



Notice of Meeting and Meeting Agenda Water Advisory Committee

Tuesday, November 26, 2024

12:00 PM

Goldstream Meeting Room
479 Island Hwy
Victoria BC V9B 1H7

Members of the public can watch the live meeting via MS Teams link: [Click here](#)
Audio and video participation is disabled.

MEMBERS:

Katie Oppen – Chair (Scientific)

Kathleen Zimmerman – Vice Chair (Agriculture)

Celine Davis (Resident / Ratepayer)

Mike Doehnel (Vice Chair, Saanich Peninsula Water Commission)

Ashley Fernandes (Environmental)

Karen Harper (Vice Chair, Regional Water Supply Commission)

Taylor Krawczyk (Agriculture)

Alex McArdle (Agriculture)

Craig Nowakowski (Island Health)

Adam Pakvis (Commercial / Industrial Water User)

Tom Pedersen (Environmental)

John Rogers (Vice Chair, Juan de Fuca Water Dist. Commission)

Wilf Scheuer (Commercial / Industrial)

David Timothy (Fish Habitat)

Mike Turner (Fish Habitat)

1. Territorial Acknowledgement

2. Approval of Agenda

3. Adoption of Minutes

3.1. [24-1266](#) Adoption of the Minutes of the September 23, 2024 Meeting

Recommendation: That the minutes of the September 23, 2024 Water Advisory Committee meeting be adopted.

Attachments: [Draft Minutes: September 23, 2024](#)

4. Chair's Remarks

5. Presentations/Delegations

Delegations will have the option to participate electronically. Please complete the online application for "Addressing the Board" on our website and staff will respond with details.

Alternatively, you may email your comments on an agenda item to the Water Advisory Committee at iwsadministration@crd.bc.ca. Requests must be received no later than 4:30 p.m. two calendar days prior to the meeting.

6. General Manager's Report

6.1. [24-1265](#) Water Advisory Committee Bylaw and Terms of Reference Update

Recommendation: There is no recommendation. This report is for information only.

Attachments: [Appendix A: Amendment Bylaw No. 4652](#)
[Appendix B: Updated Committee Terms of Reference](#)

6.2. [24-1204](#) Strategic Plan Update [Verbal]

7. Committee Business

7.1. [24-1260](#) Water Quality Summary Report for Greater Victoria Drinking Water System - May to August 2024

Recommendation: There is no recommendation. This report is for information only.

Attachments: [Staff Report: Water Quality Summary Report for GVDWS - May to August 2024](#)
[Appendix A: Water Quality Summary Report for GVDWS - May to August 2024](#)

7.2. [24-1259](#) Water Advisory Committee Proposal - Agricultural Water Rates

Recommendation: There is no recommendation. The report is for information only.

Attachments: [WAC Proposal: Agricultural Water Rates](#)

7.3. [24-1261](#) Dam Safety Program Update

Recommendation: There is no recommendation. This report is for information only.

Attachments: [Staff Report: Dam Safety Program Update](#)
[Appendix A: CRD Managed Dams Map](#)
[Appendix B: Summary of RWS Dams](#)
[Appendix C: Application of the Dam Safety Regulation](#)
[Appendix D: Dam Failure Consequence Classification](#)
[Appendix E: Dam Safety Program – Major Project Descriptions](#)

7.4. [24-1262](#) Master Plan - Program Implementation Design RFP

Recommendation: There is no recommendation. This report is for information only.

Attachments: [RFP Appendix A: Scope of Services](#)

7.5. [24-1264](#) Summary of Recommendations from Regional Water Supply Commission

Recommendation: There is no recommendation. This report is for information only.

Attachments: [Summary of Recommendations from Regional Water Supply Commission](#)

7.6. [24-1263](#) Water Watch Report

Recommendation: There is no recommendation. The report is for information only.

