the purpose of enabling the storage or diversion of water from a stream or an aquifer, or both, plus any other works incidental to or necessary for the barrier.

Dams vary significantly in size, design and material; from very large hydroelectric dams to small earthen embankment dams used for irrigation purpose. In total, there are 1,901 dams in B.C. scattered throughout the province (**Figure 1**) that are regulated by the Ministry of Forests.

There are currently 1,901 regulated and 245 unregulated dams identified in the DSP's electronic registry. These dams are comprised of both those that the Regulation applies to and those that are defined as "minor" dams that are not regulated.

The criterion for a minor dam is:

1. Less than 7.5 metres in height, and
2. Able to impound no more than 10,000 m<sup>3</sup> of water.

Minor dams are exempt from the Regulation unless the Comptroller of Water Rights or water manager determines otherwise based on a perceived risk to public safety, the environment, or land or other property. Minor dams presently not considered a potential hazard are included in the electronic registry with the rationale that they can be monitored for changing conditions that would

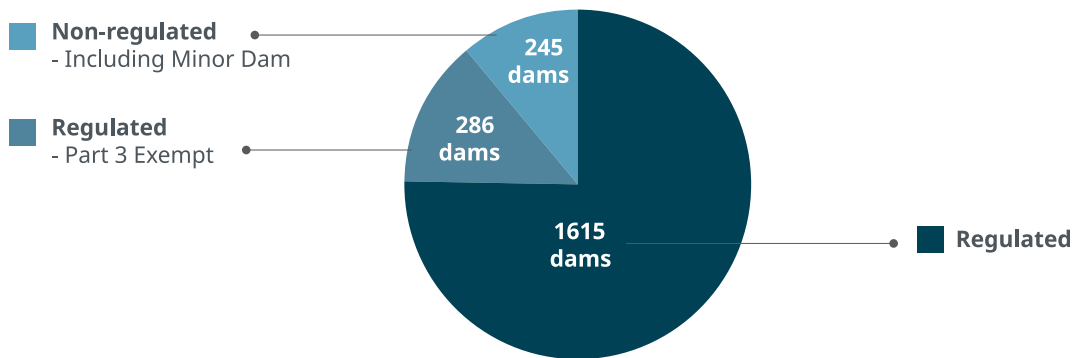


Photo: Skins Dams (Credit Quinten Beach)

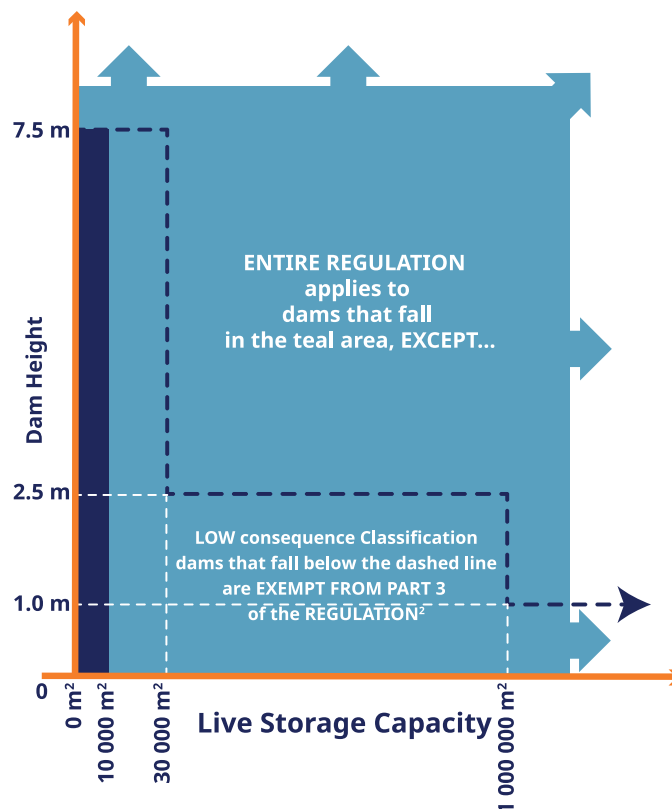
necessitate that an order be issued to have the Regulation apply. An example of this would be if a new development was constructed immediately downstream of the dam causing a change in the dam failure consequence classification.

Dams are further characterized as those subject to Part 2 only of the Regulation and those for which all the Regulation applies. Dams meeting designated height and storage thresholds (**Figure 2**) are subject to Part 3 of the Regulation.

**Figure 1 – Regulated Status of B.C. Dams**



**Figure 2 – Application of the Regulation to Dams in British Columbia**



1. Dam Safety Regulation 40/2016, Part 1, Section 2
2. Dam Safety Regulation 40/2016, Part 3, Section 7

## 2.1 Benefits

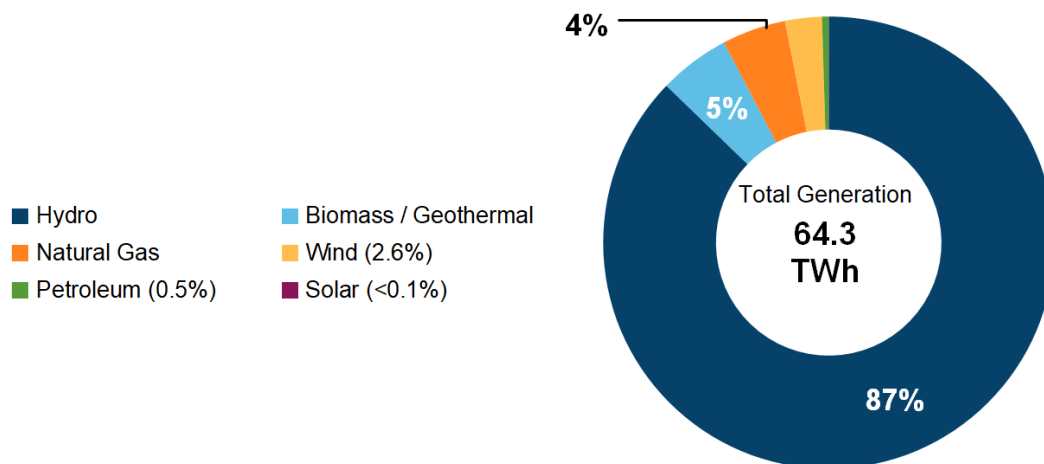
Rich in water resources, British Columbia has a long history of dam construction. In the early 1900's, dams allowed for the development of the agricultural industry in areas previously unsuitable due to low stream flows during the growing season. Today, the agri-food system is worth \$22 billion to B.C.'s economy.

