2025 Formal Annual Dam Inspections – Water Supply Dams

Final Report

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Disclaimer

This report has been prepared by Hatch for the sole and exclusive use of the City of Nanaimo (the "Client") for the purpose of assisting the management of the Client in making decisions with respect to the management of the two City-owned water supply dams (Jump Creek Dam and South Fork Dam) and shall not be (a) used for any other purpose, or (b) provided to, relied upon or used by any third party.

This report contains opinions, conclusions and recommendations made by Hatch using its professional judgment and reasonable care. Use of, or reliance upon this report by Client, is subject to the following conditions:

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(b) the report being read, with sections or parts hereof read or relied upon in context.

(c) the conditions of the ten dams may change over time or may have already changed due to natural forces or human intervention, and Hatch takes no responsibility for the impact that such changes may have on the accuracy or validity or the observations, conclusions and recommendations set out in this report.

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1. Introduction

The City of Nanaimo (the "City") retained Hatch Ltd. ("Hatch") to conduct Formal Annual Dam Inspections (FADI) for 10 City dams as per the BC Dam Safety Regulations. This report summarizes the results of the 2025 FADIs for the water supply dams which were undertaken by Hatch on September 16, 2025.

The City's Water and Resources and Water Supply Operations staff are responsible for the management and maintenance of 10 dams. Jump Creek and South Fork dams are located approximately 27 km and 21 km southwest of the City, respectively and are part of the City's potable water supply system. See **Figure B1** in **Appendix B**.

The scope of the inspection work included:

- Review of background information, including as-built drawings, rehabilitation records/drawings, previous FADI and dam safety review (DSR) reports, operation, maintenance and surveillance (OMS) manuals, and any available instrumentation records.
    - The 2024 DSR reports were in progress at the time of the 2025 FADI inspection. The draft reports were available for review.
- Meet with City Waterworks Dam Inspectors who perform the daily operation, maintenance and surveillance on the dams and discuss the various issues they have observed since the 2024 FADI.
- Visit the dam sites and undertake visual inspections of the dams and compile a photographic record.
- Review of dam safety management strategies including:
    - dam failure consequence classification;
    - operation, maintenance and surveillance;
    - recommendations for dam safety improvements; and
    - review and update of the dam safety issues database assembled from previous FADI.

The two water supply dams inspected are listed below with acronyms to identify the dams and maintain consistency with previous FADI reports:

- JCR - Jump Creek Dam.
- SFK - South Fork Dam.

A list of the documentation reviewed is provided in **Appendix A**, figures are presented in **Appendix B**, photographs are included in **Appendix C**, and the Mobile Dam Inspection Database forms from September 2025 are included in **Appendix D**. The following sections of this report document the results of the FADI.

2. Regional Geology

The general geological conditions of the inspected dam sites are based on the review of geological mapping of Vancouver Island (Ministry of Environment BC). **Table 2-1** is a summary of the surficial and bedrock geology.

Table 2-1: Summary of Regional Geology of the Inspected Dam Sites

Dam	Regional Surficial Geology	Regional Bedrock Geology
Jump Creek Dam	Glaciofluvial sand and gravel deposits related to outwash from previous glaciation; moraine deposits. Some bedrock outcrops with little to no overlying sediment.	Bedrock belonging to the Island Plutonic Site. Consists of Granodioritic intrusive rocks, feldspar porphyritic intrusive rocks.
South Fork Dam	Sediments generally thicker than 1 m overlying bedrock. May include pockets of colluvium or perched glaciofluvial sediments. May overlap with fluvial sediments consisting of sand and gravel. Some bedrock outcrops with little to no overlying sediment.	Bedrock belonging to Mesozoic Vancouver group which includes Daonella and Karmutsen formation. Consists of undivided sedimentary rocks, marine sedimentary volcanic rocks with lesser amounts of mudstone, Siltstone, and Basaltic Volcanic rocks.

3. Dam Safety Program

3.1 Dam Failure Consequence Classification

The Dam Failure Consequence Classifications (DFCC) of the City's dams are determined in accordance with the B.C. Water Sustainability Act Dam Safety Regulation [B.C. Reg 44/2016]. The current classifications of the water supply dams included in this FADI are summarized in **Table 3-1** below.

Table 3-1: Dam Consequence Classification Ratings

Dam	Dam Failure Consequence Classification
Jump Creek	Very High
Jump Creek Saddle Dam / Auxiliary Spillway	High
South Fork Dam	Very High

A dam breach assessment and inundation mapping project was completed for Jump Creek and South Fork Dams in September 2020, independent to the annual formal dam inspections. This assessment included a review of the DFCC for Jump Creek Main Dam and Saddle Dam / Auxiliary Spillway and the South Fork Dam. The B.C. Dam Safety Regulation and CDA Guidelines present a classification system based upon the potential "incremental" losses that could be caused by a hypothetical dam breach, excluding the damages that would be caused by a natural flood event of the same magnitude without a breach. Results for the incremental loss of life during the inflow design flood scenarios demonstrate that, many of the vulnerabilities are located within the low-lying regions of the floodplain and would be inundated by the natural flood alone, prior to the arrival of the dam breach flood wave. Incorporating expected additional time for evacuation during flood events lowers the incremental loss of life estimate further for IDF events, with hypothetical dam breach events occurring during normal or Sunny Day conditions governing each overall DFCC.

A review of the most recent aerial imagery in the downstream reach compared to the aerial imagery available during the 2020 dam breach study demonstrates that a few additional houses have been constructed along Nanaimo River Road, but these do not appear to represent significant changes in development that would alter the dam classification. There is evidence of fairly significant tree clearing along roads south of Nanaimo River Road, approximately south of S Forks Rd; it is recommended that this area continue to be reviewed for future development during reviews of the downstream areas. The DFCC were unchanged for the Jump Creek and South Fork dams from the previous FADIs.

Recommendations for each dam are listed as follows:

3.1.1 Jump Creek Dam and Jump Creek Saddle Dam

The dam classification is currently 'Very High' for the Jump Creek Dam and 'High' for the Jump Creek Saddle Dam. The dam classification is consistent in all three categories (loss of life, infrastructure and economic losses, and environmental and cultural losses) for both the Main Dam and Saddle Dam based on the 2020 DFCC study.

3.1.2 South Fork Dam

The dam classification is currently 'Very High' for the South Fork Dam based on the recent 2020 DFCC study. It is of interest to note that it is not loss of life that governs the Very High DFCC. Loss of life alone would justify a High DFCC category, but the potential environmental and cultural losses bring the overall dam classification up to a Very High. For South Fork Dam, infrastructure and economic losses could be considered Very High as well, if the City chooses to include the Water Supply as a third party.

3.2 Operating, Maintenance and Surveillance Manuals

The City has prepared Operating, Maintenance and Surveillance (OMS) manuals for each of their two water supply dams. Copies of the manuals are kept in the City of Nanaimo Public Works and City Engineering libraries. The manuals were both last updated in 2024 and are updated periodically as required. These copies have been distributed to key City personnel

and are available electronically for the City Dam Inspectors to access during routine inspections if required. A comprehensive review of the manuals was performed by Hatch as part of the 2024 DSR for each of these dams, and as no updates have been made to the manuals since that time, further review has not been carried out. As noted in the 2024 DSR, the OMS manuals contain the relevant information that is expected in an OMS manual, though some non-conformances were noted. Excerpts of the Dam Inspection Database (updated records of weekly dam inspections) were provided as part of the 2025 FADI; but as the 2024 DSR has only recently been completed, these excerpts appear similar to previous years as updates to these forms as per the 2024 DSR recommendations have not yet been implemented.

3.3 Dam Emergency Plan

The City of Nanaimo has a comprehensive Water Supply Dams Emergency Plan (DEP) which was last updated in 2024.

3.4 Dam Safety Management

The City of Nanaimo updated their Dam Safety Management Program document in March 2024. A comprehensive review of this document was performed by Hatch as part of the 2024 DSR for each of these dams, and as no updates have been made to the Dam Safety Management Program since that time, the most recent DSR recommendations are still valid.

3.5 Surveillance

3.5.1 General

The City Waterworks Dam Inspectors perform inspections 2-3 times per week, which includes taking piezometer and seepage weir readings at Jump Creek and South Fork dams. Water levels are available on a continual basis and are connected with the City's SCADA system. Water quality is tested weekly from the middle of June to the middle of September (weather dependent). Regular and diligent monitoring of instrumentation and visual inspection observations is integral as these are Very High consequence classification dams and are essential for the City's water supply.

Additional site surveillance occurs after storm events and earthquakes. A more comprehensive inspection is carried out monthly which includes taking instrumentation readings.

The inspectors are equipped with a heavy-duty laptop computer for outdoor use and the information collected during the weekly and monthly inspections is entered directly into the City's Mobile Dam Inspection Database. The most recent checklists from the database were reviewed by Hatch and have been included in **Appendix D**. It should be noted that the checklists have not been completed at the required frequency due to either not filling them out or potentially uploading issues. This should be resolved.

The City of Nanaimo surveillance and instrumentation reading frequencies were compared against the BC Dam Safety Regulation. The weekly inspection frequency is appropriate for the High and Very High consequence classification dams.

The inspection database is a Microsoft Access database which provides an interface for inspectors to input observations. However, there is currently limited capability to export and report data out of the database. For past FADIs, the data out of the database has been provided in the form of screenshots of the most recent observations. However, we have not been able to review a full record of past observations, and it would be impractical to provide screenshots of all past observations. Hatch recommends that the database be updated to add functions to report chronological past data such as inspection report observations in tabular form.

3.5.2 Piezometers and Weirs

As part of the routine inspections, the seepage elevation over the ‘V’ notch weirs are recorded by measuring the flow elevation above the base of the ‘V’ notch. This data is plotted on graphs to help identify trends. See shown in **Figure 3-1**, the weir flows are well correlated to the precipitation and there is no concern with any of the trends.

Due to the low flow at the weirs, the drawdown is expected to be minimal and the seepage measurements at the weirs are effective at identifying trends.

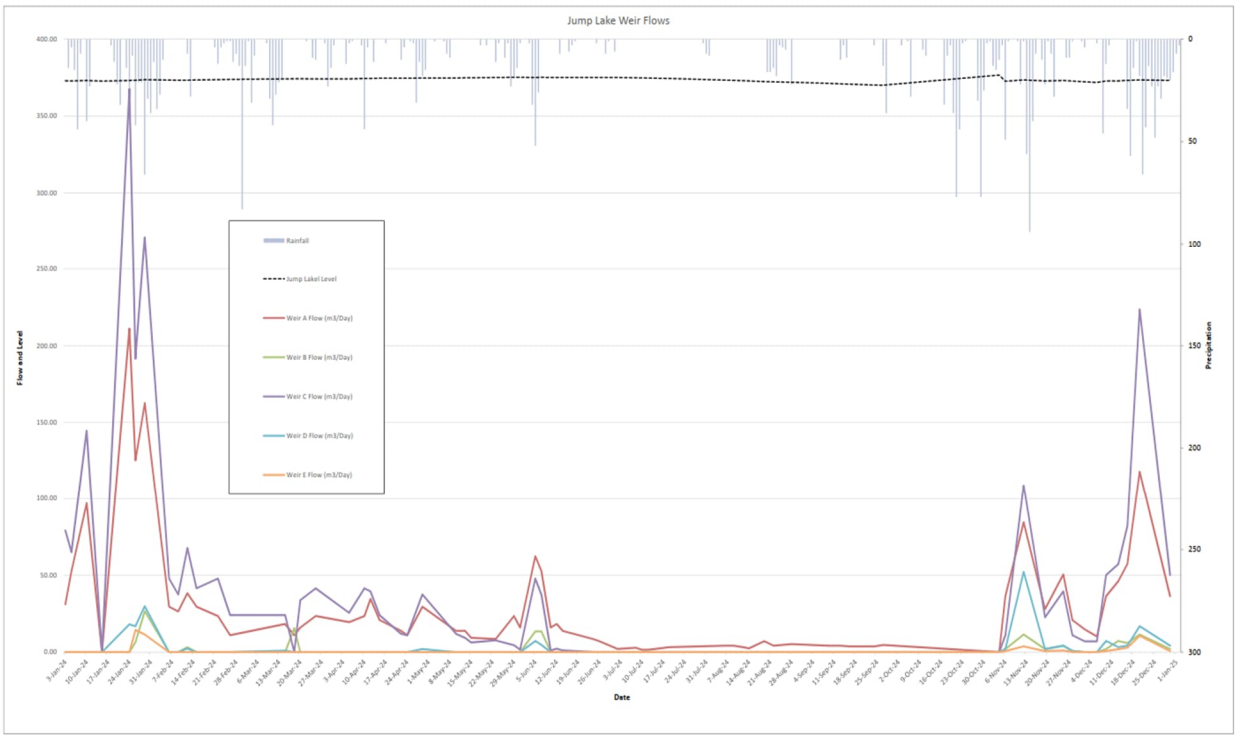


Figure 3-1: Jump Lake Weir Flows

3.6 Items from Previous FADI and DSR

The outstanding dam safety and maintenance issues/recommendations are updated annually in the FADIs. These items are listed in **Table 5-1** and **Table 5-2** of the report for outstanding Inspection and Surveillance and Dam Safety Issues, respectively.

4. Formal Annual Dam Inspections

Visual inspections of the dams were carried out by Kyle Caithness, P. Eng. (Structural Engineer) and Tim Tuo, P. Eng. (Geotechnical Engineer) from Hatch on September 16, 2025. The Hatch inspectors were accompanied by City of Nanaimo staff:

- Jaymie Miller – Lead Supervisor – Waterworks.
- Chris Meier – Waterworks Dam Inspector.
- Clayton Wallace – Water Resources Section.

The daily inspection activities and weather conditions are summarized in **Table 4-1**.

Table 4-1: FADI Activity Summary

Date (2025)	Weather	Summary of Inspection Activities
September 16	Temperature: 11°C - 23°C Conditions: Sunny	9:00 AM: Jump Creek Dam 12:00 PM: South Fork Dam

No rain had occurred recently before the inspections, meaning that the sites were dry at time of inspection.