Attachments: [Water Watch Report](#)

8. New Business

9. Adjournment

Next Meeting: 2025, date to be confirmed



Making a difference...together

MINUTES OF A MEETING OF THE Water Advisory Committee, held Monday, September 23, 2024 at 12 pm in the Goldstream Meeting room at 479 Island Highway, Victoria, BC

PRESENT: Members: K. Zimmerman (Vice Chair); M. Doehnel; A. Fernandes; K. Harper; T. Krawczyk (EP); C. Nowakowski (EP); T. Pedersen; J. Rogers; W. Scheuer; D. Timothy; M. Turner;

Staff: A. Fraser, General Manager, Integrated Water Services; Nigel Burrows, Manager, Wildfire Security & Emergency Response, Watershed Protection; Kirsti Wilson, Demand Management Coordinator, Environmental Protection; Danielle Buckle, Water Conservation Assistant, Environmental Protection; Jenn Zimmerman, Communications Coordinator, Corporate Services; D. Dionne, Manager, Business Support Services, Integrated Water Services (Recorder)

REGRETS: K. Oppen; C. Davis; A. McArdle; A. Pakvis

EP = Electronic Participation

The meeting was called to order at 12:02 pm.

1. TERRITORIAL ACKNOWLEDGEMENT

The Chair provided the Territorial Acknowledgement.

2. APPROVAL OF AGENDA

MOVED by W. Scheuer, **SECONDED** by T. Pedersen,
That the agenda be approved.

CARRIED

3. ADOPTION OF MINUTES

MOVED by T. Pedersen, **SECONDED** by M. Turner,
That the minutes of the May 28, 2024 Water Advisory Committee meeting be adopted.

CARRIED

4. CHAIR'S REMARKS

The Chair noted that since the next scheduled meeting would be December 24, 2024 the meeting date has been moved to November 26, 2024 instead.

5. PRESENTATIONS/DELEGATIONS

5.1. PRESENTATIONS

There were no presentations or delegations.

6. GENERAL MANAGER'S REPORT

- **Strategic Plan Update**

A. Fraser provided an update highlighting some of the key feedback from the Regional Water Supply Commission that have been added since the plan was presented to this Committee:

- Updated the use of the term drinking water in both the commitments and the mission to drinkable water, to reflect the responsibility for providing water that meets the quality requirements for drinking water, but that's not how everybody uses that water.
- Added the development of a long-term resource strategy and succession planning program for the service that considers the strategic priority as well as the changing infrastructure landscape within the service.
- Added a requirement to develop a policy, parameters and requirements for the consideration of renewable energy or environmentally sustainable enterprises within the Greater Victoria watershed.
- Investigating the introduction of a framework that measures the investment in climate adaptation and mitigation versus the cost of inaction. We also incorporated more focus on how we align and how we support our climate change objectives.

The Regional Water Supply Commission will be receiving the updated draft Strategic Plan on September 25, 2024 and will be seeking approval to proceed with public consultation.

7. COMMITTEE BUSINESS

7.1. Presentation: Wildfire Management and 2024 Update

N. Burrows provided a presentation and staff responded to questions from the Committee regarding:

- Illegal access
- Oldman River fire
- Public reporting
- CRD fire response crew and what they respond to
- Road access
- Fire breaks
- Forrest fuel removal
- Infrared camera success
- Wildfire management plan
- Post wildfire Riparian restoration

7.2. Presentation: Demand Management Program Update

K. Wilson and D. Buckle provided a presentation and staff responded to questions regarding:

- Increasing population

- Variable growth challenges
- Unaccounted for water use
- Non-revenue water loss
- School outreach
- Smart water monitors
- ICI water use
- Water use incentives – pricing, equitable rate studies
- Include details on the outcomes of those programs.
- Peak demand water use outreach program
- Instantaneous peak demand – positive community response

Follow-up tasks:

- Agricultural Water Rates: Prepare a detailed presentation on the agricultural water rates study for the November meeting. (Water Management Team)

1:40 T. Krawczyk left the meeting

7.3. Water Advisory Committee Proposal – Agricultural Water Rates

MOVED by D. Timothy, **SECONDED** by Commissioner M. Turner,
That item 7.3 be postponed to the next Water Advisory Committee meeting.

CARRIED

7.4. Summary of Recommendations from Regional Water Supply Commission

Received for information.

7.5. Water Watch Report

Received for information.