When people think of dams, most picture the big hydro generating dams such as Kenney (**Photo 1**), Revelstoke, and Site C. B.C. generates approximately 65 terawatt-hours (TWh) of electricity (**Figure 3**) and is expected to increase by 1,100 megawatts (MWh) once BC Hydro's Site C dam is completed.



Photo 1 – Kenney Dam – Nechako Reservoir (credit Rio Tinto)

Figure 3 - Electricity Production in BC (2019), source - Canada Energy Regulator





Municipal water supply reservoirs created by dams exist in almost every community in B.C. These include very large concrete dams like the Cleveland dam in the Lower Mainland (**Photo 2**), to earthfill embankment dams found in smaller communities.



*Photo2 – Cleveland Dam. One of Metro Vancouver’s municipal water supply reservoirs.*

There are many more other dams constructed for purposes that are equally important to the function and economy of our province. These include dams that support wildlife conservation, industrial/commercial use, recreation and flood control (**Photo 3**).



*Photo 3 – Okanagan Lake Dam constructed for flood control purpose.*



## 2.2 Risks

Despite advancements made in dam engineering and regulatory oversight, dams have the potential to fail. Dams fail due to improper design, construction, maintenance or management. Dams require engineering design to withstand threats caused by extreme weather, earthquakes, and landslides. Climate change is raising the risk of dam failures as is the aging of infrastructure.

Events such as the Cannon Creek dam failure (1995), the Testalinden dam failure (2010) (**Photo 4**) and the Cleveland dam incident (2020) resulting in 2 fatalities, all shaped the current dam safety program.



*Photo 4 – Testalinden Dam failure consequences.*





Photo: Upper Bonnington Dam

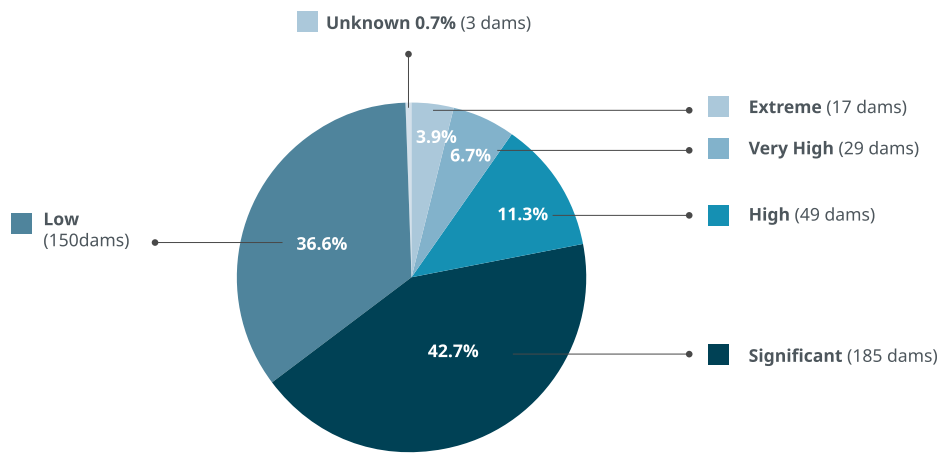
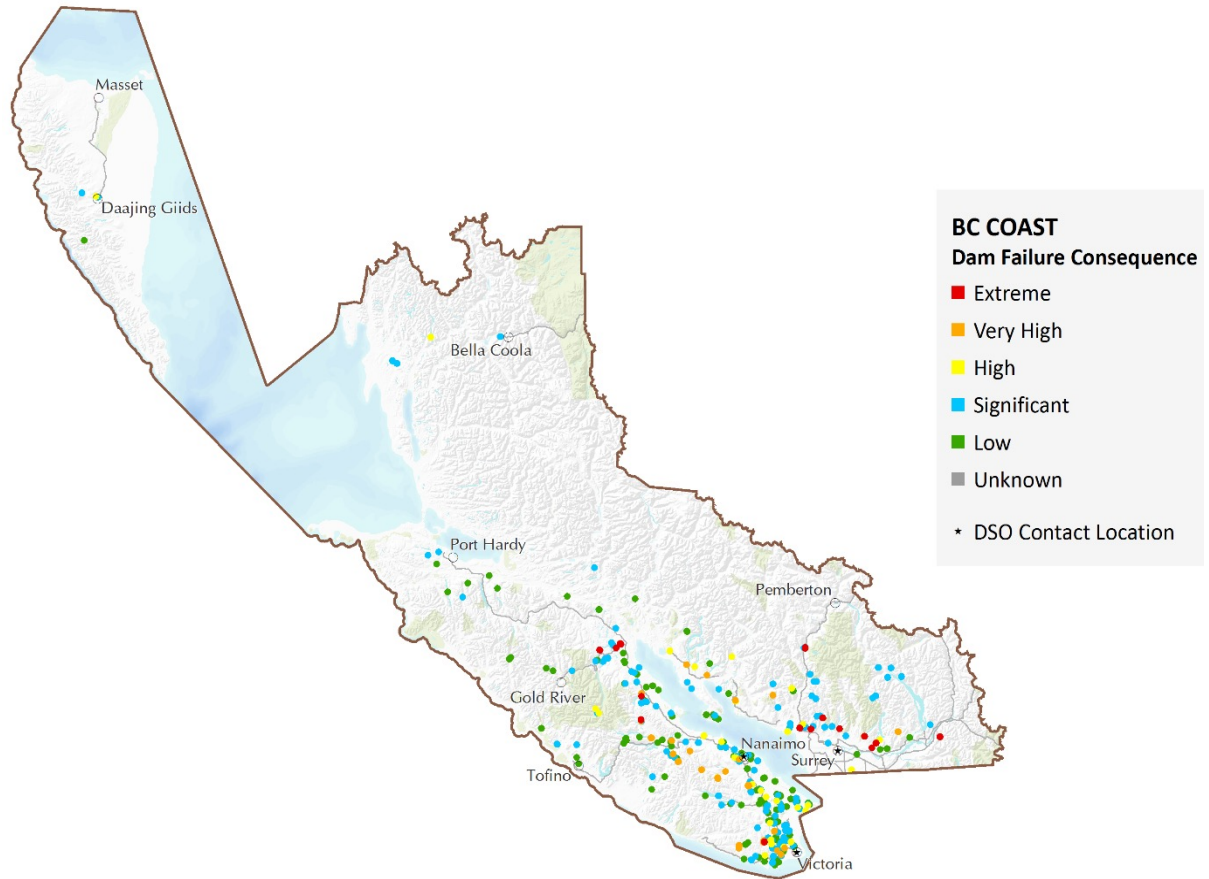
## 2.3 Dam Failure Consequence Classification

Regulated dams are characterized by their failure consequence classification. The higher the consequence classification, the higher the expected standard of care. Under the Regulation, a dam failure consequence classification is given to all dams based on the potential for loss of life, the deterioration of environmental and cultural values, and the losses to infrastructure and the economy should the dam fail. B.C. has adopted a 5-tier classification system ranging from Low to Extreme. Schedule 1 of the Dam Safety Regulation provides criteria for establishing the appropriate classification — <https://rb.gy/uedlk>.

