REPORT

Inventory and Assessment of Dams in Newfoundland and Labrador

Year 3

Submitted to:

Paula Dawe, P. Eng.
Water Resources Management Division
Department of Municipal Affairs and Environment
4th Floor, West Block
Confederation Building
P.O. Box 8700
St. John's, NL
A1B 4J6

Submitted by:

Golder Associates Ltd.
11 Austin Street - Suite 101 St. John’s, Newfoundland and Labrador, A1B 4C1 Canada

+1 709 722 2695

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Executive Summary

In recent years, many provincial governments throughout Canada have been placing a larger emphasis on dam safety in an attempt to limit, and ideally eliminate, the occurrence of dam failures and the risk they can pose to people, infrastructure, and the environment. The Department of Municipal Affairs and Environment, Water Resources Management Division (WRMD) of the Government of Newfoundland and Labrador has retained Golder Associates to complete the third phase of their Inventory and Assessment of Dams in Newfoundland and Labrador project. This report summarizes the scope of the study, process taken, the main findings of the study, and recommendations provided to Government.

The current project (Year 3) was executed in several phases as discussed in detail in this report. The first and largest phase involved verifying that the records presently in the database were current and accurate. This meant contacting every dam owner that did not provide updated information in Years 1 or 2 of the overall project and requesting that they provide up to date information using a dam inventory form. The information received was then compared with the information in the database and the necessary updates were made. In total, out of the three hundred twenty-two (322) dams that information was requested for, Golder received updated information for ninety-six (96) dams from the dam owners. In addition to the forms received, additional information was collected from dam owners, the WRMD, or via field visits, which indicated that eighteen (18) dams no longer existed (although only ten (10) of these dams were confirmed by the WRMD to be removed from the database). The response rate on a per dam basis was 31%. A total of seventy-two (72) owners were contacted and responses were received from twenty-eight (28) of them. The responses were received ether by way of the dam inventory form, verbal correspondence indicating that a dam no longer existed, or updated information provided via email. This equates to a 39% response rate on a per owner basis.

The second phase was similar to the first and involved identifying any new dams not already in the database. New dams were identified based on information provided by the WRMD, from potential dam owners, or during the field visits. Dams were also identified from a KMZ file of potential dams provided by the WRMD and the locations were subsequently ground truthed to verify the presence of a dam. In total, seventeen (17) new dams were added to the inventory. Of these new dams, the owner provided acknowledgement for three (3) of them and the WRMD indicated ownership for seven (7) of them. Four (4) dams were identified and confirmed from the KMZ file and three (3) of the new dams were confirmed during the site visits. Once indication of these dams was received, information requests (i.e., dam inventory forms) were sent to the respective owners. Information was received for nine (9) of the new dams. The new dams for which information was not received had only their name, owner (if known), co-ordinates, and other known information (e.g., dimensions, status, type) added to the database. The owner was unable to be determined for four (4) of these new dams.

The third phase required collecting any dam breach inundation mapping that exists for the provincial dams and digitizing the maps into a single GIS layer. The vast majority of dams in the province do not have any dam breach inundation mapping completed; inundation mapping is known to exist for only thirty-eight (38) systems/developments, encompassing ninety-five (95) dam inventory database entries. This is only about 14% of the seven hundred two (702) dams in the inventory (considering additions and subtractions of new and no longer existing dams at the conclusion of this project; also excluding the one test dam entry in the inventory). Inundation maps for thirty-four (34) dams were provided as hardcopies by the WRMD and were digitized during this project; making the total number of inundation maps digitized during all three (3) years of the project sixty-five (65). The remaining thirty (30) maps are known to exist but were not made available.

The fourth phase was to complete preliminary consequence assessments, based on economic losses and taking into consideration the population at risk, for dams that had their inundation maps digitized as part of the project. For areas that fell within the dam breach flood inundation zones, the infrastructure likely to be affected was cataloged to estimate the potential damage and cost associated with a dam breach, and to determine a likely population that would be at risk of being affected in some way by the flooding. Once infrastructure was counted, an order of magnitude dollar value was assigned that represented a high-level estimate for repairing or replacing the infrastructure to its pre-flood conditions. The information collected was summarized into a separate table for each potential dam breach, and the assumed costs were totaled to get a lump sum cost estimate for the total damages. The population at risk in the flood zone was estimated by assuming an average of three (3) persons per household and multiplying by the number of homes affected. The population at risk from a dam breach ranged from zero (0) to three thousand nine hundred six (3906). A total of thirty-six (36) preliminary consequence assessments were completed based on the evaluation criteria selected by government.

The fifth phase was to complete preliminary risk assessments for dams that had dam safety reviews or other dam safety related documents available. Documents were received for twenty-three (23) developments, containing a total of one hundred three (103) dams. Thirteen (13) of these dams had a preliminary risk assessment previously completed in Years 1 or 2, but more recent documentation was received during Year 3 and therefore an updated risk assessment was completed. To conduct the risk assessments, an Annual Dam Safety Report form was completed for each dam, which allowed a risk level to be assigned to each dam. During the Year 3 assessment, thirty-five (35) of the dams were assigned a risk level of 1 – Alert (34%), thirty-one (31) were assigned a risk level of 2 – Caution (30%), twenty-two (22) were assigned a risk level of 3 – Stable (21%), two (2) were assigned a risk level of 4 – No Concerns (2%), and thirteen (13) were assigned a risk level of 5 – Effectual (13%). This means that over the course of the full three-year project (Years 1 to 3), a total of three hundred eighty (380) dams have undergone a preliminary risk assessment, which is approximately 54% of the seven hundred two (702) dams currently registered in the Dam Inventory Database. In total, seventy-seven (77) of the dams were assigned a risk level of 1 – Alert (20%), one hundred twenty-two (122) were assigned a risk level of 2 – Caution (32%), one hundred twenty-three (123) were assigned a risk level of 3 – Stable (33%), thirty-six (36) were assigned a risk level of 4 – No Concerns (9%), and twenty-two (22) were assigned a risk level of 5 – Effectual (6%).

The sixth phase involved gathering information on any public safety incidents that have occurred at dams throughout the province. A total of one hundred sixty-three (163) dam owners were contacted requesting information related to any public safety incidents that may have occurred around their dams and eighty-six (86) of them responded, equating to a response rate of 53%. Internet searches were also completed, and various government bodies, agencies, and archives were contacted. In some cases, interviews with people knowledgeable of a particular site were also completed. Public safety incidents were identified at eight (8) dams in the province; five (5) of these reported incidents are of a general nature and described multiple occurrences of public trespassing at the dams, while the other three (3) reported incidents were specific incidents that resulted in four (4) drowning fatalities. Public safety incident report forms were completed for these three (3) specific incidents.

The seventh phase involved creating a prioritized list of dams with High, Very High, and Extreme classifications, that do not currently have dam failure inundation mapping completed, but which should have it developed. The list created during Year 2 was used and updated based on dams that were added or removed from the Dam Inventory Database as part of this study. Six (6) priority levels for inundation mapping study were used and dams were assigned to each. One (1) dam was assigned the highest priority of 1, sixteen (16) dams were assigned a priority of 2, sixty-seven (67) dams were assigned a priority of 3, nine (9) dams were assigned a priority of 4, fifteen (15) dams were assigned a priority of 5, and twenty-seven (27) dams were assigned a priority of 6 (lowest

priority). This phase also involved creating a second prioritized list of municipal water supply dams in the Dam Inventory Database that do not currently have dam failure inundation mapping (most of these dams do not have a Canadian Dam Association consequence classification either) and therefore consideration should be given to having inundation studies completed. Three (3) priority levels were created and dams were assigned to each. Fifty-eight (58) dams were assigned the highest priority of 1, one hundred (100) dams were assigned a priority of 2, and thirty-nine (39) dams were assigned a priority of 3 (lowest priority).

The eighth phase involved completing site visits to confirm the presence of some of the dams inferred to be present and to obtain photos for the Dam Inventory Database. During the site visits photos were taken; and co-ordinates, measurements, and any other relevant information was recorded, where possible, to further verify the accuracy of the information in the database. Sixty-six (66) site visits were completed; ten (10) new dams were confirmed, photographed and added to the database; four (4) dams listed in the database were confirmed to not exist and were removed from the database; two (2) new dams, which were not previously known to exist, were found in the field, but the decision was made by the WRMD to not add these dams to the database; five (5) KMZ dams were confirmed to not exist; and, one (1) new dam site was visited (Gallants), but it was found that construction had not yet began so it was not added to the database.

The last phase of the project was to take all of the information gathered in the previous phases and physically update the Government dam registry and database. In total, ninety-six (96) of the dams already in the database were updated and ten (10) dams were removed. This is equivalent to 33% of the three hundred twenty-two (322) dams that previously existed in the database, prior to the start of this project. Photos were obtained for two hundred forty-eight (248) dams. The photos that were added to the inventory were for seventy-seven (77) dams that did not already have photos, one hundred fifty-two (152) dams that had additional photos added to their entries, and sixteen (16) new dams added to the inventory during Year 3. There are forty-one (41) dams in the Dam Inventory Database that do not have any photos attached to their dam entries. Currently 94% of dams have photos in the Dam Inventory Database.

Most of the recommendations provided herein are specific to the Dam and Reservoir Inventory Form, the Annual Dam Safety Report Form, and the Dam Inventory Database. The recommendations mainly focus on increasing the ability of a dam owner to understand the form(s) they are being asked to complete and the ease of making edits to Government's internal Dam Inventory Database. As such, these specific recommendations have not been summarized as part of the executive summary.

With respect to dam safety management, it is Golder's recommendation that those dams that do not currently have a Canadian Dam Association consequence classification assigned should be the primary focus of future work. The CDA consequence classification is critical to effective dam safety management and is the foundation for the effective implementation of the CDA guidelines and technical bulletins. A comprehensive and defendable classification for these dams should be developed immediately. In addition, only about 14% of the dams in the Dam Inventory Database appear to have inundation mapping completed. Inundation mapping is an important tool for assigning an accurate CDA consequence classification, as well as developing comprehensive and effective Emergency Plans. While not every single dam in the database requires inundation mapping in order to assign a CDA classification or requires a comprehensive Emergency Plan, there is however a very large percentage of provincial dams that have an easily identifiable population at risk downstream and thus inundation mapping must be completed for these dams. Additional consideration must then be given to additional dams where the consequences of failure may impact important infrastructure or have environmental liabilities associated with a potential failure, e.g., tailings dams. Based on the results of the three-year project, many provincial dams still do not have dam breach inundation information critical for dam classification and emergency planning which is contrary to best management practices and should be addressed on a priority basis.

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by the Water Resources Management Division (WRMD) of Department of Municipal Affairs and Environment (DMAE), to conduct an inventory and assessment of all the dams in Newfoundland and Labrador. The purpose of the project was to help strengthen the province's dam safety program by updating the provincial Dam Inventory Database and to identify potential deficiencies and information gaps associated with these dams. Having a comprehensive and accurate database will assist Government in developing the necessary regulatory tools to manage dam failure risks in the province. The main objectives of the study included the following:

- Verify information in the current Dam Inventory Database;
- Compile missing information for the existing records;
- Identify new dams and create records for each;
- Digitize the available dam break flood inundation mapping on file with Government for dams in the entire province;
- Complete preliminary consequence assessments based on the economic consequences (order of magnitude) of a potential dam failure and taking into consideration the permanent population at risk (PAR) for those dams in the province that have available dam break inundation mapping;
- Conduct a high level, preliminary risk assessment on the provincial dams based on information presented in existing Dam Safety Reviews and/or Dam Safety Inspections;
- Identify any public safety incidents around dams that have happened in the province;
- Identify dams within the entire province where dam break flood inundation mapping should be considered; and,
- Complete a site visit to those dams that require confirmation of their existence, or do not have photos in the database.

This is the third and final year (Year 3) of the currently planned project. Year 1 of the project, which covered dams in the eastern region of the province, was completed in 2016 (Golder, 2016), and Year 2 of the project, which covered the remainder of the dams, in western Newfoundland and in Labrador, was completed in 2017 (Golder, 2017). Year 3 commenced in September 2017 and was the final year where an attempt to collect all information that was not collected in Years 1 and 2 was made. Tasks included compiling available data, requesting information from all remaining dam owners who had not previously responded in Years 1 or 2, creating records of previously unidentified dams, verifying and updating the existing information contained within the database, verifying the existence of several dams in the field, as well as visiting dams in the field that did not previously have photos in the database. Additionally, Year 3 involved contacting every dam owner in the province to inquire about any public safety incidents that may have previously occurred at their dam(s). All information obtained from the dam owners was used to complete the following: conduct preliminary risk assessments on each of the dams where dam safety documents were available, digitize the inundation mapping provided and create a GIS layer for each set of mapping, and complete an assessment of the total economic losses for those dams with digitized inundation mapping to estimate the damage that would be caused downstream from a hypothetical dam breach. Lastly, a list was developed based on the Canadian Dam Association (CDA) consequence classification for each

dam within the entire province to help prioritize dams where consideration should be given to completing flood inundation studies. While this task had also been completed in Year 2, Year 3 also included developing a prioritized list of water supply dams where consideration should be given to completing flood inundation studies, regardless of their CDA consequence classifications, which in most cases was missing from the database.

2.0 VERIFICATION AND COMPLETION OF EXISTING RECORDS

This phase of the project consisted of contacting dam owners, compiling received and available information, and verifying and updating existing Dam Inventory Database records. It should be noted that, in general, the accuracy of the information provided by the dam owners was not verified. The only verification that was completed by Golder was with respect to the information provided by each owner and how it compared to the existing entries in the database.

This phase was the most time-consuming portion of the project with the associated tasks being completed throughout most of the project duration. The starting point was to review the contact information in the inventory given to Golder by the WRMD to verify that the contact information provided was current. It should be noted that in Years 1 and 2 of the project, each dam owner was contacted individually using the information in the database at the time to confirm their current email address, phone number, and fax number. However, during Year 3, rather than making separate calls to each dam owner about their contact information again, the contact information was checked against company websites, and the municipal and local service district directories available on the DMAE website. Records were updated if their contact information was noted to have changed, for example, if a town recently got a new clerk or changed their email address. If an email address could not be found for a dam owner, they were contacted by phone to obtain an email address and they were informed that Golder was calling them in reference to the Government of Newfoundland and Labrador's Dam Inventory Project and that they would be receiving a brief letter from Golder requesting information on a dam that was listed under their ownership. Additionally, while contacting dam owners in order to ask for information about their dams, any changes they mentioned in regard to their contact information was updated as necessary. Most of the contact information in the database that had been collected during the previous two years of the project was found to still be current, however some updates were necessary.

Once the contact information was gathered/confirmed, letters were drafted to each owner indicating what information was being requested from them for this project. Attached to Golder's letter was an additional letter to dam owners provided by the WRMD, a map indicating the dams in each region, and the dam inventory form that they were asked to complete and return to Golder. The letter also presented the option for the owner to participate in a conference call with Golder to assist in completing their dam inventory form(s). These letters were sent to the owners via email, or in some cases by fax if the owner did not have an email address. In an attempt to receive the replies in a timely manner, a target date of two (2) weeks from the date the letter was sent was given as the deadline date for the owners to provide their responses. If there was no communication back from the owner within approximately two (2) weeks of the letter being sent, a follow-up phone call was made. If after the follow-up call there was still no reply from the owner, then a further follow-up email was sent.

At the start of Year 3 there were six hundred ninety-six (696) dams in the inventory, including three hundred seventy-three (373) dams that had already been updated in Year 1 or 2 with information provided by their owners and one (1) test dam entry used for training purposes by the WRMD. Of the remaining three hundred twenty-two (322) dams to be addressed during Year 3, Golder received updated information for ninety-six (96) dams from the dam owners. In addition to the forms received, additional notification was collected from dam owners, the WRMD, or during the field visits, which indicated that eighteen (18) dams no longer existed. Ten (10) of the eighteen (18)

dams were confirmed by the WRMD to be removed from the inventory (see the list of removed dams in Appendix A). Six (6) of the eighteen (18) dams were Orphaned and Abandoned mining dams owned by the Department of Natural Resources (#356, #363, #675, #715, #1202, and #1203) and confirmed by the WRMD to exist, and therefore left in the inventory. Two (2) of the eighteen (18) dams, i.e., Port Hope Simpson Old Water Supply Dam (#2249) and the City of Corner Brook's Third Pond Dam (#1748), were kept in the inventory until the WRMD could confirm during a site visit that they no longer exist. This means that two hundred sixteen (216) of the dams that were in the database at the start of Year 3 were unable to be updated.

Seventy-two (72) dam owners were contacted for information to update the Dam Inventory Database during the Year 3 project. This number assumes Deer Lake Power and Corner Brook Pulp and Paper Ltd. as one owner, and Nalcor Energy and NL Hydro as one owner. Twenty-eight (28) of these owners provided responses to Golder. It should be noted that of the two hundred sixteen (216) dams that were unable to be updated, Newfoundland Power owns one hundred fifty-nine (159) of them. Also, the owners of fourteen (14) of these dams are unknown, which prevented the collection of information.

Along with the dam inventory forms, documentation such as Dam Safety Reviews (DSRs), Dam Safety Inspections (DSIs), Emergency Plans, Operations, Maintenance and Surveillance (OMS) manuals, construction and design reports, pictures, drawings, and maps were received for various dams. All information received was filed electronically and any hardcopies received were kept as well. The forms received from the owners were first compared with the existing entries in the database to identify any new or updated information, as well as any discrepancies. If discrepancies were found, the owner was contacted to confirm the correct information. The dam inventory forms received were used to update the WRMD's Dam Inventory Database. To help complete this task, a binder was created that contained an updated dam inventory form for the applicable dams. All new and updated information on each form was highlighted to flag any updates to be made in the database. This made for a more efficient process when updating the database.

3.0 IDENTIFICATION OF NEW DAMS

This phase of the project included identification of new dams in Newfoundland and Labrador that were not currently in the Dam Inventory Database. The new dams were identified based on information provided by the WRMD or from current dam owners about other dams under their ownership that were not previously listed in the database, as well as those dams that were identified in the field.

At the start of the project, Golder was provided with a KMZ file from the WRMD that included the locations of twenty-eight (28) potential dams that the Provincial Government had identified as potentially existing based on a review of aerial photos and federal dam inventory documents. A similar file was provided at the start of Year 2, which Golder used to attempt to find a contact person and/or owner for the potential dams to confirm if they did exist. Since there was a field work component involved in Year 3, focus was placed on making site visits to those locations identified in the KMZ file that were reasonably accessible to determine if there was a dam present and to document the findings with photos. Golder selected twenty-two (22) potential dams that appeared to be accessible to visit during the fieldwork component of the project. Of these twenty-two (22) dams, six (6) were confirmed to exist and were added to the database, six (6) were confirmed to not exist, one (1) was found to already be in the inventory, and nine (9) could not be accessed and were left as unconfirmed. The six (6) dams that were not considered for the fieldwork (due to inaccessibility) were also left as unconfirmed. A summary table of information regarding the dams in the KMZ file can be found in **Appendix B**.

This phase also involved identifying and creating records for new dams that were identified based on the information received from current dam owners during phone calls and/or emails as described in Section 2.0, as well as the additional information provided by the WRMD, or obtained during the field visits. It should be noted that dam owners not contacted during Phase 2 above (i.e., owners who provided updated information for their dams in Year 1 or Year 2) were contacted separately during this phase (i.e., a separate letter was sent to them without the dam inventory form) to determine if any additional or updated information was available. Eleven (11) additional dams were identified through these efforts.

In total, during this phase seventeen (17) previously unidentified dams were discovered and added to the Dam Inventory Database. The owners were identified for thirteen (13) of these dams and dam inventory forms were received from the dam owners for nine (9) of them. The owners did not provide information for the other four (4) dams. In these cases, the dams were still added to the inventory, but the only information entered was the dam name, owner information, dam location, dam type, dam status, and in some cases dimensions, associated structures, and the project name. Dam owners were unable to be identified for the remaining four (4) newly identified dams; however, once again, in these cases the dams were still added to the inventory, but the only information entered was the dam name, dam location, dam type, dam status, and in some cases dimensions, associated structures, and the project name. A full list of dams added to the inventory can be found in **Appendix C**.

4.0 DAM FAILURE INUNDATION MAPPING

This phase involved identifying dams within the entire province of Newfoundland and Labrador for which dam break flood inundation mapping has already been developed. Inundation studies are known to exist for a total of ninety-five (95) dams throughout thirty-eight (38) systems/developments and eleven (11) dam owners (this number of owners assumes Deer Lake Power and Corner Brook Pulp and Paper Ltd. as one owner, and Nalcor Energy and NL Hydro as one owner, similar to Section 2.0). This includes mapping for three potential cascade failures as well. In Years 1 and 2, inundation maps encompassing thirty-one (31) dams were provided as hardcopies by the WRMD and were digitized to create a single GIS layer. In Year 3 of the project, additional inundation maps encompassing thirty-four (34) dams were obtained either from the WRMD or dam owners, which were digitized and combined with the GIS layer from Years 1 and 2. This made a total of sixty-five (65) dams with inundation maps that were digitized. A list of the dams that had inundation maps digitized in Year 3 is outlined in Table 1. It should be noted that although the number of dams encompassed within the inundation maps is thirty-four (34), the number of dam breach scenarios digitized was actually forty-five (45). This is because several of the maps had multiple inundation scenarios shown. For example, the two dams with available mapping at Vale's Long Harbour Processing Plant have inundation mapping showing both overtopping and a fair-weather breach. In total, there were forty-five (45) inundation scenarios added to the GIS layer in Year 3.

Hardcopies of the inundation mapping for sixteen (16) of remaining thirty (30) dams that are known to have inundation studies completed, were provided by the WRMD; however, Golder received the information towards the end of the project, at which point the number of inundation maps digitized had already surpassed the number included in the original proposal, therefore due to budgetary and time constraints the additional maps provided were not digitized. Hardcopies of the inundation mapping for the other fourteen (14) dams were not provided to the WRMD or Golder.

It should also be noted that the ninety-five (95) dams that have inundation mapping constitute ninety-five (95) Dam Inventory Database entries. Some of these entries however have multiple inundation mapping scenarios for a single dam. For example, the Muskrat Falls Dam is split up into six (6) inundation mapping scenarios, but in

terms of the inundation mapping they are all lumped together as one dam. The same is true with the inundation maps for the Grand Falls Power Canal, which is broken up into seven (7) entries, and the Horse Chops Dam and the Bishop's Falls Dam, which are comprised of two (2) Dam Inventory Database entries each. Also of note, is that for two (2) Newfoundland Power owned developments it is known that dam break flood inundation mapping exists, but the specific dams modeled within each are unknown because copies of the mapping were not available. A summary table outlining all dams/developments known to have dam break flood inundation mapping is presented in **Appendix D**.

With seven hundred three (702) dams in the Dam Inventory Database (after the Year 3 update), only ninety-five (95), or approximately 13.5%, are known to have dam break flood inundation mapping completed. Inundation mapping plays a major role in assigning a consequence classification to a dam, which in turn determines the design requirements of a dam in accordance with CDA guidelines and the level of detail to be included in the owner's dam safety management documents. Ideally, some level of detailed inundation mapping should be completed for every single dam in order to determine an accurate dam classification; however, it is recognized that in some specific circumstances the inundation zone may be assessed qualitatively using simplified methods.

Table 1: Digitized Inundation Maps for the Year 3 Dam Inventory and Assessment Project

Dam System/ Development	Dam Owner	Dame Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Beaver Brook Antimony Mine	Beaver Brook Antimony Mine Inc.	Old Tailings Pond Dam (#1192)	Yes	Yes
		Southwest Horseshoe Dam (#1408)	Yes	Yes
St. John's (Petty Harbour – Long Pond Watershed) Water Supply	City of St. John's – Public Works	Beer Pond North Dam (#674)	Yes	Yes
		Petty Harbour Long Pond Dam (#754)	Yes	Yes
		Beer Pond Southeast Dam (#903)	Yes	Yes
		Beer Pond Northeast Dam (#904)	Yes	Yes
St. John's (Windsor Lake Watershed) Water Supply	City of St. John's – Public Works	Windsor Lake Dam (#436)	Yes	Yes
Buchans Mine Closure (OAM)	Department of Natural Resources	Dam 1 (North and South) (#1193)	Yes	Yes
		Dam 4 (#682)	Yes	Yes
Consolidated Rambler Mine (OAM)	Department of Natural Resources	Northwest Dam (#1208)	Yes	Yes
Gullbridge Copper Mine (OAM)	Department of Natural Resources	Gullbridge Tailings Dam (#1201)	Yes	Yes
Hope Brook Gold Mine (OAM)	Department of Natural Resources	Main Pine Pond Dam (#392)	Yes	Yes

Dam System/ Development	Dam Owner	Dame Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
		New Pine Pond Spillway and Saddle Dam A (#568) (*See Saddle Dam 1)	Yes	Yes
		Main Tailings Pond Dam and Spillway (#569)	Yes	Yes
		Heap Leach Dam (#571)	Yes	Yes
		Polishing Pond Dam/Spillway (#572) (*See Main Tailings Pond Dam)	Yes	Yes
		Saddle Dam B (#573) (*See Saddle Dam 2)	Yes	Yes
		Saddle Dam 1 (#574)	Yes	Yes
		Saddle Dam 2 (#575)	Yes	Yes
		Saddle Dam 3 (#576) (*See Main Pine Pond Dam)	Yes	Yes
Minworth Fluorspar Mine (OAM)	Department of Natural Resources	Minworth Tailings Dam (#740)	Yes	Yes
Whalesback Copper Mine (OAM)	Department of Natural Resources	Whalesback Copper Mine Dam (#1204)	Yes	Yes
Churchill Falls Hydroelectric Development – East Forebay Reservoir	Nalcor Energy – Churchill Falls	GF-9 (#1114)	Yes	Yes
		FF-10A (#1115)	Yes	Yes
		FF-12 (#1119)	Yes	Yes
Churchill Falls Hydroelectric Development – West Forebay Reservoir	Nalcor Energy – Churchill Falls	GJ-11A (#1131)	Yes	Yes
Churchill Falls Hydroelectric Development – Lobstick	Nalcor Energy – Churchill Falls	GL-18 (#1081)	Yes	Yes

Dam System/ Development	Dam Owner	Dame Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Churchill Falls Hydroelectric Development – Ossokmanuan Reservoir	Nalcor Energy – Churchill Falls	Ossok Dam 1 (#1162)	Yes	Yes
Rattling Brook Hydroelectric Generating Facility	Newfoundland Power Inc.	Rattling Lake Dam (#222)	Yes	Yes
Sandy Brook Hydroelectric Generating Facility	Newfoundland Power Inc.	Sandy Brook Forebay Dam (#229)	Yes	Yes
Topsail Hydroelectric Generating Facility	Newfoundland Power Inc.	Three Island Pond Dam (#173)	Yes	Yes
		Three Arm Pond Dam (#174)	Yes	Yes
Vale Long Harbour Processing Plant – Residue Storage Area	Vale Newfoundland and Labrador Ltd.	Dam 1 (#1388)	Yes	Yes
		Dam 2 (#1389)	Yes	Yes

5.0 DAM FAILURE CONSEQUENCE ASSESSMENTS

The thirty-four (34) inundation scenarios that were digitized throughout the project were used in conjunction with the most recent orthorectified imagery available for the Province to complete a preliminary consequence assessment, based only on the potential economic losses and taking into consideration the PAR, for the areas identified as being at risk of flooding during a hypothetical dam breach. Although there were forty-five (45) total scenarios digitized, many of these scenarios were different breach conditions for the same dam, and therefore only the worst-case scenario was chosen to be digitized. Orthorectified imagery was obtained from the Department of Fisheries and Land Resources, Fish and Wildlife Enforcement Division (FWED), and was loaded into ArcGIS and overlain with the digitized inundation layers to see which areas would fall within the flood zones. In any areas where orthorectified imagery wasn't available (Labrador only), community mapping files were obtained from the FWED and used along with the most recently available aerial imagery from Google and Bing maps. Where available, Google Street View was used to determine exactly what each of the buildings in the flood zone was, providing a more accurate assessment.

As discussed in Section 4.0, inundation mapping is known to exist for ninety-five (95) dam entries in the Dam Inventory Database. However, thirty (30) of these dams have inundation mapping that was not digitized and therefore could not be used to complete a preliminary consequence assessment. These dams are as follows:

- #355 Deep Bank Dam – Deer Lake Hydroelectric Generating Station
- #357 West Bank Dyke – Deer Lake Hydroelectric Generating Station
- #411 Forebay Dam – Deer Lake Hydroelectric Generating Station

- #17 Bishop's Falls Ambursen Dam – Bishop's Falls Hydroelectric Generating Station
- #214 Bishop's Falls Earth Dam – Bishop's Falls Hydroelectric Generating Station
- #19 Buchans Main Dam – Buchans Hydroelectric Generating Station
- #6 Grand Falls Main Dam – Grand Falls Hydroelectric Generating Station
- #10 Grand Falls Power Canal – ASB Embankment Dam – Grand Falls Hydroelectric Generating Station
- #11 Grand Falls Power Canal – East Concrete Gravity Dam – Grand Falls Hydroelectric Generating Station
- #12 Grand Falls Power Canal – East Embankment Dam – Grand Falls Hydroelectric Generating Station
- #13 Grand Falls Power Canal – Intake Dams No.'s 1, 2 & 4 – Grand Falls Hydroelectric Generating Station
- #14 Grand Falls Power Canal – RCC Spillway – Grand Falls Hydroelectric Generating Station
- #15 Grand Falls Power Canal – West Concrete Gravity Dam – Grand Falls Hydroelectric Generating Station
- #16 Grand Falls Power Canal – West Embankment Dam – Grand Falls Hydroelectric Generating Station
- #20 Exploits Dam – Grand Falls Hydroelectric Generating Station
- #21 Goodyear's Dam – Grand Falls Hydroelectric Generating Station
- #23 North Twin Dam – Grand Falls Hydroelectric Generating Station
- #24 South Twin Dam – Grand Falls Hydroelectric Generating Station
- #768 Star Lake Saddle Dam – Star Lake Hydroelectric Generation Station
- #1138 GJ-18 – Churchill Falls Hydroelectric Development – West Forebay Reservoir
- #1048 GL-1 – Churchill Falls Hydroelectric Development – Lobstick
- #1076 GL-13 – Churchill Falls Hydroelectric Development – Lobstick
- #1176 Gabbro West – Churchill Falls Hydroelectric Development – Gabbro
- #139 Cape Broyle Forebay Dam– Cape Broyle/Horse Chops (CAB/HCP) Hydroelectric Generating Facility
- #141 Cape Broyle Intake Dam– Cape Broyle/Horse Chops (CAB/HCP) Hydroelectric Generating Facility
- #144 Horse Chops East Dam– Cape Broyle/Horse Chops (CAB/HCP) Hydroelectric Generating Facility
- #145 Horse Chops West Dam– Cape Broyle/Horse Chops (CAB/HCP) Hydroelectric Generating Facility
- #146 Mount Carmel Pond Dam – Cape Broyle/Horse Chops (CAB/HCP) Hydroelectric Generating Facility
- Unknown Dam – Petty Harbour Hydroelectric Generating Facility
- Unknown Dam – Seal Cove Hydroelectric Generating Facility

Note: For the two (2) unknown dams, it is only known that a dam at the given development has had inundation mapping completed, but not which specific dam.