8. NOTICE OF EXPIRING TERMS – DECEMBER 31, 2024

The following Committee members terms are expiring on December 31, 2024. The Chair thanked those members reaching their third term for their time and commitment to the Committee. Staff advised that for those members still in their first or second term they are able to put their names forward for another term. For those ending, they would need to wait a year before reapplying.

- Kathleen Zimmerman, Agricultural [Term 1]
- Alex McCardle, Agricultural [Term 1]
- Adam Pakvis, Commercial & Industrial Water User [Term 1]
- Katie Oppen, Scientific [Term 1]
- Tayler Krawczyk, Agricultural [Term 3]
- Wilf Scheuer, Commercial / Industrial [Term 2]
- David Timothy, Fish Habitats [Term 3]

9. NEW BUSINESS

There was no new business.

10. ADJOURNMENT

MOVED by T. Pedersen, **SECONDED** by A. Fernandes,
That the September 23, 2024 Water Advisory Committee meeting be adjourned at 2:05 pm.
CARRIED

CHAIR

SECRETARY

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4652

A BYLAW TO AMEND BYLAW NO. 2541
WATER ADVISORY COMMITTEE BYLAW NO. 1, 1997

WHEREAS:

- A. Under Bylaw No. 2541, "Water Advisory Committee Bylaw No. 1, 1997", the Regional Board established a Regional Water Supply, Protection and Conservation Advisory Committee to provide advice to the Regional Water Supply Commission on water supply, water quality, the stewardship of the lands held by the Regional District for water supply purposes and water conservation measures;
- B. To align the function of the Water Advisory Committee with the Regional Water Supply Strategic Plan and the priorities defined within, to provide a direct link to the Regional Water Supply Commission through the Commission's Vice Chair and to provide clarity on membership representation; and
- C. The Board wishes to amend Bylaw No. 2541 to ensure consistency between the work of the Water Advisory Committee and the Regional Water Supply Commission's strategic priorities.

NOW, THEREFORE, the Board of the Capital Regional District in open meeting assembled enacts as follows:

- 1. Bylaw No. 2541, "Water Advisory Committee Bylaw No. 1, 1997", is hereby amended as follows:
 - (a) By amending Section 2(b) to remove from the bulleted list "First Nations" and "other bodies the Regional District Board considers appropriate."
 - (b) By inserting as Section 2(c) the following:
 - (c) up to five representatives from other bodies the Regional District Board considers appropriate.
 - (c) By inserting as Section 2(d) the following:
 - (d) one representative from each First Nation in the Capital Regional District, who may participate in Water Advisory Committee meetings at their pleasure, in accordance with Bylaw No. 3828, "Capital Regional District Board Procedures Bylaw, 2012", where the First Nation has an interest in matters being considered by the Water Advisory Committee.
 - (d) By amending section 3 to insert ", to a maximum participation of three terms (i.e. six years)," between the words "two year period" and "except".
 - (e) By replacing Section 5 with the following:
 - 5. The Water Advisory Committee shall, at its first meeting each year, appoint as its Chair the Vice-Chair of the Regional Water Supply Commission, with a term commencing and ending commensurate to the term of the Vice-Chair. The Water Advisory Committee shall,

at its first meeting each year, elect from among its members a Vice-Chair of the Water Advisory Committee.

(f) By amending section 6 as follows:

6. The Committee must follow Bylaw No. 3828, "Capital Regional District Board Procedures Bylaw, 2012", when conducting a meeting, so far as they are applicable.

(g) By amending section 7 as follows:

7. The mandate of the Water Advisory Committee is to provide advice to the Regional Water Supply Commission, with a view to the current Strategic Plan approved by the Regional Water Supply Commission and the priorities defined within, on water supply, water quality, and stewardship of the lands held by the Regional District for water supply and water conservation purposes.

2. This Bylaw may be cited for all purposes as the "Water Advisory Committee Bylaw No. 1, 1997", Amendment Bylaw No. 1, 2024".