**Figures 5 to 7** provide the distribution of regulated dams by failure consequence classification in the Ministry's three natural resource areas.



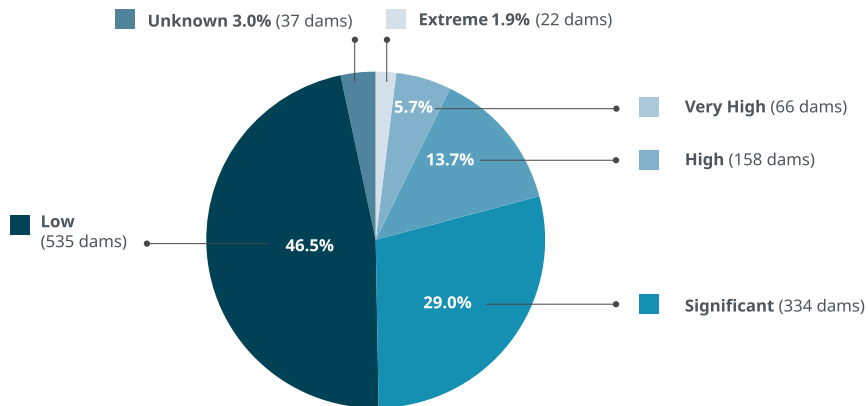
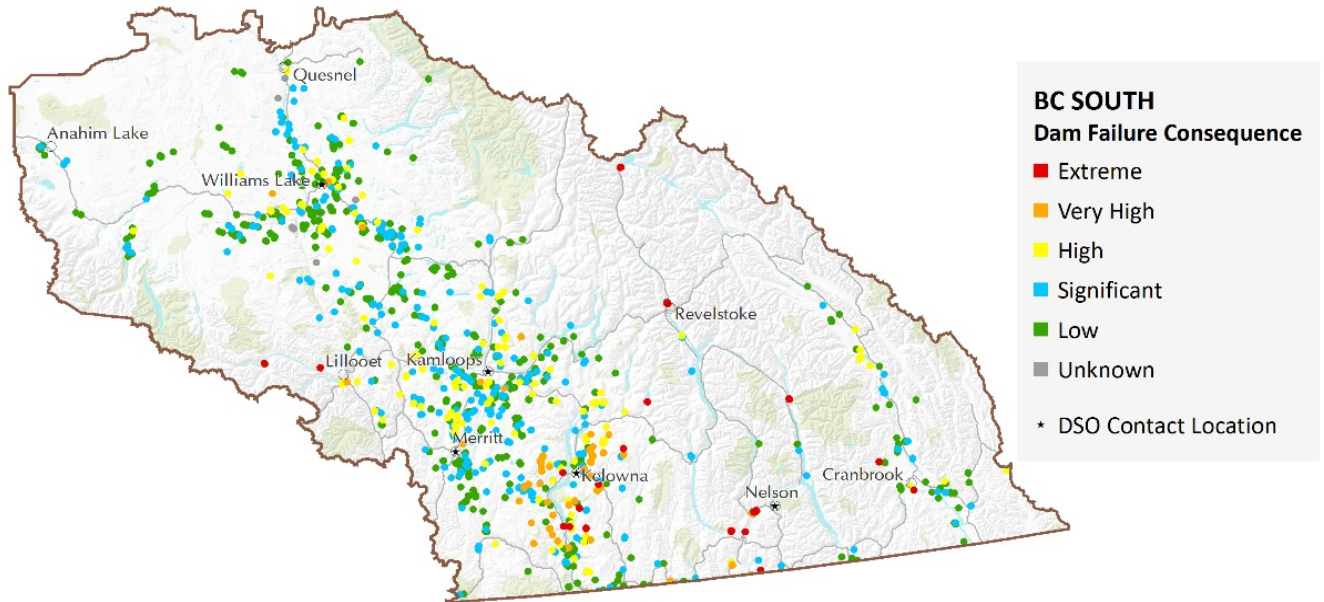
Figure 5 – Coastal Distribution of Active Regulated Dams by Failure Consequence Classification (note % is of Area Subtotal)



B.C. COAST AREA	
Regions	Regulated
West Coast Region	318
South Coast Region	115
<b>Coast Area - Subtotal</b>	<b>433</b>