The full list of dams with inundation mapping known to be completed, along with details of if hardcopies were obtained and if a GIS layer has been created or not, can be seen in Appendix D.

With respect to the incremental economic losses resulting from a hypothetical dam failure, the CDA guidelines only consider damages to third party properties. However, in practice, many dam owners also consider their own direct costs associated with a failure when choosing the appropriate design criteria. For this reason, both the third party and owner's costs have been included in the assessments presented herein, at the direction of the WRMD. The WRMD also specifically requested an evaluation of all potential costs associated with a potential dam failure, i.e., the total costs, and therefore no attempt was made to determine the incremental economic losses, were applicable.

The consequence assessments were completed using the worst-case conditions available for each dam, i.e., the digitized inundation layer that shows the largest extent of incremental flooding and, in some cases, includes the baseline flooding associated with the event leading up to the dam breach. The specific flooding conditions used in each analysis are outlined further in the summary tables provided in the following subsections. For areas that fell within the dam breach flood inundation zones, the infrastructure likely to be affected was tallied to quantify the potential damage and cost associated with a hypothetical dam breach, and to determine a likely permanent population that would be at risk of being affected in some way by the flooding. The types of infrastructure that were tallied included, but were not limited to, homes, commercial and municipal buildings, recreational areas, roads, transmission lines, bridges, culverts, pipelines, and various other structures that would be likely to sustain damage from flooding. Once infrastructure was counted, research was completed to assign a dollar value that represented the likely cost of repairing the infrastructure to its pre-flood conditions. The information collected was summarized into a separate table for each potential dam breach, and the assumed costs were totaled to get a lump sum cost estimate for all the repairs. Because the repair costs are highly variable, the total value was translated into an order of magnitude cost assumption that represented the expected cost of damage resulting from a dam breach. It should be noted that economic losses were extracted from available studies, some dating back to the 1990s. For simplicity, an update of these costs has not been performed considering inflation and changes in the land use. In other words, the actual present-day values of these costs are very likely higher than indicated.

In order to determine the permanent PAR in the flood zone, an average of three (3) persons per household was used to multiply by the number of homes affected. The following general assumptions and limitations were taken into account to reach a finalized consequence assessment:

- In many cases, the depth and velocity of floodwaters resulting from a breach were not known and therefore could not be factored into the amount of damage or cost of repairing infrastructure. Therefore, including the replacement costs for all households flooded within the inundation area and the PAR assessment may be considered conservative;
- Assigned dollar values did not include economic losses associated with the loss of revenue for a company or business whose facilities would be temporarily closed during repairs, or flights that would be cancelled because of flooding of an airport and its runway, e.g., loss of tourism, etc.;
- The amount of inventory a business may have in their facility was not included in the overall damage/repair cost. For example, the value of the cars that may be for sale on a car dealership's parking lot;

- It is likely that some of the structures counted as homes are cabins that only host seasonal, temporary populations, meaning the permanent PAR estimate may be conservative in some cases;
- The cost assigned for flood repair damages for a particular property only included the costs of the home, with no consideration of additional infrastructure such as a shed in the backyard or a wharf at waterfront properties;
- Commercial infrastructure was assigned to either a large building or small building category. Smaller buildings were those that are similar in size to an average home (e.g., convenience stores or small churches) and therefore would incur a similar cost for damage/repair but would not have a permanent PAR. Large infrastructure included buildings such as office buildings, warehouses, etc., and had a larger dollar amount estimated for damage/repair. In general, the repair costs of large commercial buildings were assumed to be double that of the small commercial buildings, except for buildings that are several magnitudes larger, such as schools or airports, which were assigned their own repair costs;
- The replacement of the entire section of roadway in the flood zone was not assumed in the cost estimate as it was considered unlikely that a flood would cause all roads to completely wash out. Instead, only areas where the floodwater would cross the road were assumed to wash out. In general, the areas of road that were assumed to wash out conveyed water through a culvert or under a bridge, therefore the cost of replacing the culvert or bridge was included along with the associated roadwork;
- The cost value for repairing or replacing most road infrastructure was assigned based on past contracts awarded for similar work in Newfoundland and Labrador, found on the Government of Newfoundland and Labrador's website, under past awarded contracts, major capital projects documents, or Job Creation Partnerships (JCP) listings. Several costs were looked at for each type of road repair, and an average cost was assumed that was thought to encompass the general road repair work that would need to take place to repair flood damage. For example, because it would be very difficult to estimate the size of a culvert that would wash out, an average cost for a culvert replacement was assumed based on previous awarded contracts found on the Department of Transportation and Works website;
- Where possible, bridges were categorized by type and assigned a cost per metre that was assigned based on whether they were a concrete, metal, or wooden structure. Those bridges on main roadways were assumed to be concrete, whereas those on smaller access roads were assumed to be either metal or wooden. The lengths of the bridges were measured in ArcGIS, and a cost per metre was assigned. The cost assigned was determined based on an average of past government contracts awarded;
- Any infrastructure cost values that were based on past government work (tender documents, major capital projects, JCPs, etc.) are assumed to include the cost of materials, equipment, and labour;
- General debris cleanup in municipalities was not considered in the consequence assessments; and,
- In the case of hydropower dams, it was assumed that the dam itself would need to undergo major repairs. A cost value was generally assigned based on the kW potential of the hydropower development, and includes the cost of replacing the dam itself, as well as all associated infrastructure such as penstocks, electrical and mechanical equipment, powerhouses, etc. In these cases, this associated infrastructure was not included in other sections of the infrastructure assessment to avoid counting any major infrastructure twice. For example, if the powerhouse for a hydropower dam was in its inundation zone, the building itself was not included in the small or large commercial building tally, as its repair costs are assumed in the repair

cost of the dam. In cases where the kW potential was unable to be determined, a different cost assumption was used based on the dam type, such as concrete gravity or earthfill, and its dimensions. It should be recognized that the costs to the dam owner are generally not included as part of the consequence assessment, however we have included the owners cost in each analysis as line items and they can be easily subtracted from the total cost if required.

Any other assumptions or limitations encountered that were specific to a particular dam breach are explained in the subsequent sections, along with the tables showing the detailed breakdown of how the consequence assessment was completed for each of the inundation zones. References for the assigned costs are included. The tables also indicate if any major transportation routes such as the Trans-Canada Highway, or any other numbered highways throughout the province would be potentially affected by floodwaters. In the case that a numbered highway may be affected, the Route number of that highway is included in the table.

While completing the consequence assessments for each area, Table 2, prepared by Hatch (2011), was used as a secondary check to try and verify the order of magnitude for the total estimated cost of damages that was calculated for each failure scenario. The table relates the economic damages that can be expected as a result of a dam breach to the CDA dam classifications, which do not have cost associations in the CDA guidelines. In general, it was found that the economic damages assessments, as presented in the following sections generally fit the criteria in Table 2 with respect to the current dam classifications assigned to these dams. When assessing damages for “Low” classification dams, the estimated economic losses were sometimes found to exceed $100,000. The higher estimates may indicate that the consequence assessments completed are over-conservative, or that the CDA class assigned to the dam may need to be reviewed to determine if it should be classified as a higher consequence structure.

Table 2: Dam Classes and Associated Economic Losses (Hatch, 2011)

CDA Dam Class	Economic Damages ($)
“EXTREME”	>100 million
“VERY HIGH”	>10 million
“HIGH”	>1 million
“SIGNIFICANT”	>100,000
“LOW”	<100,000

It should be noted that determining the environmental and cultural losses or completing loss of life calculations were not included in the scope of work for this task, however such losses must also be accounted for during a consequence classification assessment.

The following sections discuss the consequence assessments for thirty-four (34) of the dams. Note that for the Hope Brook Orphaned and Abandoned Mine Site, there is no infrastructure within the inundation zones of any of the dams, therefore the nine (9) dams evaluated from this site are combined into one table.

5.1 Beaver Brook Antimony Mine Old Tailings Pond Dam

There are no towns downstream of the Beaver Brook Antimony Mine, meaning there is no permanent population at risk should there be a breach in the Old Tailings Pond Dam. Inundation mapping shows that damage would be limited to on-site infrastructure only, including office buildings and the processing plant. Given the close proximity of the buildings to the tailings dam, it was assumed that buildings would be damaged beyond repair. Combined,

the damages, including the cost of damages to the dam itself, are expected to be within the millions of Canadian Dollars (CAD) range. The dam is located in the Gander Lake watershed, which is used as a drinking water source for the towns of Gander, Glenwood, and Appleton. A failure of the dam may affect this drinking water supply. The costs of emergency sampling, an alternative water supply, or additional treatment have not been considered further herein, but would need to be considered as part of a more detailed consequence assessment.

Table 3: Beaver Brook Antimony Mine Old Tailings Pond Dam Break Consequence Assessment

Background Information						
Dam Name:	Old Tailings Pond Dam					
Project Name:	Beaver Brook Antimony Mine					
Dam Owner:	Beaver Brook Antimony Mine Inc.					
Inventory Number:	1192					
Assumed Breach Conditions:	Unknown					
Communities Downstream:	N/A					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Small Commercial Buildings	3	building	$200,000.00	$600,000.00	Small mine buildings. Assumed same as cost of house in Glenwood	RE/MAX, 2017
Large Commercial Buildings	3	building	$400,000.00	$1,200,000.00	Twice the cost of the smaller buildings	RE/MAX, 2017
Processing Plant	1	entire plant	$7,500,000.00	$7,500,000.00	Processing plant based on 450 t/day	911 Metallurgist, 2010; VVC Exploration, n.d.
Old Tailings Pond Dam	300	metre	$2,000.00	$600,000.00	Earthfill Tailings Dam	Delcan, 2011
Estimated Total Loss ($)				**$9,900,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.2 Southwest Horseshoe Dam

Again, because there are no communities immediately downstream of the Beaver Brook Antimony Mine, the inundation zone is limited to infrastructure within the mine site, and there is no permanent population at risk should there be a breach in the dam. Inundation mapping shows that damage would be limited to on-site

infrastructure only, including office buildings and the processing plant. Given the close proximity of the buildings to the tailings dam, it was assumed that buildings would be damaged beyond repair. Combined, the damages, including the cost of damages to the dam itself, are expected to be within the millions of CAD range. The dam is located in the Gander Lake watershed, which is used as a drinking water source for the towns of Gander, Glenwood, and Appleton. A failure of the dam may affect this drinking water supply. The costs of emergency sampling, an alternative water supply, or additional treatment have not been considered further herein, but would need to be considered as part of a more detailed consequence assessment.

Table 4: Southwest Horseshoe Dam Break Consequence Assessment

Background Information						
Dam Name:	Southwest Horseshoe Dam					
Project Name:	Beaver Brook Antimony Mine					
Dam Owner:	Beaver Brook Antimony Mine Inc.					
Inventory Number:	1408					
Assumed Breach Conditions:	Unknown					
Communities Downstream:	N/A					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Small Commercial Buildings	1	building	$200,000.00	$200,000.00	Small mine buildings. Assumed same as cost of house in Glenwood	RE/MAX, 2017
Processing Plant	0.25	building	$7,250,000.00	$1,812,500.00	Only small part of the processing plant is in the inundation zone	911 Metallurgist, 2010; VVC Exploration, n.d.
Southwest Horseshoe Dam	700	metre	$2,000.00	$1,400,000.00	Earthfill Tailings Dam	Delcan, 2011
Estimated Total Loss ($)				**$3,412,500.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.3 Beer Pond North Dam

A breach in Beer Pond North Dam would cause floodwater to pass through the downstream town of Maddox Cove, however no homes or buildings fall within the inundation zone, meaning the permanent population at risk is zero persons. It is likely that one culvert would need to be replaced, along with the cost to repair the dam leading

to a total estimated cost of damages in the hundreds of thousands of CAD range. Additional costs associated with the potential loss of the water supply have not been considered further herein but would need to be considered as part of a more detailed consequence assessment.

Table 5: Beer Pond North Dam Break Consequence Assessment

Background Information						
Dam Name:	Beer Pond North Dam					
Project Name:	St. John's (Petty Harbour – Long Pond Watershed) Water Supply					
Dam Owner:	City of St. John's – Public Works					
Inventory Number:	674					
Assumed Breach Conditions:	100-year flood					
Communities Downstream:	Maddox Cove					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Culvert	2	per culvert	$60,000.00	$120,000.00		GPA, 2016
Beer Pond North Dam	50	metre	$2,000.00	$100,000.00	Earthfill Dam	Delcan, 2011
Estimated Total Loss ($)				**$220,000.00**		
Estimated Order of Magnitude of Losses				**Hundreds of Thousands**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.4 Petty Harbour Long Pond Dam

There are no towns or infrastructure, other than Petty Harbour Road, downstream from the Petty Harbour Long Pond Dam, meaning that the permanent population at risk estimate is zero persons. The cost of replacing the section of road in the inundation zone, combined with the repair costs for the dam leads to an estimated cost of damages in the millions of CAD range. Additional costs associated with the potential loss of the water supply have not been considered further herein but would need to be considered as part of a more detailed consequence assessment.

Table 6: Petty Harbour Long Pond Dam Break Consequence Assessment

Background Information	
Dam Name:	Petty Harbour Long Pond Dam
Project Name:	St. John's (Petty Harbour – Long Pond Watershed) Water Supply
Dam Owner:	City of St. John's – Public Works
Inventory Number:	754
Assumed Breach Conditions:	100-year flood
Communities Downstream:	N/A

Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Culvert	1	per culvert	$60,000.00	$60,000.00		GPA, 2016
Petty Harbour Long Pond Dam	45	metre	$75,000.00	$3,375,000.00	Concrete Gravity Dam	Nalcor Energy, 2016
Estimated Total Loss ($)				**$3,435,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.5 Beer Pond Southeast Dam

A breach in Beer Pond Southeast Dam would send water towards the downstream community of Petty Harbour. A small amount of infrastructure including a pipeline, a pumphouse, and twelve (12) homes fall within the inundation zone. The total estimated permanent population at risk is approximately thirty-six (36) persons. Once floodwaters reach the downstream infrastructure, water velocities are expected to be relatively slow, however the depth is expected to reach approximately 1.5 m, indicating that homes and other buildings within the area could be extensively damaged and may need to be fully replaced. The total estimated cost of damages is in the tens of millions of CAD range. Additional costs associated with the potential loss of the water supply have not been considered further herein but would need to be considered as part of a more detailed consequence assessment.

Table 7: Beer Pond Southeast Dam Break Consequence Assessment

Background Information						
Dam Name:	Beer Pond Southeast Dam					
Project Name:	St. John's (Petty Harbour – Long Pond Watershed) Water Supply					
Dam Owner:	City of St. John's – Public Works					
Inventory Number:	903					
Assumed Breach Conditions:	IDF 1/3 between 1000-year flood and PMF					
Communities Downstream:	Petty Harbour					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Houses	12	house	$180,000.00	$2,160,000.00		RE/MAX, 2017
Small Commercial Buildings	2	building	$180,000.00	$360,000.00		RE/MAX, 2017
Culvert	1	per culvert	$60,000.00	$60,000.00		GPA, 2016

Pipeline	330	metre	$350.00	$115,500.00	Water transmission pipeline	Town of Baie Verte, 2011
Pumphouse	1	Pump-house	$25,000.00	$25,000.00		GovNL, 2016
Wharf/ Marina	1	entire site	$300,000.00	$300,000.00		GovNL, 2015b
Bridge	35	metre	$98,000.00	$3,430,000.00	Concrete paved bridge	GPA, 2016
Bridge	7	metre	$98,000.00	$686,000.00	Concrete paved bridge	GPA, 2016
Beer Pond Southeast Dam	88	metre	$75,000.00	$6,600,000.00	Concrete Gravity Dam	Nalcor Energy, 2016
Estimated Total Loss ($)				**$13,736,500.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Tens of Millions**		
Permanent Population at Risk				**36**		
Major Transportation Routes Affected				**None**		

5.6 Beer Pond Northeast Dam

A breach in Beer Pond Northeast Dam would also send floodwater towards Maddox Cove, but again the water would be contained within the river it follows and no homes or other buildings would fall within the inundation zone. The permanent population at risk estimate is zero, and the estimated cost of damages is in the millions of CAD range.

Table 8: Beer Pond Northeast Dam Break Consequence Assessment

Background Information						
Dam Name:	Beer Pond Northeast Dam					
Project Name:	St. John's (Petty Harbour – Long Pond Watershed) Water Supply					
Dam Owner:	City of St. John's – Public Works					
Inventory Number:	904					
Assumed Breach Conditions:	IDF 1/3 between 1000-year flood and PMF					
Communities Downstream:	Maddox Cove					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Culvert	2	per culvert	$60,000.00	$120,000.00		GPA, 2016
Beer Pond Northeast Dam	30	metre	$75,000.00	$2,250,000.00	Concrete Gravity Dam	Nalcor Energy, 2016
Estimated Total Loss ($)				**$2,370,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.7 Windsor Lake Dam

A breach in Windsor Lake Dam would cause floodwaters to flow through the town of Portugal Cove – St. Phillips and St. Phillips, affecting approximately fifty-eight (58) homes. The permanent population at risk is estimated to be one hundred seventy-four (174) persons. Once floodwaters reach the downstream infrastructure, water velocities are expected to be relatively slow, however the depth is expected to reach approximately 1.5 m, indicating that homes and other buildings within the area could be extensively damaged and may need to be fully replaced. The total estimated cost of damages is in the range of tens of millions of CAD. Additional costs associated with the potential loss of the water supply have not been considered further herein but would need to be considered as part of a more detailed consequence assessment.

Table 9: Windsor Lake Dam Break Consequence Assessment

Background Information						
Dam Name:	Windsor Lake Dam					
Project Name:	St. John's (Windsor Lake Watershed) Water Supply					
Dam Owner:	City of St. John's – Public Works					
Inventory Number:	436					
Assumed Breach Conditions:	IDF 2/3 between 1000-year flood and PMF					
Communities Downstream:	Portugal Cove – St. Phillips, St. Phillips					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Houses	58	house	$360,000.00	$20,880,000.00		RE/MAX, 2017
Small Commercial Buildings	4	building	$360,000.00	$1,440,000.00		RE/MAX, 2017
Wharf/Marina	1	entire site	$300,000.00	$300,000.00		GovNL, 2015b
Bridge	10	metre	$98,000.00	$980,000.00	Concrete paved bridge	GPA, 2016
Bridge	15	metre	$98,000.00	$1,470,000.00	Concrete paved bridge	GPA, 2016
Bridge	15	metre	$98,000.00	$1,470,000.00	Concrete paved bridge	GPA, 2016
Bridge	20	metre	$98,000.00	$1,960,000.00	Concrete paved bridge	GPA, 2016
Bridge	20	metre	$98,000.00	$1,960,000.00	Concrete paved bridge	GPA, 2016
Windsor Lake Dam	100	metre	$2,000.00	$200,000.00	Earthfill Dam	Delcan, 2011
Estimated Total Loss ($)				**$30,660,000.00**		
Estimated Order of Magnitude of Losses				**Tens of Millions**		
Permanent Population at Risk				**174**		
Major Transportation Routes Affected				**Route 50 (Thorburn Road) Route 41 (Tickers Hill Road)**		

5.8 Buchans Dam 1 South

Inundation mapping shows that floodwater from a breach in Dam 1 South at the former Buchans Mine Site would cause floodwater to travel east along a flow path just south of the Town of Buchans and discharge into the Buchans River. No major infrastructure in the town would be affected, and the permanent population at risk is zero. Minor municipal infrastructure including a water transmission pipeline and pumphouse, and roadworks including a bridge and culvert would be in the inundation zone and potentially need to be replaced. The estimated cost of damages is in the range of millions of CAD.

Table 10: Buchans Dam 1 South Dam Break Consequence Assessment

Background Information						
Dam Name:	Dam 1 South					
Project Name:	Buchans Mine Closure (OAM)					
Dam Owner:	Department of Natural Resources					
Inventory Number:	1193					
Assumed Breach Conditions:	PMF					
Communities Downstream:	Buchans					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Dam	60	metre	$2,000.00	$120,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach.	Delcan, 2011; Golder, 2017b
Bridge	40	metre	$98,000.00	$3,920,000.00	Concrete bridge Buchans Highway	GPA, 2016
Culverts	1	culvert	$60,000.00	$60,000.00		GPA, 2016
Pumphouse	1	pumphouse	$25,000.00	$25,000.00		GovNL, 2016
Pipeline	160	metre	$350.00	$56,000.00	Water transmission pipeline	Town of Baie Verte, 2011
Estimated Total Loss ($)				**$4,181,000.00**		
Estimated Order of Magnitude of Losses				**Millions**		
Population at Risk				**0**		
Major Transportation Routes Affected				**Highway 370 (Buchans Highway)**		

5.9 Buchans Dam 4

Inundation mapping for a breach in Dam 4 at the former Buchans Mine Site shows water discharging south towards Red Indian Lake. There are no towns downstream from the dam, meaning there is no permanent

population at risk, and the only infrastructure anticipated to be affected by the inundation is a bridge along the Buchans Highway. Total damages are estimated to cost in the range of millions of CAD.

Table 11: Buchans Dam 4 Dam Break Consequence Assessment

Background Information						
Dam Name:	Dam 4					
Project Name:	Buchans Mine Closure (OAM)					
Dam Owner:	Department of Natural Resources					
Inventory Number:	682					
Assumed Breach Conditions:	PMF					
Communities Downstream:	N/A					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Dam	65	metre	$2,000.00	$130,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach.	Delcan, 2011; Golder, 2017b
Bridge	25	metre	$98,000.00	$2,450,000.00		GPA, 2016
Estimated Total Loss ($)				**$2,580,000.00**		
Estimated Order of Magnitude of Losses				**Millions**		
Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.10 Consolidated Rambler Northwest Dam

Inundation mapping for a breach in the Northwest Dam shows floodwater traveling northwest and discharging into Baie Verte at a point just south from the Anaconda Mining Site. There are no homes or buildings within the flood path, therefore the permanent population at risk is zero persons. Just northwest of the dam, there is a bridge that crosses Route 414 that would likely need to be replaced after a breach given its close proximity to the dam. The estimated cost of damages is in the millions of CAD range.

Table 12: Consolidated Rambler Northwest Dam Break Consequence Assessment

Background Information	
Dam Name:	Northwest Dam
Project Name:	Consolidated Rambler Mine (OAM)
Dam Owner:	Department of Natural Resources
Inventory Number:	1208
Assumed Breach Conditions:	PMF
Communities Downstream:	N/A

Consequence Assessment						
Infrastructure Type	**Number Affected**	**Repair Cost Per Unit**	**Unit**	**Total Repair Cost**	**Comments**	**Reference**
Dam	73	$2,000.00	metre	$146,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach.	Delcan, 2011; Golder, 2017b
Bridge	30	$98,000.00	metre	$2,940,000.00	Paved bridge, Route 414	GPA, 2016
Estimated Total Loss ($)				**$3,086,000.00**		
Estimated Order of Magnitude of Losses				**Millions**		
Population at Risk				**0**		
Major Transportation Routes Affected				**Route 414**		

5.11 Gullbridge Tailings Dam

The Gullbridge Tailings Dam has no towns immediately downstream, meaning no infrastructure is within the inundation zone and the permanent population at risk is zero. The only cost associated with a dam breach at Gullbridge is the cost of repairing the dam. According to inundation studies completed by Golder in 2017, the breach is anticipated to be trapezoidal in nature, with a bottom width of approximately 50 m. Given the total length of the dam, which is approximately one kilometer, it is unreasonable to assume that after a 50 m wide breach, the entire dam would need repairing. For the purposes of estimating the repair costs, Golder has assumed that a section twice the width of the breach, or 100 m long, would need repairing. This translates to a cost estimate in the hundreds of thousands of CAD range. A failure of the dam may affect the drinking water supply for the Town of South Brook. The costs of emergency sampling, an alternative water supply, or additional treatment have not been considered further herein but would need to be considered as part of a more detailed consequence assessment.

Table 13: Gullbridge Tailings Dam Break Consequence Assessment

Background Information	
Dam Name:	Gullbridge Tailings Dam
Project Name:	Gullbridge Copper Mine (OAM)
Dam Owner:	Department of Natural Resources
Inventory Number:	1201
Assumed Breach Conditions:	PMF
Communities Downstream:	South Brook

Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Dam	55	metre	$2,000.00	$110,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach.	Delcan, 2011; Golder, 2017b
Estimated Total Loss ($)				**$110,000.00 (entirely owner's cost)**		
Estimated Order of Magnitude of Losses				**Hundreds of Thousands**		
Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.12 Hope Brook Gold Mine (OAM) Tailings Dams

Given the remote location of the former Hope Brook Gold Mine, there are no towns or infrastructure anywhere near the site, and no permanent populations at risk. The only damages that would occur are to the tailings dams themselves. The following table outlines the individual costs associated with repairing damages to nine (9) tailings dams on site if they were to breach. Golder completed inundation mapping for the site in 2017, where the bottom width of the breach in each dam failure scenario was estimated. In all cases in the following table, it was assumed that the section of dam that would need to be repaired is twice the width of the bottom breach width.

Table 14: Hope Brook Gold Mine (OAM) Tailings Dams Dam Break Consequence Assessment

Background Information	
Dam Name:	Hope Brook Tailings Dams
Project Name:	Hope Brook Gold Mine (OAM)
Dam Owner:	Department of Natural Resources
Assumed Breach Conditions:	PMF
Communities Downstream:	N/A

Consequence Assessments						
Dam Breached (Inventory Number)	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Heap Leach Dam (#571)	57	metre	$2,000.00	$114,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach. It should be noted that due to the remoteness of the Hope Brook site, the cost of repairing	Delcan, 2011; Golder, 2017b
Main Tailings Pond Dam and Spillway (#569)	42	metre	$2,000.00	$84,000.00		
Main Pine Pond Dam (#392)	65	metre	$2,000.00	$130,000.00		

Background Information						
Saddle Dam 1 (#574)	56	metre	$112,000.00	$52,000.00	the dams is very likely higher than indicated, as the site is only accessibly by air or water, which was not accounted for in the cost estimate. Cost of damages are entirely owner's cost.	
Saddle Dam 2 (#575)	54	metre	$2,000.00	$108,000.00		
Saddle Dam 3 (#576)	59	metre	$2,000.00	$118,000.00		
Saddle Dam B (#573)	35	metre	$2,000.00	$70,000.00		
New Pine Pond Spillway/Saddle Dam A (#568)	14	metre	$2,000.00	$28,000.00	Hydrotechnical modeling was not completed for this dam, however the dam overtops as a result of a breach in the Main Tailings Pond Dam, therefore no breach width was calculated, and the entire crest length of Saddle Dam A was assumed to require repair.	Delcan, 2011; Golder, 2017b
Polishing Pond Dam/Spillway (#572)	45	metre	$2,000.00	$90,000.00	Hydrotechnical modeling was not completed for this dam, however the dam is expected to overtop as a result of the baseline flooding, therefore no breach width was calculated, and the entire crest length of Saddle Dam A was assumed to require repair.	Delcan, 2011; Golder, 2017b
Major Transportation Routes Affected				**None**		

5.13 Minworth Tailings Dam

There are no towns downstream from the Minworth Tailings Dam and therefore no permanent population at risk should the dam breach. There are several culverts along unpaved roads in the inundation area that would likely need to be replaced. The estimated cost of damages is in the hundreds of thousands of CAD range.

Table 15: Minworth Tailings Dam Break Consequence Assessment

Background Information	
Dam Name:	Minworth Tailings Dam
Project Name:	Minworth Fluorspar Mine (OAM)
Dam Owner:	Department of Natural Resources
Inventory Number:	740
Assumed Breach Conditions:	PMF
Communities Downstream:	N/A

Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Dam	20	metre	$2,000.00	$40,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach.	Delcan, 2011; Golder, 2017b
Culverts	3	culvert	$60,000.00	$180,000.00		GPA, 2016
Estimated Total Loss ($)				**$220,000.00**		
Estimated Order of Magnitude of Losses				**Hundreds of Thousands**		
Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.14 Whalesback Copper Mine Dam

Inundation mapping for a breach in the Whalesback Copper Mine Dam shows that there are no towns or major infrastructure downstream from the dam, meaning there is no permanent population at risk. There is one bridge along an unpaved road that may wash out due to the floodwaters. The total estimated cost of damages is in the hundreds of thousands of CAD range.