As part of the review, the main dam structures were inspected as well as the areas immediately upstream and downstream of the dams that were accessible or clearly visible from the dams. Observations from these inspections are documented for each dam in the sections which follow. For the purpose of this report, all location descriptions are oriented in a downstream facing direction. A photographic record of the inspections is included in **Appendix C**.

Prior to entering the dam sites, Hatch filled out field visit safety forms to identify potential hazards and City staff provided additional safety information as required for working in the watershed. The condition rating of the various components of the City's dam structures shown in this document will be consistent with the following:

- Satisfactory: Minimal wear or deterioration; like new condition. No repairs required.
- Fair: Normal material wear or deterioration. Functionally adequate for all intended uses.
- Poor: Abnormal material wear, deterioration, or local defects. Components may not fulfill intended uses. Major maintenance or repairs advisable to restore component to a satisfactory condition. If maintenance or repairs

are not carried out, the design life of the component may be severely limited, and the component may become unsafe.

- Unsatisfactory: Severe material wear, deterioration, or local defects. Components will not fulfill intended uses. Immediate repair or replacement required. Present situation threatens the structural integrity of the project and represents an unsafe condition.

The major recommendations of this FADI are summarized at the end of this report in **Table 5-1** and **Table 5-2** and have been ranked using a priority rating system described in **Section 5**, which was established independent of the CDA Guidelines.

4.1 Jump Creek (JCR)

4.1.1 Dam Description

Jump Creek Dam is located approximately 27 km southwest of Nanaimo on Jump Creek, a tributary to the South Nanaimo River (**Figure B1** in **Appendix B**). Jump Creek Dam was constructed in 1974 and consists of two zoned earth fill embankments founded on glacial till. The dam has undergone several modifications over the years, including the addition of spillway overshot gates in 1987, the addition of a steel liner in the upper transition section of the low-level outlet in 1988 (to prevent further cavitation damage), a new spillway entrance channel groin, new crest arrangements, a new emergency overflow spillway in the Saddle Dam in 2000, low-level outlet modifications in 2002, and the addition of a pair of small siphon-powered generating units to power on-site services in 2024.

The main dam is 464 m long, 25 m high and is comprised of a central low permeability till core together with upstream and downstream sand and gravel shell zones. The upstream face slopes at 2.5H:1V (Horizontal: Vertical) and is protected with riprap. The downstream face also slopes at 2.5H:1V and is not protected with erosion protection measures.

The main service spillway is located near the right abutment of the main dam and includes two 2.4 m high by 7.5 m wide steel flap gates separated by a centre pier which supports an access bridge. The spillway has a discharge capacity of 189 m^3/s at the top of the core of the Main Dam (i.e., El. 377.14 m). The spillway chute descends the right-hand groin of the dam and terminates in a plunge pool (**Figure B2** in **Appendix B**). The spillway gates are operated on a regular basis with the gates being raised in the spring and lowered in the fall. The gates are also greased a couple times a year as part of regular maintenance. The main spillway bridge spans between the spillway piers and consists of a reinforced concrete slab (**Photograph JCR 4**). There are steel beams bearing on the concrete slab which are used to elevate the spillway bridge deck and provide clearance for the spillway gate gear drive and stem.

The new generating units were installed in November of 2024 near the right training wall of the spillway (**Photographs JCR 40** and **JCR 41**). A pair of turbines are housed in a seacan trailer slightly above the tailrace elevation, placed on a foundation of concrete lock-blocks.

Their water intake consists of a single siphon placed in the headpond to the right of the spillway. Due to the low water level at the time of inspection, the siphon was completely exposed above the water surface. The water is then passed through a pipe down to the units, which appears to be buried in fill. Some wash-out and erosion was noted on the hill to the right of the seacan; City staff noted that they had experienced some erosion during construction and had installed erosion protection blankets along the washed-out portions. The power from these generating units is used to power site services (including satellite internet, cameras, instrumentation, heaters in the generator building, etc.). However, the diesel generators on site are still required to operate the gates.

A new log boom was installed in July 2019 and is located 50 m upstream of the main spillway to provide protection to the spillway from debris originating in the reservoir. The log boom arrangement consists of one 20 ft-long log on each end of the boom to articulate the shoreline slope and fourteen 40 ft-long logs in the centre. The logs are a minimum of approximately 500 mm diameter and are connected together with chains. The boom is connected to anchor points on either side of the spillway. The left anchor is located on the main embankment slope approximately 60 m northwest of the spillway structure and consists of a 900 mm diameter corrugated steel pipe (CSP) infilled with concrete and a concrete anchor block partially submerged at the toe of the riprap (**Photograph JCR 3**). The right anchor is located in the forest on the right shoreline approximately 180 m to the southwest of the spillway structure. The anchor consists of a concrete anchor block covered with earth fill material and a new anchor consisting of four concrete lock blocks chained together. Both sets of anchors were observed to be connected together with chains but the connection was not currently taut (**Photograph JCR 2**), which will result in loading (and ultimately the movement) of the old smaller concrete block prior to the new larger concrete lock blocks being engaged.

The low-level outlet within the main embankment consists of a reinforced concrete box culvert 1.37 m wide by 1.22 m high at the base of the dam, controlled by a 1.52 m by 1.52 m cast iron slide gate installed on the slope of the dam and operated by a gate stem controlled from a platform at the dam crest (**Photograph JCR 18**). A steel liner starts 99 m upstream of the outlet to the tunnel and extends approximately 7.5 m upstream. The energy from the flow through the LLO is dissipated at the downstream end by a standard USBR type impact stilling basin.

The Saddle Dam/Auxiliary Spillway (**Photographs JCR 34** to **JCR 39**) is approximately 154 m long and 6.7 m high and is an earth fill dam with central impervious core. Modular concrete lock blocks and a geomembrane form an additional freeboard for the central core of the dam. The Auxiliary Spillway has a maximum discharge capacity of 37 m^3/s at elevation 377.144 m (i.e., the top of core of the Main Dam). The upstream face slopes at 2.5H:1V and the downstream face slopes at 2H:1V. Both slopes are protected with riprap (**Figure B3** in **Appendix B**).

The details of the Jump Creek Dam and Appurtenant structures are summarized in **Table 4-2**. The Jump Creek Saddle Dam/Auxiliary Spillway data are summarized in **Table 4-3**.

Table 4-2: Data for Jump Creek Dam and Appurtenant Structures

Structure	Details
Type of Dam	Earth fill with central impervious core
Dam Failure Consequence Classification	Very High
Maximum Height	25 m
Crest Length	464 m
Crest Width	6.1 m
Crest Elevation	377.554 m (Geodetic Datum)/(Design El. 381.00 m)
Top of Core Elevation	377.144 m (Geodetic Datum)/(Design El. 380.59 m)
Top of Median Barrier	378.024 m (Geodetic Datum)/(Design El. 381.47 m)
Main Spillway Crest Elevation	372.982 m (Geodetic Datum)/(Design El. 376.428 m)
Main Spillway Gates (Maximum Height)	375.42 m (Geodetic Datum)/(Design El. 378.886 m)
Low-Level Inlet Invert Elevation	360.485 m (Geodetic Datum)/(Design El. 363.931 m)
LLO Invert Elevation	352.865 m (Geodetic Datum)/(Design El. 356.311 m)
Upstream Slope	2.5H:1V
Downstream Slope	2.5H:1V
Retained Water (Spillway Gate Down)	13,300,000 m^3
Retained Water (Spillway Gate Up Max)	16,800,000 m^3
Inflow Design Flood (IDF)	2/3 between the 1,000-yr flood and the PMF
Peak Probable Maximum Flood (PMF) Inflow	309 m^3/s
Main Spillway Outflow Under PMF	224 m^3/s
Auxiliary Spillway Outflow Under PMF	0 m^3/s
Main Dam Freeboard Under PMF	0.4 m
Saddle Dam Freeboard Under PMF	0.14 m
IDF Inflow	260 m^3/s
Main Spillway Outflow Under IDF	172 m^3/s
Watershed Area	52 km^2
LLO	Sluice gate 1.5 m by 1.5 m, invert level of opening 363.91 m, concrete outlet
	1.2 m by 1.2 m, length 91.4 m
	Trash rack 4.3 m by 3 m, opening size 300 mm
Spillway	Two overshot gates hinged at spillway crest; 7.5 m wide by 2.4 m high
	Spillway crest El. 372.982 m, maximum El. 375.422 m, maximum discharge 189 m^3/s at top of dam core (i.e., El. 377.14 m)

Table 4-3: Data for Jump Creek Saddle Dam/Auxiliary Spillway

Structure	Details
Type of Dam	Earth fill dam with concrete modular blocks
Dam Failure Consequence Classification	High
Saddle Dam Height	6.7 m
Saddle Dam Crest Length	154 m
Saddle Dam Crest Width	6 m
Saddle Dam Crest/Top of Spillway Wingwall	377.294 m (Geodetic Datum)/(Design El. 380.740 m)
Spillway Crest Elevation	376.64 m (Geodetic Datum)/(Design El. 380.090 m)
Top of Core Elevation	375.894 m (Geodetic Datum)/(Design El. 380.340 m)
Auxiliary Spillway Crest length	73 m
Auxiliary Spillway Maximum discharge at El. 377.144 m (i.e., Top of Core of Main Dam)	37 m^3/s (corrected from historic data as part of the 2025 DSR)
Auxiliary Spillway Outflow Under PMF	38 m^3/s
Upstream Slope	2.5H:1V
Downstream Slope	2H:1V
Dam Failure Consequence Classification	High

4.1.2 Instrumentation

Instrumentation within the main dam includes piezometers, seepage weirs, a staff gauge, automated water level meters, and CCTV cameras (that were replaced in November 2023). There are twelve standpipe piezometers in total, within nine boreholes as shown in **Figure B2** in **Appendix B**. Typical photos of the standpipe piezometers are shown in **Photographs JCR 24** and **JCR 25.** Water levels within the standpipes are measured and entered within the City's database as part of a bi-weekly monitoring program.

There are a series of pneumatic piezometers installed in the dam. City staff indicated that these piezometers are no longer reliable and are not measured. In Hatch's experience, this is expected performance considering the age of the pneumatic piezometers, which were installed during original construction. Terminal boxes for pneumatic piezometers were located during the inspection on the downstream side of the dam near the left abutment.

Five 'V' notch weirs ('A' to 'E') are used to monitor seepage at the downstream toe of the main dam at locations shown in **Figure B2** in **Appendix B**. Seepage weir readings taken the week of the inspection by City Dam Inspectors are summarized in **Table 4-4**. Images of the weirs at the time of inspection are shown in **Photographs JCR 26** to **JCR 29**.

Table 4-4: Seepage Weir Readings – September 16, 2025)

Weir	Flow Height (cm)
Weir A	~1.0
Weir B	0
Weir C	0
Weir D	0
Weir E	0

None of the existing instruments are automated. Instrumentation readings are manually obtained approximately two to three times per week. The current frequency of instrumentation monitoring is appropriate and satisfies the requirements of the BC Dam Safety Regulation. The City reviews the readings monthly. Weir measurements are variable due precipitation and runoff influence.

The 2016 FADI recommended the retrofit of existing standpipe piezometers with real-time automated vibrating wire (VW) piezometers. Vibrating wire piezometers can be connected to an automatic data acquisition system (ADAS) and allow for higher data resolution (lower reading intervals), real-time identification of changes or potential development of dam safety issues and enhanced remote monitoring. As part of the 2022 FADI, the 2016 recommendation was updated to state that VW retrofits of the existing standpipe piezometers may be considered if adverse or changing trends in instrumentation measurements occur. Alternatively, VW piezometers may also be considered to reduce City of Nanaimo staff workload associated with manual instrumentation measurements.

Additional piezometers were found downstream of the Main Dam and Auxiliary Spillway which were not owned by the City and were apparently installed for soil investigations for potential dam upgrading purposes. It is recommended to gather the installation details and initiate monitoring those as an additional source of information.

CCTV cameras were installed by the City in November 2023, which allows live streaming of the dam crest and reservoir, still photos and 360° view of the area from the City's offices.

4.1.3 Formal Inspection

The Jump Creek Dam was in similar condition to that reported during the 2024 FADI. Visual inspections were performed by walking the crest of the Main Dam and Saddle Dam/Auxiliary Spillway, observing the upstream and downstream faces, walking the toe of the Main Dam and Saddle Dam/Auxiliary Spillway, walk the left and right sides of the concrete spillway, and observing the reservoir from the crest of the dam.

The water level was above the spillway invert, obscuring the spillway chute floor upstream of the rollway. However, visual inspection of concrete walls and floor downstream of the rollway inside the spillway chute was conducted. Review of the upstream side of the dam was limited to the area above the waterline. Visual inspection of the LLO was also carried out. The following key observations were made during the inspection:

4.1.3.1 Main Dam

4.1.3.1.1 Upstream Face

- There was no sign of cracking or slope instability along the upstream slope of the dam during the inspection.
- The upstream slopes showed no sign of erosion or beaching. No settlements or depressions of concern were noted **(Photograph JCR 1)**.
- Riprap on the upstream face was only inspected above the waterline. The water level on the date of the inspection was 2.61 m below the spillway rollway sill. Riprap coverage appeared continuous apart from select zones of low coverage, smaller size rock particles (compared to the mean size), and lack of strong particle interlocking (**Photograph JCR 1** and **JCR 30**). Some areas at the bottom of the exposed riprap were found to be mainly comprised of smaller rock particles **(Photograph JCR 1)**. The riprap thickness varies from approximately 0.3 m thick. Riprap diameter ranges between 0.1 m to 1.5 m with a mean size of approximately 0.5 m. Zones of low coverage and lack of interlocking were specifically observed left of piezometer SP12. Zones of low coverage and smaller rock size should be monitored, and consideration given to rehabilitate the riprap protection in those areas.
- Minor vegetation growth and accumulation of woody debris was noted in the freeboard zone (**Photographs JCR 6** and **JCR 30**). It is recommended that vegetation be cleared (including roots) and voids backfilled to mitigate potential riprap dislodgement due to vegetation growth and improve visibility of the upstream face for inspections.