READ A FIRST TIME THIS	th	day of	20__
READ A SECOND TIME THIS	th	day of	20__
READ A THIRD TIME THIS	th	day of	20__
ADOPTED THIS	th	day of	20__

CHAIR

CORPORATE OFFICER

Terms of Reference

CRD

WATER ADVISORY COMMITTEE

PREAMBLE

In 1997 the *Greater Victoria Water District Act* was repealed and replaced by the *Capital Regional Water Supply and Sooke Hills Protection Act* (Act). The implementation of the Act is governed by the Capital Regional Water Supply and Sooke Hills Protection Regulation (Regulation). Both the Act and the Regulation were enacted August 1, 1997.

Under the Regulation the Capital Regional District (CRD) must establish by bylaw a standing committee of the Regional Board known as the Regional Water Supply Commission (Commission). The Commission was established in September, 1997. The Regulation further requires the appointment of a Regional Water Supply, Protection and Conservation Advisory Committee (Committee) to provide advice to the Commission on water supply, water quality, the stewardship of lands held by the CRD for water supply purposes and water conservation measures.

These terms of reference serve to clarify the mandate, responsibilities and procedures and supplement Bylaw No. 2541, "Water Advisory Committee Bylaw No. 1, 1997".

The Committee's official name is to be:

Water Advisory Committee

1.0 PURPOSE

- a) Reviewing options for water supply, water quality, water conservation and the stewardship of catchment lands based on their technical and economic merit;
- b) Taking into consideration the social and environmental impacts in the review of options;
- c) Ensuring all relevant issues are being considered;
- d) Advising on the development of a public consultation process;
- e) Attending and participating, when required, in public meetings, open houses, etc.;
- f) Communicating the issues being considered to groups represented by the Committee members and reporting comments/concerns back to the Committee; and
- g) Making recommendations to be forwarded to the Regional Water Supply Commission.

2.0 ESTABLISHMENT AND AUTHORITY

- a) The mandate of the Water Advisory Committee is to provide advice to the Regional Water Supply Commission with a view to the current Strategic Plan approved by the Regional Water Supply Commission and the priorities defined within, on water supply, water quality and stewardship of the lands held by the Regional District for water supply purposes and water conservation purposes.
- b) The Water Advisory Committee shall, at its first meeting each year, appoint as its Chair the Vice-Chair of the Regional Water Supply Commission, with a term commencing and ending commensurate to the term of the Vice-Chair. The Water Advisory Committee shall, at its first meeting each year, elect from among its members a Vice-Chair of the Water Advisory Committee.

3.0 COMPOSITION

The Committee shall consist of 11 members, with a diversity of background, interests and geographical location, representing a balance between technical and non-technical members and industry and public members.

The membership of the Water Advisory Committee is comprised as follows:

- (a) one representative each from the Regional Water Supply Commission, the Juan de Fuca Water Distribution Commission and the Saanich Peninsula Water Commission.
- (b) One (1) representative from each of the following:
 - The agriculture community
 - Groups concerned with the protection of fish habitats
 - Environmental groups
 - Commercial and industrial water users
 - Residents and ratepayers' associations
 - Island Health
 - The scientific community
- (c) up to five representatives from other bodies the Regional District Board considers appropriate.
- (d) one representative from each First Nation in the Capital Regional District, who may participate in Water Advisory Committee meetings at their pleasure, in accordance with Bylaw No. 3828, "Capital Regional District Board Procedures Bylaw, 2012", where the First Nation has an interest in matters being considered by the Water Advisory Committee.

4.0 TERM OF SERVICE

In order to ensure on-going opportunities to serve on the Committee and to maintain continuity, the Regional Water Supply Commission will appoint Committee members for up to a two-year term, to a maximum participation of three terms (i.e. six years). The Committee may request that the Commission replace a member who has missed three consecutive meetings.

5.0 PROCEDURES

- a) The Regional Water Supply Commission will approve the Committee terms of reference annually.
- b) Issues requiring consideration by the Committee will be identified by the Commission, staff or the Committee. Issues and recommendations for the Committee's consideration will be submitted to the Committee in the form of a staff report.
- c) The Committee must follow Bylaw No. 3828, "Capital Regional District Board Procedures Bylaw, 2012", when conducting a meeting, so far as they are applicable.
- d) Regular meetings of the Committee will be set based on the need for consideration of issues identified by the Commission or staff, or at the call of the Committee Chair. At a minimum there will be two meetings per year.
- e) The agenda will be finalized in consultation between staff and the Chair and Vice Chair of the Committee. Items to be included in the agenda must be received by the Committee secretary at least one week in advance of a meeting.
- f) A quorum is a majority of the Committee membership and is required to conduct committee business.