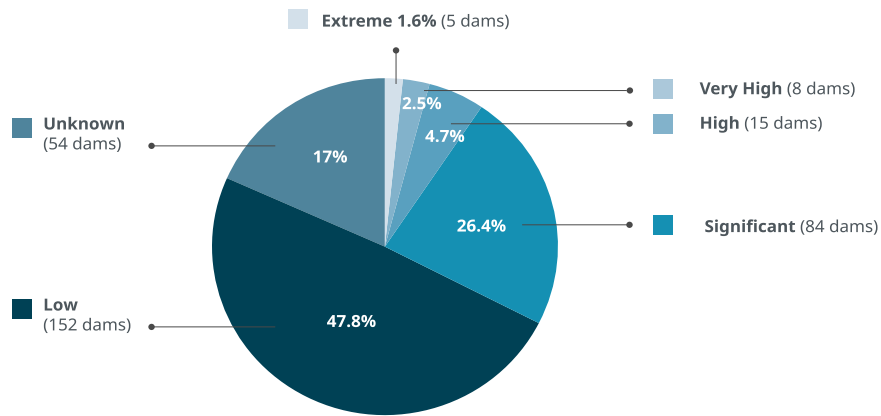
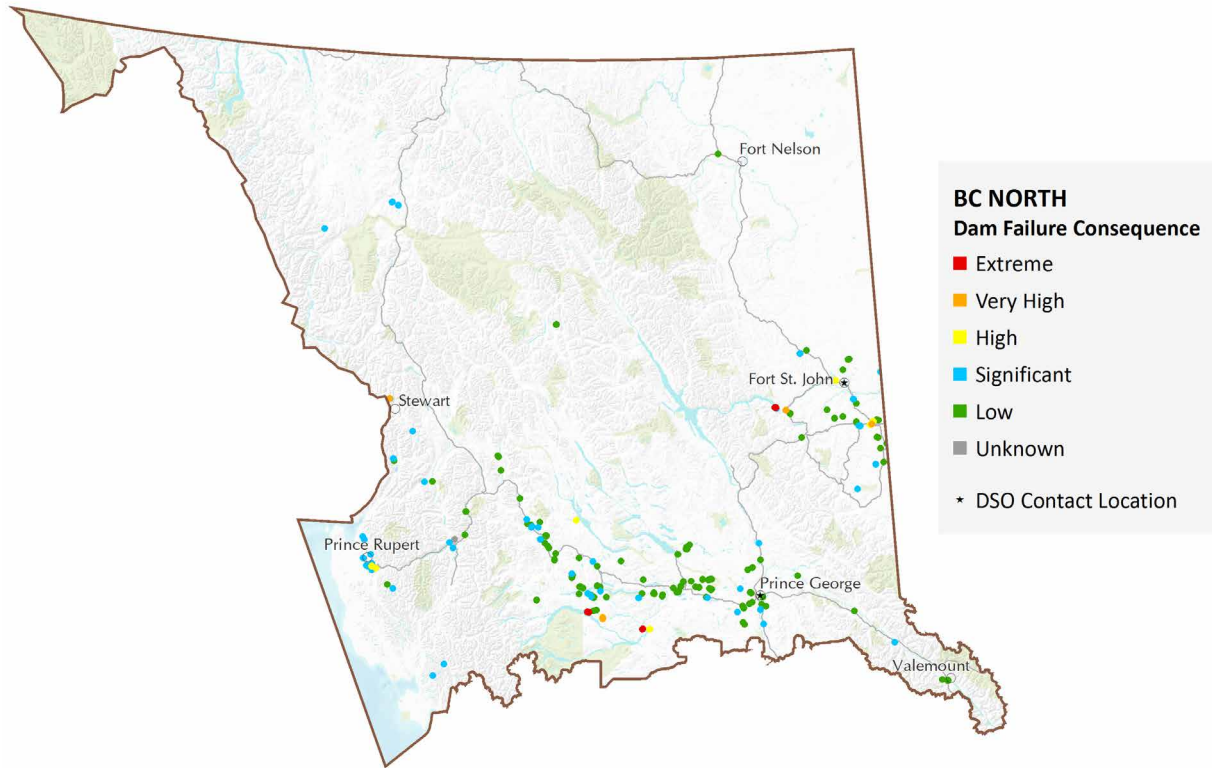
Figure 6 – Southern Distribution of Regulated Active Dams by Failure Consequence (note % is of Area Subtotal)



B.C. SOUTH AREA	
Regions	Regulated
Cariboo Region	376
Thompson – Okanagan Region	659
Kootenay - Boundary Region	115
<b>South Area - Subtotal</b>	<b>1150</b>



Figure 7 – Northern Distribution of Regulated Active Dams by Failure Consequence (note % is of Area Subtotal)



B.C. NORTH AREA	
Regions	Regulated
Skeena Region	93
Omineca Region	78
North East Region	147
<b>North Area - Subtotal</b>	<b>318</b>



Photo: Fletcher Lake Dam

## 2.4 Risk Level

The DSP uses a risk-based system that combines the consequence of failure of a dam with the probability of failure. These two factors are entered into a table to determine the risk level. This method of classification enables effective and efficient use of DSP resources, ensuring that dams are monitored according to the risk they pose.

The failure probability rating is influenced by several factors such as the dam's design adequacy, identified deficiencies, maintenance and surveillance undertaken by the dam owner, and dam owner compliance.

In B.C., the risk of dams is classified into five levels (Risk Level Chart – Appendix A). Levels 1–Alert and 2–Caution identify those dams that a dam safety officer should devote additional time and regulatory effort on to address identified deficiencies and/or non-compliant dam owners. Risk Level 2 is further defined by the following:

- a.** owner is not actively working on correcting the deficiency, OR
- b.** owner is actively working on an approved project to correct the deficiency.

A listing of dams with risk levels of 1 and 2a have been provided in Appendix B.

Section 25 of the *Freedom of Information and Protection of Privacy Act* (FOIPPA), requires public bodies to proactively disclose information:

- 1.** About a risk of significant harm; or
- 2.** That is clearly in the public interest.



This applies to dams with risk levels 1 and 2a. There are currently two dams with a risk level of 1 and 16 dams in the level 2a category. These dams receive increased attention from DSP staff to ensure dam owners mitigate and rectify any identified deficiencies in a timely manner.



*Photo: Ocean Falls Dam*





Photo: Site C Dam (credit 2017 Site C Clean Energy Project)

## 3.0 Role of the Dam Safety Program

### Our Vision

*"That all British Columbians benefit from safe dams."*

### Our Mission

*"Ensuring safe dams through effective regulatory oversight."*

The B.C. Dam Safety Program (DSP) within the Ministry of Forests (FOR), and its partner the BC Energy Regulator (BCER), are responsible for the regulation of 1,901 dams in B.C. and receive their authority under the *Water Sustainability Act* (WSA) and the Regulation.