4.1.3.1.2 Crest and Abutments

- The crest was in satisfactory condition at the time of inspection. There were no cracks, settlements, or sinkholes observed on the dam crest and no signs of erosion or unusual conditions at this stage along the dam crest. Minor rutting of the road topping material was noted where water had accumulated due to the rainy weather.
- No seepage or signs of movement were observed at either the left or right abutment of the dam. Large trees (10+ m high) were noted along both abutments where the dam blends into the natural environment.
- The 2024 DSR recommended completing a topographic survey to measure dam deformation and settlement, and addition of survey monuments to the crest of the dam, at approximately 100 m spacing.
- The upstream face of the left abutment steepens to approximately 1H:1V over a 15 m length. It is recommended that the City monitor this over-steepened section, conduct a survey of the area, and compare to past year's survey to determine if movement is advancing. As described in the 2022 FADI, high water levels have eroded soil cover where the riprap meets the abutment at shoreline. This has created erosional scour approximately 0.3 m to 0.5 m high. No significant change was observed during this site

inspection. This should be monitored, and consideration given to placement of rockfill and riprap to mitigate erosion if conditions worsen.

4.1.3.1.3 Downstream Face and Toe

- The downstream face and toe of the dam were noted to be in satisfactory condition. The downstream face appears to be comprised of shell materials with gravels and cobbles up to 0.3 m diameter. No evidence of slide movements, settlement or displacement, cracking, sinkholes, piping, or ejecta were observed.
- Some sparse, low-lying vegetation growth was observed on the downstream face, similar to previous inspections. Minor vegetation (e.g., grass and weeds) should be trimmed to allow inspection of the dam face. Removal of the root system is not necessary for small, grass-like vegetation. Brush and trees should be removed (including the root system) and the void backfilled.
- Bulging near the at the downstream toe of the dam was first documented in the 2017 FADI report. The bulge is located approximately 50 m left (north-west) of the LLO and approximately one-third of the slope height above the toe. Surveying pins have been installed and are surveyed once a year by the City and do not appear to have been changing with time. The bulge is not accompanied by slumping at the slope crest or signs of seepage and is therefore not considered to have formed due to slope instability or slumping. The bulge likely dates back to the original dam construction. Survey monitoring should be continued on an annual basis. The visual inspection for this FADI did not indicate any recent changes to this area.
- Ponded seepage and a wet area approximately 8 m x 3 m was noted on the downstream toe near Weir A. The seepage location corresponds with the section where the dam is highest (25 m) and is located over the historical watercourse for Jump Creek. This seepage is considered dam seepage which has been collected by the downstream blanket drain and is expected to be captured by weirs A and C. The ponded seepage was clear with no signs of material migration.
- Toe seepage is monitored by five ‘V-notch’ weirs located downstream of the toe **(Photographs JCR 28** to **JCR 31)**. At the time of the inspection, there was approximately 1 cm of water flowing over Weir A. The remainder of the weirs were dry. Discussions with City staff indicate that Weir A is the only weir which is consistently subjected to flow, while others may flow periodically, especially after rainfall.
- Seepage was observed on the downstream face of the dam (near the right abutment) approximately 50 m downstream of the crest and 10 m to the right of the spillway. This was previously observed in the 2023 FADI and 2024 DSR inspections. The construction of a new V-notch weir was recommended to capture and monitor this seepage.

- Immediately downstream of this area, there is a small ditch extending downstream along the spillway. There is an approximately 3 m to 5 m high soil slope on the right side of this ditch. The bottom of the ditch is stained with rust-coloured deposits. The ditch was dry at the time of the inspection, but it is presumed that seepage from the area above flows down the ditch. Additionally, there is slight erosion and sloughing of the soil slope above (**Photograph JCR 42**). City staff indicated that this condition may have been exacerbated by construction of the turbine seacan in the past year. This area should continue to be monitored for changing conditions. This is not anticipated to be an immediate dam safety issue due to its location on the abutment relatively far from the embankment.
- As described in the 2020 FADI report, a wet spot approximately 1 m in diameter was observed on the lower access road just upstream of Weir E (see location marked on **Figure B2** in **Appendix B**). This was not observed during the 2025 inspection. This area should be closely monitored at the same time as data is collected at Weir E. If active seepage is observed and if the seepage is cloudy, and/or if earth material starts to bulge in this location, dam safety personnel should be notified immediately.

4.1.3.2 Main Spillway

- The main spillway structure was generally observed to be in fair condition and no major changes in condition were observed since the 2023 FADI. Small pieces of debris were observed inside the spillway chute at the time of the inspection (**Photographs JCR 12** to **JCR 15**).
- Inside of the spillway chute was dry but inaccessible at the time of inspection and the concrete structure was inspected from outside of the chute. A couple reinforcing bars were locally exposed along the spillway chute slab and walls, but no immediate action is required.
- Areas of spalling were observed at the construction joints along the spillway slab (**Photograph JCR 12**). Spalls up to 100 mm wide were observed. Calcite staining was noted at some of the construction joints along both the spillway slab and walls, which could be an indication of past seepage through the joints. Signs of seepage were not observed during the 2025 inspection but some seepage was observed along the slab at the downstream construction joints in 2022 FADI. It is recommended that the areas around the construction joints continue to be monitored to detect any additional concrete deterioration or seepage over time.
- Minor concrete erosion and minor cracking was also noted at the base of each wall within the spillway. These areas should continue to be monitored and if any major spalling begins to occur, repair of these areas would be recommended.
- The spillway gates were fully open and could not be inspected during this inspection; however, the 2022 FADI indicates the downstream side of the spillway gates were inspected and were generally observed to be in fair condition. As indicated in 2021 FADI report, one vertical strut on the right gate showed considerably more corrosion than any

of the other struts on either gate, though there was no notable section loss. This corrosion could be due to a small leak or crack along the weld; however, no defect was found during the visual inspection. It is recommended that the corrosion be monitored and if it advances further, recoating of the gate in that area would then be recommended. It is also recommended that the gate leakage be monitored when the gate is retaining water in the raised position to determine if any leakage around the strut is noticeable. City staff stated that the gates had been inspected a couple of weeks prior to Hatch's inspection, and that the gates were in good condition with no additional corrosion issues noted.

- The steel grating panels on the spillway deck were observed to be in fair condition and steel angles were installed along both sides of the grating to prevent vehicles from driving over the grating since these grating panels were likely not designed for vehicle loading (**Photograph JCR 7**). The grating panels were somewhat deformed around their supporting steel beams, possibly caused by vehicle traffic in the past driving on the grating. All steel members and grating panels on the spillway deck were repainted recently.
- Minor cracking was observed in the central pier, primarily originating from the square block-out section. This has been noted for several years and does not appear to have changed based on a review of previous FADI report photos. These cracks are still not considered a concern at this time but should be monitored as part of routine inspections and future FADIs. Measurement and installation of crack gauges was discussed with City staff on site so that advancement of the crack can be easily tracked and monitored using the Mobile Dam Inspection Database.
- Minor vegetation growth was observed adjacent to the spillway and spillway chute. It is recommended to cut back and clear the vegetation from the area. This clearing work should continue to be completed as a part of the annual vegetation control program.
- Some small spalls were noted on the roadway barriers on the spillway bridge near the handrail connections (**Photograph JCR 43**). This damage should be monitored for changes in future FADIs.
- Hairline cracking was noted on the right abutment wall near the spillway bridge on the earth side (**Photograph JCR 44**). This cracking should be monitored for changes in future FADIs.
- The existing drainage system below the spillway chute was discussed with City staff. This system consists of a series of 152 mm (6 in) diameter perforated galvanized corrugated steel pipes running across the spillway at each transverse contraction joint, connecting to a pair of pipes running outside the spillway walls and draining through outlets into the stilling basin (as shown on drawing 4088-06-303 by Associated Engineering Services Ltd.). This system is currently untested, and City staff do not believe it has ever been tested. Due to the relatively thin and light nature of the chute

slabs (305 mm or 12 inches thick), the drainage system is important to maintain stability of the structure and prevent shifting of the slabs due to excessive uplift pressure. It is recommended that the City of Nanaimo investigate options to inspect and test the drainage system to ensure its continued efficacy.

4.1.3.3 Log Boom

- The log boom was generally in satisfactory condition as it was replaced in July 2019. The boom was observed from both shorelines adjacent to the anchors (**Photographs JCR 3 and JCR 16**).
- The chain connecting the existing anchor block to the new right anchor grouping was not taut (**Photograph JCR 2)** and therefore will not equally load the entire anchor assembly when engaged. The anchor chain has been tightened since original installation but still needs to be tightened so the new anchor assembly is engaged when the log boom experiences loading from debris.
- Chain clamps were replaced as needed in 2022 when the reservoir level was low which allowed repair work at the log boom from the surface. Surface corrosion was observed on some hardware used to tie-down the log boom and should be monitored and replaced if needed.

4.1.3.4 Low Level Outlet

Normal water flows through the low-level outlet (LLO) were set to approximately 40 ft^3/s at the time of inspection **(Photograph JCR 22)**. The condition review of the LLO was limited to the portions of the intake structure and outlet structure above the water level.

- The conditions within the LLO tunnel were not reviewed during this inspection; however, the 2021 FADI report indicates that the tunnel concrete in general was observed to be in fair condition with areas of rust staining and calcite deposits on the walls and roof of the tunnel.
- The condition of the LLO concrete outlet structure was in satisfactory condition for all concrete above the water level. The condition of the intake structure was also observed to be in satisfactory condition.
- Some minor vegetation growth was observed near the outlet channel, mainly on the right bank of the channel and it is recommended to remove all vegetation from the edges of the channel and continue cleaning this area as part of the annual vegetation control plan.

The inspection also included the inlet works on the upstream side of the dam (**Photograph JCR 18)** and the following observations were made.

- The LLO intake concrete was observed to be in fair condition. The actual intake for the LLO was not visible as it was below the water surface.
- The covers over the valve stems on the upstream slope of the dam were in poor condition at the time of inspection. Many of the metal straps holding the covers down are

bent with rusted fasteners, making their removal difficult (**Photograph JCR 45**). City staff noted that they are planning to contract a local dive company to remove these covers, clean out the LLO tunnel, and replace the covers with a more easily removable system.

- Corrosion was noted in many fasteners on the LLO operating platform, apparently caused by dissimilar metals contact between the bolts, washers, and nuts (**Photograph JCR 46**). These components are in fair condition, but the corrosion should be monitored and if section loss is observed, the affected hardware should be replaced with proper components of the correct type. However, it is noted that the condition of this structure was similar to the 2023 inspection.
- As noted in the 2023 inspection, there was minor undermining of the bottom of the concrete block for the LLO gate, which should continue to be monitored. This undermining was not visible during the 2025 inspection.

4.1.3.5 Auxiliary Spillway

- The crest of the auxiliary spillway was visually reviewed and was found to be in satisfactory condition without any major defects or differential settlement between concrete blocks (**Photograph JCR 39**). The deterioration is being monitored as part of Mobile Dam Inspection Database and City Dam Inspectors numbered the top of the blocks in 2022 and will continue to track the condition of the blocks with photographic records over time. However, no significant changes were observed in the condition of the concrete blocks compared to previous inspections. Some surface deterioration (minor spalling and weathering) due to freeze-thaw action is visible. Some vegetation was present on the crest and downstream slope and should be removed.
- Riprap is interlocked and in good condition on the upstream slope (**Photograph JCR 34** and **JCR 35**). Isolated zones of sparse riprap (generally less than 1 m x 1 m) were observed on the upstream slopes, particularly near the corners of the lock block crest.
- Two areas of sparse riprap were observed on the downstream slope, similar to observations from the 2024 DSR (**Photograph JCR 37**). Since this is an overflow spillway, the riprap should be replaced to original specification to protect the filter from erosion.
- Minor wood debris has collected at the upstream face of the dam. This debris is removed by the City as part of the annual maintenance program.
- It has previously been recommended to read the existing piezometer located downstream of the downstream access road. This piezometer is not owned by the city. The downstream water table is anticipated to be near the surface based on the presence of the downstream swamp and observed seepage at the downstream toe. Monitoring of the existing piezometer is not required.

- Ponding of water has previously been observed at the downstream toe. During this inspection, no seepage or wet areas were observed, this could be due to the relatively low reservoir level and the dry weather. The previous FADIs observed seepage below the energy dissipator concrete blocks in the cobbles at the downstream toe as well as some behind the concrete sill. City dam inspectors have previously noted that the water never flows over the concrete sill at the downstream toe.

4.1.3.6 Reservoir

A visual review of the reservoir and surrounding basin area was made from the crest of the main dam and the Saddle Dam/Auxiliary Spillway.

- No sign of instability that could lead to overtopping was observed. However, a full inspection of the reservoir rim was not carried out at this time.
- There was a landslide scar on the east slope of the reservoir adjacent to the Spillway. The landslide washed out part of the access road in 2018. Landslide propensity poses a potential landslide risk to the Spillway and dam.

4.1.3.7 Public Safety

There is no public access to this dam as it is only accessible by private logging roads managed by Mosaic Forest Management with a number of locked gates to restrict access. The City supervises school tours to the dam, but there is no non-supervised public presence at this site. Therefore, public safety control measures were not considered at this time.

City staff stated that there are multiple access roads available.

4.1.4 Recommendations

The following surveillance/rehabilitation work is recommended for Jump Creek Dam as shown in **Table 4-5**. Some of these items are carried over or modified from previous FADIs or DSRs.