6.0 RESOURCES AND SUPPORT

- a) The General Manager of Integrated Water Services will be the staff liaison for the Committee and will lead the coordination and allocation of resources to the Committee.
- b) Minutes and agendas are prepared and distributed by Integrated Water Services staff.

7.0 RELATIONSHIP WITH REGIONAL WATER SUPPLY COMMISSION

- a) Reports and recommendations from the Committee will be forwarded to the Commission through the Committee Chair. Alternatively, where the Committee makes a recommendation to staff, the Committee's recommendation will be incorporated in a report by staff to the Commission.
- b) The General Manager will attempt to keep the Committee apprised of reports or initiatives with such implications. Every effort should be made to maintain a streamlined and efficient process.

Approved by Regional Water Supply Commission on _____

**REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF WEDNESDAY, OCTOBER 16, 2024**

SUBJECT **Water Quality Summary Report for Greater Victoria Drinking Water System
– May to August 2024**

ISSUE SUMMARY

Staff provide regular updates on the monitoring results for water quality conditions observed in the Greater Victoria Drinking Water System in between annual reporting to the regulator.

BACKGROUND

The Capital Regional District (CRD) supplies drinking water to the water distribution systems across Greater Victoria via the Regional Water Supply System. As a requirement under the *BC Drinking Water Protection Act*, the CRD monitors and reports on water quality to ensure the region's drinking water supply is safe and potable. The results are presented on a regular basis directly to the Commission and Island Health, and to the general public through the CRD website.

All public drinking water systems in BC must comply with the *BC Drinking Water Protection Act* and the *BC Drinking Water Protection Regulation*. In addition, the CRD relies upon water quality parameters in the Guidelines for Canadian Drinking Water Quality and guidelines developed by the US Environmental Protection Agency to inform the CRD's water quality monitoring program.

Water quality monitoring is one of the cornerstones of the multi-barrier approach to providing safe potable drinking water to the region's residents. The monitoring program ensures proper integration of source water information, treatment processes, distribution infrastructure and delivery of water to customers. The program also ensures that potential risks are effectively managed to ensure a safe drinking water supply.

Appendix A summarizes the monitoring results for raw water in Sooke Lake Reservoir, the treated water at the two water treatment plants, and for the treated water in various parts of the supply and distribution systems for the summer period from May to August 2024. In the past, quarterly update reports have been provided to the Commission. Starting in 2024, the water quality summary report interval increased to every four months.

IMPLICATIONS

Environmental Implications

The system is monitored for physical, chemical and biological water quality parameters. Monitoring results indicate that the CRD continues to meet guidelines for maintaining an unfiltered source water supply. Data from within the distribution systems also indicate a good balance between managing bacterial growth and ensuring good water quality with low concentrations of disinfection byproducts. Metal concentrations, including lead, are very low within the distribution systems, and physiochemical parameters indicate a low metal corrosion potential of the drinking water.

For the second time since 2017, the Greater Victoria Drinking Water System experienced an episode with high total coliform concentrations in the raw water coming from Sooke Lake

Reservoir. This event in late July to early August prompted the Goldstream Water Treatment Plant (WTP) to increase the UV and chlorination dosage to the maximum settings. Treated water quality requirements were maintained and the risk to the public was low.

Based on the experiences from an almost identical event in 2017, it is assumed that a wind-induced internal seiche in Sooke Lake was the cause of this event. Further investigations are ongoing. Goldstream WTP is an unfiltered facility making it susceptible to these events.

Intergovernmental Implications

The CRD provides compliance monitoring and reporting of the municipal systems, in addition to its regional commitments, to deliver effective and efficient oversight of water quality within the overall water system. Any issues that may arise within the municipal system remain the responsibility of the municipalities.