Table 16: Whalesback Copper Mine Dam Break Consequence Assessment

Background Information	
Dam Name:	Whalesback Copper Mine Dam
Project Name:	Whalesback Copper Mine (OAM)
Dam Owner:	Department of Natural Resources
Inventory Number:	1204
Assumed Breach Conditions:	PMF
Communities Downstream:	N/A

Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Dam	36	metre	$2,000.00	$72,000.00	Assumed section of dam needing repair is equal to approximately double the bottom width of the breach.	Delcan, 2011; Golder, 2017b
Bridge	10	metre	$6,000.00	$60,000.00	Wooden bridge, unpaved road	GPA, 2015a
Estimated Total Loss ($)				**$132,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Hundreds of Thousands**		
Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.15 GF-9

The inundation mapping for a breach in dyke GF-9 shows several buildings within the flood zone including two (2) homes and two (2) small apartment buildings. Assuming each of these apartment buildings had five (5) units with three (3) people living in each, the estimated number of persons at risk is thirty-six (36). These residences, along with other damaged infrastructure leads to an estimated cost of damages in the millions of CAD range.

Table 17: GF-9 Dam Break Consequence Assessment

Background Information						
Dam Name:	GF-9					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1114					
Assumed Breach Conditions:	Fair Weather Conditions					
Communities Downstream:	Churchill Falls					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Homes	2	per house	$150,000.00	$300,000.00		Prop2Go, 2017
Apartment buildings	2	building	$600,000.00	$1,200,000.00	Assuming 5 units in one building	Prop2Go, 2017
Small commercial building	1	building	$150,000.00	$150,000.00	Building at airport. Runway not affected	Prop2Go, 2017
School	0.5	entire school	$1,500,000.00	$750,000.00		Mansfield, 2017
GF-9 Dyke	3405	metre	$2,000.00	$6,810,000.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$9,210,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**36**		
Major Transportation Routes Affected				**Potentially Highway 500 (Trans Labrador Highway)**		

5.16 FF-10A (Churchill Falls Area)

The inundation maps showing the breach of dyke FF-10A do not indicate floodwater levels throughout the inundation zone. Given the proximity of the town of Churchill Falls to the reservoir, along with the size of the reservoir itself, it was assumed that the water would be deep and moving relatively quickly when it reached the town, causing any infrastructure in the inundation zone to require full replacement, rather than just repairs.

There are forty-seven (47) homes within the inundation zone leading to a population at risk estimate of one hundred forty-one (141) persons. The homes combined with the inundated commercial buildings and the cost of repairing the dyke itself leads to an estimated cost of inundation in the tens of millions of CAD range.

Table 18: FF-10A Dam Break Consequence Assessment, Churchill Falls Area

Background Information						
Dam Name:	FF-10A					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1115					
Assumed Breach Conditions:	Sunny Day Conditions					
Communities Downstream:	Churchill Falls					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Homes	47	house	$150,000.00	$7,050,000.00		RE/MAX, 2017
Small Commercial Buildings	15	building	$150,000.00	$2,250,000.00		RE/MAX, 2017
Large Commercial Buildings	8	building	$300,000.00	$2,400,000.00		RE/MAX, 2017
FF-10A Dyke	1730	metre	$2,000.00	$3,460,000.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$15,160,000.00**		
Estimated Order of Magnitude of Losses				**Tens of Millions**		
Permanent Population at Risk				**141**		
Major Transportation Routes Affected				**Potentially Highway 500 (Trans Labrador Highway)**		

5.17 FF-10A (Goose Bay/Mud Lake Area)

The floodwaters from a breach in the FF-10A dyke are expected to extend as far as the Goose Bay region. Again, floodwater levels and velocities were not provided, however given the size of the reservoir and the relatively low-lying topography in Goose Bay, it was assumed infrastructure within the inundation zone would be damaged beyond repair. There are an estimated nine hundred eighty-five (985) homes within the inundation zone and two apartment complexes, leading to a population at risk of 2985 persons.

Along with municipal infrastructure, it was assumed that the floodwater would cause significant damage to the newly constructed Muskrat Falls Dam, located on the Churchill River just west of Goose Bay. The anticipated cost of the damages to the Muskrat Falls Dam is hundreds of millions of dollars, which when combined with the estimated cost of damages to municipal infrastructure brings the total anticipated cost of damages into the billions of CAD range. It should be noted that only the economic consequences of damages to the Muskrat Falls Dam itself were considered. In the case that a breach in the FF-10A dam causes a cascading failure of the Muskrat Falls Dam, the consequences of failure would likely be more severe as the inundation area affected would be that outlined in the table below, as well as any additional infrastructure or population at risk due to the floodwater form the Muskrat Falls Dam breach.

Table 19: FF-10A Dam Break Consequence Assessment, Goose Bay and Mud Lake Area

Background Information						
Dam Name:	FF-10A					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1115					
Assumed Breach Conditions:	PMF Conditions					
Communities Downstream:	Goose Bay and Mud Lake					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Houses	985	house	$350,000.00	$344,750,000.00		RE/MAX, 2017
Apartment complex	2	building	$600,000.00	$1,200,000.00	Assume 5 apartments, 3 people in each apartment	RE/MAX, 2017
Small Commercial Buildings	132	building	$350,000.00	$46,200,000.00		RE/MAX, 2017
Large Commercial Buildings	59	building	$700,000.00	$41,300,000.00		RE/MAX, 2017
Baseball Field	1	per field	$40,000.00	$40,000.00		GovNL, 2015
Cemetery	1	entire site	$25,000.00	$25,000.00		GovNL, 2015
Ferry Terminal/Wharf	1	entire site	$300,000.00	$300,000.00		GovNL, 2015b
Wastewater Treatment Facility	1	entire facility	$23,500,000.00	$23,500,000.00		Government of Canada, 2013
Culvert	21	culvert	$60,000.00	$1,260,000.00		GPA, 2016
Bridge	10	metre	$6,000.00	$60,000.00	Wooden trail bridge, Goose Bay	GPA, 2015a
Bridge	20	metre	$6,000.00	$120,000.00	Wooden trail bridge, Mud Lake	GPA, 2015a
Bridge	50	metre	$45,000.00	$2,250,000.00	Metal bridge, Mud Lake	GPA, 2016
Bridge	60	metre	$98,000.00	$5,880,000.00	Paved bridge, north of Goose Bay	GPA, 2016

Bridge	200	metre	$98,000.00	$19,600,000.00	Paved bridge, north of Goose Bay	GPA, 2016
Bridge	112	metre	$98,000.00	$10,976,000.00	To Muskrat Falls site	GPA, 2016
Bridge	850	metre	$98,000.00	$83,300,000.00	Paved concrete highway bridge	GPA, 2016
Muskrat Falls Dam	824000	kW	$675.00	$556,200,000.00	Hydro-power Dam	IRENA, 2012
FF-10A Dyke	1730	metre	$2,000.00	$3,460,000.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$1,140,421,000.00**		
Estimated Order of Magnitude of Losses				**Billions**		
Permanent Population at Risk				**2985**		
Major Transportation Routes Affected				**Route 500 (TLH), Route 510 (TLH)**		

5.18 FF-12

The floodwaters from a breach in dyke FF-12 are not expected to affect a very large area of Churchill Falls. With only one building and a small section of road in the inundation zone, the cost of repairs is anticipated to be relatively low, however when combined with the cost of replacing the dyke itself, the estimated cost of damages is in the millions of CAD range. There are no homes within the inundation zone, meaning the permanent population at risk is zero.

Table 20: FF-12 Dam Break Consequence Assessment

Background Information						
Dam Name:	FF-12					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1119					
Assumed Breach Conditions:	Sunny Day Conditions					
Communities Downstream:	Churchill Falls					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Small Commercial Buildings	1	building	$150,000.00	$150,000.00		Prop2Go, 2017
Culvert	2	culvert	$60,000.00	$120,000.00		GPA, 2016
FF-10A Dyke	1843	metre	$2,000.00	$3,686,000.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$3,956,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**Potentially Route 500 (TLH)**		

5.19 GJ-11A

The inundation mapping for a breach in dyke GJ-11A shows floodwater extending as far as the Goose Bay and Mud Lake area. The number of homes within the inundation zone is two hundred three (203), leading to an estimated population at risk of six hundred nine (609) persons.

It should also be noted that the Muskrat Falls Dam Site is located directly in the downstream flow path, however the inundation mapping that was digitized started downstream from Muskrat Falls and only included the Goose Bay and Mud Lake areas. Potential effects to the Muskrat Falls Dam were not evaluated in the consequence assessment, however consideration should be given to updating the inundation maps to include the Muskrat Falls site as there may be potential for inundation water to damage the site or cause a cascade failure in the event of the GJ-11A dam break.

Table 21: GJ-11A Dam Break Consequence Assessment

Background Information						
Dam Name:	GJ-11A					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1131					
Assumed Breach Conditions:	Fair Weather Conditions					
Communities Downstream:	Goose Bay, Mud Lake					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Homes	203	per house	$350,000.00	$71,050,000.00		RE/MAX, 2017
Small Commercial Buildings	33	building	$350,000.00	$11,550,000.00		RE/MAX, 2017
Large Commercial Buildings	12	building	$700,000.00	$8,400,000.00		RE/MAX, 2017
Cemetery	0.205	entire site	$25,000.00	$6,250.00		GovNL, 2015
Culverts	14	per culvert	$60,000.00	$840,000.00		GovNL, 2016
Bridge	10	metre	$6,000.00	$60,000.00	Wooden trail bridge, Goose Bay	GPA, 2015a
Bridge	20	metre	$6,000.00	$120,000.00	Wooden trail bridge, Mud Lake	GPA, 2015a
Bridge	50	metre	$45,000.00	$2,250,000.00	Metal bridge, Mud Lake	GPA, 2016
Bridge	60	metre	$98,000.00	$5,880,000.00	Paved bridge, north of Goose Bay	GPA, 2016

Bridge	200	metre	$98,000.00	$19,600,000.00	Paved bridge, north of Goose Bay	GPA, 2016
Bridge	850	metre	$98,000.00	$83,300,000.00	Paved concrete highway bridge	GPA, 2016
Wharf/Ferry Terminal	1	entire site	$300,000.00	$300,000.00		GovNL, 2015
GJ-11A Dyke	67.1	metre	$2,000.00	$134,200.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$203,490,450.00**		
Estimated Order of Magnitude of Losses				**Hundreds of Millions**		
Permanent Population at Risk				**609**		
Major Transportation Routes Affected				**Route 500 (TLH), Route 510 (TLH)**		

5.20 GL-18 (Churchill Falls Area)

Inundation mapping for a breach in dyke GL-18 during fair weather conditions shows extensive damage to Churchill Falls. There are seventy-six (76) homes and four (4) small apartments within the inundation zone leading to an estimated population at risk of two hundred eighty-eight (288) persons. Additional infrastructure within the inundation zone includes the school, airport, and a portion of the Churchill Falls substation. The total estimated cost of damages is in the range of tens of millions of CAD.

Table 22: GL-18 Dam Break Consequence Assessment, Churchill Falls Area

Background Information						
Dam Name:	GL-18					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1081					
Assumed Breach Conditions:	Fair Weather Conditions					
Communities Downstream:	Churchill Falls					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Homes	76	per house	$150,000.00	$11,400,000.00		RE/MAX, 2017
Apartment buildings	4	building	$600,000.00	$2,400,000.00	Assuming 5 units in one building	Prop2Go, 2017
Small Commercial Buildings	1	building	$150,000.00	$150,000.00		RE/MAX, 2017

CF Airport	1	entire site	$20,000,000.00	$20,000,000.00	based on cost of runway at DL airport	Deer Lake Regional Airport, 2016
School	1	entire school	$1,500,000.00	$1,500,000.00	Concrete gravity	Mansfield, 2017
CF Substation	0.25	entire substation	$11,000,000.00	$2,750,000.00	5428 MW/35000 GWh	Newfoundland Power, 2012
GL-18 Dyke	3389.2	metre	$2,000.00	$6,778,400.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$44,978,400.00**		
Estimated Order of Magnitude of Losses				**Tens of Millions**		
Permanent Population at Risk				**288**		
Major Transportation Routes Affected				**Potentially Route 500 (Trans Labrador Highway)**		

5.21 GL-18 (Full Churchill River)

A breach in dyke GL-18 under PMF conditions would cause extensive damage throughout the Goose Bay and Mud Lake region. Inundation mapping shows an estimated 1292 homes and two apartment complexes within the inundation zone, amounting to a population at risk estimate of 3906 persons. Additional structures within the inundation zone include the Goose Bay ferry terminal, the Water Treatment Facility, numerous bridges and culverts, and the Muskrat Falls site west of Goose Bay. All totaled, the estimated cost of damages is in the range of billions of CAD.

It should be noted that only the economic consequences of damages to the Muskrat Falls Dam itself were considered. In the case that a breach in the FF-10A dam causes a cascading failure of the Muskrat Falls Dam, the consequences of failure would likely be more severe as the inundation area affected would be that outlined in the table below, as well as any additional infrastructure or population at risk due the floodwater form the Muskrat Falls Dam breach.

Table 23: GL-18 Dam Break Consequence Assessment, Full Churchill River

Background Information						
Dam Name:	GL-18					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1081					
Assumed Breach Conditions:	PMF					
Communities Downstream:	Full Churchill River (Goose Bay and Mud Lake)					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Houses	1292	house	$350,000.00	$452,200,000.00		RE/MAX, 2017

Apartment complex	2	entire building	$600,000.00	$1,200,000.00	Assuming 5 units in one building	RE/MAX, 2017
Small Commercial Buildings	163	building	$350,000.00	$57,050,000.00		RE/MAX, 2017
Large Commercial Buildings	69	building	$700,000.00	$48,300,000.00		RE/MAX, 2017
Baseball Field	1	per field	$40,000.00	$40,000.00		GovNL, 2015
Cemetery	1	entire site	$25,000.00	$25,000.00		GovNL, 2015
Ferry Terminal/Wharf	1	entire site	$300,000.00	$300,000.00		GovNL, 2015
Wastewater Treatment Facility	1	entire facility	$23,500,000.00	$23,500,000.00		Government of Canada, 2013
Culverts	21	per culvert	$60,000.00	$1,260,000.00		GPA, 2016
Bridge	10	metre	$6,000.00	$60,000.00	Wooden trail bridge, Goose Bay	GPA, 2015a
Bridge	20	metre	$6,000.00	$120,000.00	Wooden trail bridge, Mud Lake	GPA, 2015a
Bridge	50	metre	$45,000.00	$2,250,000.00	Metal bridge, Mud Lake	GPA, 2016
Bridge	60	metre	$98,000.00	$5,880,000.00	paved bridge, north of Goose Bay	GPA, 2016
Bridge	200	metre	$98,000.00	$19,600,000.00	paved bridge, north of Goose Bay	GPA, 2016
Bridge	112	metre	$98,000.00	$10,976,000.00	To Muskrat Falls site	GPA, 2016
Bridge	850	metre	$98,000.00	$83,300,000.00	Paved concrete highway bridge	GPA, 2016
Muskrat Falls Dam	824000	kW	$675.00	$556,200,000.00		IRENA, 2012
GL-18 Dyke	3389.2	metre	$2,000.00	$6,778,400.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$1,269,039,400.00**		
Estimated Order of Magnitude of Losses				**Billions**		
Permanent Population at Risk				**3906**		
Major Transportation Routes Affected				**Route 500 (TLH), Route 501 (TLH)**		

5.22 Ossok Dam 1

A breach in Ossok Dam 1 would lead to flood waters reaching the Goose Bay and Mud Lake region. Again, the flood water levels are not provided in the inundation mapping, however it was assumed that homes would need to be replaced. The estimated three hundred eighty-four (384) homes within the inundation zone lead to a population at risk estimate of 1152 persons, and that combined with additional damaged infrastructure leads to an estimated cost of damages in the hundreds of millions of CAD range.

It should also be noted that the Muskrat Falls Dam Site is located directly in the downstream flow path, however the inundation mapping that was digitized started downstream from Muskrat Falls and only included the Goose Bay and Mud Lake areas. Potential effects to the Muskrat Falls Dam were not evaluated in the consequence assessment, however consideration should be given to updating the inundation maps to include the Muskrat Falls site as there may be potential for inundation water to damage the site or cause a cascade failure in the event of a breach in Ossok Dam 1.

Table 24: Ossok Dam 1 Dam Break Consequence Assessment

Background Information						
Dam Name:	Ossok Dam 1					
Project Name:	Churchill Falls Hydroelectric Development					
Dam Owner:	Nalcor Energy – Churchill Falls					
Inventory Number:	1162					
Assumed Breach Conditions:	Fair Weather Conditions					
Communities Downstream:	Goose Bay, Mud Lake					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Homes	384	per house	$350,000.00	$134,400,000.00		RE/MAX, 2017
Small Commercial Buildings	43	building	$350,000.00	$15,050,000.00		RE/MAX, 2017
Large Commercial Buildings	16	building	$700,000.00	$11,200,000.00		RE/MAX, 2017
Culvert	17	per culvert	$60,000.00	$1,020,000.00		GovNL, 2015
Bridge	10	metre	$6,000.00	$60,000.00	Wooden trail bridge, Goose Bay	GPA, 2015a
Bridge	20	metre	$6,000.00	$120,000.00	Wooden trail bridge, Mud Lake	GPA, 2015a
Bridge	50	metre	$45,000.00	$2,250,000.00	Metal bridge, Mud Lake	GPA, 2016
Bridge	60	metre	$98,000.00	$5,880,000.00	Paved bridge, north of Goose Bay	GPA, 2016

Bridge	200	metre	$98,000.00	$19,600,000.00	Paved bridge, north of Goose Bay	GPA, 2016
Bridge	850	metre	$98,000.00	$83,300,000.00	Paved concrete highway bridge	GPA, 2016
Ossok Dam 1	384	metre	$2,000.00	$768,000.00	Earthfill Dam	Delcan, 2012
Estimated Total Loss ($)				**$273,648,000.00**		
Estimated Order of Magnitude of Losses				**Hundreds of Millions**		
Permanent Population at Risk				**1152**		
Major Transportation Routes Affected				**Route 500 (TLH), Route 501 (TLH)**		

5.23 Rattling Lake Dam

Inundation mapping for the Rattling Lake Dam shows the floodwater crossing the Trans-Canada Highway and discharging into the Bay of Exploits near Norris Arm. There are no homes within the inundation zone meaning the estimate for permanent population at risk is zero persons. Only a small portion of one commercial building falls within the inundation zone, therefore it was assumed that the building would not need to be fully replaced. The cost of the building repairs, combined with the cost of replacing the four bridges in the inundation zone, is estimated to be in the tens of millions of CAD range.

Table 25: Rattling Lake Dam Break Consequence Assessment

Background Information						
Dam Name:	Rattling Lake Dam					
Project Name:	Rattling Brook Hydroelectric Generating Facility					
Dam Owner:	Newfoundland Power Inc.					
Inventory Number:	222					
Assumed Breach Conditions:	Overtopping Failure with 1:10,000 Flood					
Communities Downstream:	Rattling Brook, Norris Arm					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Small Commercial Buildings	1	building	$16,000.00	$16,000.00		Aviva Canada, 2015
Bridge	25	metre	$98,000.00	$2,450,000.00	Concrete paved bridge	GPA, 2016
Bridge	30	metre	$98,000.00	$2,940,000.00	Concrete paved bridge	GPA, 2016
Bridge	25	metre	$98,000.00	$2,450,000.00	Concrete paved bridge	GPA, 2016
Bridge	17	metre	$6,000.00	$102,000.00	Wooden bridge	GPA, 2015

Rattling Lake Dam	14100	kw Capacity	$675.00	$9,517,500.00	Hydropower Dam	IRENA, 2012
Estimated Total Loss ($)				**$17,475,500.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Tens of Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**Trans-Canada Highway**		

5.24 Sandy Brook Forebay Dam

A breach in the Sandy Brook Forebay Dam would cause floodwaters to affect the area west of Grand Falls-Windsor, which includes the Town of Red Cliff. There are fourteen (14) homes within the inundation zone, leading to a permanent population at risk estimate of forty-two (42) persons. The depth or velocity of inundation water was not included in the inundation mapping, however based on the relatively small inundation zone and the fact that most homes are on the very outer limits of the inundation zone, it was assumed that homes and buildings would only endure repair costs. The total cost of damages is estimated in the tens of millions of CAD range.

Table 26: Sandy Brook Dam Break Consequence Assessment

Background Information						
Dam Name:	Sandy Brook Forebay Dam					
Project Name:	Sandy Brook Hydroelectric Generating Facility					
Dam Owner:	Newfoundland Power Inc.					
Inventory Number:	229					
Assumed Breach Conditions:	PMF					
Communities Downstream:	Red Cliff					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Houses	14	building	$16,000.00	$224,000.00		Aviva Canada, 2015
Large Commercial Buildings	1	building	$32,000.00	$32,000.00		Aviva Canada, 2015
Culvert	1	per culvert	$60,000.00	$60,000.00		GPA, 2016
TCH Road/ Causeway	920	metre	$60,000.00	$55,200,000.00		CBC, 2017
Bridge	50	metre	$98,000.00	$4,900,000.00	Concrete paved bridge	GPA, 2016
Bridge	40	metre	$6,000.00	$240,000.00	Wooden Bridge	GPA, 2015
Sandy Brook Forebay Dam	6310	kW Capacity	$675.00	$4,259,250.00	Hydropower Dam	IRENA, 2012
Estimated Total Loss ($)				**$64,915,250.00**		

Estimated Order of Magnitude of Losses	**Tens of Millions**
Permanent Population at Risk	**42**
Major Transportation Routes Affected	**Trans-Canada Highway**

5.25 Three Island Pond Dam

A breach in Three Island Pond Dam would result in a very small inundation area where only three (3) houses on the very outer edge of the flood zone would be affected leading to a permanent population at risk estimate of nine (9) persons. Floodwater depths and velocities were not provided, however given the location of the homes within the inundation area it was assumed only repair costs would be required. These costs combined with the one bridge in the inundation zone that would potentially need replacement leads to a total estimated damage cost in the millions of CAD range.

Table 27: Three Island Pond Dam Break Consequence Assessment

Background Information						
Dam Name:	Three Island Pond Dam					
Project Name:	Topsail Hydroelectric Generating Facility					
Dam Owner:	Newfoundland Power Inc.					
Inventory Number:	173					
Assumed Breach Conditions:	Fair Weather Conditions					
Communities Downstream:	Paradise/Conception Bay South					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Houses	3	building	$16,000.00	$48,000.00		Aviva Canada, 2015
Bridge	14	metre	$98,000.00	$1,372,000.00	Concrete paved bridge	GPA, 2016B
Three Island Pond Dam	2600	per kW capacity	$675.00	$1,755,000.00	Hydropower Dam	IRENA, 2012
Estimated Total Loss ($)				**$3,175,000.00**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**9**		
Major Transportation Routes Affected				**None**		

5.26 Three Arm Pond Dam

Similar to Three Island Pond Dam, a breach in Three Arm Pond Dam would result in a very small inundation zone where only one road with an assumed two culverts would be affected. No homes or buildings would be affected meaning the permanent population at risk estimate is zero. The estimated cost of the culverts combined with repair costs of the dam is in the range of millions of CAD.

Table 28: Three Arm Pond Dam Break Consequence Assessment

Background Information						
Dam Name:	Three Arm Pond Dam					
Project Name:	Topsail Hydroelectric Generating Facility					
Dam Owner:	Newfoundland Power Inc.					
Inventory Number:	174					
Assumed Breach Conditions:	Fair Weather Conditions					
Communities Downstream:	Paradise/Conception Bay South					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Culvert	2	building	$60,000.00	$120,000.00		GPA, 2016
Three Arm Pond Dam	2600	kW capacity	$675.00	$1,755,000.00	Hydropower Dam	IRENA, 2012
Estimated Total Loss ($)				**$1,875,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.27 Dam 1 – Long Harbour Processing Plant

A breach in Dam 1 at the Long Harbour Processing Plant would cause floodwater to travel directly towards the site office building. There are no homes in the inundation zone meaning the permanent population at risk estimate is zero, however the Long Harbour site does employ many people, some of whom could be in the area of the downstream flow path at the time of the breach. For the purposes of the consequence assessment, this population at risk was considered temporary as there are no office buildings or workspaces within the flow path, however, because the site is under 24-hour operation, some consideration should be given to potentially assigning a permanent population at risk depending on how many employees would have access to the affected area. Total estimated damage costs for the site are in the range of millions of CAD.

Table 29: Dam 1 - Long Harbour Processing Plant Dam Break Consequence Assessment

Background Information	
Dam Name:	Dam 1
Project Name:	Vale Long Harbour Processing Plant – Residue Storage Area
Dam Owner:	Vale Newfoundland and Labrador Ltd.
Inventory Number:	1388
Assumed Breach Conditions:	Overtopping
Communities Downstream:	Long Harbour

Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Small Commercial Buildings	2	building	$250,000.00	$500,000.00	Vale office buildings	RE/MAX, 2017
Large Commercial Buildings	3	building	$500,000.00	$1,500,000.00	Vale office buildings	RE/MAX, 2017
Dam 1	230	metre	$2,000.00	$460,000.00	Earthfill Dam	Delcan, 2011
Estimated Total Loss ($)				**$2,460,000.00**		
Estimated Order of Magnitude of Losses				**Millions**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

5.28 Dam 2 – Long Harbour Processing Plant

A breach in Dam 2 at the Long Harbour Processing Plant affects only the parking lot on site, and not the site buildings themselves. Again, this means there may be a temporary population at risk, but because there are no homes within the inundation zone the permanent population at risk is zero. The estimated cost of damages including repairs to the dam and one culvert within the inundation zone is in the range of hundreds of thousands of CAD.

Table 30: Dam 2 - Long Harbour Processing Plant Dam Break Consequence Assessment

Background Information						
Dam Name:	Dam 2					
Project Name:	Vale Long Harbour Processing Plant – Residue Storage Area					
Dam Owner:	Vale Newfoundland and Labrador Ltd.					
Inventory Number:	1389					
Assumed Breach Conditions:	Overtopping					
Communities Downstream:	Long Harbour					
Consequence Assessment						
Infrastructure Type	**Number Affected**	**Unit**	**Repair Cost Per Unit**	**Total Repair Cost**	**Comments**	**Reference**
Culvert	1	per culvert	$60,000.00	$60,000.00	Culvert through main road into town	GPA, 2016
Dam 2	453	metre	$2,000.00	$906,000.00	Earthfill Dam	Delcan, 2011
Estimated Total Loss ($)				**$966,000.00 (primarily owner's cost)**		
Estimated Order of Magnitude of Losses				**Hundreds of Thousands**		
Permanent Population at Risk				**0**		
Major Transportation Routes Affected				**None**		

6.0 DAM RISK ASSESSMENTS

Preliminary risk assessments were completed for each dam where DSRs, DSIs, or other dam safety related documents were available with enough detail to complete a high level, preliminary assessment. For each dam with this information, the Annual Dam Safety Report Form provided by the WRMD was completed. This form was used to assess, based on available information found in the documents provided by WRMD and in some cases the dam owner, the main elements of the dam safety management program that are in place for each dam, the physical condition of the dam, the probability of occurrence of a potential dam safety emergency and the overall risk level of the dam based on its CDA Dam Classification and the dam safety emergency probability rating. It should be noted that in previous years, the form addressed the potential of a dam failure occurring, which was updated this year to instead assess the potential of a dam safety emergency occurring. This was changed from the form used in previous years to better describe potential dam safety deficiencies and non-conformances, without necessarily providing an indication for the probability of failure, which is extremely difficult to accurately assess. However, the information being evaluated can be used to determine the potential for different types of dam safety emergencies to occur. For example, a dam without a properly updated Emergency Plan may not allow emergency responders to respond to a dam safety event involving the public quickly and efficiently, resulting in an emergency situation; or in cases where an OMS manual doesn't exist, improper operations during periods of heavy rainfall could lead to a dam overtopping due to a lack of available instructions, resulting in downstream flooding with or without an actual failure of the dam. A copy of the Annual Dam Safety Report has been included in **Appendix E**.

Using the Annual Dam Safety Report Form and the various reports that were provided to Golder, a cursory assessment of several of the dams in the province has been completed. However, due to time and budgetary constraints, the desktop assessments that have been completed should not be considered final and, in most cases, additional follow-up with the dam owner as well as a site visit is necessary to further validate the findings of initial preliminary assessments. Until further validation of the risk assessments can be completed, the risk level assigned to each dam should be considered as more of a "regularity" risk level, which can be used by WRMD to prioritize follow-up efforts with the various dam owners. In total, there were forty-six (46) dam safety related documents used to complete risk assessments for one hundred three (103) dams. It should be noted that for thirteen (13) of these dams, risk assessments were already completed in Years 1 or 2, but more recent documentation was received during Year 3 and therefore an updated risk assessment was completed. A breakdown of the assessment results is shown in Table 31.

Table 31: Year 3 Risk Assessment Results Breakdown

Risk Level	# of Dams	Percentage
1 – Very High (Alert)	35	34%
2 – High (Caution)	31	30%
3 – Moderate (Stable)	22	21%
4 – Low (No Concerns)	2	2%
5 – Very Low (Effectual)	13	13%

It is important to note that the risk assessments were completed based on information provided by each dam owner as part of this project as well as the information that the WRMD has on file. For example, it is known that some dam owners do actively monitor and complete regular maintenance on their dams. However, without the

proper documentation on file and supplied as evidence, the burden of proof has not been met and therefore questions such as “inspection frequency adequate” and “maintenance suitable” were marked as “Follow-up” on the risk assessment forms.

Also worth mentioning is that the original methodology that was used to develop the Annual Dam Safety Report Form provides a provision where the person completing the risk assessment can either upgrade or downgrade the risk level at their discretion. In a few cases this has been done and, in those cases, additional justification has been provided. For example, if a dam had more than one non-conformance or considerable deficiencies the risk level may have been upgraded to bring attention to the lack of information and/or deficiencies.

Over the course of the three (3) years of the Dam Inventory and Assessment Project, a total of three hundred eighty (380) dams have undergone a preliminary risk assessment, which is approximately 54% of the seven hundred three (702) dams currently registered in the Dam Inventory Database. A breakdown of the overall assessment results (Years 1 – 3) is shown in Table 32.