Table 4-5: Jump Creek Dam – Surveillance/Rehabilitation Recommendations

Item	Description	Reference
JCR 1.01	Monitor the cracks observed in the piers at the top of the spillway below the road deck as part of the Mobile Data Inspection Database. This should include photographic records and mapping the length of the cracks and the width of the cracks at select locations. This should be done on a quarterly basis and be reviewed annually as part of the FADI. 2022 Update: Mark the crack lengths in the piers to establish baseline for future comparison. Once the baseline is established, this item can be closed and can be monitored as part of annual inspections.	2017 FADI (Modified 2022)
JCR 1.02	Install one additional ‘V’ notch weir at toe of right abutment to monitor seepage.	2017 FADI
JCR 1.03	Tighten chain connection between existing right anchor block and new right anchor group so connection is taut.	2020 FADI

Item	Description	Reference
	Tightened in early 2020, but still has some sag in chain.	
JCR 1.04	Monitor areas of poor to fair condition riprap on upstream face of main dam. Consider rehabilitation of deficient areas if conditions worsen, to infill depressions, ensure full coverage, achieve strong interlock, and avoid future movement/slumps.	2021 FADI
JCR 1.05	Place additional riprap to fill a zone of sparse riprap coverage (with underlying coarse filter exposed) on the downstream slope of the auxiliary spillway near the right abutment wingwall. 2023 Update: A second zone of sparse riprap was noted and should also be repaired by placing additional riprap.	2022 FADI (Modified 2023)
JCR 1.06	Perform topographic survey in the next two years (and subsequently as part of future DSRs) to monitor potential dam deformation and/or settlements in more detail. Add survey monuments across the crest of the dam (approx. every 100 m)	2024 DSR
JCR 1.07	Conduct an inspection on the under-slab drainage system of the spillway chute to ensure that the system is still functional.	2024 DSR
Recommendations to Close		
	Update OMS manual to include log boom changes. Currently OMS manual states that there are two log booms. 2023 Revision: Close this recommendation. OMS manual was updated to include log boom changes.	2020 FADI
	Monitor the corrosion and potential leakage around the gate strut identified during the inspection. If the corrosion advances in the future, repair of the gate coating should be considered. 2022 Revision: Close this recommendation. Condition of spillway gates will continue to be monitored during annual inspections. 2023 Revision: As the gate was fully open during 2023 site inspection, the corrosion and leakage around the gate strut could not be monitored as recommended in previous FADI.	2021 FADI
	The stream gauge at the crossing of the dam access road and Jump Creek is broken and should be replaced. 2025 Revision: Discussed with City staff that this stream gauge is downstream of the dam and is not necessarily relevant to dam safety.	2022 FADI
	Identify areas with exposed rebar along the spillway chute slab and walls and perform localized repairs. 2025 Revision: This is a very minor item and deterioration does not appear to have changed Therefore no action required at this time.	2021 FADI

4.2 South Fork (SFK)

4.2.1 Dam Description

The South Fork Dam is located approximately 18 km southwest of Nanaimo and 9.7 km downstream of the Jump Creek Dam on the South Nanaimo River. The dam, which is essentially an overflow weir structure, is a concrete arch dam constructed in 1931 to provide water supply to the City of Nanaimo. The reservoir is maintained at its Full Supply Level (FSL) in order to maintain pressure in the two water supply watermains. The intake of the 1.2 m and 0.75 m water supply mains are located on the left abutment immediately upstream of the dam.

The dam is situated in a steep bedrock canyon, is 30.5 m high at its highest point, and has a total crest length of 65.4 m, of which 50.6 m is a free overflow crest spillway that discharges into a natural plunge pool. The dam is a variable radius non-reinforced concrete arch structure that has not been structurally modified since construction. The outer radius is 29.7 m at the crest and 21.5 m at its base. The thickness of the arch increases from 0.9 m at the crest to 2.1 m at its base. Horizontal construction lift joints are spaced at about 1.5 m and a vertical pressure grout joint is located at the centerline of the dam. See **Figure B4** in **Appendix B** and **Table 4-6** for the dam details.

The log boom, approximately 1 km upstream of the dam, failed in 2019 and was not reinstated as debris will pass over the spillway during high flow events, and is therefore not considered to be a dam safety concern. A glance boom was installed in 2019 at the water intake to help prevent debris from floating in the vicinity of the inlet pipe. The boom is a double log boom arrangement fabricated using new unpeeled logs. The boom is anchored to the rock at the upstream and downstream ends and held in position with wire rope and is in satisfactory condition. The boom was installed with logs pre-drilled on land without the optimum buoyancy of the logs established.

Three inlet gates are used to control the reservoir water entering the water supply tunnel. The top inlet is not operated as a vortex is created when the gate is opened, and the bottom gate is not used due to the turbidity down near the bottom of the reservoir. Therefore, the middle gate is solely used to supply the water.

Table 4-6: Data for South Fork Dam and Appurtenant Structures

Structure	Details
Type of Dam	Variable Radius Concrete Arch Dam
Dam Failure Consequence Classification	Very High
Maximum Height (from channel bed to dam crest)	30.9 m
Crest Length	65.4 m
Crest Elevation	247.44 m (Geodetic Datum)
Thrust Block Elevation	251.10 m (Geodetic Datum)
Spillway	Overflow spillway over the crest, overflow crest length 50.6 m

Structure	Details
Full Supply Level (FSL)	247.44 m (Geodetic Datum)
Outer Radius (At Crest)	29.7 m
Outer Radius (At Base)	21.5 m
Crest Width	0.914 m
Slope of Center Line of Dam	0.35
Canyon Characteristics	The canyon rock consists almost entirely of andesite with a small amount of granodiorite. The rock was hard and strong. There were no faults or shear zones in the canyon, nor any likelihood of any occurring. The veins, dykes, and other irregularities were examined, and no soluble minerals or dangerous weaknesses were found. (Construction of a Variable Radius Arch Dam on the South Fork of the Nanaimo River, 1932)
Reservoir Storage Volume	2,000,000 m^3
Inflow Design Flood (IDF)	2/3 between the 1,000-yr flood and the PMF
Peak IDF Reservoir Level	251.63 m (Geodetic Datum)
Peak IDF Inflow	876 m^3/s
Freeboard Under PMF[1]	-1.12 m
Freeboard under IDF[1]	-0.61 m
Watershed Area	153 km^2
Low-level Outlet	N/A
Inlet and Outlet Works	Intake immediately upstream of dam, water supply tunnel on left abutment, two outlets water supply main 1.2 m diameter and 0.75 m diameter

4.2.2 Instrumentation

Instrumentation pertaining to dam safety at the South Fork Dam are the lake level gauges, which are monitored weekly and continually recorded on SCADA, and the newly installed CCTV cameras. During extreme events (reservoir elevation 2.5 m above crest or higher), the flows levels are checked every 3 hours. The water level was slightly above the dam crest at the time of the inspection.

There is also a 'V' notch weir located downstream of the dam at the entrance to the water supply tunnel.

CCTV cameras were installed on November 10th, 2023. The cameras allow for continuous surveillance and data recording as well as still photos. City personnel mentioned that there seemed to be issues with the camera movement at South Fork and that trees were cut down at the end of November to help with this issue.

4.2.3 Formal Inspection

The South Fork Dam was in similar condition to that reported during the 2023 FADI and 2024 DSR. Visual inspections were performed by walking the north shore adjacent to the dam on the upstream and downstream sides. The south shore was not accessed during the inspection. Water was flowing over the dam at the time of the inspection which limited the extent of the inspections. The following observations were made during the inspection:

4.2.3.1 Abutments

- The left and right abutments of the dam are composed of bedrock and were in fair condition. At the time of the inspection, the interface between the dam and abutments was partially covered with water flowing over the dam crest. Complete visual review of the abutments is limited by access and viewing locations at the site. The bedrock at the right abutment was found to be partially covered by moss and vegetation. Exposed areas were fresh to slightly weathered and of satisfactory quality. The rock above the right abutment was observed from across the channel to have subvertical joint faces during the 2020 inspection and observed during the 2024 DSR as having sub-horizontal joint surfaces. One pillar rock block immediately downstream of the right concrete abutment may be prone to toppling or sliding due to the vertical tension crack and sub-horizontal sliding plane.

- The concrete-bedrock contact at the right abutment was observed from the left abutment and seemed in fair condition with some minor alteration and loose rock flakes (**Photograph SFK 5**). The presence of moss and vegetation at that location limited the observation of the area. Any growths in that location should be cut and controlled to allow proper inspection. The rock upstream of the left abutment, above the dam crest elevation, was observed to be poor to fair condition and partly vegetated (**Photographs SFK 13 and SFK 14**).

- Detached rock blocks near the intake access penstock upstream of the left abutment were observed between 1 m^3 to 6 m^3 with full length tension cracks on shallow sliding discontinuities. Assessments of rock wedges are considered necessary for long term operation and safe access of the dam left abutment. One large rock block (**Photograph SFK 14**) may be prone to toppling or sliding due to the vertical tension crack to the left of the block. The 2024 DSR noted, another large rock block that may be prone to toppling or sliding immediately to the right of the staircase on the left abutment. No obvious signs of movement of these blocks were noted. The rock blocks should be monitored after heavy rainfall events for movement or signs of instability. There is no risk to the overall dam stability, however these rock blocks may pose some risk to the submerged water intakes.

- Small rockfalls from behind the protective mesh (rocks <0.2 m in size) were observed at the toe of the slope on the left side of the downstream channel (**Photograph SFK 12**).

- The concrete block and access ramp at the left abutment was observed to be in fair condition with some cracking and spalling noted on the upstream face. Calcite staining was also observed at this location. No change in concrete condition was noticed since the last year's inspection. Some concrete handrail posts exhibited minor cracking and one had exposed reinforcing steel at its peak (**Photograph SFK 15**).
- City staff have made drone inspections of the right abutment of the dam; no defects were noted during this inspection. No access was provided to this portion of the dam during the time of inspection due to difficulties in access and safety concerns. All future inspections of this area will be conducted by drone.

4.2.3.2 Crest and Reservoir

- At the time of the site visit, the reservoir level was slightly above the dam crest and was flowing over the crest into the plunge pool downstream.
- The concrete at the dam crest appeared to be in fair condition. The immediate upstream reservoir area was free of debris except for one large tree and several other pieces of wood debris stuck on the crest near the centre of the dam. Now that the debris boom has been permanently removed, debris is expected to regularly flow over the dam crest during high flow events (**Photographs SFK 1** and **SFK 5**).
- City staff have recently conducted underwater inspections on the upstream face of the dam using a remote operated vehicle (ROV). No significant defects were noted during this inspection, but City staff did discover a large accumulation of silt on the upstream face of the dam.

4.2.3.3 Downstream Face

A small amount of water was flowing over the dam crest at the time of inspection, preventing a full visual inspection of the downstream concrete face of the dam **(Photograph SFK 7)**. However, the 2020 drone inspection during no flow conditions noted that the concrete on the downstream face of the dam was in fair condition without any major deterioration or sign of movement in the lift joints. The conclusions of the ongoing spillway seismic study will help inform any further inspection and rehabilitation work on the downstream face of the dam.

4.2.3.4 Log Boom

The log boom was observed to be well positioned near the left shoreline immediately upstream of the dam to provide protection for the water inlet pipes (**Photograph SFK 4**). The log boom appeared to be in satisfactory condition and the floatation of the logs appeared adequate at the time of the inspection.

4.2.3.5 *Inlet Gates*

The inlet gates could not be visually inspected on site. An underwater dive inspection of the gates was performed by a third party on May 4, 2020. It was noted that there was a significant amount of organic growth on the cylinders and brackets. A safety chain was installed on the middle gate to provide system redundancy should the gate hydraulics fail as

this is the only active gate. There was significant corrosion on the gate components and pitting around the lip of the intake observed during the underwater inspection.

4.2.3.6 Water Supply Tunnel

- The tunnel was found to be in satisfactory condition. Shotcrete was observed in satisfactory condition on the fractured rock face at the entry to the tunnel to limit the potential for debris falling into the tunnel and onto the steel water supply pipe. Cracks observed in the shotcrete facing above the entrance to the supply tunnel should continue to be monitored for signs of further cracking by using spray paint along the existing length. Spreading/separation of the cracks should also be monitored using a crack gauge.

- The tunnel inspection involved access into the tunnel on the left-hand side of the water supply pipe from the downstream end. The majority of the tunnel face appeared to be composed of hard, sound rock with minimal risk of loose fragments falling from above. As reported in 2022 FADI, one rock block was observed overhead, approximately 4 m into the tunnel on the righthand side of the water supply pipe, that was delineated by joints. This area should be marked/identified and monitored as it may present a safety hazard in the future if movement is noted during future inspections.

- Discontinuities were generally tight, however, a few local, clay infilled discontinuities are favorably oriented perpendicular and sub-vertical to the tunnel alignment. A local shear or clay-filled discontinuity sub-parallel to the left wall was observed to be actively spalling approximately halfway into the tunnel (on the tunnel wall just before the fourth concrete footing on the lefthand side of the water supply pipe encountered from the entrance of the tunnel). Some loose rock was observed at the toe of the wall near this discontinuity. This area should be marked/identified, monitored for continued spalling and should not be further disturbed by accessing personnel. Beyond this zone, the typical competent rock was observed.

- Six rock bolts were observed approximately 5 m from the end of the tunnel (i.e., near the upstream end). This area should be marked/identified and tunnel conditions should continue to be monitored during routine inspections and future FADIs. The rock was found generally tight and generally dry to damp conditions outside of the portal area. Minor seepage was observed within 5 m of the portal during the inspection up to the end of the tunnel.

- The steel pipe and concrete anchor blocks were found to be in fair condition (**Photograph SFK 9**). There was some staining of the concrete around the water level at the base of the tunnel and some spalling was observed on a couple of the anchor blocks, however these are not considered to be a major concern at this time. It should be monitored, and concrete repair is required in deficient areas if conditions worsen.

- The lowest handrail post on the stairs leading into the tunnel has become disconnected from the stair stringers by a broken weld and can be easily moved by hand. This defect should be repaired as it presents a safety hazard.
- The electrical lighting system in the tunnel has failed. City staff noted that this is an ongoing issue, potentially related to the extremely humid environment in the tunnel. It is recommended that the lighting system be brought back to operating condition.