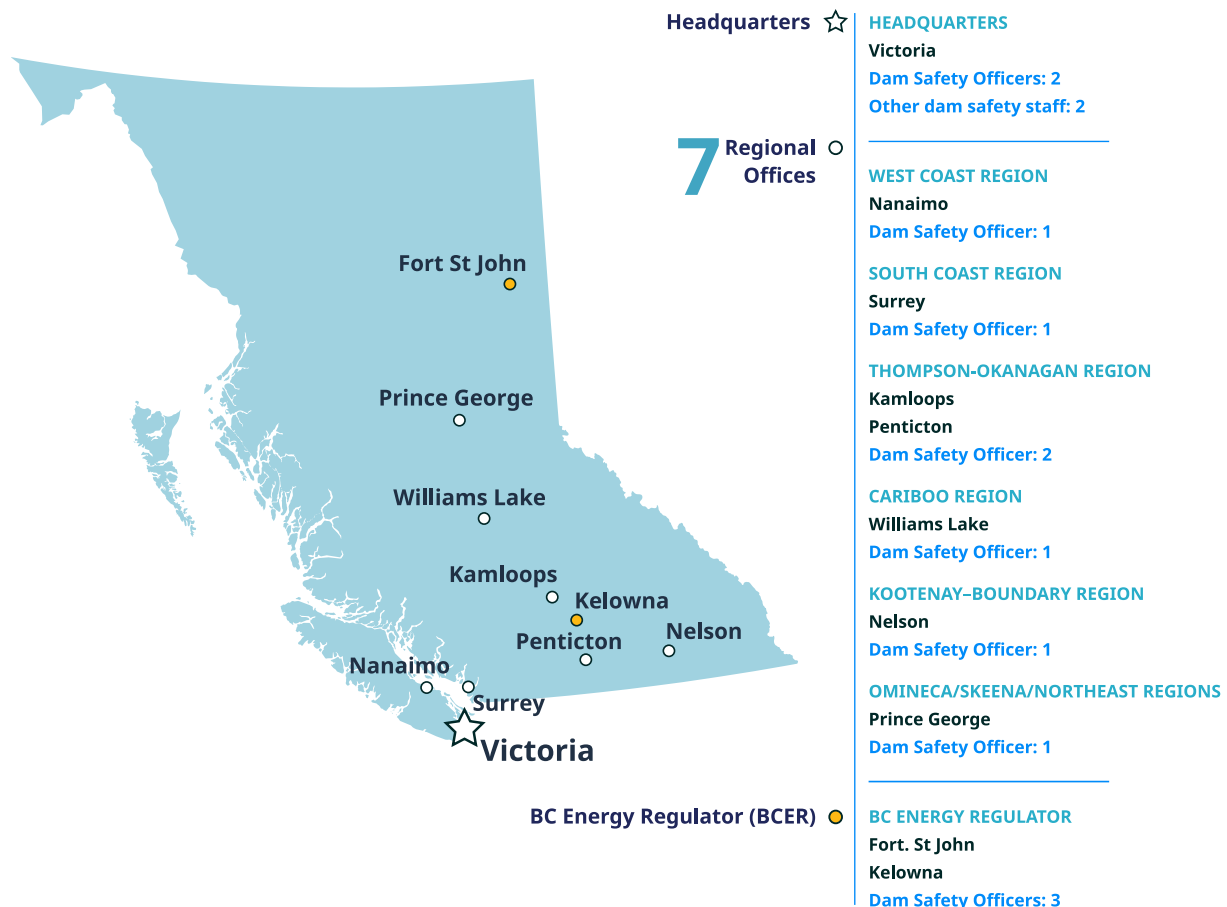
Photo: B.C. Dam Safety Staff, Revelstoke Dam

### 3.1 Our Staff

The B.C. Dam Safety Program is managed by a team of FOR and BCER dedicated staff. FOR staff are currently comprised of 4 Headquarters (Victoria) staff with two that are assigned to all Major dams (over 9m in height), while the 7 Regional offices regulate the remaining dams. The BCER has 3 staff designated as dam safety officers under an MOU with the Ministry of Forests, with authority for regulating freshwater dams. These dams support the oil and gas industry and are located predominantly in the northeast of the province.

In the 2022/2023 fiscal year, staff have worked diligently to review and make decisions on 265 submissions under the Regulation.

In response to the OAG’s recommendation to evaluate staffing needs, 5 additional positions were identified for headquarters. Labour force demands have created a challenge in filling these positions. To address the shortfall in staffing, which is expected to be temporary, the DSP contracted some of its workload to external engineering firms.



## 3.2 Strategic Approach

In meeting the DSP's vision and mission, the DSP has developed a strategic approach founded on 4 pillars:

1. Education
2. Prevention
3. Compliance & Enforcement
4. Emergency Preparedness and Response

### 3.2.1 Education

Victoria employs a training coordinator to develop and deliver all 3 training targets. Education falls into 3 distinct objectives:

1. promoting public awareness of the benefits and risks related to dams,
2. dam owner training, and
3. program staff training.

#### 3.2.1.1 Public Awareness

The importance of informing the public about dam safety in their communities was recently highlighted in the Office of the Auditor General's (OAG) report. The program achieves this in several ways including the information posted on the Dam Safety website, outreach to stakeholders and this annual report.

Planned future initiatives include the development of a provincial dam safety awareness day and public outreach events.

#### 3.2.1.2 Dam Owner Training

Following the success of the virtual workshops initiated in response to COVID-19, the DSP continued an ongoing partnership with the Ministry of Agriculture and Food (AF) to utilize funding that would provide dam owners with free online webinars and free dam safety in-person workshops. A total of 221 participated in 2022/23.

The DSP continues to partner with the BC Water & Waste Association (BCWWA) to deliver in-person training. The intended audience is generally municipality staff with duties related to dam safety. Workshops were held in Penticton, Quesnel and Armstrong with 61 participants.

To assist dam owners and the engineering community, the DSP provides a series of internal guidance documents and information bulletins and has partnered with Engineers and Geoscientists BC in the development of technical and professional practice guidelines.



Finally, the DSP continues to support the Canadian Dam Association in their initiative to revise the current Dam Safety Guidelines and associated Technical Bulletins.

### 3.2.1.3 Staff Training

The DSP continues to promote internal training for staff. Dam Safety Officers (DSO) are required to attend internal training initiatives to maintain their designation. These sessions include:

#### Community of Practice (COP)

The COP offers an opportunity on an annual basis for DSOs from across the province to meet and discuss program policies, procedures, initiatives and challenges. These sessions also allow networking and team building to be facilitated as DSOs may not interact on a regular basis. This translates into ongoing support for DSOs as they carry out their roles individually in their respective regions.

#### Professional Development Series

The professional development training for DSOs focuses on various complex dam safety engineering topics to aid in the support of their statutory decision-making roles. This event has been historically held on a biennial basis, with this past year an off year.

Staff are also encouraged to actively participate in dam engineering technical training facilitated by recognized industry leaders such as the Canadian Dam Association (CDA) (**Photo 5**) or the Association of State Dam Safety Officials (ASDSO).