Table 32: Overall Risk Assessment Results Breakdown (Years 1 – 3)

Risk Level	# of Dams	Percentage
1 – Very High (Alert)	77	20%
2 – High (Caution)	122	32%
3 – Moderate (Stable)	123	33%
4 – Low (No Concerns)	36	9%
5 – Very Low (Effectual)	22	6%

It is important to note that the Annual Dam Safety Report Form has been modified each year and the methodology used in the risk assessments has changed slightly each year from Year 1 to Year 3, meaning that it is possible that a dam assessed in Year 1 or 2 could receive a different risk level if it was reassessed using the methodology and form used in Year 3. Details of the form and methodology used in the previous two years can be seen in the Inventory and Assessment of Dams in Eastern Newfoundland report (Golder, 2016) and the Inventory and Assessment of Dams in Newfoundland and Labrador: Year 2 report (Golder, 2017), both reports are available through the Provincial Government’s website.

Upon completion of the Year 3 risk assessments, a final revision was made to the Annual Dam Safety Report Form (August 2018). This revision included renaming the “Poor” Condition Assessment designation to “Marginal” and changing the description of each of the Condition Assessment criteria. The Dam Emergency Probability Rating was renamed to Likelihood of Dam Safety Concern and the criteria of each likelihood designation were revised. An additional criterion was also given under the “Unlikely” designation. The Risk Level Chart was renamed to Dam Safety Risk Matrix and the numbering scheme in the Dam Safety Risk Matrix was updated so that a Dam Safety Risk Level of 5 now corresponds to “Very High” and a Dam Safety Risk Level of 1 now corresponds to “Very Low” whereas before the opposite was true. Changes were also made to the Dam Safety Risk Level & Corrective Action Level table including renaming some of the Corrective Action Levels and revising some of the possible corrective actions to take. The Dam Safety Risk Matrix was also revised so that the ordering of the Dam Failure Consequence Classifications was presented in reverse order and for the first time in the three-year project some of the rankings within the risk matrix itself were revised. The final August 2018 version of the Annual Dam Safety Report Form has been included in **Appendix F**.

7.0 PUBLIC SAFETY INCIDENTS AROUND DAMS IN NEWFOUNDLAND & LABRADOR

This phase of the project consisted of contacting dam owners within the province to collect information regarding any public safety incidents that may have occurred in the past. The public safety incident information was requested from dam owners in the letters sent to them in Phases 2 and 3 of the project. A public safety incident report form was attached to these letters for the dam owners to complete if they had information on a public safety incident. This form was obtained from the 2011 CDA Guidelines for Public Safety Around Dams, where it is included as an appendix.

A public safety incident that occurs upstream or downstream of a dam can include, but is not limited to:

- Death of a member of the public;
- Injury to a member of the public;
- Loss of property by a member of the public;
- Unauthorized access or operation of the dam by someone other than the dam owner/operator;
- The requirement of medical treatment for a member of the public; and,
- The rescue of a member of the public by first responders.

Of the one hundred sixty-three (163) dam owners that were contacted regarding public safety incidents around their dams, eighty-six (86) responded to the request. As well as contacting dam owners, Golder completed numerous internet searches and also contacted the Royal Newfoundland Constabulary (RNC), Royal Canadian Mounted Police (RCMP), Eastern Health, Central Health, Western Health, Labrador-Grenfell Health, the Office of the Chief Medical Examiner, the Access to Information and Protection of Privacy (ATIPP) office, Service NL, Workplace NL, and the Memorial University of Newfoundland (MUN) Library Archives in an attempt to find records of public safety incidents around dams that may have been reported. It should be noted that the MUN Archives search included records from the Telegram newspaper.

The vast majority of the responses indicated that there have not been any public safety incidents, however indication was received of public safety incidents at eight (8) dams. Brief details of these incidents are provided in Table 33.

Table 33: Summary of Public Safety Incidents

Dam System/ Development	Dam Owner	Dame Name & Index Number	Incident Type	Incident Date
Curling Water Supply	City of Corner Brook	First Pond Dam (Second Pond Dam) (#362)	Fatality (drowning)	May 30, 1966
Corner Brook Pulp and Paper Limited	Corner Brook Pulp and Paper Limited	Three Mile Pond Dam (#629)	Trespassing	Multiple
Deer Lake Hydroelectric Generating Station	Deer Lake Power	Main Dam at Grand Lake (#1)	Trespassing	Multiple
Deer Lake	Deer Lake Power	Intake Control Dam	Trespassing	Multiple

Dam System/ Development	Dam Owner	Dame Name & Index Number	Incident Type	Incident Date
Hydroelectric Generating Station		(#4)		
Deer Lake Hydroelectric Generating Station	Deer Lake Power	Forebay Dam (#411)	Trespassing	Multiple
Churchill Falls Hydroelectric Development – Gabbro	Nalcor Energy – Churchill Falls	Gabbro Control Structure – Between Gabbro East (#1174) & Gabbro West (#1176)	Fatality (drowning)	1980s or 1990s
Bay d'Espoir Hydroelectric Development	Newfoundland and Labrador Hydro	Granite Canal	Fatality (drowning)	Approx. 1986
St. Anthony (Grenfell) Old Water Supply	Town of St. Anthony	Mission Dam (#439)	Trespassing	Multiple

Five (5) of these reported incidents are of a general nature and describe multiple occurrences of public trespassing at the dams. Corner Brook Pulp and Paper Ltd./Deer Lake Power reported that there have been numerous incidents over the years of members of the public trespassing on foot, by ATV, or by boat beyond gates, signage, fencing, and buoys and accessing the dam slopes, crests, spillways, and reservoirs. These incidents have prompted responses by Corner Brook Pulp and Paper Ltd. as well as by the RCMP. Similarly, the Town of St. Anthony reported that every spring there are issues with snowmobilers "skipping" water near the dam, which exposes them to hazards associated with the dam. Fortunately, no injuries are known to have occurred as a result from these incidents.

The remaining three (3) reported incidents had to do with specific singular incidents that all resulted in drowning fatalities. The incident at the First Pond (Second Pond) Dam in Corner Brook involved two (2) young boys drowning while swimming, the incident at the Gabbro Control Structure in Churchill Falls involved a man drowning after trying to save his boat that had failed to start while he and another man were in it upstream of the control structure, and the incident at Granite Canal involved a man drowning while he was fishing at or attempting to cross the outflow of a bypass canal. Completed public safety incident report forms for these three (3) specific incidents are presented in **Appendix G**.

8.0 IDENTIFICATION OF DAMS REQUIRING DAM BREAK FLOOD INUNDATION MAPPING

The majority of dams in the province do not currently have flood inundation mapping, which is a critical aspect required to properly classifying a dam as per the CDA Guidelines. A prioritized list of dams in the Dam Inventory Database with an Extreme, Very High, or High classification that do not currently have dam failure flood inundation mapping completed but should receive further consideration with respect to having it developed was created during Year 2. This list was updated during the current Year 3 project based on dams that were added to or removed from the Dam Inventory Database and information that was updated in the Dam Inventory Database. The updated list is included in **Appendix H** and consists of one hundred thirty-five (135) dams. While there are

several NL Hydro dams listed in **Appendix H**, it must be clarified that NL Hydro has completed dam break studies for several structures with their downstream effects assessed. In instances where the dam break modeling concluded that there was no loss of life, the inundation mapping was not prepared. While inundation mapping may not have been prepared, dam break inundation studies that assessed downstream effects have been completed (P. Dawe, personal communication, October 30, 2018).

The methodology for assigning a priority level to a dam was based on its CDA classification, as listed in the provincial database. The potential for the loss of life associated with a permanent population was considered to be of paramount importance with respect to prioritizing the dams. Accordingly, a dam with an Extreme Loss of Life classification was given a priority of 1, a Very High Loss of Life classification was priority 2, and a High Loss of Life classification was assigned a priority of 3 (regardless of what their Environmental & Cultural [E&C] and Infrastructure & Economics [I&E] classifications were). Dams with an unspecified loss of life (Significant Loss of Life classification) or no potential population at risk (Low Loss of Life classification) were assigned a priority level starting at priority 4 based on the E&C or I&E classifications. For example, a dam with an Extreme E&C or I&E classification and a Low or Significant Loss of Life classification was given a priority of 4, a Very High E&C or I&E classification and a Low or Significant Loss of Life classification was priority 5, and a High E&C or I&E classification and a Low or Significant Loss of Life classification was priority 6. Each priority level was then further subdivided based on the next governing classification criteria. For example, a dam with a Loss of Life classification of Very High was given a priority of 2, if its E&C or I&E classification was Extreme it was considered priority 2A, but if its E&C or I&E classification was Very High it was considered priority 2B, and so on.

It is important to note that dam classification information was obtained from available information in the database and a check of the accuracy of that information was not carried out as part of the current study. There is potential for dams to have incorrect or missing classifications. For these reasons if any future studies are to be completed using this information, a detailed review should be completed first to verify the accuracy of the classifications.

A second prioritized list consisting of one hundred ninety-seven (197) municipal water supply dams in the Dam Inventory Database that do not currently have dam failure inundation mapping or a CDA consequence classification, but which consideration should be given to having it developed was created during the current Year 3 project. Nine (9) of these dams on the list are not water supply dams but are owned by municipalities and therefore are also thought to be relevant. This list was developed at the request of the WRMD and was done irrespective of dam classifications; it is included in **Appendix I**.

The methodology for assigning a priority classification was based on a cursory review of the storage capacity associated with each dam and the potential inundation area downstream of the dam using Google Earth, and further considering the PAR and infrastructure that might potentially be damaged or lost as a result of a hypothetical dam breach. A priority of 1 was given to dams in which a breach of the reservoir would very likely have a direct effect on a population center (i.e., a large PAR) or a critical road leading to a large population center, where if the road was lost a large population would be indirectly affected (i.e., the only road providing access to/from a community). The priority 1 dams were then subdivided into two groups: 1A which consisted of the dams where a failure would very likely directly affect a community (i.e., large PAR) and 1B which consisted of the dams where a failure would appear to significantly damage or destroy a critical road leading to a community and thus indirectly affect a community. The priority levels within each subset were then assigned based on the size of the population of the communities that would appear to be affected by a dam failure. For example, the dam in group 1A whose failure would affect the community with the highest population was assigned the highest internal priority 1A-1, with the next highest priority dam (second largest population affected) being assigned an internal priority of

1A-2, and so on. Similarly, the dam in group 1B whose failure would affect the community with the highest population (by way of washing out a critical road to the community) was assigned the highest internal priority of 1B-1, with the next highest priority dam (second largest population affected) being assigned an internal priority of 1B-2, and so on.

A priority of 2 was given to dams in which a failure might potentially affect a community or infrastructure servicing a community, but further study is required to confirm. For instance, based on a visual assessment of the size of the reservoir and proximity of the downstream flow path to a population center, some uncertainty exists as to whether or not the floodwaters would have any effect on a permanent population. A priority of 3 was then given to dams where it appears with some certainty that a failure would not be expected to have any notable effect on a permanent population, but some temporary population may be present. The list of dams within priority level 2 and 3 were not further prioritized within their respective priority levels.

It should be noted that as the priorities have been conditionally assigned based on a cursory review from Google Earth, there are inherent limitations associated with this type of assessment and further study is recommended to confirm the rankings of each dam.

It should also be noted that the Grand Bank Dam (#673) has been included on both lists as it is a water supply dam for the Town of Grand Bank and it also has a CDA dam classification of High.

Lastly, it is possible that some dam owners may currently be working on developing dam break flood inundation mapping for dams included on either of the two lists that have been created.

9.0 SITE VISITS

This phase of the project involved completing site visits to various dams in the province for two main purposes. The first was to obtain photos of dams that did not have photos attached to their entries in the Dam Inventory Database. The second was to confirm the presence, or lack thereof, of some of the dams noted in Section 2.0 to be removed from the Dam Inventory Database. Dams marked as potentially existing based on the KMZ file provided to Golder by the WRMD (as discussed in Section 3.0) were also visited to confirm if they did in fact exist. Additionally, any dams that Golder identified in the field that were not in the database or KMZ file were also recorded.

The site visits were completed over a sixteen (16) day period by a field team consisting of two (2) Golder personnel. Prior to the site visit, Golder proposed a field plan to the WRMD that included seventy-six (76) dams/sites to be visited. It was decided in the field that fourteen (14) of these dams were inaccessible or not practical to visit so these dams were omitted from the field plan. Attempts to visit the remaining sixty-two (62) dams were made, however Golder was unable to access ten (10) of these. Successful site visits were made to fifty-two (52) of the dams outlined in the original field plan. Golder also completed site visits to fourteen (14) additional dams in the field. These additional site visits were completed due to a dam being in close proximity to one of the dams on the field plan or a new (previously unidentified) dam being found in the field. It should be noted that not all of these additional dams were confirmed by the WRMD to be added to the inventory, i.e., some were considered to not meet the definition of a dam. In total, sixty-six (66) successful site visits were completed. For each dam/site visited photos were taken and co-ordinates, measurements, and any other relevant information were recorded where possible.

Upon completion of the site visits, an extensive list of findings was prepared and reviewed by the WRMD. Several dams that owners had previously said do not exist were determined to in fact exist, and the owners were

contacted to inform them of this and retrieve any possible information. Several dams from both the inventory and KMZ file were found to not exist, or they were very old structures that were so deteriorated they were no longer acting as a dam. For the dams that were found in the field that were not previously noted in the inventory, an attempt was made to locate the owner, generally by calling the nearest town and inquiring about the dam. The detailed summary of the site visits is included in **Appendix J**, while a brief overview is provided in the points below:

- Seventy-six (76) site visits attempted;
  - Sixty-two (62) from the field plan;
  - Fourteen (14) additional, unplanned;
- Ten (10) sites inaccessible;
- Forty-four (44) dams already in the database photographed;
- Four (4) new dams photographed and added to the database (from the WRMD or found in field);
- Six (6) KMZ file dams confirmed, photographed, and added to the database;
- Four (4) dams in the database confirmed to not exist and removed from the database;
- Two (2) new dams found in field, but were decided by the WRMD to not be added to the database;
  - Structure near Duck Pond (not high enough to qualify as a dam); and,
  - Structure at Corner Brook Water Supply (intake structure which does not retain water);
- Five (5) KMZ dams confirmed to not exist; and,
- One (1) new dam site visited (Gallants), but it was found that construction had not started yet and therefore it was not added to the database.

10.0 UPDATING DAM INVENTORY DATABASE

Once Golder received and compiled the information from dam owners, it was possible to update the WRMD's Dam Inventory Database. As previously discussed, this was completed using a binder containing information on the dams that required updating, removal or addition. For dams to be updated, the dam inventory forms within the binder had all the new and updated information highlighted to flag any updates to be made in the database so that it was easily identifiable. A total of ninety-six (96) dams were updated in the database. A list of these dams can be seen in **Appendix K**.

Any dam entry that was to be removed from the database had its dam inventory number recycled, meaning that all the information for that dam was cleared from that index number and the new dam being added to the database had its information added under that same number. This limited the index numbers in the inventory and avoided adding unnecessary new entries.

The other substantial portion of the database update was gathering photos of each dam and adding them to the respective dam entries in the database. Photos were collected from the WRMD, dam safety reviews, inspections, dam owners, and were taken in the field. Photos were obtained for two hundred forty-eight (248) dams in the province but were only added to two hundred forty-five (245) dam entries because it was found that the same

photos provided by the WRMD and by a dam owner were already included in the Dam Inventory Database. It should be noted that additional or more recent photos were also added to some of the Year 3 dam entries that already had other photos attached to them in the database. At the start of Year 3 there were one hundred seventeen (117) dams in the inventory without photos. The photos that were added to the inventory were for seventy-seven (77) dams that did not already have photos, one hundred fifty-two (152) dams that did already have photos, and sixteen (16) new dams added to the inventory during Year 3. After these additions, there are forty-one (41) dams in the Dam Inventory Database which do not have any photos attached to their dam inventory entries (including new dams that were added to the database during Year 3). A list of the dams that do not have any photos associated with them in the database can be found in **Appendix L**. Representative photos of each dam showing the main dam structure, upstream slope, downstream slope, and any associated structures were selected to be attached to the database entries. The photos already in the inventory were checked as the new photos were being added to avoid including any duplicates and to check if any were added to an incorrect dam.

Additionally, throughout the project if there were any drawings, maps, or reports received for a dam these were saved electronically and any hardcopies received were kept as well. They were then submitted to the WRMD at the conclusion of the project.

The database was only accessible for updating from a Government computer, so Golder personnel travelled to the WRMD office and completed the updates there.

11.0 RECOMMENDATIONS

While completing the project, Golder developed a list of recommendations for the WRMD in relation to the Dam and Reservoir Inventory Form that was submitted to the dam owners, the Annual Dam Safety Report Form used for the dam risk assessments, and the Dam Inventory Database. These recommendations arise from both Golder's own experiences with the project and from speaking with dam owners. Many of the recommendations that have been presented below are the same recommendations that were made in Years 1 and 2.

Dam Safety Management

As with the previous two years' dam inventory and assessment projects it was noted that a large proportion of dam owners do not have inundation mapping completed for their systems. Accordingly, the classification of these dams may not be accurate. The accuracy of a dam classification is very important, as the consequence of a dam failure underlies several of the principles of the CDA dam safety guidelines and inundation mapping is critical for developing an accurate understanding of the consequences of a dam failure.

In order to address this deficiency, our first recommendation is that dams that have a conditional CDA dam classification or unconfirmed CDA dam classification (e.g., has not had a classification assigned) should have dam break flood inundation mapping completed immediately to either confirm or assign a CDA dam classification. If dam break inundation mapping is not completed and a classification is assigned, a detailed rationale should be provided as to why the inundation mapping is not necessary in order to assign a defendable dam classification.

It is then recommended that the WRMD review the prioritized lists presented herein and contact the remaining dam owners, based on their own assessment of the prioritized list, to formally request that dam failure inundation mapping be completed for their dams. The timeline for completion should be determined by the WRMD and on a case by case basis.

Dam and Reservoir Inventory Form

The following is a list of updates that Golder recommends being implemented to improve the Dam and Reservoir Inventory Form. For the most part, these updates are to benefit the dam owner representatives completing the forms who may not have a technical background in this area and may not be familiar with many of the terms used on the form.

- During this Year 3 project, public safety incident information was a significant area of interest and was requested from dam owners. It is recommended to include a question on the form asking if there has ever been a public safety incident at the dam, along with space to include a brief description if there has been an incident. This information would be useful in helping to provide a better understanding of the history of the dam.
- During the Inventory and Assessment of Dams in Eastern Newfoundland project (Year 1), dam failure information and monitoring equipment information were two significant areas of interest and were requested from dam owners. Although these items were not a focus of Year 3 the value of this information is still clear, as it would provide a better understanding of the dam history and the ability to foresee any issues that could result in a failure. It is therefore recommended to include questions on the form asking if a dam failure has ever occurred, with a brief description if so, and if there is any monitoring equipment installed along with details such as the type, location, and operation.
- The quality and accuracy of the information received on the forms has improved since they were first distributed during the Year 1 project, due in part to the continual improvements made to the forms each year and the inclusion of the extra reference information given to the owners with the form. However, there was still some information received that either seemed incorrect or was inconsistent with other documentation. Since the quality of the information in the database is largely dependent on the information provided in the dam owner's response, it is recommended that a QA/QC of any information received be completed before the information is entered into the database. This could be achieved by, for example, a follow up call between the WRMD and the dam owner to gauge their level of understanding and verify the information.

Annual Dam Safety Report Form

The following is a list of updates that Golder recommends implementing to improve the Annual Dam Safety Report form.

- Under dam safety program elements, we recommend the following edit "Dam break flood inundation study and mapping *completed and submitted*?" to improve consistency.
- Under dam deficiencies, it is recommended to include the meanings of the acronyms IDF and EDF in brackets so that it is clear to the person completing the form.
- Additional recommendations on how to improve the risk assessment portion of the form have been submitted separately for discussion.
- This is the final year of this multi-year project, and the Annual Dam Safety Report Form should no longer be considered a working version and can now be considered finalized, however, some revisions will likely be made in the years to come. It is recommended that a guidance document now be prepared so that additional explanation and guidance can be given to persons filling out the form(s) and that the form(s) are filled out in a consistent manor. It is also recommended that WRMD staff or agents working on behalf of the WRMD fill

out the form and then review the findings with the respective dam owner before finalizing the annual safety report.

Dam Inventory Database

The following is a list of updates and issues that we would like to bring to the attention of the WRMD for further consideration with respect to the database.

- Currently when adding/updating information in the database the user must click a button to save each section of a dam entry page individually. If the button for a given section is not clicked, that section will not be updated. For example, after entering the information in the General section of the page (project name, dam name, owner name and contact information), the user must click the "Update General Info" button before moving on and updating the Operator section. After entering the Operator information, the user must then click the "Update Operator Info" button before moving on to the next section, and so on. It is easy to forget to click these buttons after every section, as they are located to the left side of the data fields, near the section title, and not below the section's data fields. They would be more easily noticed below the last data field of every section as this is in the line of sight and follows the order of the data entry fields as the user progresses through the database entry. It would be helpful to move these buttons to the end of each section so that they are easily noticed and not accidentally forgotten by the user, or perhaps more preferably, remove these buttons at each section and only have one at the end of the page to update the entire entry.
- It was noticed that some fields only accepted numerical entries and not text. If text was entered into these fields, an error page would be displayed when the "Update" button was pressed. This would result in the user having to reload the database, log back in, and relocate the dam entry they were working on from the drop-down menu in the database. A good example of this issue is the Operation Parameters section. In this section, for water level, surface area, and storage volume the "Normal" field accepted both text and numbers, but the "Minimum" and "Maximum" fields did not accept text. This became problematic when entering water levels because some owners provided water levels as an elevation and some provided them as measured heights. For those given as elevations it was intended to enter these with "EL" before the number to distinguish these from a measurement, but this wasn't possible due to the error. Hence, enabling all data fields to accept both numerical and text entries to avoid future issues with circumstances such as this would be helpful.
- It was found that when text was entered into the "Dam Status – Other" text box after the Dam Status drop down menu it would not save. This issue was noticed and then checked by entering the data, clicking "Update" and then exiting and going back in to view the entry again. This issue should be investigated and corrected.
- It was found that when information was entered into the "Other – Capacity" text box of the Structures section, the information would then also appear in the "Dam Status – Other" text box after saving. The information in the "Dam Status – Other" text box was then deleted, however after saving and returning to the entry, the information would remain. It was also noticed that the information entered in the "Other – Capacity" text box of the Structures section appeared in the "Dam Status – Other" text box of other dam entries. The information was successfully deleted from these other entries; however, the original issue should be investigated and corrected.
- The database currently has the 1999 CDA dam classifications in the drop-down menus for both the Life Safety and Socio-Economic classifications in the Dam Safety Review section. It is our understanding that the WRMD is already aware of this and intend on updating the menus with respect to the current 2007 CDA classifications. To include "Significant" and "Extreme" classifications, these were indicated in the "Additional

Comments" field of the inventory entry for the time being until the database is updated to the 2007 classifications.

- When entering a year into the "Date of Next Review" field of the Dam Safety Review section, the same error as discussed in the second bullet above would result. It was noticed that in order for the input to work and not get an error message, a full date in the format of DD-MM-YYYY had to be entered instead of just the year. The "Date of Next Update to Emergency Preparedness Plan" field needs the date entered in this format as well, but this is stated next to the data entry field. It is therefore recommended to state the required date format next to the "Date of Next Update to Dam Safety Review" field similar to the EPP field in order to avoid encountering this error.
- When clearing all the information in some entries in order to recycle them it was found that when clearing the dates in the "Date of Next Review" and "Date of Next Update to Emergency Preparedness Plan" fields in the Dam Safety Review section they would revert back to the previously entered values after clicking the "Update" button. This kept happening and there was no way to clear the field. This issue should be investigated and corrected.
- Numerous new dam entries were created during the inventory update process. It was noticed on multiple occasions that when two new dam entries were consecutively created and populated, the majority of the information entered when creating the first dam entry would be deleted upon saving the second new entry. It was then necessary to go back to the prior new entry and re-enter its information. The only way to get around this error was to add blank dam entries (only enter a dam name) for all of the required new entries and then populate each once they had all been added. This issue should be investigated and corrected.
- It was noticed that some of the attached photos and documents that had been previously added to the database were attached to the wrong dam entry. There is currently no way for the user to correct these mistakes and remove an attached file from an incorrect entry; rather, a list of these cases was made and given to the WRMD to provide to the database administrator who can then delete the files. It would save time if an option to delete incorrect file attachments was added to the database to allow the user to easily correct mistakes such as these. However, we can also appreciate that giving users the ability to delete attachments could prove problematic if the person accessing the database is not fully aware of what they are doing.
- It is recommended to include some additional sections in the database to provide more information on each dam. These sections could include Structural Design, Geotechnical Design, Dam Risk Level, and Dam Monitoring. The first two sections would provide valuable insight on the history of a dam and its initial design. A dam is given a risk level based on its failure consequence and emergency probability ratings; it provides a good high-level view of the status of the dam in terms of if there is any work that needs to be done to reduce its risk of a dam safety emergency and the urgency of the work. Dam monitoring is important in dam safety as it can help to provide a dam operator with a warning of any issues within a dam, such as seepage, which can allow for the operator to complete necessary actions to prevent a breach from occurring. Having an indication in the database of any monitoring equipment that a dam has would be very useful information in terms of dam safety. Any additions to the database would also have to be reflected in the Dam and Reservoir Inventory Form.

12.0 CLOSURE

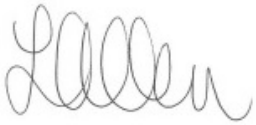
We trust this report meets with your current requirements. Should additional information be required, please do not hesitate to contact the undersigned at your convenience.

Yours truly,

Golder Associates Ltd.