4.2.3.7 Miscellaneous

- The condition of the access road that leads down to the toe of the dam was previously identified as a potential stability concern. In particular, there was an observed narrowing of the road over a relatively large steel culvert. The erosion has no advanced noticeably since the previous inspection. It is recommended that the culvert continue to be monitored and if erosion and sloughing of the roadway continues, then a concrete headwall or other reinforcing measure should be implemented.
- As noted during the 2018 FADI, the inlet supply tunnel platform is constructed on wood planks resting on top of the steel support beams used to stabilize the inlet ventilation piping. The platform is sloped away from the channel towards the rock face. During rain events, this platform gets very slippery and is considered a slip hazard for City staff. During the 2025 inspection, the wood platform was found to be dry but was soft and quite flexible in some areas indicating it might be rotten. City staff noted that this platform was due to be replaced once the local wildfire risk is reduced.
- One of the handrails at the top of the stairs leading from the inlet operating platform down to the inlet supply tunnel platform is deformed with some broken welds (**Photograph SFK 16**). This is a safety hazard for users of the stairs and should be repaired.
- The paint system on the access ramp leading to the inlet operating platform is failing and surface corrosion is occurring on the steel framing and chequered plate floor (**Photograph SFK 17**). The inlet operating platform is of galvanized construction and no significant corrosion was noted. The access ramp appears to have just been painted, leading to the corrosion noted above. There are also several missing bolts in the connection between the access ramp and the inlet operating platform (**Photograph SFK 18**). The missing bolts should be replaced, and it is recommended that the access ramp be cleaned of corrosion and repainted.

4.2.3.8 Public Safety

Similar to Jump Creek Dam, there is no public access to this dam as it is only accessible by private logging roads with a number of locked gates to restrict access. The City supervises school tours to the dam, but there is no non-supervised public presence at this site. Therefore, public safety control measures were not considered at this time.

City staff noted previously that they are considering installing permanent stairs down to the left abutment of the dam, but are worried that the easier access provided may encourage more people to visit the site.

4.2.4 Recommendations

The following surveillance/rehabilitation work is recommended for South Fork Dam as shown in **Table 4-7**. Some of these items are carried over from previous FADIs.

Table 4-7: South Fork Dam – Surveillance/Rehabilitation Recommendations

Item	Description	Reference
SFK 1.01	Install an anti-slip surface on inlet supply tunnel platform. 2023 Revision: Replace inlet supply tunnel platform as wood platform was found to be slippery and soft in some areas indicating it might be rotten.	2017 FADI (Modified 2023 FADI)
SFK 1.02	Monitor for movement of rock wedges on the upstream side of the left abutment. 2022 Revision: The rock wedge presents a hazard to personnel using the nearby ladder or accessing the debris boom. Rock fall hazard should be mitigated which could include scaling or removal of the wedge, rock support, or prohibit access to the area.	2019 FADI (Modified 2022)
SFK 1.03	Remove the vegetation growth within the lift joint cracks on the downstream face of the dam structure.	2021 FADI
SFK 1.04	Remove the vegetation growth at the right abutment upstream of the dam to allow proper inspection of the concrete-bedrock interface.	2023 FADI
SFK 1.05	Identify and mark two main areas, the local shear or clay filled discontinuity sub-parallel to the left wall (around the fourth concrete footing from the tunnel entrance) and the rock block (approximately 4 m into the tunnel) to facilitate continued inspection and monitoring.	2023 FADI
SFK 1.06	Repair detached handrails noted in condition assessment above in inlet supply tunnel and inlet operating platform.	2025 FADI
SFK 1.07	Reinstate electrical supply and lighting in inlet supply tunnel.	2025 FADI
SFK 1.08	Monitor deterioration of access ramp to the inlet operating platform. Replace missing hardware, and clean and repaint the access ramp.	2025 FADI
Recommendations to Close		
	Measure crack width of shotcrete facing above the entrance to the tunnel by installing survey nails in a triangular pattern into the rock across the crack face. Log photographs to monitor any crack progression. This should be performed as part of the routine inspections as included in the Mobile Dam Inspection Database. 2023 Revision: Close this recommendation. The cracks are being monitored with paint and pictures.	2015 FADI

Item	Description	Reference
	Backfill void in gravel/riprap along access road at downstream left side of channel. Void currently presents tripping hazard to personnel. 2023 Revision: Close this recommendation. No voids or tripping hazards observed.	2020 FADI

5. Summary

There are two types of recommendations summarized below:

1. Outstanding surveillance and rehabilitation recommendations were summarized from previous FADI and new recommendations were made. See **Table 5-1**.
2. Outstanding dam safety recommendations originating from previous DSRs that were in the City's Dam Safety Issues tracking spreadsheet were summarized. See **Table 5-2**.

Note that items in these tables are summarized and additional detail is provided in earlier sections. Additionally, Hatch has attempted to summarize all previous outstanding recommendations; however, it is the City's responsibility to ensure that all previous recommendations have been prioritized and addressed to their satisfaction.

Hatch understands that the City has limited resources. Therefore, it is extremely important to prioritize the various recommendations so the City can create a plan for addressing/resolving these deficiencies. Priority ratings have been added for each item where:

A = high priority (complete within 2 years);

B = medium priority (complete within 5 years); and

C = low priority (complete within 10 years/reassess with changing conditions).

Table 5-1: Summary of Surveillance and Rehabilitation Recommendations

Item	Description	Reference	Priority
GENERAL 1.01	Convert elevations to flow on seepage plots.		A
GENERAL 1.02	The inspection database is a Microsoft Access database which provides an interface for inspectors to input observations. However, there is currently limited capability to export and report data out of the database. Hatch recommends that the database be updated to add functions to report chronological past data such as inspection report observations in tabular form. The most recent Mobile Dam Database checklists have not been completed at the required frequency (weekly) due to either not filling them out or potentially uploading issues. This should be resolved.		A

Item	Description	Reference	Priority
JCR 1.01	Monitor the cracks observed in the piers at the top of the spillway below the road deck on a quarterly basis as part of the Mobile Data Inspection Database. 2022 Revision: Mark the crack lengths in the piers to establish baseline for future comparison. Once the baseline is established, this item can be closed and can be monitored as part of annual inspections.	2017 FADI (Modified 2022)	A
JCR 1.02	Install one additional 'V' notch weir at toe of right abutment to monitor seepage.	2017 FADI	A
JCR 1.03	Tighten chain connection between existing right anchor block and new right anchor group so connection is taut.	2020 FADI	A
JCR 1.04	Monitor areas of poor to fair condition riprap on upstream face of main dam. Consider rehabilitation of deficient areas if conditions worsen, to infill depressions, ensure full coverage, achieve strong interlock, and avoid future movement/slumps.	2021 FADI	A
JCR 1.05	Place additional riprap to fill a zone of sparse riprap coverage (with underlying coarse filter exposed) on the downstream slope of the auxiliary spillway near the right abutment wingwall. 2023 Revision: A second zone of sparse riprap was noted and should also be repaired by placing additional riprap.	2022 FADI (Modified 2023)	A
JCR 1.06	The stream gauge at the crossing of the dam access road and Jump Creek is broken and should be replaced.	2022 FADI	B
JCR 1.07	Conduct an inspection on the under-slab drainage system of the spillway chute to ensure that the system is still functional.	2024 DSR	B
SFK 1.01	Install an anti-slip surface on inlet supply tunnel platform. 2023 Revision: Replace inlet supply tunnel platform as wood platform was found to be slippery and soft in some areas indicating it might be rotten.	2017 FADI (Modified 2023 FADI)	A
SFK 1.02	Monitor for movement of rock wedges on the upstream side of the left abutment. 2022 Revision: The rock wedge presents a hazard to personnel using the nearby ladder or accessing the debris boom. Rock fall hazard should be mitigated which could include scaling or removal of the wedge, rock support, or prohibit access to the area.	2019 FADI (Modified 2022)	A
SFK 1.03	Remove the vegetation growth within the lift joint cracks on the downstream face of the dam structure.	2021 FADI	B
SFK 1.04	Remove the vegetation growth at the right abutment upstream of the dam to allow proper inspection of the concrete-bedrock interface.	2023 FADI	A

Item	Description	Reference	Priority
SFK 1.05	Identify and mark two main areas, the local shear or clay filled discontinuity sub-parallel to the left wall (around the fourth concrete footing from the tunnel entrance) and the rock block (approximately 4 m into the tunnel) to facilitate continued inspection and monitoring. It is recommended these areas be marked during the 2024 DSR.	2023 FADI	A
SFK 1.06	Repair detached handrails noted in condition assessment above in inlet supply tunnel and inlet operating platform.	2025 FADI	A
SFK 1.07	Reinstate electrical supply and lighting in inlet supply tunnel.	2025 FADI	C
SFK 1.08	Monitor deterioration of access ramp to the inlet operating platform. Replace missing hardware, and clean and repaint the access ramp.	2025 FADI	B

Table 5-2: Outstanding Dam Safety Issues

Item	Description	Reference	Priority
JCR 2.02	Perform stability analysis for dam and spillway with most recent horizontal ground acceleration of corresponding PGA.	2013 DSR	B
SFK 2.01	Stability analysis of dam and dam abutments needs to be checked for increased seismic coefficient. 2023 Revision: Seismic stability assessment of dam is underway and scheduled to be completed in late 2025 / early 2026.	2013 DSR	A

6. Cost Estimate

The cost estimate is an ASCE Class 5 (-50% to +100%) cost estimate that provides for engineering services and for maintenance/rehabilitation works where the scope of work is defined sufficiently to provide an estimate. Where an engineering study is required, the subsequent rehabilitation has not been estimated as this will be dependent on the findings the engineering report and detailed design.

Table 6-1: Cost Estimate – Outstanding Surveillance and Rehabilitation Issues

Item	Description	Estimated Cost	Notes
GENERAL 1.01	Convert elevations to flow on seepage plots.	N/A	By City staff
GENERAL 1.02	The most recent Mobile Dam Database checklists have not been completed at the required frequency (weekly) due to either not filling them out or potentially uploading issues. This should be resolved.	N/A	By City staff

Item	Description	Estimated Cost	Notes
JCR 1.01	Monitor the cracks observed in the piers at the top of the spillway below the road deck on a quarterly basis as part of the Mobile Data Inspection Database. 2022 Revision: Mark the crack lengths in the piers to establish baseline for future comparison. Once the baseline is established, this item can be closed and can be monitored as part of annual inspections.	N/A	Include in MDID
JCR 1.02	Install one additional 'V' notch weir at toe of right abutment to monitor seepage.	$ 1,000	Labour by City staff
JCR 1.03	Tighten chain connection between existing right anchor block and new right anchor group so connection is taut.	N/A	Labour by City staff
JCR 1.04	Monitor areas of poor to fair condition riprap on face of upstream dam and rehabilitate if conditions worsen.	N/A	By City staff
JCR 1.05	Place additional riprap to fill a zone of sparse riprap coverage (with underlying coarse filter exposed) on the auxiliary spillway near the right abutment downstream wingwall. 2023 Update: A second zone of sparse riprap was noted and should also be repaired by placing additional riprap.	$ 40,000	Allowance for design and construction. Other zone was included in previous assessment cost. This work is planned for 2026
JCR 1.06	The stream gauge at the crossing of the dam access road and Jump Creek is broken and should be replaced.	$ 500	By City staff
JCR 1.07	Conduct an inspection on the under-slab drainage system of the spillway chute to ensure that the system is still functional.	$10,000	
SFK 1.01	Install an anti-slip surface on inlet supply tunnel platform. 2023 Revision: Replace inlet supply tunnel platform as wood platform was found to be slippery and soft in some areas indicating it might be rotten.	$ 20,000	
SFK 1.02	Monitor movement of the rock wedge on the upstream side of the left abutment. 2022 Revision: The rock wedge presents a hazard to personnel using the nearby ladder or accessing the debris boom. Prohibit access to the area or mitigate the rockfall hazard which could include scaling or removal of the wedge or rock support.	N/A	No cost associated with restricting access to the area.
SFK 1.03	Remove the vegetation growth within the lift joint cracks on the downstream face of the dam structure.	$ 30,000	Allowance. Will be dependant on access.
SFK 1.04	Remove the vegetation growth at the right abutment upstream of the dam to allow proper inspection of the concrete-bedrock interface.	$ 20,000	Access will be a challenge.
SFK 1.05	Areas requiring monitoring in the water supply tunnel should be identified/marked to facilitate inspection and observations.	$ 100	Labour by City staff

Item	Description	Estimated Cost	Notes
SFK 1.06	Repair detached handrails noted in condition assessment above in inlet supply tunnel and inlet operating platform.	$ 1,000	Labour by City staff
SFK 1.07	Reinstate electrical supply and lighting in inlet supply tunnel.		
SFK 1.08	Monitor deterioration of access ramp to the inlet operating platform. Replace missing hardware, and clean and repaint the access ramp.	$ 5,000	

Table 6-2: Cost Estimate – Outstanding Dam Safety Issues

Item	Description	Estimated Cost	Comments
JCR 2.02	Perform stability analysis for dam and spillway with most recent seismic parameters.	$ 75,000	
SFK 2.01	Stability analysis of dam and dam abutments for increased seismic coefficient.		In progress

Appendix A
Summary of Information Reviewed

Item	Document Name	Date
1	Dam Mobile Database (pdf files from most recent routine inspections)	2025
2	Jump Creek OMS Manual	April 2024
3	South Fork Dam OMS Manual	January 2024
4	2023 Formal Annual Dam Inspections	March 2025
5	2022 Formal Annual Dam Inspections	April 2023
6	2021 Formal Annual Dam Inspections	June 2022
7	2020 Formal Annual Dam Inspections	February 2021
9	City of Nanaimo – Dam Safety Management Program	March 2024
10	Dam Safety Reviews for Jump Creek Dam & Saddle Dam, South Fork Dam, Reservoir No. 1 Dam, Westwood Lake & Saddle Dam	2014
11	City of Nanaimo – Water Supply Dams Emergency Plan	2024
12	Water Licence Amendment 114478	June 2022
13	Jump Creek Dam – Dam Safety Review	November 2025
14	South Fork Dam – Dam Safety Review *(Draft – awaiting results of Seismic Assessment)*	March 2025