Photo 5 - FOR Staff at the 2022 CDA Annual Conference and Tradeshow, St. John's, NF

### 3.2.2 Prevention

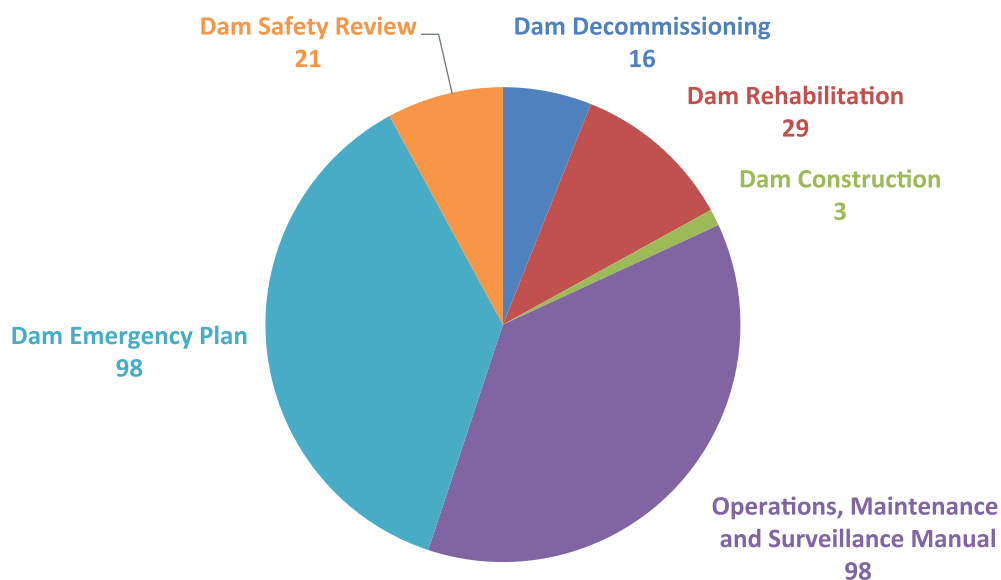
Prevention of dam failure is achieved, in part, through the application of a comprehensive dam safety management system development by dam owners. The Regulation assists owners in this endeavour by establishing a safety management framework through regulatory requirements. Elements of a safety management system include, in part:

- operation, maintenance and surveillance manual;
- dam emergency plan;
- dam safety reviews; and,
- requirements to submit engineering designs for dam construction and alterations.

Dam safety officers (DSO) play a role in promoting compliance of the Regulation by monitoring owner performance. Each year, DSO review application submissions required under the Regulation. DSO provide an administrative review of submissions to determine if they are complete and appropriate prior to acceptance and/or approval. This process ensures that they meet industry standards, best practices for minimizing environmental disturbance, and upholds the Crown's duty to consult with First Nations.

A breakdown of reviews undertaken in 2022/2023 is provided in **Figure 8**:

*Figure 8 – Dam Safety Officer Technical Reviews*





Unauthorized dams<sup>1</sup> are occasionally constructed. These tend to be smaller structures but can pose a hazard to public safety, the environment or property. The DSP works with provincial staff and the public on identifying these structures with the goal of bringing them into compliance or removing them entirely. Recently, the DSP initiated a systematic computer-based approach to identifying these structures. This year a total of 15 unauthorized dams were discovered.

### **3.2.3 Compliance & Enforcement**

The DSP follows a compliance and enforcement (C&E) policy that involves the co-ordination of dam safety officers, other dam safety staff and natural resource officers within the Ministry's Compliance and Enforcement Branch. The C&E model encourages voluntary compliance by establishing clear and relevant requirements in legislation. The DSP's educational program further promotes dam owner compliance.

Program staff verify the performance of owners in the safe management and operation of the dams. If a dam owner is found to be noncompliant with a legislated or regulatory requirement, corrective enforcement measures can be applied by the natural resource officer until the dam owner is compliant with the regulation or legislation. A range of measures are available such as advisories, warnings, orders, water licence cancellations, tickets and court prosecutions. The following is a brief summary of some of the DSP tools in achieving compliance and enforcement.

#### **3.2.3.1 Self-Reporting by Owners**

Every December, all owners of dams that have a failure consequence classification of High, Very High or Extreme are required to submit a report on the regulatory compliance status of their dams. DSOs use the information in the report to assess compliance levels, update information in the provincial dam database, and help dam owners address any emerging dam safety issues. The 2022 Annual Compliance Status questionnaire and survey results can be found in Appendix C.

#### **3.2.3.2 Audits**

A large part of the DSP program to ensure dams are safe and dam owners are following the Regulation is achieved through conducting dam audits. This entails meeting with the dam owner to check their records and a site visit to the dam to identify any obvious deficiencies. Dams with a Significant Consequence Classification are audited on a 10-year cycle whereas High, Very High and Extreme dams are audited every 5 years. Low consequence classification dams are audited as required. This past year saw 149 dam audits.

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<sup>1</sup> Dams constructed without a water licence.

### 3.2.3.3 Orders, Penalties and Charges

The WSA currently has several approaches to eliciting compliance. The Comptroller of Water Rights, Water Managers and Engineers designated under the *Water Sustainability Act* have authority to issue Orders to owners of dams. These Orders can be enabling, such as providing dam owners with authorizations to undertake dam improvements or can be used to compel dam owners in instances of non-compliance.

For certain non-compliances under the Regulation, dam safety officers may recommend ticketing. In more egregious cases of non-compliance, formal charges may be laid by Crown Counsel. In 2022/23, charges were laid with owners of the Cherry Creek Irrigation dam for failure to comply with an order from the Water Manager to remove or repair the dam. Two additional charges are pending for owners of unauthorized dams.

### 3.2.4 Emergency Preparedness and Response

Emergency planning and response involves responding to abnormal conditions arising at a dam. Although the dam owner is ultimately responsible for addressing safety issues at their facility, support is often provided to the dam owner by dam safety officers and, if needed, through other agencies such as Emergency Management and Climate Readiness (EMCR).



Photo: Elko Dam 2013 flood (credit BC Hydro)



In the event of a developing or actual hazardous condition<sup>2</sup> at a dam, dam owners must:

- Activate an approved dam emergency plan by the owner
- Engage local emergency authorities, EMCR, and the DSP.