Michael Morris, B. Eng., EIT.
Junior Geotechnical Engineer

Shiu Kam, P. Eng.
Principal, Senior Geotechnical Engineer



Lindsay Allen, B. Sc., EIT.
Junior Geotechnical Engineer

Andrew Peach, P. Geo., EP.
Senior Engineering Geologist

LA/MM/AP/SK/mvrd
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APPENDIX A

Dams Removed from the Dam Inventory Database

Dams Removed from the Dam Inventory Database

Dam Index #	Project Name	Dam Name	Dam Owner
365	Terra Nova	Unknown Dam	Town of Terra Nova
366	Rocky River Fishway Flow Improvement	Rocky River Fishway (2 Dams)	Salmon Association of Eastern Newfoundland
537	Gaultois Water Supply	Piccaire Pond Dam	Town of Gaultois
729	Abitibi Woods Dam	Ambrose Lake – Harpoon Brook Weir	Nalcor Energy
743	Steady Brook Swimming Pool	Steady Brook Dam	Town of Steady Brook
1189	Anaconda Mining Inc. (Pine Cove)	Diversion Dam	Anaconda Mining Inc.
1328	Whitbourne Fire Pump System	Unnamed Wooden Dam	Newfoundland and Labrador Hydro
1728	Lower Cove Quary	Settling Pond Dam #2	Atlantic Minerals Ltd.
1848	IOC Wabush 3 Development	Overburden Stockpile Sedimentation Pond	Iron Ore Company of Canada (IOC)
2088	St. Shott's Water Supply	Pond Control Dam	Town of St. Shott's

APPENDIX B

KMZ File Dams Summary

KMZ File Dams Summary

KMZ File Dam #	Location	Waterbody	Field Visit Result	WRMD Response	Final Status
1	South of Gander Lake	Gillingham's Pond	Unconfirmed (Inaccessible)	N/A	***Unconfirmed***
2	South of Gander Lake	Hunt's Pond	Unconfirmed (Inaccessible)	N/A	***Unconfirmed***
11	Cormack	Farm Pond	Yes	Yes	***Yes***
12	Cormack	Farm Pond	Unconfirmed (Inaccessible)	N/A	***Unconfirmed***
15	Avalon Wilderness Reserve	Bloody Pond	Unconfirmed (could not access)	N/A	***Unconfirmed***
20	Bay du Nord Wilderness Reserve	Unnamed Pond, off highway	Unconfirmed (Inaccessible)	N/A	***Unconfirmed***
25	Northern Arm	Unnamed Pond, Aspen Drive	Found to already be in the inventory		
26	Southwest Grand Falls – Windsor	Diversion Lake	No (remnants of old dam)	No	***No***
27	Southeast of Millertown	Shoulderblade Lake	Unconfirmed (could not access)	N/A	***Unconfirmed***
28	Southwest Grand Falls – Windsor	Unnamed Pond	Unconfirmed (could not access)	N/A	***Unconfirmed***
31	Paradise	Octagon Pond	Yes	Yes	***Yes***
38	Northeast of Birchy Lake Area	Unnamed Pond	Yes	Yes	***Yes***
39	Brigus Junction	Second Junction Pond	No	No	***No***
42	Bay d'Espoir Highway	Miguel's Lake	No (remnants of old dam)	No	***No***
43	West of Bay d'Espoir Highway	Unnamed Pond	Unconfirmed (Inaccessible)	N/A	***Unconfirmed***

KMZ File Dam #	Location	Waterbody	Field Visit Result	WRMD Response	Final Status
47	North of Sop's Arm	Long Steady	Unconfirmed (attempted access – unsuccessful)	Unconfirmed	***Unconfirmed***
48	North of Sop's Arm	Long Steady	Unconfirmed (attempted access – unsuccessful)	Unconfirmed	***Unconfirmed***
54	South of Millertown	Victoria River	Unconfirmed (could not access)	N/A	***Unconfirmed***
55	Hare Bay/Gambo/Benton	Cook's Pond	Unconfirmed (Inaccessible)	N/A	***Unconfirmed***
57	South of Badger	Unnamed Lake	Unconfirmed (could not access)	N/A	***Unconfirmed***
58	Butterpot Provincial Park	Gull Pond East	Unconfirmed (attempted access – unsuccessful)	No	***No***
61	Southeast of Millertown	Caribou Pond	Unconfirmed (could not access)	N/A	***Unconfirmed***
63	West of Bay d'Espoir Highway	Unnamed Pond	Unconfirmed (could not access)	N/A	***Unconfirmed***
64	Rocky Harbour (Burnt Berry Campsite)	Gull Pond	No	No	***No***
68	Burin	Long Cove Pond	No	No	***No***
-	Marystown Old Water Supply	Linton Lake	Yes	Yes	***Yes***
-	North of Hughes Brook (Old Man's Pond Dam)	Old Man's Pond	Yes	Yes	***Yes***
-	Grand Bank Old Water Supply Dam	Grand Bank Brook	Yes	Yes	***Yes***

APPENDIX C

Dams Added to the Dam Inventory Database

Dams Added to the Dam Inventory Database

Assigned Dam Index #	Project Name	Dam Name	Dam Owner	Source
743	Marystown Old Water Supply	Old Water Supply Dam	Unknown Owner	KMZ File
1189	KMZ #38	Indian Brook River Diversion	Deer Lake Power	KMZ File
1328	Grand Bank Water Supply	Grand Bank Old Dam	Town of Grand Bank	KMZ File
2929	Cormack (KMZ #11)	Unknown Dam	Unknown Owner	KMZ File
2930		Old Man's Pond Dam	Unknown Owner	KMZ File
2931	Octagon Pond (KMZ #31)	Unknown Dam	Unknown Owner	KMZ File
729	IOC Luce Lake North Diversion and Dewatering Project	Berm between Luce Lake North & Luce Lake South	Iron Ore Company of Canada (IOC)	WRMD
1728	St. Lawrence Fluorspar Mine	Polishing Pond	Canada Fluorspar (NL) Inc.	WRMD
1848	St. Lawrence Fluorspar Mine	Tailings Impoundment Dam	Canada Fluorspar (NL) Inc.	WRMD
2088	Galway CP07C	CP07C Regional Stormwater Detention Pond	10718 NFLD Inc.	WRMD
2928	Vale Long Harbour Processing Plant	Rattling Brook Big Pond Dam	Vale Newfoundland and Labrador Ltd.	WRMD
2888	Vale Long Harbour Processing Plant	Lower Tier Plant Stormwater Pond	Vale Newfoundland and Labrador Ltd.	Owner
2889	Vale Long Harbour Processing Plant	Upper Tier Plant ETP Polishing Pond	Vale Newfoundland and Labrador Ltd.	Owner
2908	Vale Long Harbour Processing Plant	Upper Tier Plant Stormwater Pond	Vale Newfoundland and Labrador Ltd.	Owner

Assigned Dam Index #	Project Name	Dam Name	Dam Owner	Source
365		Unknown Dam 1	Town of Greenspond	Field
366		Unknown Dam 2	Town of Greenspond	Field
537	Westport Old Water Supply	Unknown Dam	Town of Westport	Field

APPENDIX D

Dams with Known Dam Break Flood Inundation Mapping

Dams with Known Dam Break Flood Inundation Mapping

Dam System/Development	Dam Owner	Dam Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Barry Group Inc. Fish Plant Water Supply	Barry Group Inc.	Water Supply Dam/Barry Group Reservoir (#1348)	Yes	Yes
Beaver Brook Antimony Mine	Beaver Brook Antimony Mine Inc.	Old Tailings Pond Dam (#1192)	Yes	Yes
		Southwest Horseshoe Dam (#1408)	Yes	Yes
St. John's (Petty Harbour - Long Pond Watershed) Water Supply	City of St. John's - Public Works	Beer Pond North Dam (#674)	Yes	Yes
		Petty Harbour Long Pond Dam (#754)	Yes	Yes
		Beer Pond Southeast Dam (#903)	Yes	Yes
		Beer Pond Northeast Dam (#904)	Yes	Yes
St. John's (Windsor Lake Watershed) Water Supply	City of St. John's - Public Works	Windsor Lake Dam (#436)	Yes	Yes
Corner Brook Pulp and Paper Limited	Corner Brook Pulp and Paper Limited	Glynmill Pond Dam (#608)	Yes	Yes
		Glynmill Pond Dam (#608) / Three Mile Pond Dam (#629)	Yes	Yes
		Glynmill Pond Dam (#608) / Corner Brook Lake Dam (Twelve Mile Lake Dam) (#628) / Three Mile Pond Dam (#629)	Yes	Yes
Deer Lake Hydroelectric Generating Station	Deer Lake Power	Main Dam at Grand Lake (#1)	Yes	Yes
		Deep Bank Dam (#355)	No	No
		West Bank Dyke (#357)	No	No
		Forebay Dam (#411)	No	No
Buchans Mine Closure (OAM)	Department of	Dam 1 (#1193)	Yes	Yes

Dam System/Development	Dam Owner	Dam Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
	Natural Resources	Dam 4 (#682)	Yes	Yes
Consolidated Rambler Mine (OAM)	Department of Natural Resources	Northwest Dam (#1208)	Yes	Yes
Gullbridge Copper Mine (OAM)	Department of Natural Resources	Gullbridge Tailings Dam (#1201)	Yes	Yes
Hope Brook Gold Mine (OAM)	Department of Natural Resources	Main Pine Pond Dam (#392)	Yes	Yes
		New Pine Pond Spillway and Saddle Dam A (#568) (*See Saddle Dam 1)	Yes	Yes
		Main Tailings Pond Dam and Spillway (#569)	Yes	Yes
		Heap Leach Dam (#571)	Yes	Yes
		Polishing Pond Dam/Spillway (#572) (*See Main Tailings Pond Dam and Spillway)	Yes	Yes
		Saddle Dam B (#573) (*See Saddle Dam 2)	Yes	Yes
		Saddle Dam 1 (#574)	Yes	Yes
		Saddle Dam 2 (#575)	Yes	Yes
		Saddle Dam 3 (#576) (*See Main Pine Pond Dam)	Yes	Yes
Minworth Fluorspar Mine (OAM)	Department of Natural Resources	Minworth Tailings Dam (#740)	Yes	Yes
Whalesback Copper Mine (OAM)	Department of Natural Resources	Whalesback Copper Mine Dam (#1204)	Yes	Yes
Bishop's Falls Hydroelectric Generating Station	Government of Newfoundland and Labrador	Bishop's Falls Dam - Bishop's Falls Ambursen Dam (#17) - Bishop's Falls Earth Dam (#214)	Yes	No

Dam System/Development	Dam Owner	Dam Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Buchans Hydroelectric Generating Station	Government of Newfoundland and Labrador	Buchans Main Dam (#19)	Yes	No
Grand Falls Hydroelectric Generating Station	Government of Newfoundland and Labrador	Grand Falls Main Dam (#6)	Yes	No
		Grand Falls Power Canal - ASB Embankment Dam (#10) - East Concrete Gravity Dam (#11) - East Embankment Dam (#12) - Intake Dams No.'s 1, 2 & 4 (#13) - RCC Spillway (#14) - West Concrete Gravity Dam (#15) - West Embankment Dam (#16)	Yes	No
		Exploits Dam (#20)	Yes	No
		Goodyear's Dam (#21)	Yes	No
		North Twin Dam (#23)	Yes	No
		South Twin Dam (#24)	Yes	No
Star Lake Hydroelectric Generating Station	Government of Newfoundland and Labrador	Star Lake Main Dam (#9)	Yes	Yes
		Star Lake Saddle Dam (#768)	Yes	No
Lower Churchill Hydroelectric Generation Project	Nalcor Energy	Muskrat Falls Dam - South Rockfill Dam (#677) - North RCC Dam (Overflow Dam) (#749) - North Transition Dam (#756) - Gated Spillway (#850) - Centre Transition Dam (#851) - South Transition Dam (#968)	Yes	Yes

Dam System/Development	Dam Owner	Dam Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Churchill Falls Hydroelectric Development - East Forebay Reservoir	Nalcor Energy - Churchill Falls	GF-9 (#1114)	Yes	Yes
		FF-10A (#1115)	Yes	Yes
		FF-12 (#1119)	Yes	Yes
Churchill Falls Hydroelectric Development - West Forebay Reservoir	Nalcor Energy - Churchill Falls	GJ-11A (#1131)	Yes	Yes
		GJ-18 (#1138)	No	No
Churchill Falls Hydroelectric Development – Lobstick	Nalcor Energy - Churchill Falls	GL-1 (#1048)	No	No
		GL-13 (#1076)	No	No
		GL-18 (#1081)	Yes	Yes
Churchill Falls Hydroelectric Development - Orma Lake	Nalcor Energy - Churchill Falls	GR-2 (#1142)	Yes	Yes
		GR-8 (#1148)	Yes	Yes
		GR-9 (#1149)	Yes	Yes
		GR-10 (#1150)	Yes	Yes
Churchill Falls Hydroelectric Development - Gabbro	Nalcor Energy - Churchill Falls	Gabbro West (#1176)	No	No
Churchill Falls Hydroelectric Development - Ossokmanuan Reservoir	Nalcor Energy - Churchill Falls	Ossok Dam 1 (#1162)	Yes	Yes
Bay d'Espoir Hydroelectric Generating Facility - Long Pond	Newfoundland and Labrador Hydro	LD-1 (Power Canal Embankment) (#46)	Yes	Yes
		LD-2 (North West Cut-off Dam) (#47)	Yes	Yes
		LD-3 (South East Cut-off Dam) (#48)	Yes	Yes
		LD-4 (South West Cut-off Dam) (#49)	Yes	Yes
Bay d'Espoir Hydroelectric Generating Facility - Victoria Lake	Newfoundland and Labrador Hydro	VD-3 (Victoria Dam) (#86)	Yes	Yes

Dam System/Development	Dam Owner	Dam Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Snooks Arm and Venams Bight	Newfoundland and Labrador Hydro	SV-1 (Snooks Arm Main Dam) (#77)	Yes	Yes
Cape Broyle/Horse Chops (CAB/HCP) Hydroelectric Generating Facility	Newfoundland Power Inc.	Cape Broyle Forebay Dam (#139)	No	No
		Cape Broyle Intake Dam (#141)	No	No
		Horse Chops Dam - believed to be Horse Chops East Dam (#144) & Horse Chops West Dam (#145)	No	No
		Mount Carmel Pond Dam (#146)	No	No
Hearts Content Hydroelectric Generating Facility	Newfoundland Power Inc.	Rocky Pond Control Dam and Spillway (#190)	Yes	Yes
		Packs Pond Diversion Dam (#193)	Yes	Yes
New Chelsea-Pitman's Pond (NCH/PIT) Hydroelectric Generating Facility	Newfoundland Power Inc.	Seal Cove Pond Dam (NCH Forebay Dam) (#194)	Yes	Yes
		Pitman's Pond Dam (#195)	Yes	Yes
Petty Harbour Hydroelectric Generating Facility	Newfoundland Power Inc.	Unknown	No	No
Pierre's Brook Hydroelectric Generating Facility	Newfoundland Power Inc.	Gull Pond Dam (PBK Forebay Dam) (#94) / Big Country Pond Dam (#96)	Yes	Yes
		West Country Pond Dam (#100)	Yes	Yes
Port Union Hydroelectric Generating Facility	Newfoundland Power Inc.	Long Pond Dam (#212)	Yes	Yes
Rattling Brook Hydroelectric Generating Facility	Newfoundland Power Inc.	Rattling Lake Dam (#222)	Yes	Yes
Rose Blanche Brook Hydroelectric Generating	Newfoundland Power Inc.	Rose Blanche Forebay Dam (#240)	Yes	Yes

Dam System/Development	Dam Owner	Dam Name & Index Number	Hardcopies Obtained?	GIS Layer Created?
Facility				
Sandy Brook Hydroelectric Generating Facility	Newfoundland Power Inc.	Sandy Brook Forebay Dam (#229)	Yes	Yes
Seal Cove Hydroelectric Generating Facility	Newfoundland Power Inc.	Unknown	No	No
Topsail Hydroelectric Generating Facility	Newfoundland Power Inc.	Three Island Pond Dam (#173)	Yes	Yes
		Three Arm Pond Dam (#174)	Yes	Yes
Vale Long Harbour Processing Plant - Residue Storage Area	Vale Newfoundland and Labrador Ltd.	Dam 1 (#1388)	Yes	Yes
		Dam 2 (#1389)	Yes	Yes

APPENDIX E

Annual Dam Safety Report Form

Annual Dam Safety Report

Dam Name: _____

Dam Owner: _____ Date: _____

Dam Failure Consequence Classification: ◯ Extreme ◯ Very High ◯ High ◯ Significant ◯ Low

Describe Changes to Conditions Downstream of Dam (increased development, population at risk, etc.):

DAM SAFETY PROGRAM ELEMENTS

	Yes	No	N/A	Follow up?
Any recent alterations to the dam?				
Any critical incidents or hazards occurred?				
Critical incidents or hazards reported?				
Consequence classification assessment completed?				
Dam break flood inundation study and mapping completed?				
Dam owner inspections undertaken?				
Inspection frequency adequate?				
OMS plan prepared and submitted?				
EPRP prepared and submitted?				
EPRP updated (contact information)?				
Dam safety review status acceptable?				
Maintenance suitable?				
Surveillance and monitoring suitable?				
Public safety risk assessment and plan complete?				
Public safety measures taken (signs posted)?				
Hazard identification and failure mode analysis undertaken?				
Outlets, gates and other mechanical components tested?				
Reservoir or tailings impoundment operation as per OMS manual?				
Design and operation of tailings dam as per current phase?				

General comments and site observations (Please provide pictures):

DAM DEFICIENCIES

	Yes	No	Potential	N/A
IDF inappropriate?	☐	☐	☐	☐
EDF inappropriate?	☐	☐	☐	☐
Spillway or discharge works capacity inadequate?	☐	☐	☐	☐
Slope stability inadequate?	☐	☐	☐	☐
Freeboard inadequate?	☐	☐	☐	☐
Geotechnical deficiencies observed? (internal erosion, slumping external erosion, sinkhole, settlement, cracks, bulges, lateral movement)	☐	☐	☐	☐
Structural deficiencies observed? (cracks, misalignment, settlement, concrete deterioration, lateral movement)	☐	☐	☐	☐
Sliding safety factor inadequate?	☐	☐	☐	☐
Rip rap deficiencies observed? (displaced, broken down)	☐	☐	☐	☐
Debris deficiencies observed? (floating debris, spillway blocked)	☐	☐	☐	☐
Animal activity observed? (burrowing, beavers)	☐	☐	☐	☐
Excessive vegetation growth observed? (embankments, spillway)	☐	☐	☐	☐
Seepage observed? (location, quantity, clarity)	☐	☐	☐	☐

Description of deficiencies (Please provide pictures):

Condition Assessment:	**Dam Emergency Probability Rating:**	**Dam Risk Level (Corrective Action Level):**
*Refer to attached information on pages 3 and 4		
◯ Satisfactory	◯ Likely	◯ 1-Very High (Alert)
◯ Fair	◯ Probable	◯ 2-High (Caution)
◯ Poor	◯ Unlikely	◯ 3-Moderate (Stable)
◯ Unsatisfactory	◯ Very Unlikely	◯ 4-Low (No Concerns)
◯ Not Rated		◯ 5-Very Low (Effectual)

Printed name of Dam Safety Consultant	Signature	Date
Printed name of Dam Owner/Agent	Signature	Date

Condition Assessment (assessment that best describes the condition of the dam based on available information)

1) SATISFACTORY

No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic) in accordance with applicable best management practices.

2) FAIR

No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic events may result in a dam safety deficiency.

3) POOR

A dam safety deficiency is recognized for loading conditions which may realistically occur. Uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

4) UNSATISFACTORY

A dam safety deficiency is recognized.

5) NOT RATED

Dam Emergency Probability Rating- General Guidelines for Allocating Probability Ratings

(Note: Apply highest failure probability rating, only one bullet required)

Likely

- An unacceptable dam deficiency has been confirmed based on CDA Guidelines or observed deficiencies that could clearly lead to a dam failure.
- Design, construction, structural and/or operational deficiencies remain uncorrected.
- Non-conformance with established dam safety requirements, procedures, systems and instructions.
- Owner exhibits reluctance to operate dam in a safe and timely manner, or is incapable of doing so.

Probable

- An unacceptable dam deficiency has been confirmed based on CDA Guidelines or observed deficiencies that could potentially lead to a dam failure.
- Design, construction, structural and/or operational deficiencies remain uncorrected, however, dam owner is actively working on an approved project to correct the deficiency.
- Owner exhibits reluctance to undertake and report on annual inspection, or is incapable of doing so.
- Design and operation lacks redundancy (e.g., no back-up power for electrical gates).
- Inadequate/inappropriate dam safety requirements, procedures, systems and instructions.

Unlikely

- An unacceptable dam deficiency might exist, but has not been confirmed.
- Design and/or performance deficiencies may exist, but are actively monitored and are not expected to significantly increase failure potential over the near term.
- Design and operation exhibits redundancy.

Very Unlikely

- Dams that are breached, partially breached, reservoir drained or otherwise safeguarded.

RISK LEVEL CHART

Dam Emergency Rating	Dam Failure Consequence Classification				
	Extreme	Very High	High	Significant	Low
Likely	1	1	1	2	3
Probable	2	2	2	3	4
Unlikely	3	3	4	4	5
Very Unlikely	3	4	4	5	5

DAM SAFETY RISK LEVEL & CORRECTIVE ACTION LEVEL

Dam Safety Risk Level	Corrective Action Level	Possible Corrective Actions to Take
1-Very High	Alert (immediate action required)	-Increased site surveillance -Enhanced instrumentation monitoring -Hiring of engineering consultants -Immediate repairs -Restricted reservoir operation -ENVC may request EPRP reviewed at increased frequency -ENVC may issue an Order to lower water levels, empty reservoir, or take other corrective action -Suspend operation of dam
2-High	Caution (considerable work to do)	-Increased site surveillance -Increased instrumentation monitoring -Planning for rehabilitation work in the immediate or near future -Modify reservoir operation -ENVC may request EPRP reviewed at increased frequency -ENVC may request inspection reports at increased frequency -ENVC may request submission of OMS Manual or DSR at increased frequency
3-Moderate	Stab	-Annual inspection reports to ENVC -Monitor operation under peak loading -Rehabilitate hazardous conditions -ENVC may request submission of OMS Manual or DSR at increased frequency
4-Low	No Concerns	-Normal operation -Annual inspection reports to this department
5-Very Low	Effectual (significant and low consequence dams only)	-Normal operation -Annual inspection reports to this department

Glossary

OMS- Operation, Maintenance and Surveillance
EPRP- Emergency Preparedness and Response Plan
IDF- Inflow Design Flood
DSR- Dam Safety Review
d/s- downstream
CDA- Canadian Dam Association
ENVC- Dept of Environment & Conservation
EDF- Environmental Design Flood

Updated: Feb 2018

APPENDIX F

Final August 2018 Annual Dam Safety Report Form

Annual Dam Safety Report

Dam Name: _____

Dam Owner: _____ Date: _____

Dam Failure Consequence Classification: ◯ Extreme ◯ Very High ◯ High ◯ Significant ◯ Low

Describe Changes to Conditions Downstream of Dam (increased development, population at risk, etc.):

DAM SAFETY PROGRAM ELEMENTS

	Yes	No	N/A	Follow up?
Any recent alterations to the dam?				
Any critical incidents or hazards occurred?				
Critical incidents or hazards reported?				
Consequence classification assessment completed?				
Dam break flood inundation study and mapping completed?				
Dam owner inspections undertaken?				
Inspection frequency adequate?				
OMS plan prepared and submitted?				
EPRP prepared and submitted?				
EPRP updated (contact information)?				
Dam safety review status acceptable?				
Maintenance suitable?				
Surveillance and monitoring suitable?				
Public safety risk assessment and plan complete?				
Public safety measures taken (signs posted)?				
Hazard identification and failure mode analysis undertaken?				
Outlets, gates and other mechanical components tested?				
Reservoir or tailings impoundment operation as per OMS manual?				
Design and operation of tailings dam as per current phase?				

General comments and site observations (Please provide pictures):

DAM DEFICIENCIES

	Yes	No	Potential	N/A
IDF inappropriate?	☐	☐	☐	☐
EDF inappropriate?	☐	☐	☐	☐
Spillway or discharge works capacity inadequate?	☐	☐	☐	☐
Slope stability inadequate?	☐	☐	☐	☐
Freeboard inadequate?	☐	☐	☐	☐
Geotechnical deficiencies observed? (internal erosion, slumping, external erosion, sinkhole, settlement, cracks, bulges, lateral movement)	☐	☐	☐	☐
Structural deficiencies observed? (cracks, misalignment, settlement, concrete deterioration, lateral movement)	☐	☐	☐	☐
Sliding safety factor inadequate?	☐	☐	☐	☐
Rip rap deficiencies observed? (displaced, broken down)	☐	☐	☐	☐
Debris deficiencies observed? (floating debris, spillway blocked)	☐	☐	☐	☐
Animal activity observed? (burrowing, beavers)	☐	☐	☐	☐
Excessive vegetation growth observed? (embankments, spillway)	☐	☐	☐	☐
Seepage observed? (location, quantity, clarity)	☐	☐	☐	☐

Description of deficiencies (Please provide pictures):

Condition Assessment:	**Likelihood of Dam Safety Concern:**	**Dam Safety Risk Level (Corrective Action Level):**
*Refer to attached information on pages 3 and 4		
◯ Satisfactory	◯ Likely	◯ 5-Very High (Alert)
◯ Fair	◯ Probable	◯ 4-High (Caution)
◯ Marginal	◯ Unlikely	◯ 3-Moderate (Stable)
◯ Unsatisfactory	◯ Very Unlikely	◯ 2-Low (Effectual)
◯ Not Rated		◯ 1-Very Low (No Concerns)

Printed name of Dam Safety Consultant	Signature	Date
Printed name of Dam Owner/Agent	Signature	Date

Condition Assessment (assessment that best describes the condition of the dam based on available information)

1) SATISFACTORY

No unacceptable dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic) in accordance with applicable best management practices.

2) FAIR

No unacceptable dam safety deficiencies are recognized for normal loading conditions, however, potential deficiencies may exist. Rare or extreme hydrologic events may result in a dam safety deficiency.

3) MARGINAL

An unacceptable dam safety deficiency is recognized for loading conditions which may realistically occur, however, uncertainties exist as to critical analysis parameters which identify a dam safety deficiency. Further investigations and studies are necessary.

4) UNSATISFACTORY

An unacceptable dam safety deficiency is recognized for loading conditions which may realistically occur and no additional investigations or studies are required to confirm the critical analysis parameters.

Likelihood of Dam Safety Concern - General Guidelines

(Note: Apply highest likelihood rating, only one bullet required)

Likely

- An unacceptable dam safety deficiency has been identified based on CDA Guidelines or observed deficiencies that could clearly lead to a dam failure or uncontrolled release.
- Design, construction, structural and/or operational deficiencies remain uncorrected.
- Non-conformance with established dam safety requirements, procedures, systems and instructions.
- Owner exhibits reluctance to operate dam in a safe and timely manner, or is incapable of doing so.

Probable

- A potential dam safety deficiency has been identified based on CDA Guidelines or observed deficiencies that could potentially lead to a dam failure or uncontrolled release.
- Design, construction, structural and/or operational deficiencies remain uncorrected, however, dam owner is actively working on an approved project to correct the deficiency.
- Design and operation lacks redundancy (e.g., no back-up power for electrical gates).
- Non-conformance with some established dam safety requirements, procedures, systems and instructions.

Unlikely

- A dam safety deficiency might exist, but has not been confirmed based on CDA Guidelines.
- Design and/or performance deficiencies have been observed, but are actively monitored and are not expected to significantly increase the failure potential.
- Design and operation exhibits redundancy.
- Conformance with established dam safety requirements, procedures, systems, and instructions.

Very Unlikely

- Dams that are breached, partially breached, reservoir drained or otherwise safeguarded.

DAM SAFETY RISK MATRIX

Likelihood of Dam Safety Concern	Dam Failure Consequence Classification				
	Low	Significant	High	Very High	Extreme
Likely	4	4	5	5	5
Probable	3	4	4	4	4
Unlikely	2	3	3	3	3
Very Unlikely	1	2	2	2	2

DAM SAFETY RISK LEVEL & CORRECTIVE ACTION LEVEL

Dam Safety Risk Level	Corrective Action Level	Possible Corrective Actions to Take
5-Very High	Alert (immediate action required)	-Increased site surveillance -Enhanced instrumentation monitoring -Hiring of engineering consultants -Immediate repairs -Restricted reservoir operation -WRMD may request EPRP reviewed at increased frequency -WRMD may issue an Order to lower water levels, empty reservoir, or take other corrective action -Suspend operation of dam
4-High	Caution (additional studies and/or corrective action required in the near term)	-Increased site surveillance -Increased instrumentation monitoring -Planning for rehabilitation work in the immediate or near future -Modify reservoir operation -WRMD may request EPRP reviewed at increased frequency -WRMD may request inspection reports at increased frequency -WRMD may request submission of OMS Manual or DSR at increased frequency
3-Moderate	Stable (follow-up required to confirm)	-Annual inspection reports to WRMD -Monitor operation under peak loading -Rehabilitate hazardous conditions -WRMD may request submission of OMS Manual or DSR at increased frequency
2-Low	Effectual (reassess annually)	-Normal operation -Annual inspection reports to WRMD
1-Very Low	No Concerns	-No action required unless dam classification or conditions change

Glossary

CDA - Canadian Dam Association
DSR - Dam Safety Review
EDF - Environmental Design Flood
EPRP - Emergency Preparedness and Response Plan
IDF - Inflow Design Flood
OMS - Operation, Maintenance and Surveillance
WRMD - Water Resources Management Division

Updated: August 2018

APPENDIX G

Public Safety Incident Report Forms

Public Safety Incident Report

1.0 INCIDENT IDENTIFICATION

1.1 Site or Dam name: Curling Water Supply - First Pond Dam (Second Pond Dam)

1.2 Incident Date (dd mm yyyy): 30/05/1966

1.3 Incident Time: ☐ AM ☐ PM

1.4 River Name: First Pond (Second Pond)

1.5 Location of Incident:

- ☐ Upstream (specific location)
- ☐ Headpond
- ☒ Dam (e.g., Crest, Roof, Deck)
- ☐ Tailrace (designated dangerous area)
- ☐ Downstream (specific location)
- ☐ Penstock
- ☐ Spillway
- ☐ Intakes
- ☐ Roadway(s)
- ☐ Other:
- ☐ Authorized public access area
- ☐ Boat Ramp(s)

1.6 Incident Type

- ☒ Fatality (Not a suicide or homicide)
- ☐ Injury
- ☐ Stranding/rescue
- ☐ Other:
- ☐ Trespassing, or otherwise entering into a dangerous area
- ☐ Failure of a physical control measures
- ☐ Failure to follow operating procedures

1.7 Names of Individuals Involved (if known):
Gregory Musseau, 8
Garry Musseau, 12

1.8 Names of Eyewitnesses:
Clifton Musseau

1.9 Name of First Aid Responder: William Wells, Clarence Martin

1.10 Name of Hospital/Clinic: Western Memorial Hospital, Christopher Fisher Division

1.11 Name of Responding Police Officer:

1.12 Police Report Number (if applicable):

2.0 DESCRIPTION OF INCIDENT

2.1 Incident Description:

Incident occurred during the day on May 30, 1966 at the wooden dam at the head of First Pond (Second Pond). Two young brothers, ages 8 and 12, drowned while going for a swim in the pond.

2.2 Describe the sequence of events leading to the incident and any injuries that resulted:
(Include observations by staff at site, resultant discussion with member(s) of the public, if any etc.)

The two boys, Gregory and Garry, along with their cousin, Clifton, went to look for their brother and his friend in the area of First Pond (Second Pond). The two boys decided to go for a swim in the pond. They were walking along the crest of the dam at the head of the pond when they slipped off and fell into the pond. They were not able to climb back up the dam as it was too steep (said to be 45 degree slope) and they drowned. Their cousin tried to pull them out of the water, but was unsuccessful so he ran to a nearby road where he found two men to come help. The men recovered the boys' bodies and attempted CPR, but they were also unsuccessful in saving them. The RCMP were notified at 3pm and immediately went to the area where they collected the bodies and brought them to the Christopher Fisher Division of the Western Memorial Hospital. Autopsies were said to be planned to be performed there. The boys were not in school that day as all school children in Newfoundland were given an unscheduled holiday in honor of the recent visit to the province by Governor General and Madame Georges P. Vanier.