Appendix B
Figures

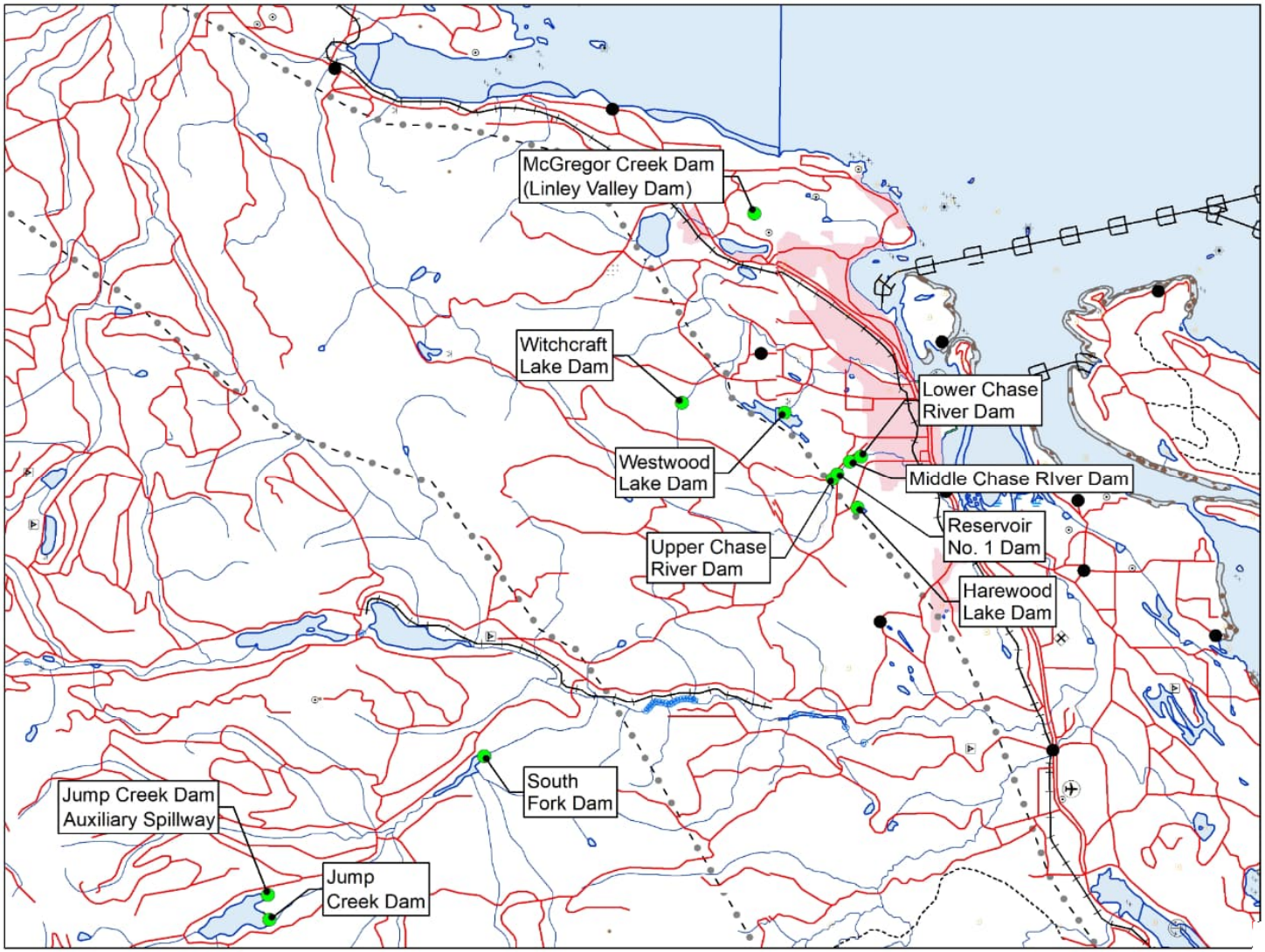


Figure B1: Dam Locations

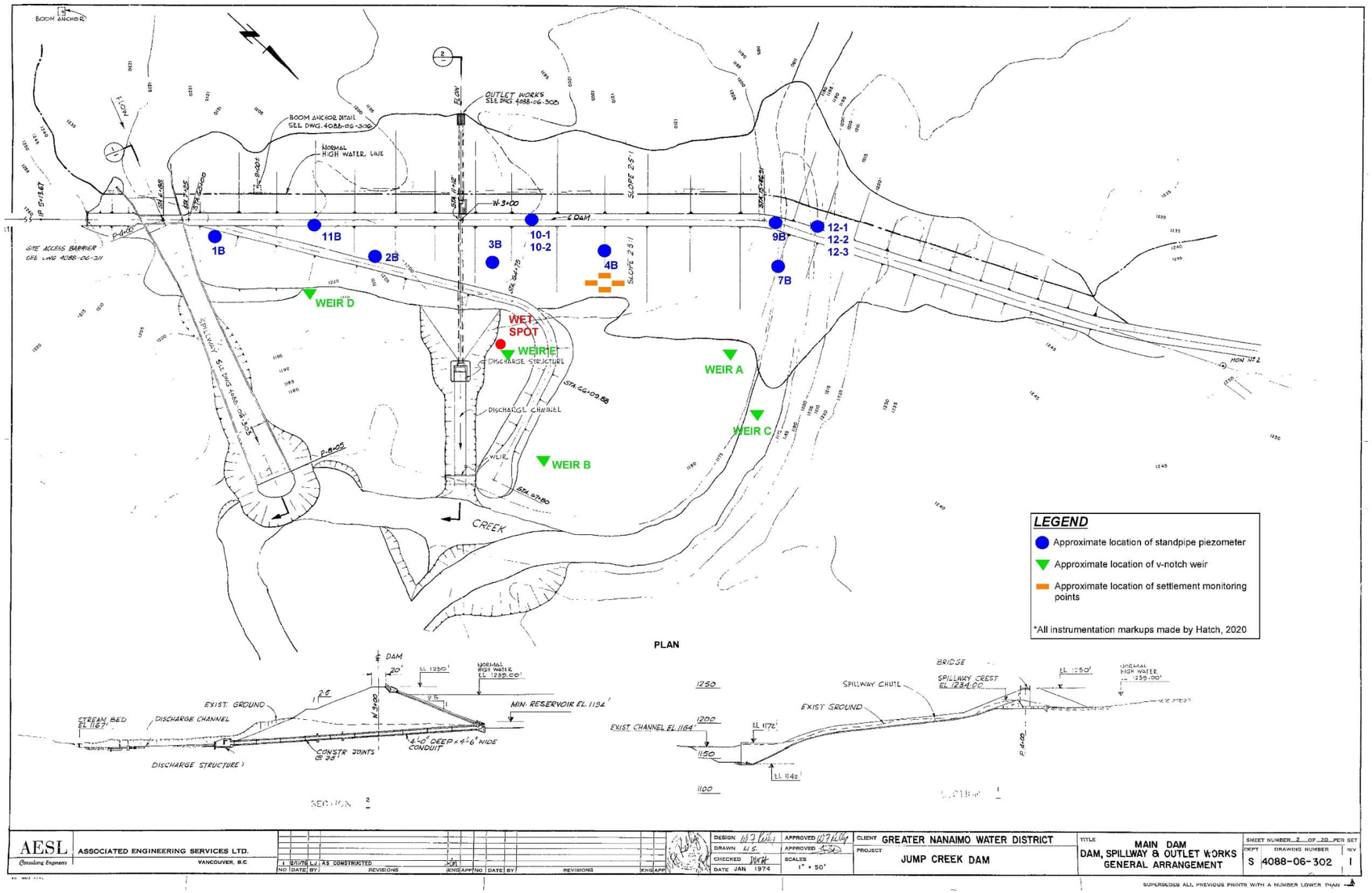


Figure B2: General Layout of the Jump Creek Dam and Instrumentation (Figure Taken From 2014 DSR)

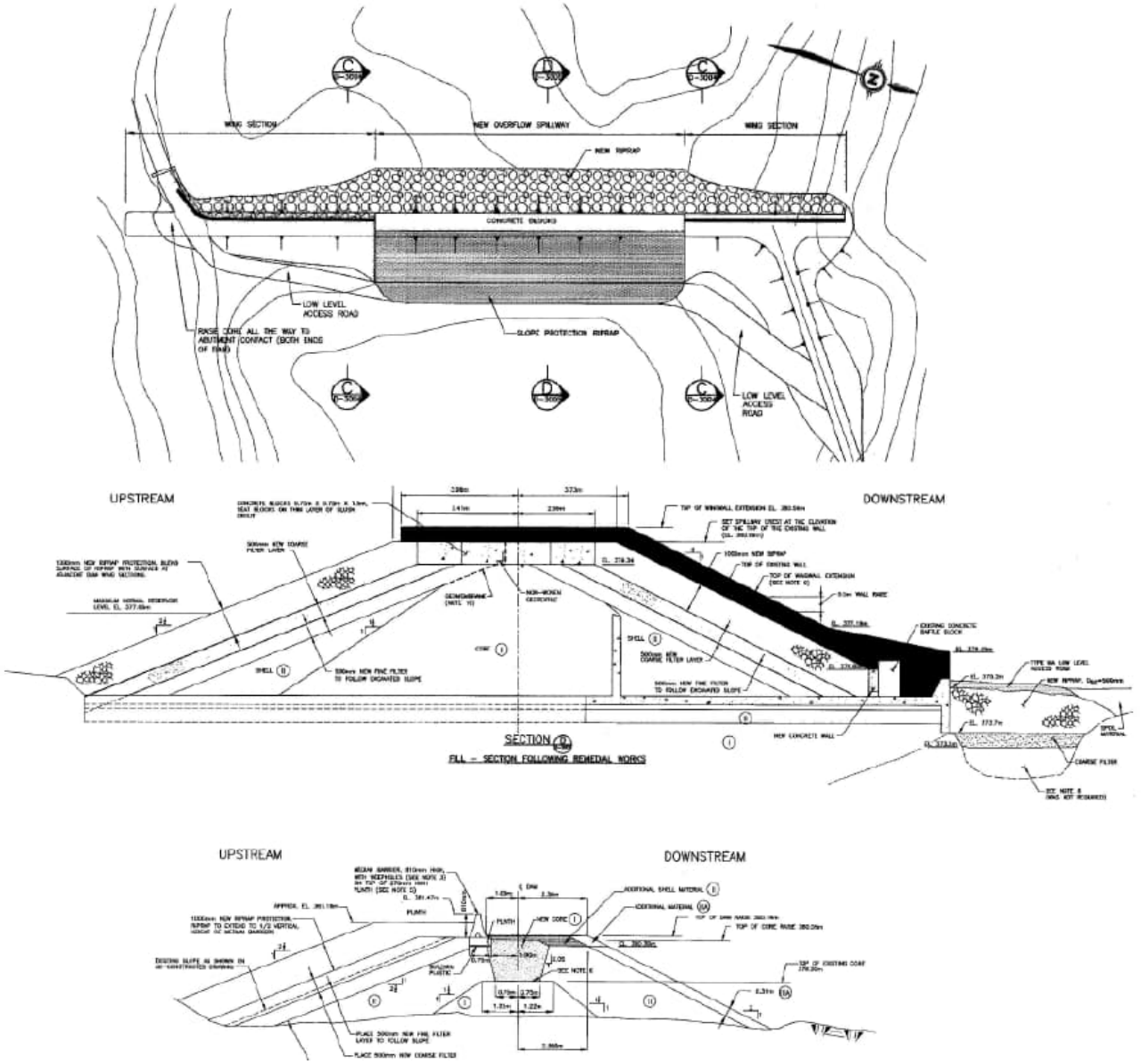
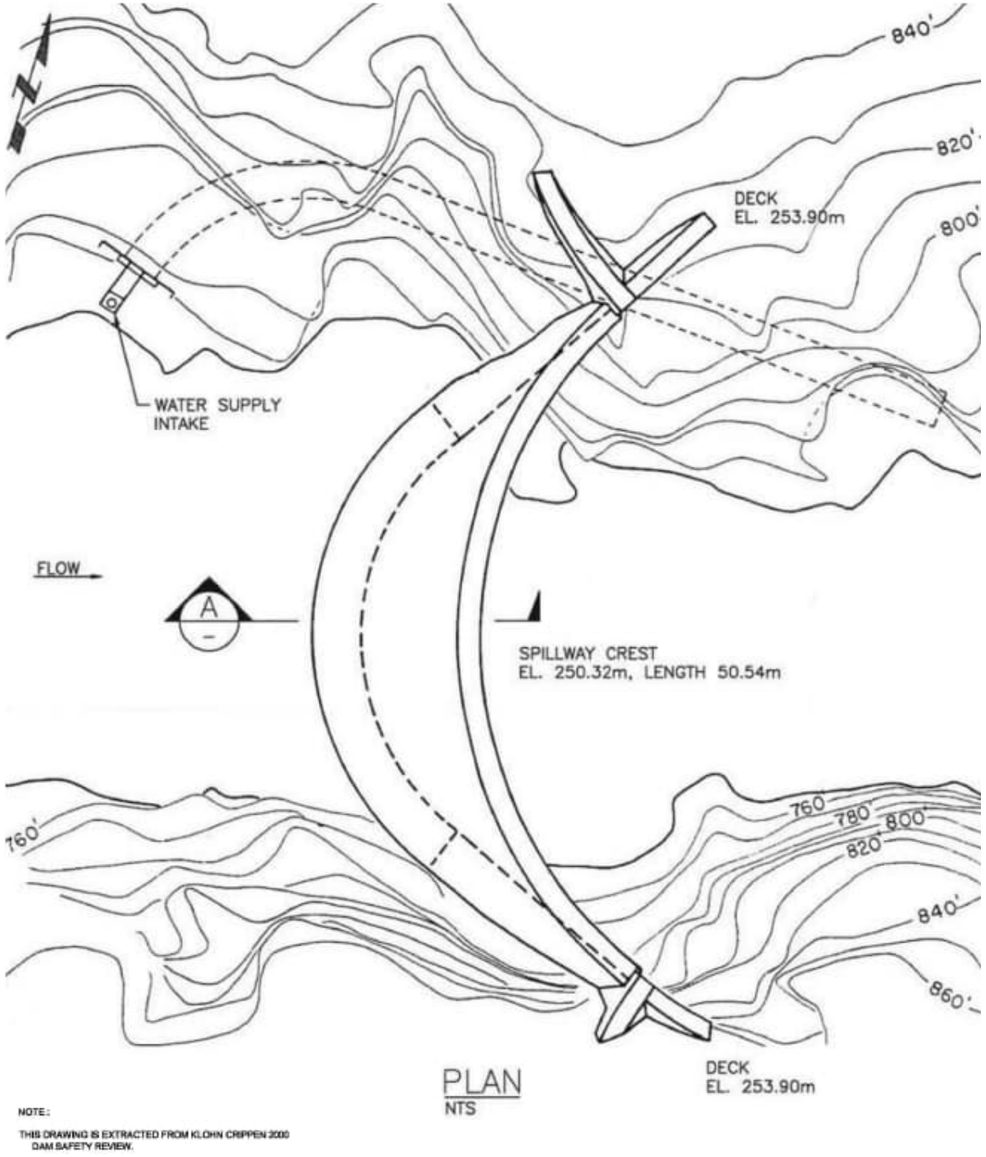