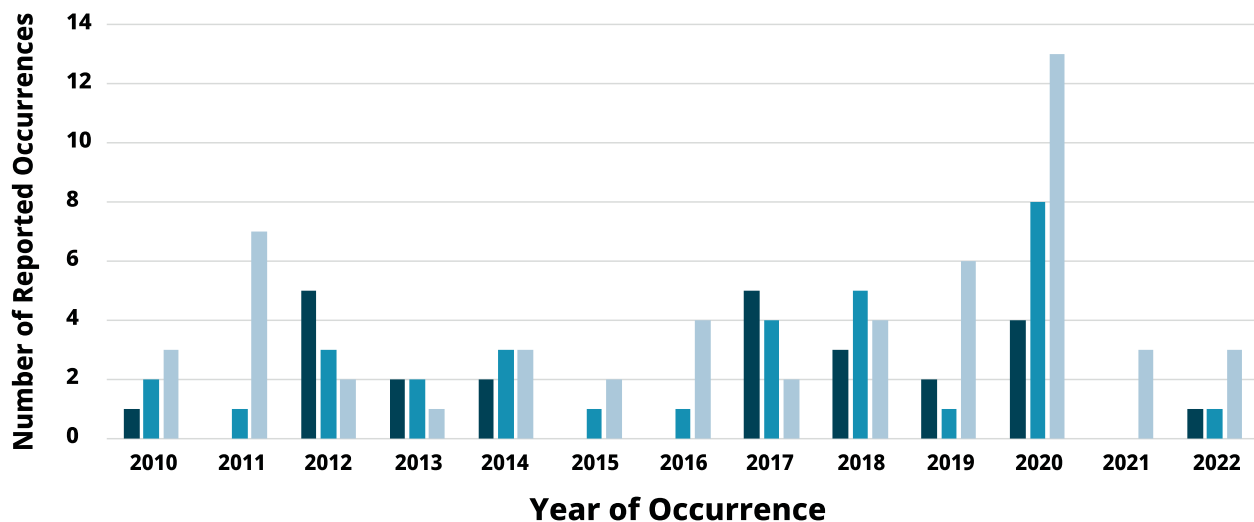
Dam owners who become aware of a hazardous condition in relation to the dam must operate the dam in a manner - and initiate any remedial actions, including modifying the operations at the dam - that will safeguard the public and minimize damage to the environment or land or other property.

In the event of a dam related emergency, the DSP follows the British Columbia's Dam Emergency Response Plan. The Ministry of Forests (FOR) is the lead provincial agency responsible for minimizing downstream effects, supported by EMCR, local authorities, and other agencies.

FOR will monitor the situation and help the owner as requested. If the owner is not dealing with the situation appropriately, FOR may have an emergency declared and take over incident command. FOR's main focus in this instance is preventing the uncontrolled release of a reservoir.

**Figure 9** details the number of reported incidents presented by emergency levels (**Appendix D**), encountered since 2010 when tracking began.

**Figure 9 – Number of dam incidents classified by dam emergency levels since 2010**



**Types of Dam Emergency Level:** ■ Dam Emergency Level 3 ■ Dam Emergency Level 2 ■ Dam Emergency Level 1

<sup>2</sup> "hazardous conditions", in relation to a dam, as per the Dam Safety Regulation, means conditions, including, without limitation, defects or insufficiencies of the dam, that

(a) are or are likely to be hazardous to the dam, or

(b) may reasonably be anticipated to cause all or part of the dam, or any operation or action at or in connection with the dam, to be or become potentially hazardous to

(i) public safety,

(ii) the environment, or

(iii) land or other property;



Photo: Bennett Dam

## 4.0 2022–2023 Highlights

### 4.1 Office of the Auditor General's Audit

The Dam Safety Program was audited in 2021 by the Office of the Auditor General (OAG). The objective of the audit was *“to determine if the Ministry of Forests, Lands, Natural Resource Operations and Rural Development has effectively overseen the safety of dams in B.C.”*. The OAG provided 9 recommendations for improvements that the DSP continues to address.

The full version of the report, *“Oversight of Dam Safety in British Columbia,”* can be found at <https://www.bcauditor.com/pubs/2021/oversight-dam-safety-british-columbia>

A summary of recent initiatives include:

- Informing dam owners of their regulatory responsibilities through bulletin mailouts
- Developing a tool to identify unauthorized dams (LiDAR project)
- Improving the dam inventory database
- A commitment to increasing staffing levels in Headquarters by 5 full-time positions.



## 4.2 Program Projects

### 4.2.1 Legislative Dam Safety Reviews Guidelines

Engineers and Geoscientists BC (EGBC), in partnership with the Ministry of Forests (FOR) and the Ministry of Energy and Low Carbon Innovation (EMLI) embarked on revising the Legislative Dam Safety Reviews in B.C. Guidelines. The document is expected to be published in 2023 and helps support consultants in ensuring their dam safety review reports are complete and meet the expectations of the DSP in the acceptance process.

### 4.2.2 Improved Information for Designing Dams to Manage Flood Events

In 2018, the DSP started work on a series of projects to improve information available for engineering consultants to use when designing dams and estimating the magnitude of flood events in B.C. The goal of the projects is to improve the quality of hydrotechnical reports completed for dams in B.C., and to lower the cost by making the relevant information more readily available. The reports and links to relevant information can be accessed on the EGBC Climate Change Information Portal (<https://rb.gy/h0zfb>) and the British Columbia Regional Flood Frequency Analysis Portal (<https://rb.gy/3vlzq>).

### 4.2.3 Revision of Plan Submission Guidelines

This year, the DSP has contracted an external consultant in revising the Plan Submission Guidelines to address, in part:

- additional requirements to meet expected industry standards, and
- requests from the consulting industry for clearer direction on requirements, to allow for an efficient approval process.

The revision, anticipated to be complete in 2024, will also include a revision of the current accompanying checklist.



Photo: Trio Creek Dam

## 4.3 Construction Projects

2022/2023 was another busy year for dam construction projects. The following is a snapshot of some work that went on.

### 4.3.1 New Dam Construction

The largest of the new dam construction projects is Site C where substantial progress was made during 2022 with the Dam Safety Program providing 12 authorizations.

The main earthfill dam is scheduled to be completed in 2023. Work continues along the approach channel, generating station and spillway as planned. The steel and concrete piles, installed to address potential instabilities along shale bedding planes, are expected to be completed in 2023.

Three scenarios to fill Site C's reservoir have been considered. It is anticipated that the reservoir will be filled by fall 2024, followed by wet commissioning of all conveyance facilities and commissioning of the turbines. Reservoir filling will mean water levels in the Peace River will rise over approximately four months, widening the river by two to three times on average.

**Photos 6-7** are examples of further progress on the construction of the structures on the project.





*Photo 6 – Site C – An upstream view with the approach channel at left, and the powerhouse, generating station, and the earthfill dam at centre. (Photo credit: 2017 Site C Clean Energy Project)*



*Photo 7 – Site C – View of the spillway, penstocks, powerhouse and operation building (Photo credit: 2017 Site C Clean Energy Project)*



### 4.3.2 Alteration, Improvement or Replacement of Dams

Like any type of infrastructure, dams require continuous maintenance and periodic upgrades, which can be significant construction projects extending over multiple years, such as Prince Rupert's replacement of the Woodworth dam (**Photo 8**) completed in 2022.