Social Implications

The full disclosure of water quality monitoring data maintains public confidence in the CRD to effectively manage the regional drinking water supply. The data and reports are available online through the CRD public website. Staff respond to direct customer concerns and questions, and work with CRD operational staff, municipal staff, small system operators and Island Health officials to ensure good communication and support for the overall system.

CONCLUSION

The water quality monitoring program remains an essential component in the delivery of a safe and abundant drinking water supply to the region. Monitoring results for summer 2024 indicate generally good water quality in the source water and treated drinking water except for the effects and implications during the total coliform event in Sooke Lake. Other than the total coliform bacteria concentrations during the two-week event, all critical parameters indicate stable conditions. Staff are providing this report to share the latest water quality monitoring results with the Commission.

RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Glenn Harris, Ph.D., R.P.Bio., Senior Manager, Environmental Protection
Concurrence:	Russ Smith, Acting General Manager, Parks, Recreation & Environmental Services
Concurrence:	Alicia Fraser, P. Eng., General Manager, Integrated Water Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT

Appendix A: Water Quality Summary Report for the Greater Victoria Drinking Water System – May to August 2024

**WATER QUALITY SUMMARY REPORT
FOR THE GREATER VICTORIA DRINKING WATER SYSTEM
MAY TO AUGUST 2024**

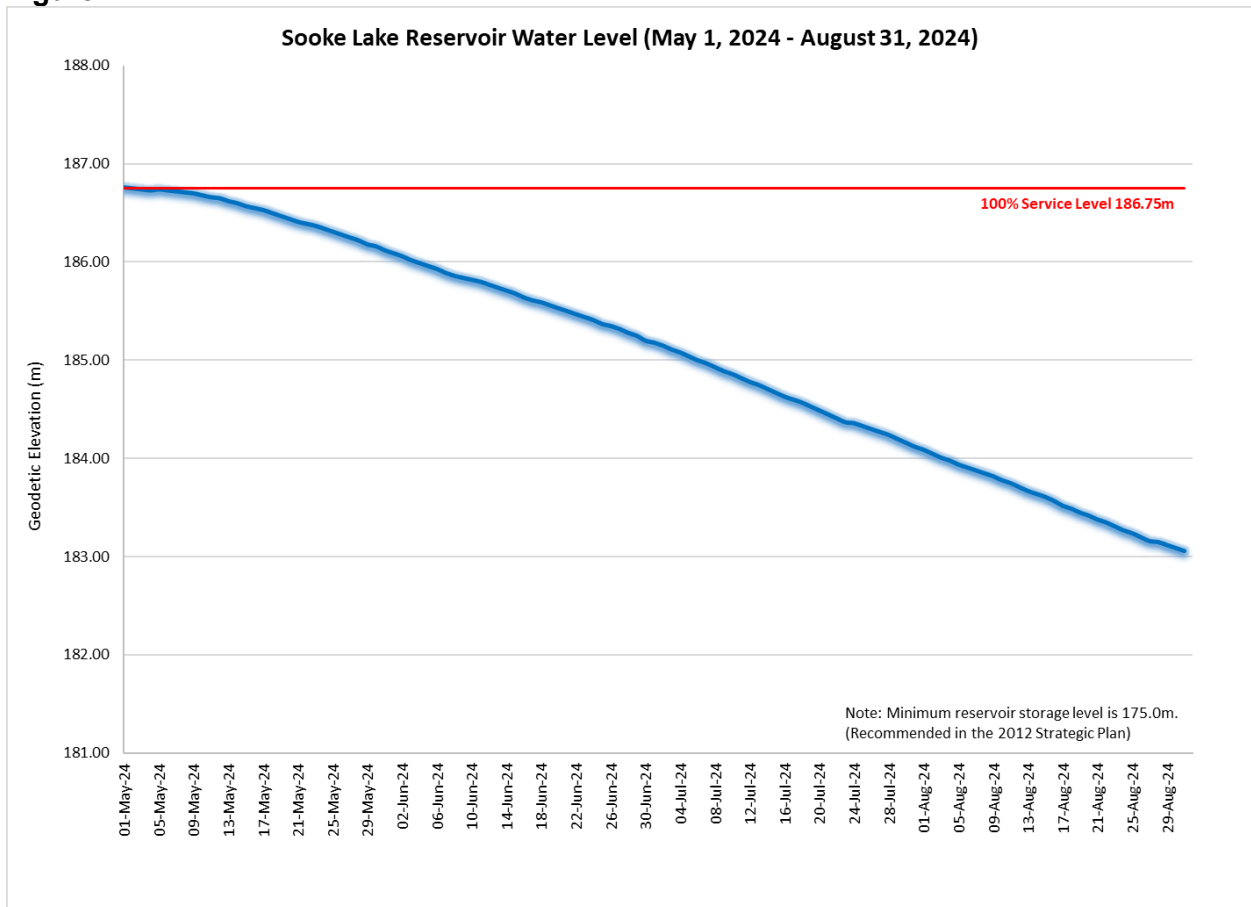
October 2024

1. SOURCE WATER – SOOKE LAKE RESERVOIR

(a) Physical Parameters

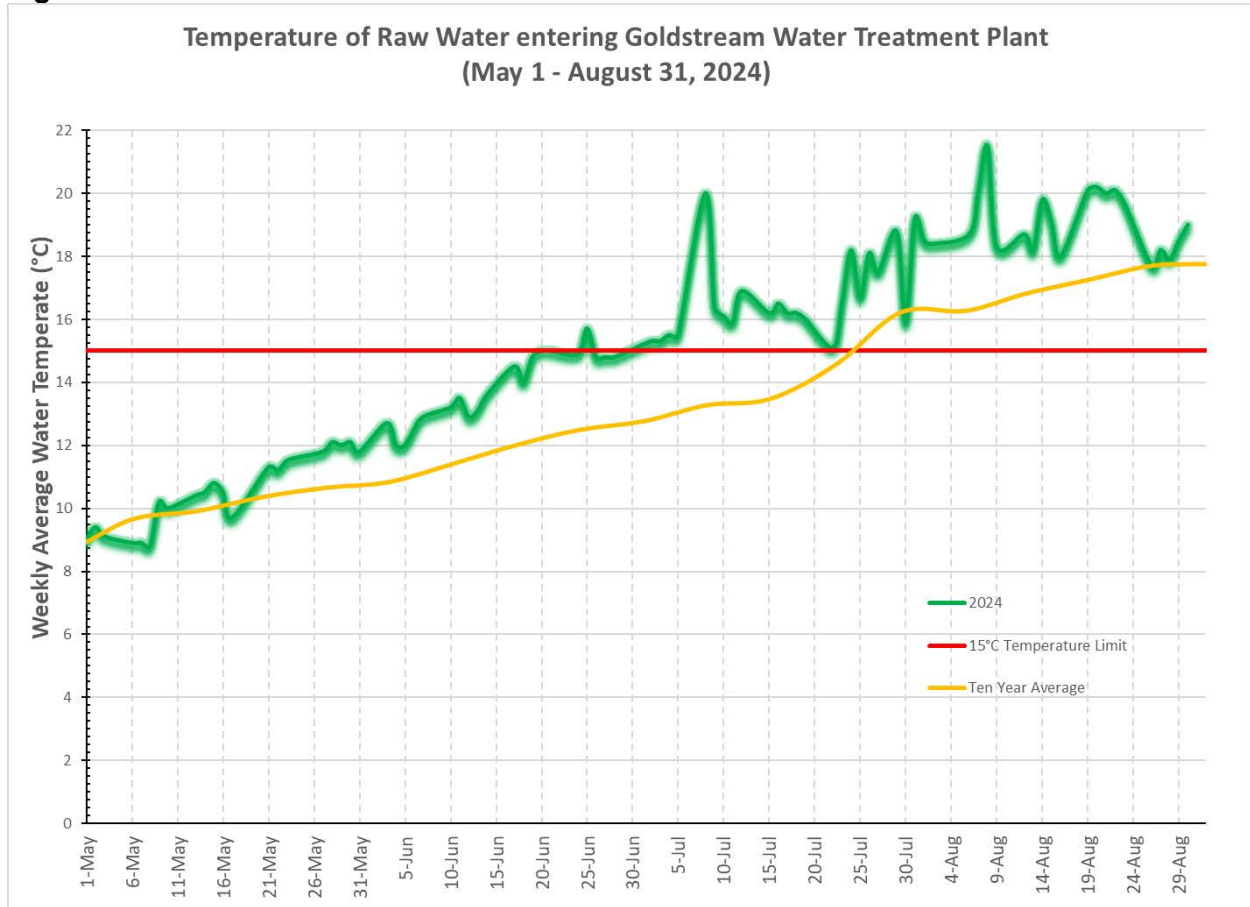
Water Levels. Sooke Lake Reservoir remained at 100% capacity until May 2, 2024 (see Figure 1). After May 2, reservoir levels continuously fell until the end of the reporting period. Significant precipitation in the middle of August did not generate any runoff into the reservoir and had therefore no impact on the declining level trend. On August 31, the reservoir had 72% of its full storage capacity. This is within the historical average range since the raising of the dam in 2004.