Figure B3: General Layout of the Auxiliary Jump Creek Dam (Figure taken from 2016 FAD)



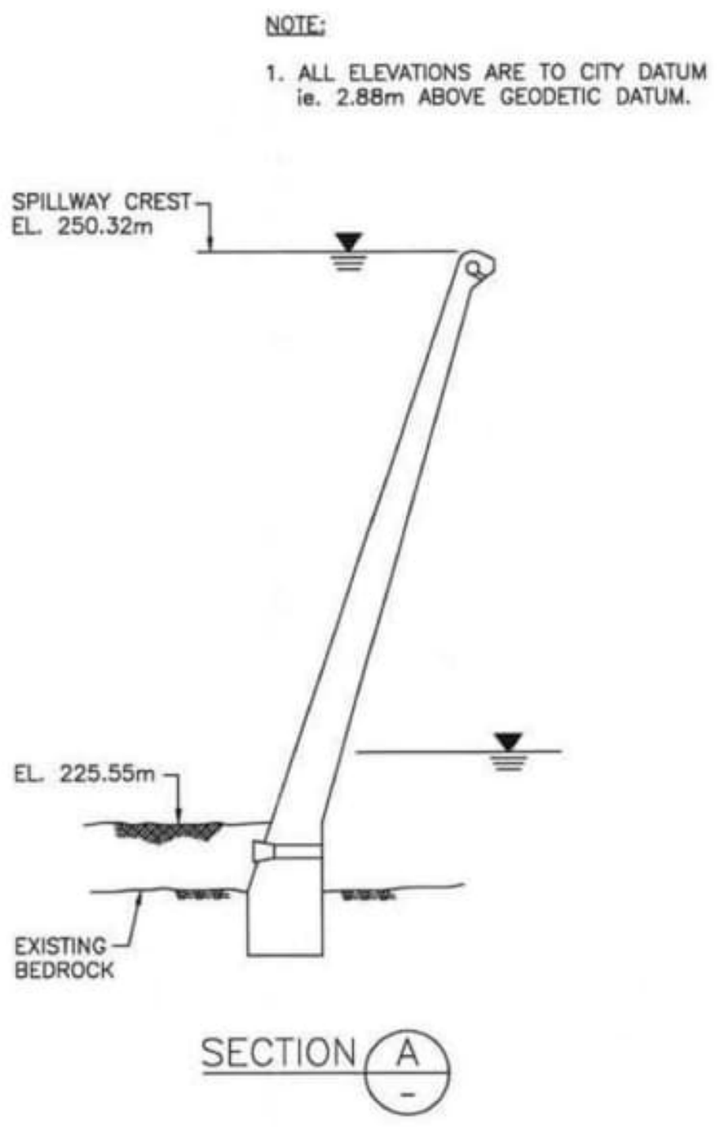
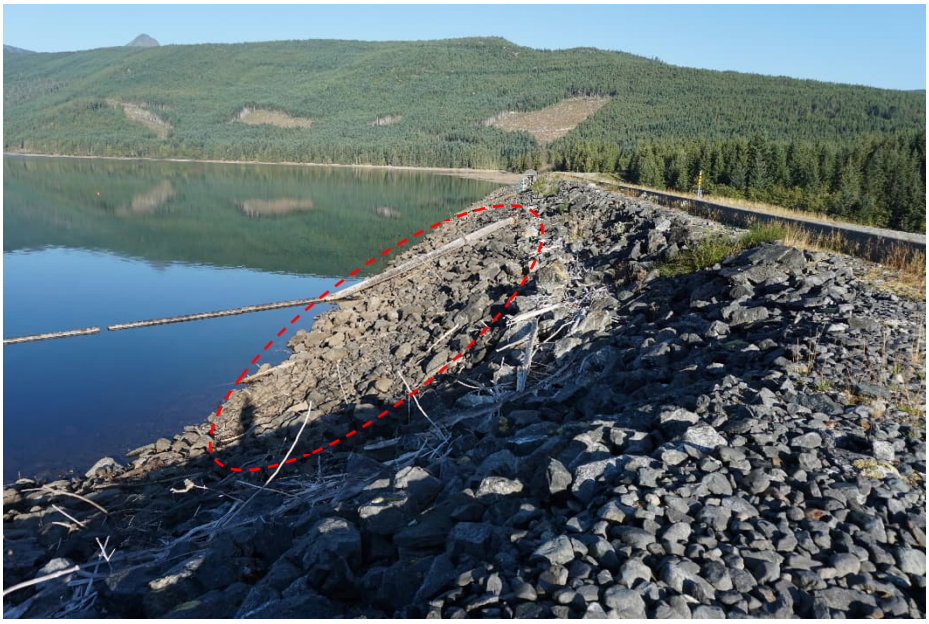


Figure B4: General Layout of the South Dam (Figure taken from 2014 DSR)

Appendix C
Inspection Photographs



JCR 1: Upstream Face of the Dam, with Smaller Size Rock Particles along the Reservoir

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 2: Log Boom at Right Anchors

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 3: Log Boom Left Anchor

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 4: Downstream Side of Spillway Concrete Structure

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 5: Upstream Side of Spillway Structure

Location: Jump Creek Dam (JCR)

Date: September 16. 2025

JCR 6: LLO Intake Gate at Upstream Face

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 7: Steel Grating and Angles on Spillway Deck to Prevent Wheel Loading on Grating

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 8: Spillway Gate Operating Area

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 9: Spillway Chute (looking Upstream)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 10: Vegetation near to Right Wall of Spillway Chute

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 11: Open Spillway gates

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 12: Spillway Structure Chute (looking Downstream)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 13: Small Debris Inside Spillway Structure Chute (Looking Downstream)

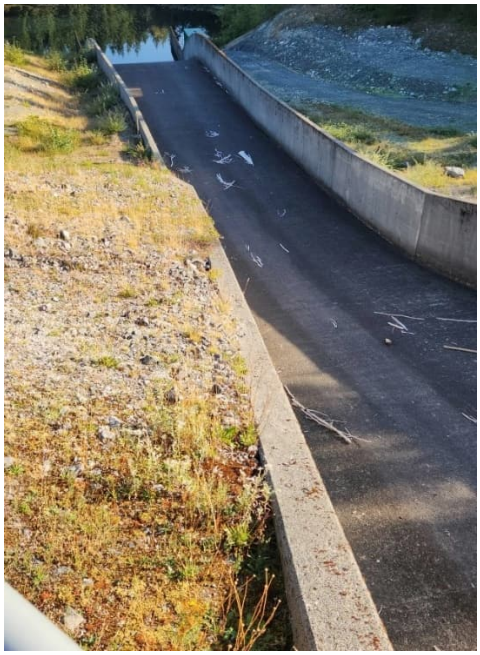
Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 14: Construction Joints in Spillway Structure Chute

Location: Jump Creek Dam (JCR)

Date: September 16, 2025



JCR 15: Spillway Structure Chute

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 16: Upstream Face of Dam with Log Boom

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 17: Dam Crest (Looking towards the Left Abutment)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 18: LLO Intake at the Upstream Face of the Dam

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 19: Reservoir and Boom (from Right Abutment)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 20: Downstream Side of LLO

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 21: LLO Concrete Structure at Downstream Side (Right Wingwall)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 22: Water level downstream of the LLO

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 23: LLO Channel and Downstream Concrete Weir

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 24: Typical Standpipe Piezometer Casing

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 25: Typical Standpipe Piezometer within Casing

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 26: Weir B

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 27: Weir C

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 28: Weir D

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 29: Flowing Water at Weir E

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 30: Poor Quality Riprap Left of Piezometer SP12

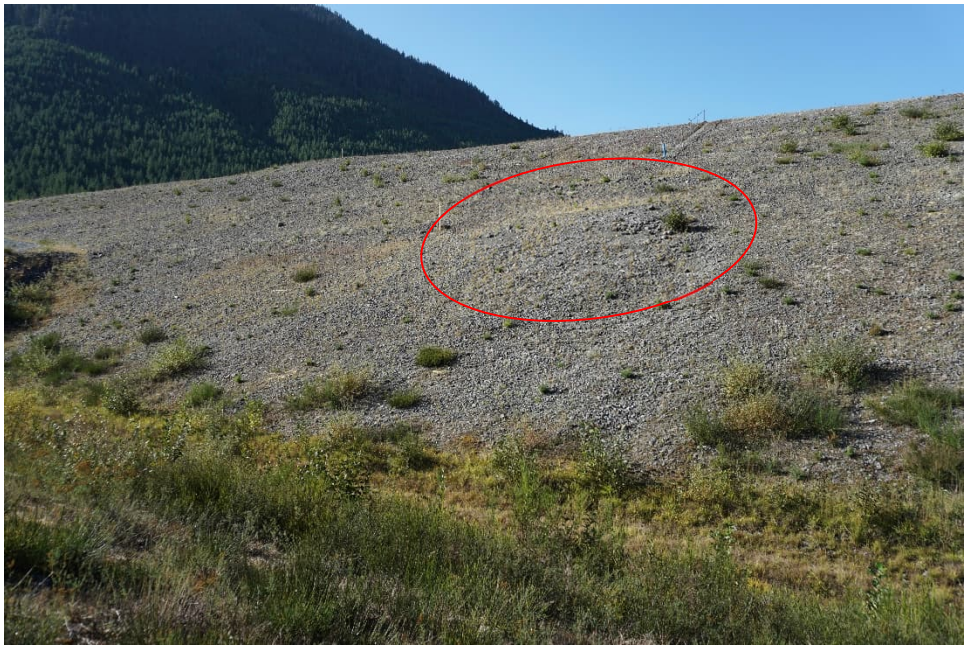
Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 31: Downstream Right Abutment

Location: Jump Creek Dam (JCR)

Date: September 16, 2025



JCR 32: Bulge on Downstream Face (Looking from Downstream Toe)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 33: Downstream Toe with Ruts and Seepage

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 34: Auxiliary Spillway with Concrete Block Crest and Upstream Face of Dam (Looking towards the Right Abutment)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 35: Auxiliary Spillway and Downstream Face of Dam (Looking towards the Left Abutment)

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 36: Auxiliary Spillway and Downstream Face of Dam, zone with sparse riprap

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 37: Auxiliary Spillway and Downstream Face of Dam, zone with sparse riprap

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 38: Seepage at Downstream Toe of Auxiliary Spillway

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 39: Auxiliary Crest Concrete Block

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 40: Turbine Siphon Inlet

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 41: Turbine Outlet

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 42: Erosion by Turbines

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 43: Spalling on Bridge Curbs

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 44: Cracking on Right Abutment Wall

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 45: LLO Inlet Covers

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

JCR 46: Corroded Fasteners on LLO Operating Platform

Location: Jump Creek Dam (JCR)

Date: September 16, 2025

SFK 1: South Fork Dam Reservoir

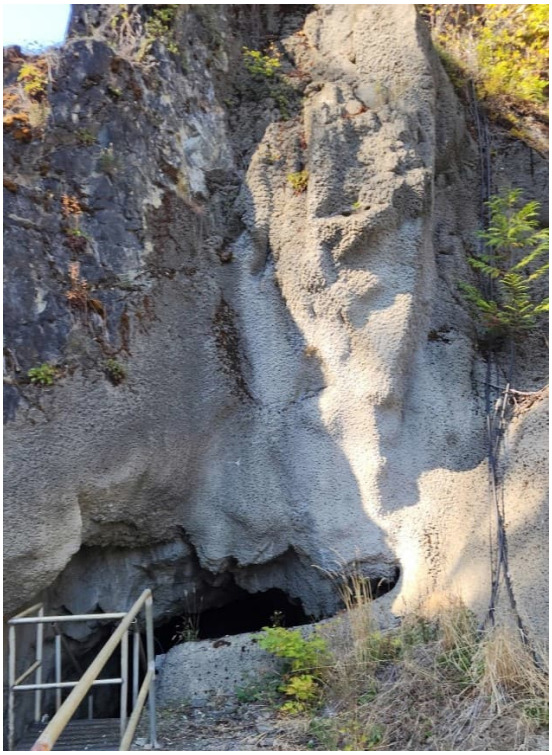
Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 2: South Fork Dam (looking from Left Abutment)

Location: South Fork Dam (SFK)

Date: September 16, 2025



SFK 3: Shotcrete at the Entry to Water Supply Tunnel

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 4: Water Supply Intake Debris Boom

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 5: Right Abutment Rockface

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 6: Left and Right Concrete Abutments

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 7: Downstream Face of Dam

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 8: Upstream Face of Intake Tunnel

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 9: Water Supply Pipe Anchor and Foundation Block

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 10: Tunnel Weir Seepage

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 11: Headwall Shotcrete Condition (Downstream)

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 12: Rock Slope with Rock Bolts and Mesh Installed Behind Building

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 13: Exposed Bedrock Upstream of Left Abutment

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 14: Upstream of Left Abutment

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 15: Handrail Post with Exposed Reinforcement

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 16: Broken Weld on Handrail at Inlet Operating Platform

Location: South Fork Dam (SFK)