Continued on Page 2 of 2

Public Safety Incident Report (Page 2 of 2)

3.0 ACTIVITIES

3.1 What was the Person(s) doing at the time of the injury/incident?

From Water / Ice
- ☐ Fishing from Boat
- ☐ Windsurfing
- ☐ Swimming
- ☐ Swimming / Diving
- ☐ Snowmobiling
- ☐ Boating (under power)
- ☐ Canoeing/Kayaking/Rowing
- ☐ Jet Ski
- ☐ Skating
- ☐ Other:
- ☐ Sailing
- ☐ Waterskiing
- ☐ Scuba Diving
- ☐ Ice Fishing
- ☐ Unknown

From Shore / Structure
- ☐ Fishing from shore
- ☐ Picnicking
- ☐ Skiing
- ☐ Biking
- ☐ Accessing electrical equipment
- ☐ Unknown:
- ☒ Walking
- ☐ ATV / Dirt Biking
- ☐ Snowshoeing
- ☐ Scuba Diving
- ☐ Accessing mech. equipment
- ☐ Trespassing
- ☐ Climbing
- ☐ Hiking
- ☐ Driving
- ☒ Swimming / Diving
- ☐ Other:

4.0 CONTROL MEASURES

4.1 Select Physical Control Measures in place at the time of the incident: ☒ N/A

- ☐ Signage
- ☐ Safety Booms
- ☐ Fencing
- ☐ Audible Danger Signaling Devices
- ☐ Public Education (local)
- ☐ Video Surveillance
- ☐ Vehicle Barricades
- ☐ Operational Control Procedure
- ☐ Safety Buoys
- ☐ Visual Danger Signal Device
- ☐ Security Patrols
- ☐ Other:

5.0 ENVIRONMENTAL

5.1 Select the Physical / Environmental Factor(s) relevant to the incident: ☐ N/A

Physical
- ☐ Slope Instability
- ☒ Steep Slopes
- ☐ Uneven Surfaces
- ☒ Slippery Surface
- ☐ Strong Currents/Undertow
- ☐ Failure of Vehicle Or Vessel
- ☐ Rapid Water Rise
- ☐ Sudden Release of Water
- ☐ Remote Release of Water
- ☐ Ramped Release of Water
- ☐ Floating Debris
- ☐ Failure of Ice Cover
- ☐ Inaccessible/Awkward Location
- ☐ Exposed Mech/Elec Equipment
- ☐ Sharp Objects
- ☐ Structural Failure
- ☐ Energized Equipment
- ☐ Other:

Environmental
- ☐ Cold Environment
- ☐ Hot Environment
- ☐ Rainy Conditions
- ☐ Snow/Ice
- ☐ Windy Conditions
- ☐ Dark, Night Conditions
- ☐ Low Lighting
- ☐ Low Visibility
- ☐ Other:

6.0 CORRECTIVE MEASURES

6.1 Describe any Immediate Action(s) Taken as a result of the incident.
(i.e. Corrective actions, warnings issued, charges laid, control measure repaired or upgraded, procedures written / amended)

Unknown - all information provided in this report was obtained from a May 31, 1966 Western Star newspaper article about the incident.

7.0 CONTACT INFORMATION

7.1 Contact person on site: _____

7.2 Submitted by: _____

Fall in Second Pond, two brothers drown

Eight-year-old Gregory Musseau and his 12-year-old brother Garry, sons of Mr. and Mrs. George Musseau, Musseau's avenue, Curling, drowned Monday in Second Pond, which supplies the Curling area with water.

A spokesman for the rural detachment of the RCMP said it was reported the boys, along with a cousin Clifton Musseau, went into the Second Pond area in search of Christopher Musseau a brother of the drowned boys, and Robert Hamlyn, 12. Clifton Musseau said the other two boys decided to go for a swim in Second Pond.

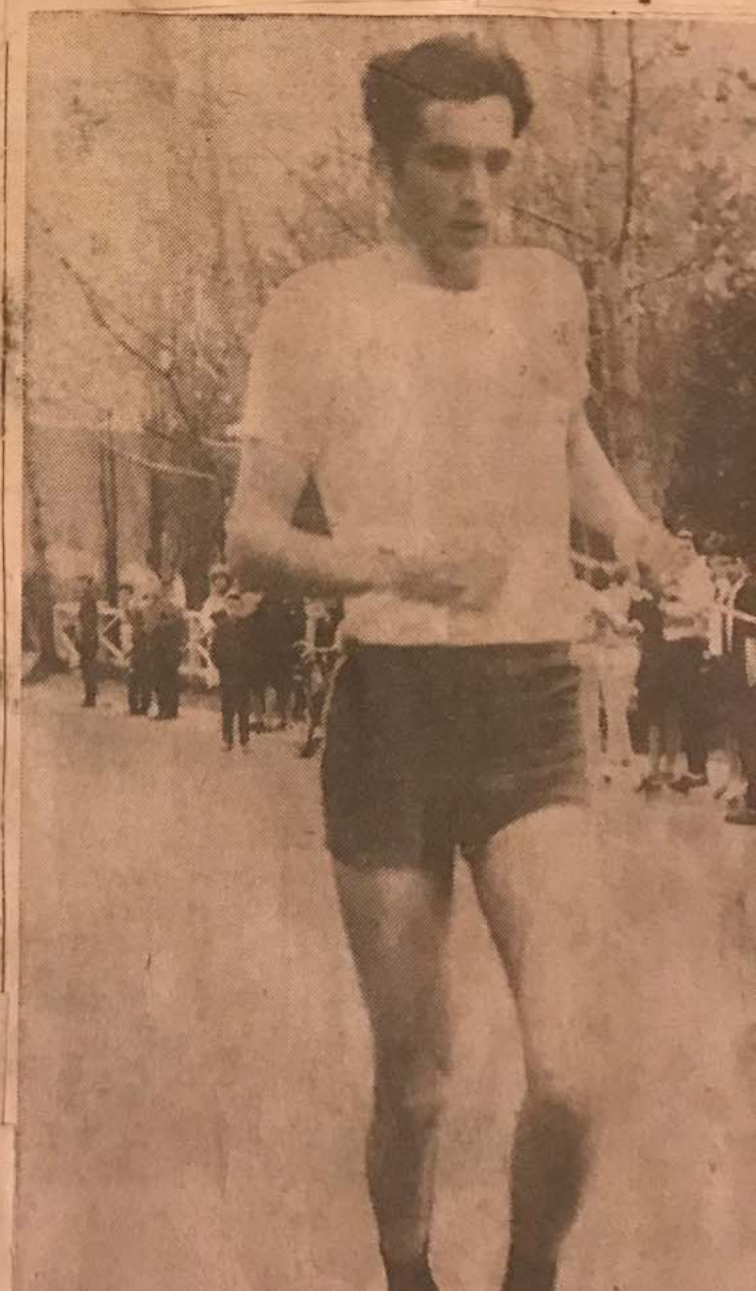
He told police that the boys were walking along the wooden dam at the head of the pond when they slipped off. The dam slants into the water at a 45 degree angle, and the boys found it impossible to get back to the top of the dam.

Clifton said he tried without success to help the boys back over the dam. He then ran to Georgetown Road, where he met William Wells and Clarence Martin. The two men went to the pond, and after recovering the bodies tried artificial respiration — without success.

The city detachment of the RCMP were notified of the drownings at 3 p.m. RCMP officers immediately went to the area and brought the bodies to the Christopher Fisher Division of the Western Memorial Hospital, where autopsies are to be performed.

Meanwhile, Christopher Musseau and Robert Hamlyn turned up safe and reported that they had not been in the woods around the Second Pond area, at all.

The boys, as well as all other school children in Newfoundland, were celebrating an unscheduled holiday granted them in honor of the recent visit to the province by Governor General and Madame Georges P. Vanier.



SHOWERS 1966

A baby shower was held Wednesday, Aug. 3, in honor of Mrs. Raymond Chipman. Many lovely gifts were received for the baby-to-be from the 35 ladies present.

The gifts were opened by Mrs. Chipman with the assistance of Mrs. Robert Anstey.

A delicious lunch was serv-

* * * 1966

To Mr. and Mrs. Raymond Chipman, Allen's Road, a boy Sept. 27 weighing 8 lbs. 4 ozs.

* * *

* * *

To Mr. and Mrs. George Hunt, Samm's Road, Curling, a boy on July 23 weighing 7 lbs. 14 ozs.

Public Safety Incident Report

1.0 INCIDENT IDENTIFICATION

1.1 Site or Dam name: Churchill Falls Hydroelectric Development - Gabbro Control Structure

1.2 Incident Date (dd mm yyyy): 1980's or 1990's

1.3 Incident Time: ☐ AM ☐ PM

1.4 River Name: Ossokmanuan Reservoir

1.5 Location of Incident:

- ☐ Upstream (specific location)
- ☐ Headpond
- ☐ Dam (e.g., Crest, Roof, Deck)
- ☐ Tailrace (designated dangerous area)
- ☐ Downstream (specific location)
- ☐ Penstock
- ☐ Spillway
- ☒ Intakes
- ☐ Roadway(s)
- ☐ Other:
- ☐ Authorized public access area
- ☐ Boat Ramp(s)

1.6 Incident Type

- ☒ Fatality (Not a suicide or homicide)
- ☐ Injury
- ☐ Stranding/rescue
- ☐ Other:
- ☐ Trespassing, or otherwise entering into a dangerous area
- ☐ Failure of a physical control measures
- ☐ Failure to follow operating procedures

1.7 Names of Individuals Involved (if known):

1.8 Names of Eyewitnesses:

1.9 Name of First Aid Responder:

1.10 Name of Hospital/Clinic:

1.11 Name of Responding Police Officer:

1.12 Police Report Number (if applicable):

2.0 DESCRIPTION OF INCIDENT

2.1 Incident Description:

Incident occurred some time in the late 1980's or early 1990's. Two men were in a boat upstream of the control structure, they had to abandon the boat and one man was carried through the structure and drowned.

2.2 Describe the sequence of events leading to the incident and any injuries that resulted:
(Include observations by staff at site, resultant discussion with member(s) of the public, if any etc.)

Two men launched their boat upstream of the Gabbro Control Structure with the intent of crossing the Ossokmanuan Reservoir. The boat's motor failed to start forcing the men to abandon it and swim back to shore. One of the men swam safely to shore, but the other man attempted to save the boat, got caught in the fast moving water, and was carried through the control structure. His body was recovered downstream of the control structure the next day.

Continued on Page 2 of 2

Public Safety Incident Report (Page 2 of 2)

3.0 ACTIVITIES

3.1 What was the Person(s) doing at the time of the injury/incident?

From Water / Ice

- ☐ Fishing from Boat
- ☐ Windsurfing
- ☐ Swimming
- ☐ Swimming / Diving
- ☐ Snowmobiling
- ☒ Boating (under power)
- ☐ Canoeing/Kayaking/Rowing
- ☐ Jet Ski
- ☐ Skating
- ☐ Other:
- ☐ Sailing
- ☐ Waterskiing
- ☐ Scuba Diving
- ☐ Ice Fishing
- ☐ Unknown

From Shore / Structure

- ☐ Fishing from shore
- ☐ Picnicking
- ☐ Skiing
- ☐ Biking
- ☐ Accessing electrical equipment
- ☐ Unknown:
- ☐ Walking
- ☐ ATV / Dirt Biking
- ☐ Snowshoeing
- ☐ Scuba Diving
- ☐ Accessing mech. equipment
- ☐ Trespassing
- ☐ Climbing
- ☐ Hiking
- ☐ Driving
- ☐ Swimming / Diving
- ☐ Other:

4.0 CONTROL MEASURES

4.1 Select Physical Control Measures in place at the time of the incident: ☐ **N/A**

- ☒ Signage (Limited)
- ☐ Safety Booms
- ☐ Fencing
- ☐ Audible Danger Signaling Devices
- ☐ Public Education (local)
- ☐ Video Surveillance
- ☐ Vehicle Barricades
- ☐ Operational Control Procedure
- ☐ Safety Buoys
- ☐ Visual Danger Signal Device
- ☐ Security Patrols
- ☐ Other:

5.0 ENVIRONMENTAL

5.1 Select the Physical / Environmental Factor(s) relevant to the incident: ☐ **N/A**

Physical

- ☐ Slope Instability
- ☐ Steep Slopes
- ☐ Uneven Surfaces
- ☐ Slippery Surface
- ☒ Strong Currents/Undertow
- ☒ Failure of Vehicle Or Vessel
- ☐ Rapid Water Rise
- ☐ Sudden Release of Water
- ☐ Remote Release of Water
- ☐ Ramped Release of Water
- ☐ Floating Debris
- ☐ Failure of Ice Cover
- ☐ Inaccessible/Awkward Location
- ☐ Exposed Mech/Elec Equipment
- ☐ Sharp Objects
- ☐ Structural Failure
- ☐ Energized Equipment
- ☐ Other:

Environmental

- ☐ Cold Environment
- ☐ Hot Environment
- ☐ Rainy Conditions
- ☐ Snow/Ice
- ☐ Windy Conditions
- ☐ Dark, Night Conditions
- ☐ Low Lighting
- ☐ Low Visibility
- ☐ Other:

6.0 CORRECTIVE MEASURES

6.1 Describe any Immediate Action(s) Taken as a result of the incident.
(i.e. Corrective actions, warnings issued, charges laid, control measure repaired or upgraded, procedures written / amended)

7.0 CONTACT INFORMATION

7.1 Contact person on site: _____

7.2 Submitted by: _____

Public Safety Incident Report

1.0 INCIDENT IDENTIFICATION

1.1 Site or Dam name: Bay d'Espoir Development

1.2 Incident Date (dd mm yyyy): circa 1986

1.3 Incident Time: ☐ AM ☐ PM

1.4 River Name: Granite Canal

1.5 Location of Incident:

- ☐ Upstream (specific location)
- ☐ Headpond
- ☐ Dam (e.g., Crest, Roof, Deck)
- ☐ Tailrace (designated dangerous area)
- ☐ Downstream (specific location)
- ☐ Penstock
- ☐ Spillway
- ☐ Intakes
- ☐ Roadway(s)
- ☒ Other: Outflow of Granite Canal
- ☐ Authorized public access area
- ☐ Boat Ramp(s)

1.6 Incident Type

- ☒ Fatality (Not a suicide or homicide)
- ☐ Injury
- ☐ Stranding/rescue
- ☐ Other:
- ☐ Trespassing, or otherwise entering into a dangerous area
- ☐ Failure of a physical control measures
- ☐ Failure to follow operating procedures

1.7 Names of Individuals Involved (if known):

1.8 Names of Eyewitnesses:

1.9 Name of First Aid Responder:

1.10 Name of Hospital/Clinic:

1.11 Name of Responding Police Officer:

1.12 Police Report Number (if applicable):

2.0 DESCRIPTION OF INCIDENT

2.1 Incident Description:

Incident occurred during the preliminary site investigations for the proposed Island Pond Hydroelectric Development. The camp cook drowned one evening while trout fishing after work hours near Shawmont's field camp, which was on the road to Meelpaeg Resvervoir. The cook drowned in the area where the water discharging from Granite Canal spread out over an outwash delta into several fast flowing channels before concentrating into a single channel.

2.2 Describe the sequence of events leading to the incident and any injuries that resulted:
(Include observations by staff at site, resultant discussion with member(s) of the public, if any etc.)

The cook was fishing alone and was wearing rainsuit pants taped onto a shorter pair of boots. It was surmised that, while crossing one of the fast flowing channels created from the discharge from Granite Canal, he slipped, fell into the water, which filled his pants and was swept downstream. The body was found approximately 1km downstream from the outflow of Granite Canal.

Continued on Page 2 of 2

Public Safety Incident Report (Page 2 of 2)

3.0 ACTIVITIES

3.1 What was the Person(s) doing at the time of the injury/incident?

From Water / Ice

- ☐ Fishing from Boat
- ☐ Windsurfing
- ☐ Swimming
- ☐ Swimming / Diving
- ☐ Snowmobiling
- ☐ Boating (under power)
- ☐ Canoeing/Kayaking/Rowing
- ☐ Jet Ski
- ☐ Skating
- ☐ Other:
- ☐ Sailing
- ☐ Waterskiing
- ☐ Scuba Diving
- ☐ Ice Fishing
- ☐ Unknown

From Shore / Structure

- ☒ Fishing from shore
- ☐ Picnicking
- ☐ Skiing
- ☐ Biking
- ☐ Accessing electrical equipment
- ☐ Unknown:
- ☐ Walking
- ☐ ATV / Dirt Biking
- ☐ Snowshoeing
- ☐ Scuba Diving
- ☐ Accessing mech. equipment
- ☐ Trespassing
- ☐ Climbing
- ☐ Hiking
- ☐ Driving
- ☐ Swimming / Diving
- ☐ Other:

4.0 CONTROL MEASURES

4.1 Select Physical Control Measures in place at the time of the incident: ☐ **N/A**

- ☐ Signage
- ☐ Safety Booms
- ☐ Fencing
- ☐ Audible Danger Signaling Devices
- ☐ Public Education (local)
- ☐ Video Surveillance
- ☐ Vehicle Barricades
- ☐ Operational Control Procedure
- ☐ Safety Buoys
- ☐ Visual Danger Signal Device
- ☐ Security Patrols
- ☐ Other:

5.0 ENVIRONMENTAL

5.1 Select the Physical / Environmental Factor(s) relevant to the incident: ☐ **N/A**

Physical

- ☐ Slope Instability
- ☐ Steep Slopes
- ☒ Uneven Surfaces
- ☒ Slippery Surface
- ☒ Strong Currents/Undertow
- ☐ Failure of Vehicle Or Vessel
- ☐ Rapid Water Rise
- ☐ Sudden Release of Water
- ☐ Remote Release of Water
- ☐ Ramped Release of Water
- ☐ Floating Debris
- ☐ Failure of Ice Cover
- ☐ Inaccessible/Awkward Location
- ☐ Exposed Mech/Elec Equipment
- ☐ Sharp Objects
- ☐ Structural Failure
- ☐ Energized Equipment
- ☐ Other:

Environmental

- ☐ Cold Environment
- ☐ Hot Environment
- ☐ Rainy Conditions
- ☐ Snow/Ice
- ☐ Windy Conditions
- ☐ Dark, Night Conditions
- ☐ Low Lighting
- ☐ Low Visibility
- ☐ Other:

6.0 CORRECTIVE MEASURES

6.1 Describe any Immediate Action(s) Taken as a result of the incident.
(i.e. Corrective actions, warnings issued, charges laid, control measure repaired or upgraded, procedures written / amended)

7.0 CONTACT INFORMATION

7.1 Contact person on site:

_____

7.2 Submitted by:

_____

APPENDIX H

High, Very High & Extreme Dams with No Inundation Mapping

Prioritized List of High, Very High & Extreme Dams with No Inundation Mapping

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
411	Deer Lake Hydroelectric Generating Station	Forebay Dam	Deer Lake Power	Extreme	Extreme	1	Deer Lake, Pasadena, Steady Brook, Corner Brook, Little Rapids, Humber Village, Humber Valley Resort
1118	Churchill Falls Hydroelectric Development	FF-11	Nalcor Energy - Churchill Falls	Very High	Extreme	2A	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
73	Upper Salmon Hydroelectric Generating Station	SD-2 (North Salmon Dam)	Newfoundland and Labrador Hydro	Very High	Very High	2B	Saint Veronica's, Saint Joseph's Cove, Milltown - Head of Bay d'Espoir, Swanger Cove, Saint Alban's, Conne River
218	Lawn Hydroelectric Generating Facility	Lawn Forebay Dam	Newfoundland Power Inc.	Very High	Very High	2B	Lawn
357	Deer Lake Hydroelectric Generating Station	West Bank Dyke	Deer Lake Power	Very High	Very High	2B	Deer Lake, Pasadena, Steady Brook, Corner Brook, Little Rapids, Humber Village, Humber Valley Resort
1163	Churchill Falls Hydroelectric Development	Ossok Dam 2	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1168	Churchill Falls Hydroelectric Development	Ossok Dam 7	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1169	Churchill Falls Hydroelectric Development	Gabbro Dam 1	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1170	Churchill Falls Hydroelectric Development	Gabbro Dam 2	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1173	Churchill Falls Hydroelectric Development	Gabbro - East Dam	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1174	Churchill Falls Hydroelectric Development	Gabbro East	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1175	Churchill Falls Hydroelectric Development	Gabbro - West Dam	Nalcor Energy - Churchill Falls	Very High	Very High	2B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1196	Rambler Metals & Mining - Nugget Pond Facility	Dam #2 (Saddle Dyke) - Tailings Pond	Rambler Metals & Mining Canada Ltd.	Very High	Very High	2B	Nugget Pond Mine Site
1848	St. Lawrence Fluorspar Mine	Tailings Impoundment Dam	Canada Fluorspar (NL) Inc.	Very High	Very High	2B	CFI Mining Operation
1116	Churchill Falls Hydroelectric Development	FF-10B	Nalcor Energy - Churchill Falls	Very High	High	2C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
1049	Churchill Falls Hydroelectric Development	GL-2	Nalcor Energy - Churchill Falls	Very High	Low	2D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
91	Petty Harbour Hydroelectric Generating Facility	Bay Bulls Big Pond Dam	Newfoundland Power Inc.	Very High		2E	Goulds, Petty Harbour - Maddox Cove
1113	Churchill Falls Hydroelectric Development	GF-8	Nalcor Energy - Churchill Falls	High	Extreme	3A	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1108	Churchill Falls Hydroelectric Development	GF-2	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1109	Churchill Falls Hydroelectric Development	GF-3	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1120	Churchill Falls Hydroelectric Development	GF-13	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1122	Churchill Falls Hydroelectric Development	GF-15	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1123	Churchill Falls Hydroelectric Development	GF-16	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1127	Churchill Falls Hydroelectric Development	GJ-7	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1128	Churchill Falls Hydroelectric Development	GJ-8	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1132	Churchill Falls Hydroelectric Development	GJ-11B	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1137	Churchill Falls Hydroelectric Development	GJ-17	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1139	Churchill Falls Hydroelectric Development	GJ-19	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1140	Churchill Falls Hydroelectric Development	GJ-20	Nalcor Energy - Churchill Falls	High	Very High	3B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1728	St. Lawrence Fluorspar Mine	Polishing Pond	Canada Fluorspar (NL) Inc.	High	Very High	3B	CFI Mining Operation
4	Deer Lake Hydroelectric Generating Station	Intake Control Dam	Deer Lake Power	High	High	3C	Deer Lake, Pasadena, Steady Brook, Corner Brook, Little Rapids, Humber Village, Humber Valley Resort

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
7	Grand Falls Hydroelectric Generating Station	Grand Falls Forebay Dam	Government of Newfoundland and Labrador	High	High	3C	Grand Falls, Bishop's Falls
53	Bay d'Espoir Hydroelectric Generating Facility	MD-2 (Pudops Dam)	Newfoundland and Labrador Hydro	High	High	3C	Saint Veronica's, Saint Joseph's Cove, Milltown - Head of Bay d'Espoir, Swanger Cove, Saint Alban's, Conne River
107	TCV/ROP Hydroelectric Generating Facility	Tors Cove Pond East Dam	Newfoundland Power Inc.	High	High	3C	Tors Cove, Burnt Cove
108	TCV/ROP Hydroelectric Generating Facility	Tors Cove Pond West Dam	Newfoundland Power Inc.	High	High	3C	Tors Cove, Burnt Cove
128	TCV/ROP Hydroelectric Generating Facility	Cape Pond Dam and Spillway	Newfoundland Power Inc.	High	High	3C	Tors Cove, Burnt Cove
156	CAB/HCP Hydroelectric Generating Facility	Cape Broyle Forebay Spillway	Newfoundland Power Inc.	High	High	3C	Shore's Cove, Cape Broyle
177	Deer Lake Hydroelectric Generating Station	Long Bank Dam	Deer Lake Power	High	High	3C	Deer Lake, Pasadena, Steady Brook, Corner Brook, Little Rapids, Humber Village, Humber Valley Resort
189	Hearts Content Hydroelectric Generating Facility	Southern Cove Pond Dam	Newfoundland Power Inc.	High	High	3C	Heart's Content
191	Hearts Content Hydroelectric Generating Facility	Long Pond Control Dam and Spillway	Newfoundland Power Inc.	High	High	3C	Heart's Content
348	TCV/ROP Hydroelectric Generating Facility	Tors Cove Spillway	Newfoundland Power Inc.	High	High	3C	Tors Cove, Burnt Cove
355	Deer Lake Hydroelectric Generating Station	Deep Bank Dam	Deer Lake Power	High	High	3C	Deer Lake, Pasadena, Steady Brook, Corner Brook, Little Rapids, Humber Village, Humber Valley Resort
360	CAB/HCP Hydroelectric Generating Facility	Mount Carmel Pond Spillway	Newfoundland Power Inc.	High	High	3C	Cape Broyle
673	Grand Bank Water Supply	Grand Bank Dam	Town of Grand Bank	High	High	3C	Grand Bank
1111	Churchill Falls Hydroelectric Development	GF-6	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1112	Churchill Falls Hydroelectric Development	GF-7	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1124	Churchill Falls Hydroelectric Development	GF-17	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
1133	Churchill Falls Hydroelectric Development	GJ-12	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1134	Churchill Falls Hydroelectric Development	GJ-13	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1164	Churchill Falls Hydroelectric Development	Ossok Dam 3	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1165	Churchill Falls Hydroelectric Development	Ossok Dam 4	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1166	Churchill Falls Hydroelectric Development	Ossok Dam 5	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1167	Churchill Falls Hydroelectric Development	Ossok Dam 6	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1171	Churchill Falls Hydroelectric Development	Gabbro Dam 3	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1172	Churchill Falls Hydroelectric Development	Gabbro Dam 4	Nalcor Energy - Churchill Falls	High	High	3C	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1188	Anaconda Mining Inc. (Pine Cove)	Phase 1 Tailings Dam	Anaconda Mining Inc.	High	High	3C	Anaconda Mining Operation
1368	CAB/HCP Hydroelectric Generating Facility	Horse Chops East Spillway	Newfoundland Power Inc.	High	High	3C	Cape Broyle
1390	Vale Long Harbour Processing Plant - Residue Storage Area	Dam 3	Vale Newfoundland and Labrador Ltd.	High	High	3C	Long Harbour Processing Operation
1789	Voisey's Bay Mine Site	East Diversion Dam	Vale Newfoundland and Labrador Ltd.	High	High	3C	Voisey's Bay Mine Site
1110	Churchill Falls Hydroelectric Development	GF-4	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1117	Churchill Falls Hydroelectric Development	GJ-2	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1121	Churchill Falls Hydroelectric Development	GF-14	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1125	Churchill Falls Hydroelectric Development	GF-18	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
1126	Churchill Falls Hydroelectric Development	GJ-5	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1129	Churchill Falls Hydroelectric Development	GJ-9	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1130	Churchill Falls Hydroelectric Development	GJ-10	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1135	Churchill Falls Hydroelectric Development	GJ-15	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1136	Churchill Falls Hydroelectric Development	GJ-16	Nalcor Energy - Churchill Falls	High	Significant	3D	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
90	Petty Harbour Hydroelectric Generating Facility	First Pond Dam (PHR Forebay Dam)	Newfoundland Power Inc.	High		3E	Petty Harbour
95	Pierre's Brook Hydroelectric Generating Facility	Gull Pond Freeboard Dam	Newfoundland Power Inc.	High		3E	Witless Bay
102	MOP/MRP Hydroelectric Generating Facility	Mobile First Pond Dam	Newfoundland Power Inc.	High		3E	Mobile
103	MOP/MRP Hydroelectric Generating Facility	Mobile Canal Embankment	Newfoundland Power Inc.	High		3E	Mobile
104	MOP/MRP Hydroelectric Generating Facility	Mobile Big Pond Dam	Newfoundland Power Inc.	High		3E	Mobile
172	Topsail Hydroelectric Generating Facility	Topsail Pond (Forebay) Dam	Newfoundland Power Inc.	High		3E	Paradise, Topsail
179	Topsail Hydroelectric Generating Facility	Thomas Pond Dam	Newfoundland Power Inc.	High		3E	Conception Bay South
181	Seal Cove Hydroelectric Generating Facility	Fenelons Pond Dam	Newfoundland Power Inc.	High		3E	Conception Bay South
182	Seal Cove Hydroelectric Generating Facility	Soldiers Pond Dam/Spillway	Newfoundland Power Inc.	High		3E	Conception Bay South
185	Victoria Hydroelectric Generating Facility	Blue Hill Pond Dam (VIC Forebay Dam)	Newfoundland Power Inc.	High		3E	Victoria, Salmon Cove
186	Victoria Hydroelectric Generating Facility	Rocky Pond Dam	Newfoundland Power Inc.	High		3E	Victoria, Salmon Cove

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
213	Port Union Hydroelectric Generating Facility	Wells Pond Dam	Newfoundland Power Inc.	High		3E	Port Union, Catalina
223	Rattling Brook Hydroelectric Generating Facility	Rattling Lake Spillway	Newfoundland Power Inc.	High		3E	Rattling Brook
224	Rattling Brook Hydroelectric Generating Facility	Amy's Lake Dam	Newfoundland Power Inc.	High		3E	Rattling Brook
236	Lookout Brook Hydroelectric Generating Facility	Joe Dennis Pond Dam and Spillway	Newfoundland Power Inc.	High		3E	Flat Bay
239	Lookout Brook Hydroelectric Generating Facility	Cross Pond Spillway	Newfoundland Power Inc.	High		3E	Flat Bay
1050	Churchill Falls Hydroelectric Development	GL-3	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1070	Churchill Falls Hydroelectric Development	GL-7	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1080	Churchill Falls Hydroelectric Development	GL-17	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1082	Churchill Falls Hydroelectric Development	GL-19	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1084	Churchill Falls Hydroelectric Development	GL-21	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1088	Churchill Falls Hydroelectric Development	GL-27	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1091	Churchill Falls Hydroelectric Development	GL-31	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1092	Churchill Falls Hydroelectric Development	GL-32	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1093	Churchill Falls Hydroelectric Development	GL-33	Nalcor Energy - Churchill Falls	Low	Extreme	4	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
50	Bay d'Espoir Hydroelectric Generating Facility	LD-5 (Salmon River Dam)	Newfoundland and Labrador Hydro	Low	Very High	5	N/A
738	Voisey's Bay Mine Site	H1 Dam	Vale Newfoundland and Labrador Ltd.	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
1051	Churchill Falls Hydroelectric Development	GL-4	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1068	Churchill Falls Hydroelectric Development	GL-5	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1071	Churchill Falls Hydroelectric Development	GL-8	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1073	Churchill Falls Hydroelectric Development	GL-10	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1077	Churchill Falls Hydroelectric Development	GL-14	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1078	Churchill Falls Hydroelectric Development	GL-15	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1079	Churchill Falls Hydroelectric Development	GL-16	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1083	Churchill Falls Hydroelectric Development	GL-20	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1085	Churchill Falls Hydroelectric Development	GL-22	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1086	Churchill Falls Hydroelectric Development	GL-25	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1090	Churchill Falls Hydroelectric Development	GL-30	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1094	Churchill Falls Hydroelectric Development	GL-34	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1097	Churchill Falls Hydroelectric Development	GL-37	Nalcor Energy - Churchill Falls	Low	Very High	5	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
29	Cat Arm Hydroelectric Generating Station	CD-6 (Cat Arm Dam West)	Newfoundland and Labrador Hydro	Significant	High	6A	N/A
30	Cat Arm Hydroelectric Generating Station	CD-7 (Cat Arm Dam East)	Newfoundland and Labrador Hydro	Significant	High	6A	N/A
31	Cat Arm Hydroelectric Generating Station	CD-8 (Cat Arm Dam 8)	Newfoundland and Labrador Hydro	Significant	High	6A	N/A