Many of the recent rehabilitation projects are results of Dam Safety Reviews identifying deficiencies related to undersized spillways such as with the Fraser Lake dam (**Photo 9**).



Photo 8 – New Woodworth Dam – looking upstream



Photo 9 – Fraser Lake Dam with new spillway





*Photo: Fish Hawk Dam (credit Robert Hrasko).*

### ***4.3.3 Decommissioned Dams***

Dams are decommissioned for numerous reasons including owners no longer requiring the water or repairs to identified deficiencies being cost prohibitive.

In 2022/23, the province approved 16 dam removals. One example is that of the East McDermid Creek earthfill dam. It was deemed by the owners to be too costly to maintain for the small benefit it provided. The following illustrates the construction of a rehabilitated channel following removal of the dam (**Photos 10 and 11**).





*Photo 10 – East McDermid Creek Dam removal process (credit: Masse Environmental Consultants Ltd)*



*Photo 11 – Rehabilitation of stream channel following the removal of the East McDermid Creek Dam (credit: Masse Environmental Consultants Ltd)*



# Appendices

## Appendix A (Excerpted from MOF Dam Safety Audit Program policy, December 1, 2013)

### RISK LEVEL CHART

Failure Probability Rating	Consequence of Failure Classification				
	Extreme	Very High	High	Significant	Low
Large	1	1	1	2	3
Moderate	2	2	2	3	4
Small	3	3	4	4	5
Very Small	3	4	4	5	5

### Risk Level Definitions:

#### 1. ALERT (immediate attention required):

Enhanced monitoring / consultants involved / repairs ASAP / may restrict reservoir operation / DEP reviewed / CWR or RWM notified, possible Order

#### 2. CAUTION (considerable work to do):

Increased monitoring / planning for rehab / may modify reservoir operation / DEP reviewed / may request submission of Inspection Report (perhaps weekly), OMS, or early DSR / CWR or WM made aware of situation. \*NOTE: Risk Level 2 further defined by the following:

- a. owner is not actively working on correcting the deficiency, OR
- b. owner is actively working on an approved project to correct the deficiency

#### 3. STABLE:

Regular owner inspections plus monitoring operation under peak loading / rehab hazardous conditions / may request submission of Annual Inspection Report, OMS, DEP or early DSR / may audit on an increased frequency

#### 4. NO CONCERNS:

Included in regular audit program to identify any changes / normal operation

#### 5. EFFECTUAL (significant and low consequence dams ONLY):

Significant consequence dams included in regular audit program to monitor failure consequence only / normal operation

## Appendix B (Data from E-licensing database as of March 3, 2023)

Dam Name	Risk Level
Turtle Lake North Dam	1 - Alert
Turtle Lake South Cut-Off Dam	1 - Alert
Allan Spring Dam	2a - Caution
Allendale Lake Dam	2a - Caution
Bull Lake Dam	2a - Caution
Darke Lake	2a - Caution
Frank Lake Dam	2a - Caution
Lind Creek	2a - Caution
McCuddy Creek Reservoir #2 Saddle Dam	2a - Caution
McCuddy Reservoir #2	2a - Caution
Monte Lake Dam	2a - Caution
Pike Mountain FSR Dam	2a - Caution
Roche Lake Dam	2a - Caution
Rose Valley Lake Dam	2a - Caution
Silvermere Lake Dam	2a - Caution
Spa Lake Dam	2a - Caution
Tom Peter Lake Dam	2a - Caution
Ussher Creek Dam	2a - Caution



## Appendix C (2022 Dam Status Report questionnaire and results)

The following questions were the basis of the 2022 dam status report questionnaire:

**1a** Has your Formal Inspection for 2022 been completed?

**1b** Did the owner conduct the 2022 Formal Inspection?

**1c** If not the owner, who conducted the Formal Inspection?

**1d** Any comments on the 2022 Formal Inspection?

**2a** Did you undertake regular Site Surveillance?

**2b** Any comments on Site Surveillance?

**3a** Have any dam safety concerns been identified in 2022?

**3b** If Yes to dam safety concerns identified in 2022, please elaborate on dam safety concerns.

**3c** If Yes to dam safety concerns identified, has a plan been prepared to address the safety concerns? (Choices: Yes, No or Not Applicable if no concerns)

**3d** If Yes to dam safety concerns identified, have the safety concerns for the dam been addressed? (Choices: Yes, No or Not Applicable if no concerns)

**3e** Any other comments on the plan to address the safety concerns?

**4a** Has a Dam Safety Review, as per the Dam Safety Regulation Schedule 2 requirement, been conducted by a Qualified Professional Engineer?

**4b** If yes is the response to question 4a, what year was the Dam Safety Review conducted? (express as a 4 digit number. eg. 2016)

**5a** Is your Operations, Maintenance and Surveillance Manual current?

**5b** What year was the Manual last updated, or if the original Manual is still being used, what year was it created?

**6a** Is the dam being operated under an up-to-date Dam Emergency Plan (DEP) that was accepted by a dam safety officer?

**6b** What year was the DEP last updated, or if the original DEP is still being used, what year was it created?

**6c** Have you submitted the required DEP information to the local emergency authority?

**6d** *Is the emergency contact information in your DEP up-to-date?*

**7a** *Has there been any land use development downstream of your dam in 2022 that might affect the failure consequence classification of your dam?*

**7b** *If Yes to downstream development, please elaborate.*

**8a** *Are there any other comments or suggestions related to dam safety?*

**9a** *Is there a change in contact information for this dam?*

**9b** *If Yes to a new contact, provide the correct dam contact information*

The following table summarizes key results of the 332 responding surveys.

***Summary of the 2022 dam status report results:***

<b>Key Performance Indicators</b>	<b>Question #</b>	<b>Positive Responses</b>	<b>% of Total</b>
Annual formal inspections completed	1a	311	94
Site surveillance conducted	2a	320	96
Current Operations Maintenance and Surveillance manual	5a	284	86
Current Dam Emergency Plan (DEP)	6a	272	82
Current DEP delivered to Local Emergency Authority(s)	6c	258	78
Dam emergency contact information up to date	6d	294	89
Verification of land use changes downstream of dam	7a	308	93



## Appendix D: Dam Emergency Level Classification

All dam emergencies are classified into one of the following:

**Emergency Level 3:** Dam failure is occurring or imminent and can no longer be prevented.

**Emergency Level 2:** Rapidly developing, and may lead to dam failure or flooding downstream.

**Emergency Level 1:** Abnormal operating conditions, but operation or structural integrity of dam not yet threatened.



Photo: Ocean Falls Dam.



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