Date: September 16, 2025

SFK 17: Corrosion on Underside of Inlet Operating Platform Ramp

Location: South Fork Dam (SFK)

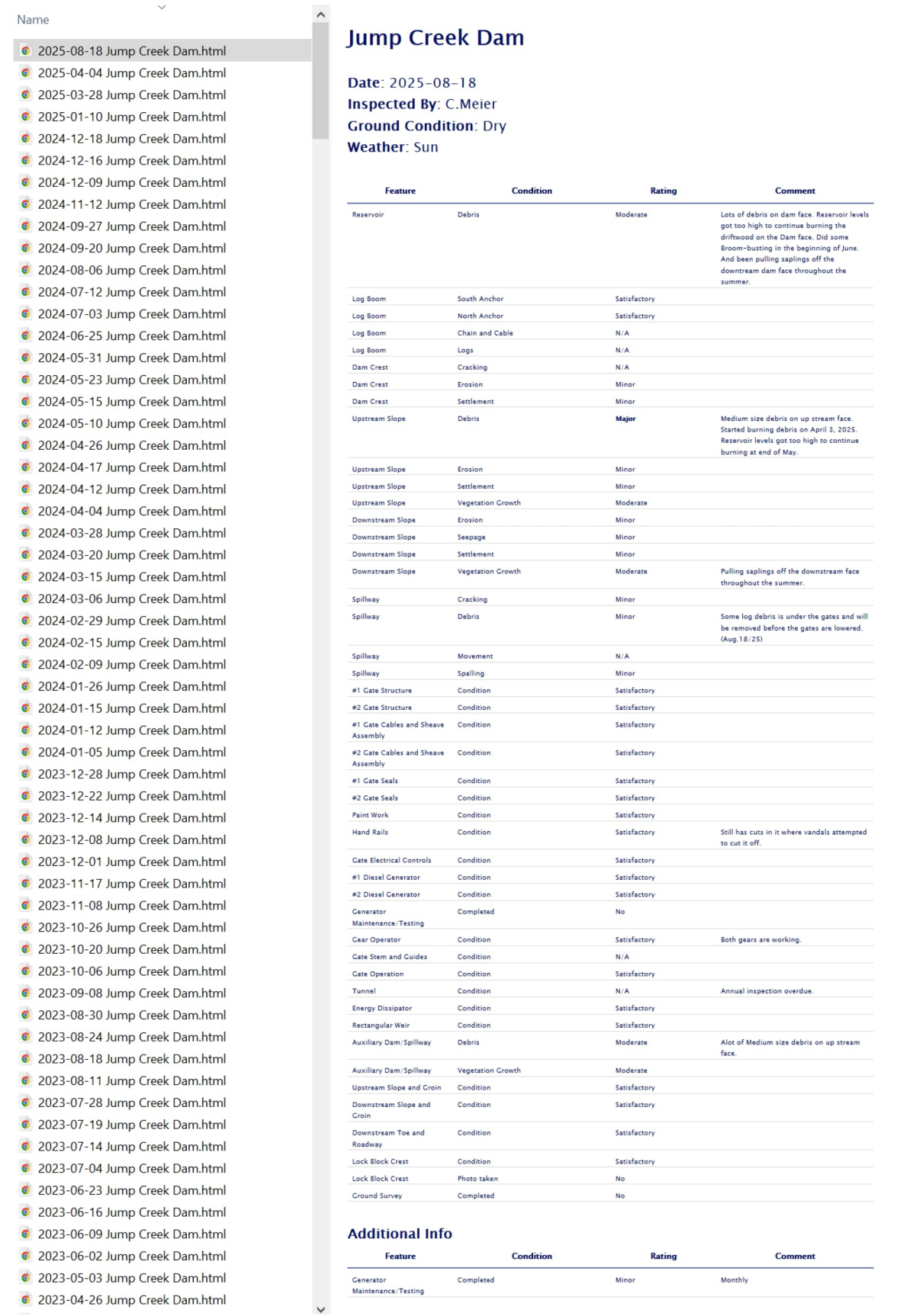
Date: September 16, 2025

SFK 18: Missing Fasteners on Inlet Operating Platform

Location: South Fork Dam (SFK)

Date: September 16, 2025

Appendix D
City of Nanaimo – Mobile Dam Inspection Database 2025



Jump Creek Dam

Date: 2025-08-18
Inspected By: C.Meier
Ground Condition: Dry
Weather: Sun

Feature	Condition	Rating	Comment
Reservoir	Debris	Moderate	Lots of debris on dam face. Reservoir levels got too high to continue burning the driftwood on the Dam face. Did some Broom-busting in the beginning of June. And been pulling saplings off the downtream dam face throughout the summer.
Log Boom	South Anchor	Satisfactory	
Log Boom	North Anchor	Satisfactory	
Log Boom	Chain and Cable	N/A	
Log Boom	Logs	N/A	
Dam Crest	Cracking	N/A	
Dam Crest	Erosion	Minor	
Dam Crest	Settlement	Minor	
Upstream Slope	Debris	**Major**	Medium size debris on up stream face. Started burning debris on April 3, 2025. Reservoir levels got too high to continue burning at end of May.
Upstream Slope	Erosion	Minor	
Upstream Slope	Settlement	Minor	
Upstream Slope	Vegetation Growth	Moderate	
Downstream Slope	Erosion	Minor	
Downstream Slope	Seepage	Minor	
Downstream Slope	Settlement	Minor	
Downstream Slope	Vegetation Growth	Moderate	Pulling saplings off the downstream face throughout the summer.
Spillway	Cracking	Minor	
Spillway	Debris	Minor	Some log debris is under the gates and will be removed before the gates are lowered. (Aug.18/25)
Spillway	Movement	N/A	
Spillway	Spalling	Minor	
#1 Gate Structure	Condition	Satisfactory	
#2 Gate Structure	Condition	Satisfactory	
#1 Gate Cables and Sheave Assembly	Condition	Satisfactory	
#2 Gate Cables and Sheave Assembly	Condition	Satisfactory	
#1 Gate Seals	Condition	Satisfactory	
#2 Gate Seals	Condition	Satisfactory	
Paint Work	Condition	Satisfactory	
Hand Rails	Condition	Satisfactory	Still has cuts in it where vandals attempted to cut it off.
Gate Electrical Controls	Condition	Satisfactory	
#1 Diesel Generator	Condition	Satisfactory	
#2 Diesel Generator	Condition	Satisfactory	
Generator Maintenance/Testing	Completed	No	
Gear Operator	Condition	Satisfactory	Both gears are working.
Gate Stem and Guides	Condition	N/A	
Gate Operation	Condition	Satisfactory	
Tunnel	Condition	N/A	Annual inspection overdue.
Energy Dissipator	Condition	Satisfactory	
Rectangular Weir	Condition	Satisfactory	
Auxiliary Dam/Spillway	Debris	Moderate	Alot of Medium size debris on up stream face.
Auxiliary Dam/Spillway	Vegetation Growth	Moderate	
Upstream Slope and Groin	Condition	Satisfactory	
Downstream Slope and Groin	Condition	Satisfactory	
Downstream Toe and Roadway	Condition	Satisfactory	
Lock Block Crest	Condition	Satisfactory	
Lock Block Crest	Photo taken	No	
Ground Survey	Completed	No	

Additional Info

Feature	Condition	Rating	Comment
Generator Maintenance/Testing	Completed	Minor	Monthly

Jump Creek Dam

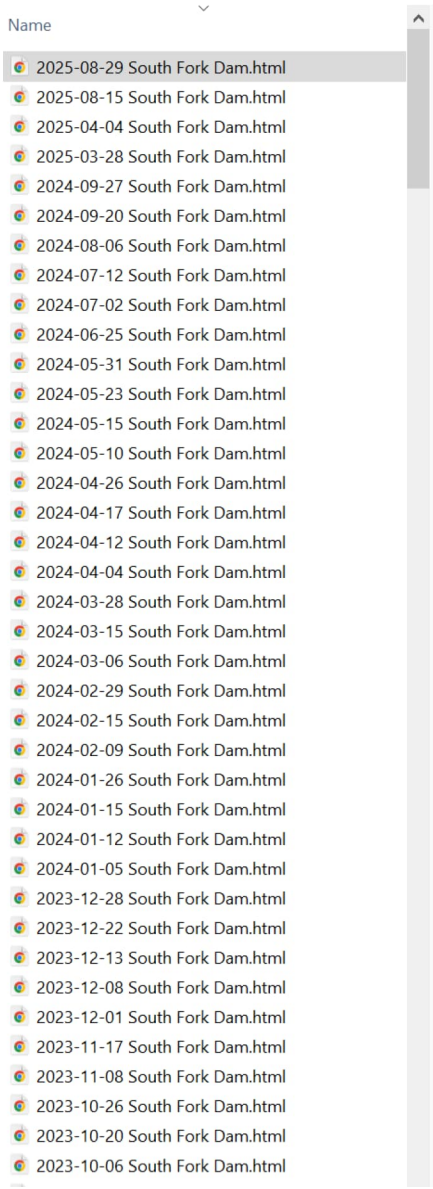
Date: 2025-08-18
Inspected By: C.Meier
Ground Condition: Dry
Weather: Sun

Feature	Condition	Rating	Comment
Reservoir	Debris	Moderate	Lots of debris on dam face. Reservoir levels got too high to continue burning the driftwood on the Dam face. Did some Broom-busting in the beginning of June. And been pulling saplings off the downtream dam face throughout the summer.
Log Boom	South Anchor	Satisfactory	
Log Boom	North Anchor	Satisfactory	
Log Boom	Chain and Cable	N/A	
Log Boom	Logs	N/A	
Dam Crest	Cracking	N/A	
Dam Crest	Erosion	Minor	
Dam Crest	Settlement	Minor	
Upstream Slope	Debris	**Major**	Medium size debris on up stream face. Started burning debris on April 3, 2025. Reservoir levels got too high to continue burning at end of May.
Upstream Slope	Erosion	Minor	
Upstream Slope	Settlement	Minor	
Upstream Slope	Vegetation Growth	Moderate	
Downstream Slope	Erosion	Minor	
Downstream Slope	Seepage	Minor	
Downstream Slope	Settlement	Minor	
Downstream Slope	Vegetation Growth	Moderate	Pulling saplings off the downstream face throughout the summer.
Spillway	Cracking	Minor	
Spillway	Debris	Minor	Some log debris is under the gates and will be removed before the gates are lowered. (Aug.18/25)
Spillway	Movement	N/A	
Spillway	Spalling	Minor	
#1 Gate Structure	Condition	Satisfactory	
#2 Gate Structure	Condition	Satisfactory	
#1 Gate Cables and Sheave Assembly	Condition	Satisfactory	
#2 Gate Cables and Sheave Assembly	Condition	Satisfactory	

#1 Gate Seals	Condition	Satisfactory	
#2 Gate Seals	Condition	Satisfactory	
Paint Work	Condition	Satisfactory	
Hand Rails	Condition	Satisfactory	Still has cuts in it where vandals attempted to cut it off.
Gate Electrical Controls	Condition	Satisfactory	
#1 Diesel Generator	Condition	Satisfactory	
#2 Diesel Generator	Condition	Satisfactory	
Generator Maintenance/Testing	Completed	No	
Gear Operator	Condition	Satisfactory	Both gears are working.
Gate Stem and Guides	Condition	N/A	
Gate Operation	Condition	Satisfactory	
Tunnel	Condition	N/A	Annual inspection overdue.
Energy Dissipator	Condition	Satisfactory	
Rectangular Weir	Condition	Satisfactory	
Auxiliary Dam/Spillway	Debris	Moderate	Alot of Medium size debris on up stream face.
Auxiliary Dam/Spillway	Vegetation Growth	Moderate	
Upstream Slope and Groin	Condition	Satisfactory	
Downstream Slope and Groin	Condition	Satisfactory	
Downstream Toe and Roadway	Condition	Satisfactory	
Lock Block Crest	Condition	Satisfactory	
Lock Block Crest	Photo taken	No	
Ground Survey	Completed	No	

Additional Info

Feature	Condition	Rating	Comment
Generator Maintenance/Testing	Completed	Minor	Monthly



South Fork Dam

Date: 2025-08-29
Inspected By: C.Meier
Ground Condition: Dry
Weather: Sun
Reservoir Level: 1cm
Weir Level: 4.5cm
Auxilliary Spillway Weir Level: 4.5cm

Feature	Condition	Rating	Comment
Reservoir	Debris	Minor	
Log Boom	South Anchor	N/A	
Log Boom	North Anchor	N/A	
Log Boom	Chain and Cable	N/A	
Log Boom	Logs	N/A	
Control Platform	Condition	Satisfactory	
Embankment Rip Rap	Condition	Satisfactory	
Fisheries Outlets and Valving	Condition	Satisfactory	
Valve Chamber	Condition	Satisfactory	
Weir at Tunnel	Condition	Unsatisfactory	
Above Water Inlet Structure	Condition	Satisfactory	
Left Abutment	Condition	Satisfactory	
Retaining Wall	Condition	Satisfactory	
Right Abutment	Condition	Unsatisfactory	
Tunnel and Piping	Entrance, Shotcrete Face Condition	Satisfactory	
Tunnel and Piping	Rock Walls and Ceiling Condition	Satisfactory	
Tunnel and Piping	Pipe Condition (Staining, Coating)	Satisfactory	
Tunnel and Piping	Debris	Minor	
48" Supply Inlet	Condition	N/A	
Downstream Face	Condition	N/A	
Drain Plug Center	Condition	N/A	
Drain Plug Left	Condition	N/A	
Roads	Sloughing	Minor	
Roads	Culvert Condition (Erosion)	Satisfactory	
Inlet Chlorine Packs	Added	Yes	Bi-monthly in the winter. Monthly through spring, summer and fall.
Ground Survey	Completed	No	

South Fork Dam

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Auxilliary Spillway Weir Level: 4.5cm

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Roads	Culvert Condition (Erosion)	Satisfactory	
Inlet Chlorine Packs	Added	Yes	Bi-monthly in the winter. Monthly through spring, summer and fall.
Ground Survey	Completed	No	