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
32	Cat Arm Hydroelectric Generating Station	CD-9 (Cat Arm Dam D)	Newfoundland and Labrador Hydro	Significant	High	6A	N/A
44	Hinds Lake Hydroelectric Generating Station	HD-9 (Eclipse Dam)	Newfoundland and Labrador Hydro	Significant	High	6A	Buchans
1157	Churchill Falls Hydroelectric Development	GS-1	Nalcor Energy - Churchill Falls	Significant	High	6A	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1158	Churchill Falls Hydroelectric Development	GS-2	Nalcor Energy - Churchill Falls	Significant	High	6A	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1194	Buchans Mine Closure (OAM)	Dam 2	Department of Natural Resources	Significant	High	6A	Buchans
2889	Vale Long Harbour Processing Plant	Upper Tier Plant ETP Polishing Pond	Vale Newfoundland and Labrador Ltd.	Significant	High	6A	Long Harbour Processing Operation
2908	Vale Long Harbour Processing Plant	Upper Tier Plant Stormwater Pond	Vale Newfoundland and Labrador Ltd.	Significant	High	6A	Long Harbour Processing Operation
2928	Vale Long Harbour Processing Plant	Rattling Brook Big Pond Dam	Vale Newfoundland and Labrador Ltd.	Significant	High	6A	Long Harbour Processing Operation
18	Buchans Hydroelectric Generating Station	Buchans Forebay Dam	Government of Newfoundland and Labrador	Low	High	6B	Buchans
690	Voisey's Bay Mine Site	South Sedimentation Pond	Vale Newfoundland and Labrador Ltd.	Low	High	6B	Voisey's Bay Mine Site
733	Voisey's Bay Mine Site	H2 Dam	Vale Newfoundland and Labrador Ltd.	Low	High	6B	Voisey's Bay Mine Site
1069	Churchill Falls Hydroelectric Development	GL-6	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1072	Churchill Falls Hydroelectric Development	GL-9	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1075	Churchill Falls Hydroelectric Development	GL-12	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1087	Churchill Falls Hydroelectric Development	GL-26	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1095	Churchill Falls Hydroelectric Development	GL-35	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui

Dam Index #	Project Name	Dam Name	Dam Owner	CDA LoL Class	CDA E&C / I&E Class	Priority	Communities Affected Downstream
1096	Churchill Falls Hydroelectric Development	GL-36	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1098	Churchill Falls Hydroelectric Development	GL-38	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1141	Churchill Falls Hydroelectric Development	GR-1	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1146	Churchill Falls Hydroelectric Development	GR-6	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1147	Churchill Falls Hydroelectric Development	GR-7	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1151	Churchill Falls Hydroelectric Development	GR-11	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1152	Churchill Falls Hydroelectric Development	GR-12	Nalcor Energy - Churchill Falls	Low	High	6B	Churchill Falls, Happy Valley - Goose Bay, Mud Lake, North West River, Sheshatshui
1190	Anaconda Mining Inc. (Pine Cove)	Phase 2 Tailings Dam	Anaconda Mining Inc.	Low	High	6B	Anaconda Mining Operation

APPENDIX I

Municipal Water Supply Dams with No Inundation Mapping

Prioritized List of Municipal Water Supply Dams with No Inundation Mapping

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
693	Curling Water Supply	Second Pond Dam (Third Pond Dam)	City of Corner Brook	Corner Brook	19806	1A-1
351	Torbay Water Supply	North Pond Dam	Town of Torbay	Torbay	7899	1A-2
488	Labrador City Water Supply	Beverly Lake Dam	Town of Labrador City	Labrador City	7220	1A-3
1648	Stephenville Water Supply	Ned's Pond Dam	Town of Stephenville	Stephenville	6623	1A-4
2671[2]		Noels Pond Dam	Town of Stephenville	Stephenville	6623	1A-4
451	Bay Roberts Water Supply	Bay Roberts Intake Dam	Town of Bay Roberts	Bay Roberts	6012	1A-5
1570	Placentia (Dunville) Water Supply	Wyse Pond Dam	Town of Placentia	Dunville	3133[3]	1A-6
539	Placentia (Dunville) Water Supply	Second Pond Dam	Town of Placentia	Dunville	3133[3]	1A-6
456	Harbour Grace Water Supply	Bannerman Lake Dam and Spillway	Town of Harbour Grace	Harbour Grace	2995	1A-7
673	Grand Bank Water Supply	Grand Bank Dam	Town of Grand Bank	Grand Bank	2310	1A-8
1328	Grand Bank Water Supply	Grand Bank Old Dam	Town of Grand Bank	Grand Bank	2310	1A-8
2608	St. Anthony Old Water Supply	Frenchman's Pond Dam	Town of St. Anthony	St. Anthony	2258	1A-9
2609	St. Anthony Water Supply	St. Anthony Pond Dam	Town of St. Anthony	St. Anthony	2258	1A-9
531	Clarke's Beach Water Supply	Clarke's Pond Dam	Town of Clarke's Beach	Clarke's Beach	1558	1A-10
710	Baie Verte Water Supply	Southwest Brook Dam	Town of Baie Verte	Baie Verte	1313	1A-11
1288	Nain Old Water Supply	Nain Brook and Annainaks Pond Dam	Nain Inuit Community Government	Nain	1125	1A-12
1948	Bide Arm Former Water Supply	Clay Cove Pond Dam	Town of Roddickton - Bide Arm	Roddickton - Bide Arm	999	1A-13
437	La Scie Water Supply	Stakes Pond Dam	Town of La Scie	La Scie	872	1A-14
2590	Port au Choix Water Supply	Winterhouse Dam	Town of Port au Choix	Port au Choix	789	1A-15
848	Placentia Water Supply	Larkins Pond Dam	Town of Placentia	Freshwater	750[4]	1A-16
535	Placentia Water Supply	Clarkes Pond Dam	Town of Placentia	Freshwater	750[4]	1A-16
739	Milltown - Head of Bay d'Espoir Water Supply	Jersey Pond Dam	Town of Milltown - Head of Bay d'Espoir	Milltown - Head of Bay d'Espoir	749	1A-17
1369	Norris Point Water Supply	Neddies Harbour Pond Water Supply Dam	Town of Norris Point	Norris Point	670	1A-18

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
727	King's Point Water Supply	Bulley's Pond Dam	Town of King's Point	King's Point	659	1A-19
649	Meadows Water Supply	Meaders Pond Dam #1	Town of Meadows	Meadows	626	1A-20
491	Port au Port East Water Supply	Unnamed Dam	Town of Port au Port East	Port au Port East	579	1A-21
691	Hopedale Water Supply	American Pond Dam	Town of Hopedale	Hopedale	574	1A-22
908	Fogo Island (Seldom - Little Seldom) Water Supply	Bullocks Cove Pond Dam	Town of Fogo Island	Seldom	386	1A-23
532	Belleoram Water Supply	Rabbit's Pond Dam	Town of Belleoram	Belleoram	374	1A-24
432	Anchor Point Water Supply	Well Cove Brook Dam #2	Town of Anchor Point	Anchor Point	314	1A-25
894	Anchor Point Water Supply	Well Cove Brook Dam #1	Town of Anchor Point	Anchor Point	314	1A-25
719	Pollard's Point Water Supply	Country Cove Pond Dam	Local Service District of Pollard's Point	Pollard's Point	306	1A-26
528	Charlottetown Water Supply	Middle Pond Dam	Town of Charlottetown	Charlottetown	290	1A-27
1009	Woody Point Water Supply	Winterhouse Brook Dam	Town of Woody Point	Woody Point	282	1A-28
1968	Greenspond Water Supply	South Pond Dam	Town of Greenspond	Greenspond	266	1A-29
362	Curling Water Supply	First Pond Dam (Second Pond Dam)	City of Corner Brook	Georgetown	229	1A-30
752	Come By Chance Water Supply	Boutcher's Brook Dam	Town of Come By Chance	Come By Chance	228	1A-31
1808	Lower Lance Cove Water Supply	Big Long Pond Dam	Local Service District of Lower Lance Cove	Lower Lance Cove/Britannia	170	1A-32
512	Shoe Cove Water Supply	Shoe Cove Dam	Local Service District of Shoe Cove	Shoe Cove	168	1A-33
449	Brent's Cove Water Supply	Paddy's Pond Dam	Town of Brent's Cove	Brent's Cove	157	1A-34
534	Baine Harbour Water Supply	Baine Harbour Pond Dam	Town of Baine Harbour	Baine Harbour	124	1A-35
893	Great Brehat Water Supply	Brehat Dam	Local Service District of Great Brehat	Great Brehat	88	1A-36
433	Nippers Harbour Water Supply	Reservoir Dam	Town of Nippers Harbour	Nippers Harbour	85	1A-37
650	Millertown Water Supply	Water Pond Dam	Town of Millertown	Millertown	81	1A-38
1628	Little Bay Islands Water Supply	Jone's Pond Dam	Town of Little Bay Islands	Little Bay Islands	71	1A-39
717	Fermeuse Water Supply	Dam 1	Town of Fermeuse	Kingman's	60[5]	1A-40
743	Marystown Old Water Supply	Old Water Supply Dam	Unknown Owner	Population west of Linton Lake	51[6]	1A-41

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
892	St. Lunaire - Griquet Water Supply	Lookout Brook Dam	Town of St. Lunaire - Griquet	Gunners Cove	45[7]	1A-42
349	Marystown Old Water Supply	Fox Hill Reservoir Dam No. 1	Town of Marystown	Road to Marystown	5316	1B-1
745	Marystown Old Water Supply	Fox Hill Reservoir Dam No. 2	Town of Marystown	Road to Marystown	5316	1B-1
1609	Harbour Breton Water Supply	Connaigre Pond Dam	Town of Harbour Breton	Road to Harbour Breton	1634	1B-2
709	Burgeo Water Supply	Long Pond Dam	Town of Burgeo	Road to Burgeo	1307	1B-3
490	Hermitage - Sandyville Water Supply	Granfer's Pond Dam	Town of Hermitage - Sandyville	Road to Hermitage - Sandyville and Seal Cove	664	1B-4
430	Brighton Water Supply	Hyne's Pond Dam	Town of Brighton	Road to Brighton	188	1B-5
896	Goose Cove East Water Supply	Jack's Pond Dam	Town of Goose Cove East	Road to Goose Cove East	174	1B-6
1008	St. Anthony Bight Water Supply	St. Anthony Bight Dam	Local Service District of St. Anthony Bight	Road to Great Brehat and St. Carols	158	1B-7
419	Salvage Water Supply	Wild Cove Pond Dam	Town of Salvage	Road to Salvage	124	1B-8
1608	Cottrell's Cove Water Supply	Manuels Pond Dam	Local Service District of Cottrell's Cove/Moore's Cove	Road to Fortune Harbour	78	1B-9
2148[2]	Galway CP14B	CP14B Stormwater Detention Pond	10718 NFLD Inc.			2
2088[2]	Galway CP07C	CP07C Regional Stormwater Detention Pond	10718 NFLD Inc.			2
448[2]	Corner Brook Margaret Bowater Park	Margaret Bowater Park Dam	City of Corner Brook			2
928	Exploits Regional Water Supply	Northern Arm Pond Dam	Exploits Regional Services Board (Host Community: Town of Grand Falls - Windsor)			2
898	Beaches Water Supply	Grassy Pond Brook Dam	Local Service District of Beaches			2
828	Bellevue Beach Water Supply	Unnamed Dam	Local Service District of Bellevue Beach			2
891	Eddies Cove West Water Supply	Unnamed Dam	Local Service District of Eddies Cove West			2
513	Little Harbour East Water Supply	Unnamed Dam	Local Service District of Little Harbour East			2
651	Little St. Lawrence Water Supply	Butler's Brook Dam	Local Service District of Little St. Lawrence			2
489	Mainland Water Supply	Caribou Brook Dam	Local Service District of Mainland			2
988	Piccadilly Head Water Supply	Unnamed Dam	Local Service District of Piccadilly Head			2
422	Rattling Brook Water Supply	Unnamed Dam	Local Service District of Rattling Brook			2

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
900	Sheaves Cove Water Supply	Sheaves Cove Dam	Local Service District of Sheaves Cove			2
452	St. Judes Water Supply	Chute Brook Dam	Local Service District of St. Judes			2
453	St. Judes Water Supply	Uncle Arthur Brook Dam	Local Service District of St. Judes			2
684	Tizzard's Harbour Water Supply	Rocky Pond Dam	Local Service District of Tizzard's Harbour			2
869	Wild Cove Water Supply	Old Dam	Local Service District of Wild Cove			2
870	Wild Cove Water Supply	Wild Cove Dam	Local Service District of Wild Cove			2
949	Conne River Water Supply	Southwest Brook Dam	Miawpukek First Nation (Conne River)			2
718	Taylor Estates Water Supply	Samm's Brook Dam	Taylor Estates Management Corporation			2
849	Arnold's Cove Water Supply	Concrete Dam and Reservoir on Steve's Pond Brook	Town of Arnold's Cove			2
670	Arnold's Cove Water Supply	Steve's Pond Dam	Town of Arnold's Cove			2
902	Bauline Water Supply	Bauline Dam	Town of Bauline			2
672	Bay de Verde Water Supply	Island Pond Dam	Town of Bay de Verde			2
423	Bay L'Argent Water Supply	Sugarloaf Dam	Town of Bay L'Argent			2
533	Beachside Water Supply	Anchor Brook Dam	Town of Beachside			2
246	Birchy Bay Water Supply	Jumper's Pond Dam	Town of Birchy Bay			2
468	Cape St. George Water Supply	Rouzes Brook Dam	Town of Cape St. George			2
1768	Cartwright (Grenfell) Old Water Supply	Grenfell Mission Dam	Town of Cartwright			2
354	Cartwright Water Supply	Burdett's Brook Pond Reservoir Dam	Town of Cartwright			2
720	Channel - Port aux Basques Water Supply	#2 Reservoir Dam	Town of Channel - Port aux Basques			2
722	Channel - Port aux Basques Water Supply	Cut Off Dam	Town of Channel - Port aux Basques			2
245	Channel - Port aux Basques Water Supply	Reservoir #1 Main Dam	Town of Channel - Port aux Basques			2
668	Channel - Port aux Basques Water Supply	WTP Effluent Control Dam	Town of Channel - Port aux Basques			2
350	Clarenville Water Supply - Andrew's Pond Control Structure	Andrew's Pond Dam	Town of Clarenville			2
530	Clarenville Old Water Supply	Lower Shoal Harbour River Intake	Town of Clarenville			2

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
548	Clarenville Old Water Supply	Club Pond Dam	Town of Clarenville			2
414	Clarenville Water Supply	Shoal Harbour River Intake	Town of Clarenville			2
753	Come By Chance Water Supply	Siding Pond Dam	Town of Come By Chance			2
755[2]	Kiwanis Pool - Conception Bay Highway	Kiwanis Pool - Conception Bay Highway	Town of Conception Bay South			2
543	Conche Water Supply	Unnamed Dam	Town of Conche			2
541	Cox's Cove Water Supply	Cox's Cove Brook Dam	Town of Cox's Cove			2
540	Daniel's Harbour Backup Water Supply	Andy's Pond Dam	Town of Daniel's Harbour			2
895	Daniel's Harbour Water Supply	Perry's Spring Dam	Town of Daniel's Harbour			2
686	Elliston Old Water Supply	Sandy Cove Brook Dam	Town of Elliston			2
734	Fermeuse Water Supply	Dam 2	Town of Fermeuse			2
1228	Forteau Water Supply	Trout River Dam	Town of Forteau			2
737	Fortune Water Supply	Horsebrook/Outside Reservoir	Town of Fortune			2
538	Gallants Water Supply	Unnamed Dam	Town of Gallants			2
788	Gillams Water Supply	Meader's Pond Dam #2	Town of Gillams			2
450	Glenburnie Water Supply	Croucher's Brook Dam	Town of Glenburnie - Birchy Head - Shoal Brook			2
390	Grand le Pierre Water Supply	Nip Nose Pond Brook Dam	Town of Grand le Pierre			2
366[2]		Unknown Dam 2	Town of Greenspond			2
1988	Greenspond Water Supply	West Pond Dam	Town of Greenspond			2
1989	Greenspond Water Supply	East Pond Dam	Town of Greenspond			2
409	Hughes Brook Water Supply	Water Supply Dam	Town of Hughes Brook			2
358	Humber Arm South Old Water Supply	John's Brook Dam	Town of Humber Arm South			2
2628	Humber Arm South Water Supply	Gurges Pond Intake Dam	Town of Humber Arm South			2
421	Irishtown - Summerside Water Supply	Irishtown Brook Dam	Town of Irishtown - Summerside			2
425	Irishtown - Summerside Water Supply	Pynn's Pond Dam	Town of Irishtown - Summerside			2

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
748	Isle aux Morts Water Supply	Burnt Ground Pond Dam	Town of Isle aux Morts			2
368	Jackson's Arm Water Supply	Lush's Pond Brook Dam	Town of Jackson's Arm			2
897	Jackson's Arm Water Supply	Lush's Pond Dam	Town of Jackson's Arm			2
711	L'anse au Clair Old Water Supply	Unnamed Dam	Town of L'anse au Clair			2
712	L'anse au Loup Water Supply	L'anse au Loup River Dam	Town of L'anse au Loup			2
1508	Lark Harbour Water Supply	Fairfax Brook Dam	Town of Lark Harbour			2
454	Lawn Water Supply	Brazils Pond Dam	Town of Lawn			2
656	Long Harbour - Mt. Arlington Heights Water Supply	Shingle Pond Dam	Town of Long Harbour - Mt. Arlington Heights			2
514	Lushes Bight - Beaumont Water Supply	Gull Pond (Milkboy) Dam	Town of Lushes Bight - Beaumont			2
413	Middle Arm Water Supply	Middle Arm Dam	Town of Middle Arm			2
609	Miles Cove Water Supply	Paddock's Pond Dam	Town of Miles Cove			2
652	Ming's Bight Water Supply	Middle Pond Brook Dam	Town of Ming's Bight			2
653	Morrisville Water Supply	Water System Intake Dam	Town of Morrisville			2
1908	Norris Point Old Water Supply	Old Water Supply Dam	Town of Norris Point			2
427[2]	Pasadena Old Swimming Pool	Blue Gulch Brook Lower Dam	Town of Pasadena			2
890	Pasadena Water Supply	Blue Gulch Brook East Dam	Town of Pasadena			2
408	Pasadena Water Supply	Blue Gulch Brook West Dam	Town of Pasadena			2
393	Pasadena Backup Water Supply	Transmission Pond Dam	Town of Pasadena			2
536	Placentia Backup Water Supply	Barrons Pond Dam	Town of Placentia			2
747	Placentia Backup Water Supply	Gull Pond Dam	Town of Placentia			2
716	Pool's Cove Water Supply	Widgeon Pond Dam	Town of Pool's Cove			2
2589	Port au Choix Water Supply	Middlehouse Dam	Town of Port au Choix			2
2588	Port au Choix Water Supply	Beaverhouse Dam	Town of Port au Choix			2
1229	Port Hope Simpson Water Supply	Water Supply Dam	Town of Port Hope Simpson			2

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
2249	Port Hope Simpson Old Water Supply	Old Dam	Town of Port Hope Simpson			2
412	Port Kirwan Water Supply	Unnamed Dam on Developed Spring	Town of Port Kirwan			2
685	Portugal Cove South Water Supply	Wright's Brook Dam	Town of Portugal Cove South			2
742	Robert's Arm Water Supply	Water Pond Dam	Town of Robert's Arm			2
2668	Robert's Arm Water Supply	Young's Pond Dam	Town of Robert's Arm			2
901	Rose Blanche - Harbour le Cou Water Supply	Rose Blanche Brook Dam	Town of Rose Blanche - Harbour le Cou			2
418	Sandy Cove Water Supply	Unnamed Dam	Town of Sandy Cove			2
369	Seal Cove (White Bay) Water Supply	Seal Cove Brook Dam	Town of Seal Cove (White Bay)			2
731	Springdale Water Supply	Sullivan's Pond Dam	Town of Springdale			2
730	Springdale Water Supply (Water Transmission Main Intake Gallery)	Sullivan's Pond Intake	Town of Springdale			2
439	St. Anthony (Grenfell) Old Water Supply	Mission Dam	Town of St. Anthony			2
415	St. Bernard's - Jacques Fontaine Water Supply	Rattle Brook Dam	Town of St. Bernard's - Jacques Fontaine			2
510	St. Bride's Water Supply	Northside Dam	Town of St. Bride's			2
438	Sunnyside Water Supply	Public Water Supply Dam	Town of Sunnyside			2
508	Westport Water Supply	Western Brook Pond Dam	Town of Westport			2
545	Codroy Fish Plant/Residential Water Supply	Unnamed dam	Unknown Owner			2
1748	Curling Water Supply	Third Pond Dam (Fourth Pond Dam)	City of Corner Brook			3
809	George's Brook - Milton Water Supply	Lily Pond Dam	Local Service District of George's Brook - Milton			3
2675	Mainland Old Water Supply	Unknown Dam	Local Service District of Mainland			3
1629	Phillips Head Water Supply	Dogberry Brook Dam	Local Service District of Phillips Head			3
725	Portland Creek Water Supply	Unnamed Stream Dam	Local Service District of Portland Creek			3
888	Pynn's Brook Water Supply	Pynn's Brook Dam	Local Service District of Pynn's Brook			3
726	Queen's Cove Water Supply	Queen's Cove Water Supply Dam	Local Service District of Random Sound West			3
1749	Swift Current Old Water Supply	Black Duck Pond Brook Dam	Local Service District of Swift Current			3

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
714	Makkovik Water Supply	Ranger Bight Reservoir Dam	Makkovik Inuit Community Government			3
728	Rigolet Water Supply	Rigolet Pond Dam	Rigolet Inuit Community Government			3
1668	Botwood Old Water Supply	Peter's River Dam	Town of Botwood			3
948	Channel - Port aux Basques Water Supply	#3 Reservoir Diversion Pond Dam	Town of Channel - Port aux Basques			3
1468	Channel - Port aux Basques Water Supply	#3 Reservoir Dam	Town of Channel - Port aux Basques			3
431	Comfort Cove Water Supply	Steady Cove Dam	Town of Comfort Cove - Newstead			3
678[2]	Municipal Pool - Legion Road	Municipal Pool - Legion Road	Town of Conception Bay South			3
388	Fogo Island (Seldom - Little Seldom) Water Supply	Bullocks Cove Pond Dam 2	Town of Fogo Island			3
808	Fortune Water Supply	Inside Reservoir	Town of Fortune			3
410	Gillams Old Water Supply	Jackie Tapp's Brook Dam	Town of Gillams			3
365[2]		Unknown Dam 1	Town of Greenspond			3
689	Hampden Water Supply	Elliot Brook Dam	Town of Hampden			3
367	Humber Arm South Temporary Water Supply	John Frank's Brook Temporary Water Supply Dam	Town of Humber Arm South			3
681	Humber Arm South Backup Water Supply	Clarkes Brook Dam	Town of Humber Arm South			3
435	Humber Arm South Water Supply	Dormody's Brook Dam	Town of Humber Arm South			3
5	Jackson's Arm Old Water Supply	Clay Cove Dam	Town of Jackson's Arm			3
389	Leading Tickles Water Supply	Cook's Pond Dam	Town of Leading Tickles			3
648	McIvers Water Supply	McIvers Reservoir Dam	Town of McIvers			3
429	Northern Arm Water Supply	Muddy Hole Pond Dam	Town of Northern Arm			3
889	Parsons Pond Water Supply	Cold Spring Dam	Town of Parsons Pond			3
416	Point Lance Water Supply	Point Lance Dam	Town of Point Lance			3
420	Port Anson Water Supply	Anchor Pond Dam	Town of Port Anson			3
1029	Southern Harbour Water Supply	Upper Reservoir	Town of Southern Harbour			3
1028	Southern Harbour Water Supply	Brigades Pond Dam	Town of Southern Harbour			3

Dam Index #	Project Name	Dam Name	Dam Owner	Community Affected Downstream	Population Affected[1]	Priority
905	St. Bride's Water Supply	Southside Dam (Conway's Brook)	Town of St. Bride's			3
732	St. George's Water Supply	Dribble Brook Dam	Town of St. George's			3
751	St. Shott's Water Supply	St. Shott's Water Reservoir Dam	Town of St. Shott's			3
1230	Peter's River Water Supply	Water Supply Dam	Town of St. Vincent's - St. Stephen's - Peter's River			3
1708	Terrenceville Water Supply	Terrenceville Dam	Town of Terrenceville			3
2648	Twillingate Water Supply	Wild Cove Pond Dam	Town of Twillingate			3
537	Westport Old Water Supply	Unknown Dam	Town of Westport			3

Notes:
1. Unless otherwise noted, population data obtained from 2016 Census at http://stats.gov.nl.ca/Statistics/Census2016/
2. Dam is not a water supply dam
3. Population obtained from Roadside Thoughts Dunville, NL web page at https://roadsidethoughts.com/nl/dunville-profile.htm
4. Population estimated using Google Earth (250 homes in community x 3 people/home = 750 people)
5. Population estimated using Google Earth (20 homes in community x 3 people/home = 60 people)
6. Population estimated using Google Earth (17 homes in area x 3 people/home = 51 people)
7. Population obtained from Northern Peninsula Gunners Cove web page at http://www.northernpeninsula.ca/home/gunners_cove.htm

APPENDIX J

Site Visit Summary

Site Visit Summary

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
11-Oct-17	113	TCV/ROP Hydroelectric Generating Facility	Long Pond - Middle Pond Control Structure	Newfoundland Power Inc.	7	47°12'28.3" N, 52°55'28.9" W (22m EPE)	-	-Concrete structure
	117	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 2	Newfoundland Power Inc.	0	-	-	-Couldn't locate
	122	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 7	Newfoundland Power Inc.	5	47°11'56" N, 52°57'49.2" W (13m EPE)	8.6 m long 4.1 m wide	
	142	CAB / HCP Hydroelectric Generating Facility	Beaver Pond Freeboard Dam	Newfoundland Power Inc.	8	47°06'06.3" N, 52°56'17.4" W (8m EPE)	-	-Earthfill dam
	141	CAB / HCP Hydroelectric Generating Facility	Cape Broyle Intake Dam	Newfoundland Power Inc.	4	47°05'58.9" N, 52°56'5.2" W (5m EPE)	-	-Rockfill dam with concrete structure
	140	CAB / HCP Hydroelectric Generating Facility	Cape Broyle Freeboard Dam	Newfoundland Power Inc.	4	47°06'11.8" N, 52°55'42" W (7m EPE)	41.5 m long 2.7 m wide	-Rock/earthfill dam
	143	CAB / HCP Hydroelectric Generating Facility	Horse Chops Canal Embankment	Newfoundland Power Inc.	4	47°08'12.4" N, 52°59'49.5" W (9m EPE)	5.5 m wide	-Earthfill dam -Penstock leading from d/s side, canal and structure on u/s side
	147	CAB / HCP Hydroelectric Generating Facility	Fly Pond Diversion Dam	Newfoundland Power Inc.	8	Area near provided coordinates: 47°05'463.7" N, 53°06'13.7" W (8m EPE) Canal area: 47°06'05.4" N, 53°06'14.7" W (9m EPE)	-	-2011 DSR mentioned the dam diverting flow through a canal to Southwest Pond. Took photos and coordinates of canal
12-Oct-17	751	St. Shott's Water Supply	St. Shott's Water Reservoir Dam	Town of St. Shott's	8	Dam: 46°38'23.9" N, 53°33'43.1" W (9m EPE) Box Structure 1: 46°38'23.4" N, 53°33'41.9" W (9m EPE) Box Structure 2: 46°38'24.5" N, 53°33'42.3" W (5m EPE)	Dam: 0.38 m wide, 24.65 m long Spillway: 0.38 m wide, 1.6 m long Box Structures: 1.45 m wide, 3.45 m long	-Concrete dam has a small spillway and valve (spillway length included in total dam length) -Concrete box structures each have a hatch on top and rockfill at one end
	188	Hearts Content Hydroelectric Generating Facility	Southern Cove Pond Canal Embankment	Newfoundland Power Inc.	7	47°51'25.7" N, 53°22'44.5" W (5m EPE)	-	-Earthfill dam -Located right next to the forebay dam. There is a turn at the end of the dam and then it becomes another dam (189 - Southern Cove Pond Dam)

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
13-Oct-17	213	Port Union Hydroelectric Generating Facility	Wells Pond Dam	Newfoundland Power Inc.	5	48°31'45.6" N, 53°09'03.4" W (11m EPE)	29 m long 2.7 m wide	-Earthfill dam dividing two ponds
	365	Terra Nova	Unknown Dam	Town of Terra Nova	0	-	-	-Couldn't access
	418	Sandy Cove Water Supply	Unnamed Dam	Town of Sandy Cove	8	Rockfill: 48°38'38.2" N, 53°42'57.2" W (9m EPE) Concrete Structures: 48°38'36.9" N, 53°42'57.6" W (9m EPE)	-	-Two concrete weir type structures nearby, but not retaining water. One structure has a notch that appeared to be a spillway -Built in 1983 (written in concrete)
	419	Salvage Water Supply	Wild Cove Pond Dam	Town of Salvage	4	48°40'32.3" N, 53°40'53.8" W (8m EPE)	-	-Concrete dam with spillway. Water just below spillway on u/s side
14-Oct-17	1988	Greenspond Water Supply	West Pond Dam	Town of Greenspond	5	49°04'16.1" N, 53°34'20" W (12m EPE)	0.6 m wide	-Concrete arch dam
	1989	Greenspond Water Supply	East Pond Dam	Town of Greenspond	11	49°04'17.9" N, 53°34'14.6" W (13m EPE)	0.45 m wide	-Concrete dam with wooden discharge structure
	-	-	Greenspond New Dam 1 (found in field)	-	6	49°04'10.9" N, 53°34'47.1" W (4m EPE)	15.5 m long 0.4 m wide 2.4 m high	-Concrete dam with a pipe in the u/s side leading to a valve in a concrete box structure on the d/s side
	-	-	Greenspond New Dam 2 (found in field)	-	4	49°04'14" N, 53°34'51.1" W (4m EPE)	40.9 m long 0.33 m wide	-Concrete dam
	1968	Greenspond Water Supply	South Pond Dam	Town of Greenspond	6	49°04'11" N, 53°34'09.6" W (7m EPE)	0.33 m wide	-Concrete arch dam with small notched spillway
	429	Northern Arm Water Supply	Muddy Hole Pond Dam	Town of Northern Arm	7	49°10'40.3" N, 55°23'36.1" W (10m EPE)	Concrete dam: 0.3 m wide	-Reservoir with rock filled gabion baskets on one side (at inlet) and concrete dam with spillway on the other side -Coordinates taken at concrete dam
	214	Bishop's Falls Hydroelectric Generating Station	Bishop's Falls Earth Dam	Government of Newfoundland and Labrador	4	49°00'56" N, 55°28'31.7" W (10m EPE)	-	-Earthfill dam
	13	Grand Falls Hydroelectric Generating Station	Grand Falls Power Canal - Intake Dams No.'s 1, 2 & 4	Government of Newfoundland and Labrador	0	-	-	-Couldn't access
15-Oct-17	-	-	KMZ #26 (Diversion Lake - South of Grand Falls)	-	5	48°49'16.4" N, 55°52'03.4" W (4m EPE)	-	-Remnants of an old timber crib dam, likely forestry
	-	-	KMZ #42 (Miguels Lake - Bay d'Espoir Highway)	-	6	48°40'39.1" N, 55°32'33.6" W (7m EPE)	-	-Remnants of an old timber crib dam, likely forestry
	537	Gaultois Water Supply	Piccaire Pond Dam	Town of Gaultois	9	47°36'28.1" N, 55°54'46.1" W (5m EPE)	-	-No sign of a dam

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
16-Oct-17	729	Abitibi Woods Dam	Ambrose Lake-Harpoon Brook Weir	Nalcor Energy	4	48°35'20.6" N, 56°38'26" W (12m EPE)	-	-Remnants of an old timber crib dam, likely forestry -Looks like there were two structures, one after the other
	-	-	Structure Near Duck Pond (found in field)	-	5	48°41'16.5" N, 56°31'21.5" W (5m EPE)	-	-May possibly be considered a dam -Wooden structure near the Teck Duck Pond Fish Habitat Compensation area
	232	Sandy Brook Hydroelectric Generating Facility	Island Pond Diversion Dam	Newfoundland Power Inc.	4	48°45'05.8" N, 56°10'48" W (7m EPE)	-	-Earthfill dam
	233	Sandy Brook Hydroelectric Generating Facility	Island Pond Outlet Dam	Newfoundland Power Inc.	3	48°44'41.5" N, 56°09'54.9" W (9m EPE)	-	
17-Oct-17	1202	Gullbridge Copper Mine (OAM)	North Retaining Dam	Department of Natural Resources	5	-	-	-Earthfill dam -Didn't take coordinates, couldn't get close enough to dam
	1203	Gullbridge Copper Mine (OAM)	Tailings Pond Retaining Dam North	Department of Natural Resources	4	-	-	-Earthfill dam -Didn't take coordinates, couldn't get close enough to dam
	356	Gullbridge Copper Mine (OAM)	Tailings Pond Retaining Dam South	Department of Natural Resources	2	-	-	-Earthfill dam -Didn't take coordinates, couldn't get close enough to dam
	363	Gullbridge Copper Mine (OAM)	Tailings Pond Retaining Dam East	Department of Natural Resources	3	-	-	-Earthfill dam -Didn't take coordinates, couldn't get close enough to dam
	-	-	Unknown Dam	Town of Westport	6	49°46'43.8" N, 56°37'59.6" W (14m EPE)	-	-Concrete and steel dam, appears to be damaged and leaking
	-	-	KMZ #38 (Birchy Lake)	-	4	49°22'15.5" N, 56°37'05.9" W (9m EPE)	-	
	718	Taylor Estates Water Supply	Samm's Brook Dam	Taylor Estates Management Corporation	7	49°06'45.6" N, 57°30'19.8" W (11m EPE)	0.25 m wide	-Concrete dam with liner, fence, and spillway
	-	-	KMZ #11 (Cormack)	-	6	49°20'03.9" N, 57°21'22.1" W (5m EPE)	-	-Earthfill dam
18-Oct-17	5	Jackson's Arm Old Water Supply	Clay Cove Dam	Town of Jackson's Arm	4	49°52'22" N, 56°47'02.4" W (12m EPE)	-	
	897	Jackson's Arm Water Supply	Lush's Pond Dam	Town of Jackson's Arm	5	49°51'08.4" N, 56°49'09.4" W (10m EPE)	-	-Concrete and rockfilled gabion dam with another rockfill dam upstream

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
	-	-	KMZ #48 (Long Steady - Jackson's Arm)	-	0	-	-	-Couldn't access
	-	-	KMZ #47 (Long Steady - Sop's Arm)	-	0	-	-	-Couldn't access
19-Oct-17	-	-	KMZ #64 (Burnt Berry Campsite - Rocky Harbour)	-	4	49°37'21.3" N, 57°55'19.1" W (16m EPE)	-	-No dam, just a bridge
	540	Daniel's Harbour Backup Water Supply	Andy's Pond Dam	Town of Daniel's Harbour	5	50°13'40.3" N, 57°34'28.7" W (6m EPE)	21.3 m long 1 m wide	-Rockfilled gabion baskets, part of basket missing much of its rock
	711	L'anse au Clair Old Water Supply	Unnamed Dam	Town of L'anse au Clair	6	51°26'32.3" N, 57°04'21.8" W (13m EPE)	-	-Earthfill dam, rockfilled gabion baskets along canal
20-Oct-17	712	L'anse au Loup Water Supply	L'anse au Loup River Dam	Town of L'anse au Loup	3	51°32'43.4" N, 56°51'28.4" W (10m EPE)	-	-Concrete dam with fishway, spillway, and two gates
	1228	Forteau Water Supply	Trout River Dam	Town of Forteau	4	51°29'12" N, 56°58'44.8" W (7m EPE)	-	-Earthfill dam going completely around the reservoir -Culvert in the dam at intlet location
21-Oct-17	2609	St. Anthony Water Supply	St. Anthony Pond Dam	Town of St. Anthony	6	51°22'25.4" N, 55°37'35.8" W (4m EPE)	20 m long (approx) 0.3 m wide	-Concrete dam with spillway -Dam runs along the pond then there is bedrock and then the concrete spillway
	2608	St. Anthony Old Water Supply	Frenchman's Pond Dam	Town of St. Anthony	0	-	-	-Couldn't access
	2590	Port au Choix Water Supply	Winterhouse Dam	Town of Port au Choix	5	50°42'25.1" N, 57°22'6.2" W (10m EPE)	-	-Earthfill dam -There is a culvert that is vertical on the u/s side and then goes through the dam to the d/s side -There is a pipe through the dam on the d/s side that is next to the culvert
	2588	Port au Choix Water Supply	Beaverhouse Dam	Town of Port au Choix	0	-	-	-Couldn't access
	2589	Port au Choix Water Supply	Middlehouse Dam	Town of Port au Choix	0	-	-	-Couldn't access
	743	Steady Brook Swimming Pool	Steady Brook Dam	Town of Steady Brook	4	48°57'11.4" N, 57°49'40.4" W (8m EPE)	-	-Concrete weir structure
	788	Gillams Water Supply	Meader's Pond Dam #2	Town of Gillams	6	49°00'36.1" N, 58°01'50.2" W (9m EPE)	-	-Earthfill dam with liner -Two culverts through the dam
	410	Gillams Old Water Supply	Jackie Tapp's Brook Dam	Town of Gillams	4	49°00'43.4" N, 58°02'08.9" W (10m EPE)	-	-Concrete dam with gated spillway -Built in 1985 (written in

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
								concrete)
22-Oct-17	2628	Humber Arm South Water Supply	Gurges Pond Intake Dam	Town of Humber Arm South	4	49°02'05.8" N, 58°10'18.5" W (10m EPE)	-	-Earthfill dam
	367	Humber Arm South Temporary Water Supply	John Frank's Brook Temporary Water Supply Dam	Town of Humber Arm South	9	49°03'02.1" N, 58°10'20.4" W (19m EPE)	-	-Wooden dam with some damage, has a fence
	681	Humber Arm South Backup Water Supply	Clarkes Brook Dam	Town of Humber Arm South	6	48°58'52.5" N, 58°08'53.4" W (9m EPE)	13.4 m long (not including baskets sticking out in the water) 0.24 m wide (concrete)	-Concrete dam and rockfilled gabion baskets
	358	Humber Arm South Old Water Supply	John's Brook Dam	Town of Humber Arm South	6	49°01'34.3" N, 58°09'05.6" W (12m EPE)	-	-Old wooden/timber crib dam with spillway
	-	-	New Dam at Corner Brook Water Supply (found in field)	-	6	48°54'41.8" N, 57°52'21.7" W (7m EPE)	24 m long 0.33 m wide	-Concrete dam with stoplogs and a flow control valve
	-	-	Old Man's Pond Dam (from KMZ file)	-	4	49°06'20" N, 57°33'45.3" W (18m EPE)	-	-Old wooden/timber crib dam, deteriorated
	899	Hughes Brook ACRE	Hatchery Brook Dam	ACRE (Aquatic Centre for Research & Education)	6	49°00'29.1" N, 57°51'40.9" W (12m EPE)	-	-Concrete dam with spillway and fishway
	1748	Curling Water Supply	Third Pond Dam (Fourth Pond Dam)	City of Corner Brook	0	-	-	-Couldn't access
23-Oct-17	538	Gallants Water Supply	Unnamed Dam	Town of Gallants	6	48°42'17.8" N, 58°14'05.9" W (9m EPE)	14.4 m long 1.7 m wide	-Wood/rockfill dam -Spillway with two pipes running below it and through the dam
	-	-	Gallants New Water Supply Dam (from WRMD)	-	5	48°42'18.3" N, 58°14'06.7" W (8m EPE)	-	-Dam not yet constructed
	1728	Lower Cove Quary	Settling Pond #2 Dam	Atlantic Minerals Ltd.	6	48°32'30.3" N, 59°00'48.9" W (10m EPE)	-	-No longer a settling pond, backfilled and converted to a laydown area
	2675	Mainland Old Water Supply	Unknown Dam	Local Service District of Mainland	7	48°33'22.9" N, 59°11'13" W (13m EPE)	0.22 m wide	-Concrete dam with spillway, deteriorated
24-Oct-17	415	St. Bernard's - Jacques Fontaine Water Supply	Rattle Brook Dam	Town of St. Bernard's - Jacques Fontaine	5	47°30'59.6" N, 54°55'27" W (10m EPE)	0.33 m wide	-Concrete dam with two spillways
	-	-	Marystown Old Water Supply Dam (from KMZ file)	-	15	47°11'50.9" N, 55°07'35.2" W (20m EPE)	-	-Concrete dam with three openings/spillways. Stoplogs in one of them -Wooden bridge with railing and frame on top of dam, assumed to be

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
								used for adding/removing stoplogs -Concrete walls on side of channel on d/s side of dam
25-Oct-17	-	-	Grand Bank Old Dam (from KMZ file)	-	11	47°05'39.2" N, 55°45'28.7" W (5m EPE)	-	-Concrete dam, old and cracked/damaged -Three small spillway openings, there may have been a gate there at one point
	673	Grand Bank Water Supply	Grand Bank Dam	Town of Grand Bank	11	47°05'06.6" N, 55°45'42.5" W (9m EPE)	-	-Concrete dam with spillway, fishway, and possibly a gate with a valve -Five gates/doors at bottom of dam on the d/s side, one appears open with a culvert coming out of it -Dam has one big leak and another smaller one, possibly more
	-	-	KMZ #68 (Burin)	-	5	47°03'51.8" N, 55°09'34.1" W (11m EPE)	-	-No dam, but there possibly used to be one. There is some wooden remnants and a possible old liner
	-	-	KMZ #39 (Brigus Junction)	-	2	47°23'09.5" N, 53°18'20.7" W (8m EPE)	-	-No dam
26-Oct-17	-	-	KMZ #31 (Octagon Pond)	-	9	47°31'15.5" N, 52°52'33.4" W (12m EPE)	6.23 m long deck, abutments 1.32 m long each 0.23 m wide abutment concrete	-Wooden deck with concrete wall underneath and concrete abutments along inlet -Exposed liner on one side near left abutment (relative to looking u/s) -Rebar sticking out of abutment concrete
	-	-	KMZ #58 (Seal Cove/Back of Butterpot Park)	-	0	-	-	-Couldn't access
	2148	Galway CP14B	CP14B Stormwater Detention Pond	10718 NFLD Inc.	14	47°30'19.3" N, 52°49'22.3" W (7m EPE)	-	-Earthfill embankments forming a stormwater pond, no water present yet

Date Visited	Index #	Project Name	Dam Name	Dam Owner	# of Photos Taken	Coordinates Obtained	Dimensions Recorded	Notes
								-Three concrete culvert inlet/outlet structures
	-	-	CP07C Regional Stormwater Detention Pond	-	12	47°30'29" N, 52°50'58.6" W (12m EPE)	-	-Earthfill embankments forming a stormwater pond, no water present yet - just boggy -Two concrete culvert inlet/outlet structures -Fence posts erected around d/s shoulder of crest

*Note: Dams in red are dams confirmed to not exist (and removed from inventory if already in the database)

APPENDIX K

Dams Updated in the Dam Inventory Database

Dams Updated in the Dam Inventory Database

Dam Index #	Project Name	Dam Name	Dam Owner
17	Bishop's Falls Hydroelectric Generating Station	Bishop's Falls Ambursen Dam	Government of Newfoundland and Labrador
34	Cat Arm Hydroelectric Generating Station	CD-11 (Cat Arm Dam C)	Newfoundland and Labrador Hydro
36	Hinds Lake Hydroelectric Generating Station	HD-1 (Hinds Lake Main Dam)	Newfoundland and Labrador Hydro
37	Hinds Lake Hydroelectric Generating Station	HD-2 (No Name Brook Diversion Dyke)	Newfoundland and Labrador Hydro
38	Hinds Lake Hydroelectric Generating Station	HD-3 (Bluegrass Diversion Dyke No.1)	Newfoundland and Labrador Hydro
39	Hinds Lake Hydroelectric Generating Station	HD-4 (Bluegrass Diversion Dyke No.2)	Newfoundland and Labrador Hydro
40	Hinds Lake Hydroelectric Generating Station	HD-5 (Bluegrass Diversion Dam)	Newfoundland and Labrador Hydro
41	Hinds Lake Hydroelectric Generating Station	HD-6 (Goose Pond Dam)	Newfoundland and Labrador Hydro
42	Hinds Lake Hydroelectric Generating Station	HD-7 (Goose Pond Dyke No.1)	Newfoundland and Labrador Hydro
43	Hinds Lake Hydroelectric Generating Station	HD-8A, 8B, 8C & 8Ds (Goose Pond Dykes)	Newfoundland and Labrador Hydro
44	Hinds Lake Hydroelectric Generating Station	HD-9 (Eclipse Dam)	Newfoundland and Labrador Hydro
45	Hinds Lake Hydroelectric Generating Station	HD-PC (Hinds Lake Power Canal Dyke)	Newfoundland and Labrador Hydro
47	Bay d'Espoir Hydroelectric Generating Facility	LD-2 (North West Cut-off Dam)	Newfoundland and Labrador Hydro
49	Bay d'Espoir Hydroelectric Generating Facility	LD-4 (South West Cut-off Dam)	Newfoundland and Labrador Hydro

Dam Index #	Project Name	Dam Name	Dam Owner
68	Paradise River Hydroelectric Generating Station	PD-1 (Paradise River Arch Dam)	Newfoundland and Labrador Hydro
69	Paradise River Hydroelectric Generating Station	PD-2 (Paradise River Cut-off Dam)	Newfoundland and Labrador Hydro
71	Roddickton Hydro Plant	RD-1 (Roddickton Timber Crib Dam)	Newfoundland and Labrador Hydro
81	Snooks Arm and Venams Bight	SV-5 (Long Pond Dam)	Newfoundland and Labrador Hydro
82	Snooks Arm and Venams Bight	SV-6 (Goat Pond Dam & Dyke) (2 small structures)	Newfoundland and Labrador Hydro
83	Snooks Arm and Venams Bight	SV-7 (Dump Pond Dam & Dyke)	Newfoundland and Labrador Hydro
100	Pierre's Brook Hydroelectric Generating Facility	West Country Pond Dam	Newfoundland Power Inc.
101	Pierre's Brook Hydroelectric Generating Facility	West Country Pond Spillway	Newfoundland Power Inc.
116	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 1	Newfoundland Power Inc.
117	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 2	Newfoundland Power Inc.
119	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 4	Newfoundland Power Inc.
120	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 5	Newfoundland Power Inc.
121	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 6	Newfoundland Power Inc.
122	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 7	Newfoundland Power Inc.
142	CAB/HCP Hydroelectric Generating Facility	Beaver Pond Freeboard Dam	Newfoundland Power Inc.

Dam Index #	Project Name	Dam Name	Dam Owner
214	Bishop's Falls Hydroelectric Generating Station	Bishop's Falls Earth Dam	Government of Newfoundland and Labrador
246	Birchy Bay Water Supply	Jumper's Pond Dam	Town of Birchy Bay
349	Marystown Old Water Supply	Fox Hill Reservoir Dam No. 1	Town of Marystown
354	Cartwright Water Supply	Burdett's Brook Pond Reservoir Dam	Town of Cartwright
362	Curling Water Supply	First Pond Dam (Second Pond Dam)	City of Corner Brook
389	Leading Tickles Water Supply	Cook's Pond Dam	Town of Leading Tickles
418	Sandy Cove Water Supply	Unnamed Dam	Town of Sandy Cove
419	Salvage Water Supply	Wild Cove Pond Dam	Town of Salvage
431	Comfort Cove Water Supply	Steady Cove Dam	Town of Comfort Cove - Newstead
449	Brent's Cove Water Supply	Paddy's Pond Dam	Town of Brent's Cove
451	Bay Roberts Water Supply	Bay Roberts Intake Dam	Town of Bay Roberts
532	Belleoram Water Supply	Rabbit's Pond Dam	Town of Belleoram
568	Hope Brook Gold Mine (OAM)	New Pine Pond Spillway and Saddle Dam A	Department of Natural Resources
569	Hope Brook Gold Mine (OAM)	Main Tailings Pond Dam and Spillway	Department of Natural Resources
570	Hope Brook Gold Mine (OAM)	Block Dam and Spillway	Department of Natural Resources
571	Hope Brook Gold Mine (OAM)	Heap Leach Dam	Department of Natural Resources
572	Hope Brook Gold Mine (OAM)	Polishing Pond Dam/Spillway	Department of Natural Resources
573	Hope Brook Gold Mine (OAM)	Saddle Dam B	Department of Natural Resources
574	Hope Brook Gold Mine (OAM)	Saddle Dam 1	Department of Natural Resources

Dam Index #	Project Name	Dam Name	Dam Owner
575	Hope Brook Gold Mine (OAM)	Saddle Dam 2	Department of Natural Resources
576	Hope Brook Gold Mine (OAM)	Saddle Dam 3	Department of Natural Resources
608	Corner Brook Pulp and Paper Limited	Glynmill Pond Dam	Corner Brook Pulp and Paper Limited
609	Miles Cove Water Supply	Paddock's Pond Dam	Town of Miles Cove
628	Corner Brook Pulp and Paper Limited	Corner Brook Lake Dam (Twelve Mile Lake Dam)	Corner Brook Pulp and Paper Limited
629	Corner Brook Pulp and Paper Limited	Three Mile Pond Dam	Corner Brook Pulp and Paper Limited
656	Long Harbour - Mt. Arlington Heights Water Supply	Shingle Pond Dam	Town of Long Harbour - Mt. Arlington Heights
672	Bay de Verde Water Supply	Island Pond Dam	Town of Bay de Verde
673	Grand Bank Water Supply	Grand Bank Dam	Town of Grand Bank
678	Municipal Pool - Legion Road	Municipal Pool - Legion Road	Town of Conception Bay South
682	Buchans Mine Closure (OAM)	Dam 4	Department of Natural Resources
687	Consolidated Rambler Mine (OAM)	West Dam	Department of Natural Resources
714	Makkovik Water Supply	Ranger Bight Reservoir Dam	Makkovik Inuit Community Government
721	Channel - Port aux Basques	Unnamed Railway Dam	Unknown Owner
724	Consolidated Rambler Mine (OAM)	Southeast Dam	Department of Natural Resources
741	Buchans Mine Closure (OAM)	Dam 3	Department of Natural Resources
745	Marystown Old Water Supply	Fox Hill Reservoir Dam No. 2	Town of Marystown
751	St. Shott's Water Supply	St. Shott's Water Reservoir Dam	Town of St. Shott's

Dam Index #	Project Name	Dam Name	Dam Owner
755	Kiwanis Pool - Conception Bay Highway	Kiwanis Pool - Conception Bay Highway	Town of Conception Bay South
868	Vale Long Harbour Processing Plant	ERCO Legacy Dam	Vale Newfoundland and Labrador Ltd.
870	Wild Cove Water Supply	Wild Cove Dam	Local Service District of Wild Cove
899	Hughes Brook Salmon Enhancement Project	Hatchery Brook Dam	North Shore Development Association
928	Exploits Regional Water Supply	Northern Arm Pond Dam	Exploits Regional Services Board (Host Community: Town of Grand Falls - Windsor)
1028	Southern Harbour Water Supply	Brigades Pond Dam	Town of Southern Harbour
1029	Southern Harbour Water Supply	Upper Reservoir	Town of Southern Harbour
1191	Atlantic Barite Mining Operation (Operations suspended)	ABL Tailings Pond Dam	Atlantic Barite Ltd.
1194	Buchans Mine Closure (OAM)	Dam 2	Department of Natural Resources
1201	Gullbridge Copper Mine (OAM)	Gullbridge Tailings Dam	Department of Natural Resources
1202	Gullbridge Copper Mine (OAM)	North Retaining Dam	Department of Natural Resources
1203	Gullbridge Copper Mine (OAM)	Tailings Pond Retaining Dam North	Department of Natural Resources
1204	Whalesback Copper Mine (OAM)	Whalesback Copper Mine Dam	Department of Natural Resources
1208	Consolidated Rambler Mine (OAM)	Northwest Dam	Department of Natural Resources
1388	Vale Long Harbour Processing Plant - Residue Storage Area	Dam 1	Vale Newfoundland and Labrador Ltd.
1389	Vale Long Harbour Processing Plant - Residue Storage Area	Dam 2	Vale Newfoundland and Labrador Ltd.

Dam Index #	Project Name	Dam Name	Dam Owner
1390	Vale Long Harbour Processing Plant - Residue Storage Area	Dam 3	Vale Newfoundland and Labrador Ltd.
1629	Phillips Head Water Supply	Dogberry Brook Dam	Local Service District of Phillips Head
1748	Curling Water Supply	Third Pond Dam (Fourth Pond Dam)	City of Corner Brook
1808	Lower Lance Cove Water Supply	Big Long Pond Dam	Local Service District of Lower Lance Cove
1809	Great Rattling Brook Dam	Great Rattling Brook Dam	Government of Newfoundland and Labrador
1811	MUN Ocean Sciences Centre Water Supply	Logy Bay Research Facility Water Supply Dam	Memorial University of Newfoundland
1888	St. Lawrence Fluorspar Mine	Mill Site Event Pond (MSEP)	Canada Fluorspar (NL) Inc.
2068	Consolidated Rambler Mine (OAM)	Northeast Dam	Department of Natural Resources
2148	Galway CP14B	CP14B Stormwater Detention Pond	10718 NFLD Inc.
2188	Terra Nova National Park	Sandy Pond Dam	Parks Canada Agency/Terra Nova National Park
2228	Mount Pearl South Brook	Unknown Dam	Department of Transportation and Works, Highway Construction and Design Division
2229	Gushue Highway	Juniper Pond Dam	Unknown Owner
2248	Fort Amherst Water Supply	Water Supply Dam 2	Unknown Owner
2268	Fort Amherst Water Supply	Water Supply Dam 1	Unknown Owner

APPENDIX L

Dams in the Dam Inventory Database without Photos

Dams in the Dam Inventory Database without Photos

Dam Index #	Project Name	Dam Name	Dam Owner
5	Jackson's Arm Old Water Supply	Clay Cove Dam	Town of Jackson's Arm
13	Grand Falls Hydroelectric Generating Station	Grand Falls Power Canal - Intake Dams No.'s 1, 2 & 4	Government of Newfoundland and Labrador
71	Roddickton Hydro Plant	RD-1 (Roddickton Timber Crib Dam)	Newfoundland and Labrador Hydro
103	MOP/MRP Hydroelectric Generating Facility	Mobile Canal Embankment	Newfoundland Power Inc.
105	MOP/MRP Hydroelectric Generating Facility	Mobile Big Pond Spillway	Newfoundland Power Inc.
106	MOP/MRP Hydroelectric Generating Facility	Morris Canal Embankment	Newfoundland Power Inc.
117	TCV/ROP Hydroelectric Generating Facility	Lemanche Canal Spillway No. 2	Newfoundland Power Inc.
147	CAB/HCP Hydroelectric Generating Facility	Fly Pond Diversion Dam	Newfoundland Power Inc.
148	CAB/HCP Hydroelectric Generating Facility	Two Arm Pond Diversion Dam	Newfoundland Power Inc.
186	Victoria Hydroelectric Generating Facility	Rocky Pond Dam	Newfoundland Power Inc.
197	NCH/PIT Hydroelectric Generating Facility	Ocean Pond Dyke	Newfoundland Power Inc.
198	NCH/PIT Hydroelectric Generating Facility	Moose Pond Diversion Dyke	Newfoundland Power Inc.
199	NCH/PIT Hydroelectric Generating Facility	Crooked Pond Dyke	Newfoundland Power Inc.
201	Lockston Hydroelectric Generating Facility	Rattling Pond Spillway	Newfoundland Power Inc.
202	Lockston Hydroelectric Generating	Lockston Canal Embankment	Newfoundland Power Inc.

Dam Index #	Project Name	Dam Name	Dam Owner
	Facility		
203	Lockston Hydroelectric Generating Facility	Trinity Pond Outlet Structure	Newfoundland Power Inc.
204	Lockston Hydroelectric Generating Facility	Copeley's Pond Diversion Dyke	Newfoundland Power Inc.
217	West Brook Hydroelectric Generating Facility	West Brook Canal Embankment	Newfoundland Power Inc.
219	Lawn Hydroelectric Generating Facility	Lawn Forebay Spillway	Newfoundland Power Inc.
233	Sandy Brook Hydroelectric Generating Facility	Island Pond Outlet Dam	Newfoundland Power Inc.
236	Lookout Brook Hydroelectric Generating Facility	Joe Dennis Pond Dam and Spillway	Newfoundland Power Inc.
237	Lookout Brook Hydroelectric Generating Facility	Joe Dennis Pond Freeboard Dyke	Newfoundland Power Inc.
238	Lookout Brook Hydroelectric Generating Facility	Cross Pond Outlet	Newfoundland Power Inc.
239	Lookout Brook Hydroelectric Generating Facility	Cross Pond Spillway	Newfoundland Power Inc.
424	IOC Tailings System	Western Control Dyke	Iron Ore Company of Canada (IOC)
426	Great Harbour Deep Former Water Supply	Great Harbour Deep Dam	Department of Transportation and Works
508	Westport Water Supply	Western Brook Pond Dam	Town of Westport
668	Channel - Port aux Basques Water Supply	WTP Effluent Control Dam	Town of Channel - Port aux Basques
708	IOC Wabush 3 Development	Waste Rock Sediment Pond	Iron Ore Company of Canada (IOC)
720	Channel - Port aux Basques Water Supply	#2 Reservoir Dam	Town of Channel - Port aux Basques

Dam Index #	Project Name	Dam Name	Dam Owner
729	IOC Luce Lake North Diversion and Dewatering Project	Berm between Luce Lake North & Luce Lake South	Iron Ore Company of Canada (IOC)
948	Channel - Port aux Basques Water Supply	#3 Reservoir Diversion Pond Dam	Town of Channel - Port aux Basques
1188	Anaconda Mining Inc. (Pine Cove)	Phase 1 Tailings Dam	Anaconda Mining Inc.
1190	Anaconda Mining Inc. (Pine Cove)	Phase 2 Tailings Dam	Anaconda Mining Inc.
1468	Channel - Port aux Basques Water Supply	#3 Reservoir Dam	Town of Channel - Port aux Basques
1748	Curling Water Supply	Third Pond Dam (Fourth Pond Dam)	City of Corner Brook
1828	Anaconda Mining Inc. (Pine Cove)	Phase 2 Polishing Pond Dam	Anaconda Mining Inc.
2008	Pierre's Brook Hydroelectric Generating Facility	West Country Pond Canal	Newfoundland Power Inc.
2249	Port Hope Simpson Old Water Supply	Old Dam	Town of Port Hope Simpson
2608	St. Anthony Old Water Supply	Frenchman's Pond Dam	Town of St. Anthony
2670	MOP/MRP Hydroelectric Generating Facility	Mobile Forebay Dam	Newfoundland Power Inc.

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