Figure 1



Water Temperature. The raw water temperature measured at the Goldstream Water Treatment Plant tracked above the long-term average trend for most of the reporting period (see Figure 2). The first part of August saw the highest water temperature of the year with >20°C, which has been a common short-term occurrence over the last few years.

Figure 2



Turbidity. Turbidity in the lake near the intake tower remained well below the 1.0 Nephelometric Turbidity Unit (NTU) limit and was very consistent for the entire reporting period (Table 1). There were no major algal events with significant impact on the raw water turbidity. Also, spring rainfall and runoff events did not affect the turbidity. This demonstrates the robustness of the Sooke Lake Reservoir in terms of turbidity impacts. The low turbidity of the raw water allows the ultraviolet disinfection stage to remain effective at inactivating parasites and bacteria.

Table 1

Sooke Reservoir, South Basin (1m) - SOL-00-01					
	Samples Collected	Unit of Measure	Minimum	Maximum	Mean
Turbidity	8	NTU	0.20	0.35	0.27

Water Transparency. The transparency of the lake water measured with the Secchi Disc in the lake was high (between 6 and 9 m) and consistent with the long-term average. Higher algal abundance during parts of the reporting period accounted for the slightly lower transparency around 6-7 m, but with no measurable impact on the treatability of the water. The average Secchi Disc depth during this reporting period was around 7.7 m.

Dissolved Oxygen. New lake profiler sensor technology allowed staff to generate detailed dissolved oxygen depth profiles in three parts of Sooke Lake. The data shows that Sooke Lake remained well oxygenated throughout the summer in all depths. Even the deep part of the North Basin exhibited dissolved oxygen concentration greater than 7 mg/L throughout the summer. The lowest dissolved oxygen concentrations were measured in the upper water column of the North Basin in August at 6.6-7.0 mg/L. This state prevents internal nutrient loading or metal releases in anoxic zones and is another indicator of the oligotrophic status of Sooke Lake.

(b) Bacteria

Total Coliform Bacteria and E. coli. The total coliform concentrations in the raw source water entering the Goldstream Water Treatment Plant were low from May until the middle of July (see Figure 3). Typically, the total coliform concentrations increase during the summer period from July to September when warm water temperatures increase bioactivity in the lake and the breakdown of the stratification in the South Basin causes a mixing effect. This typical summer increase in total coliform bacteria may reach concentrations of up to several hundred CFU/100 mL and is not cause for any concerns for the disinfection treatment process at both treatment plants. This summer the total coliform concentrations saw a first spike to nearly 6,000 CFU/100 mL in mid-July, which was followed up by a very unusually high spike of over 15,000 CFU/100 mL on July 25. In 2017 a similar severe total coliform event was recorded, and during both the 2017 and 2024 events, low concentrations of total coliform bacteria were found downstream of the Goldstream Water Treatment Plant. In both cases, the breakthrough seemed to be limited to short periods in the mornings of a few days with the highest total coliform concentrations in the source water. Also, the spread of any viable bacteria was limited to a narrow range just downstream of the treatment plant.

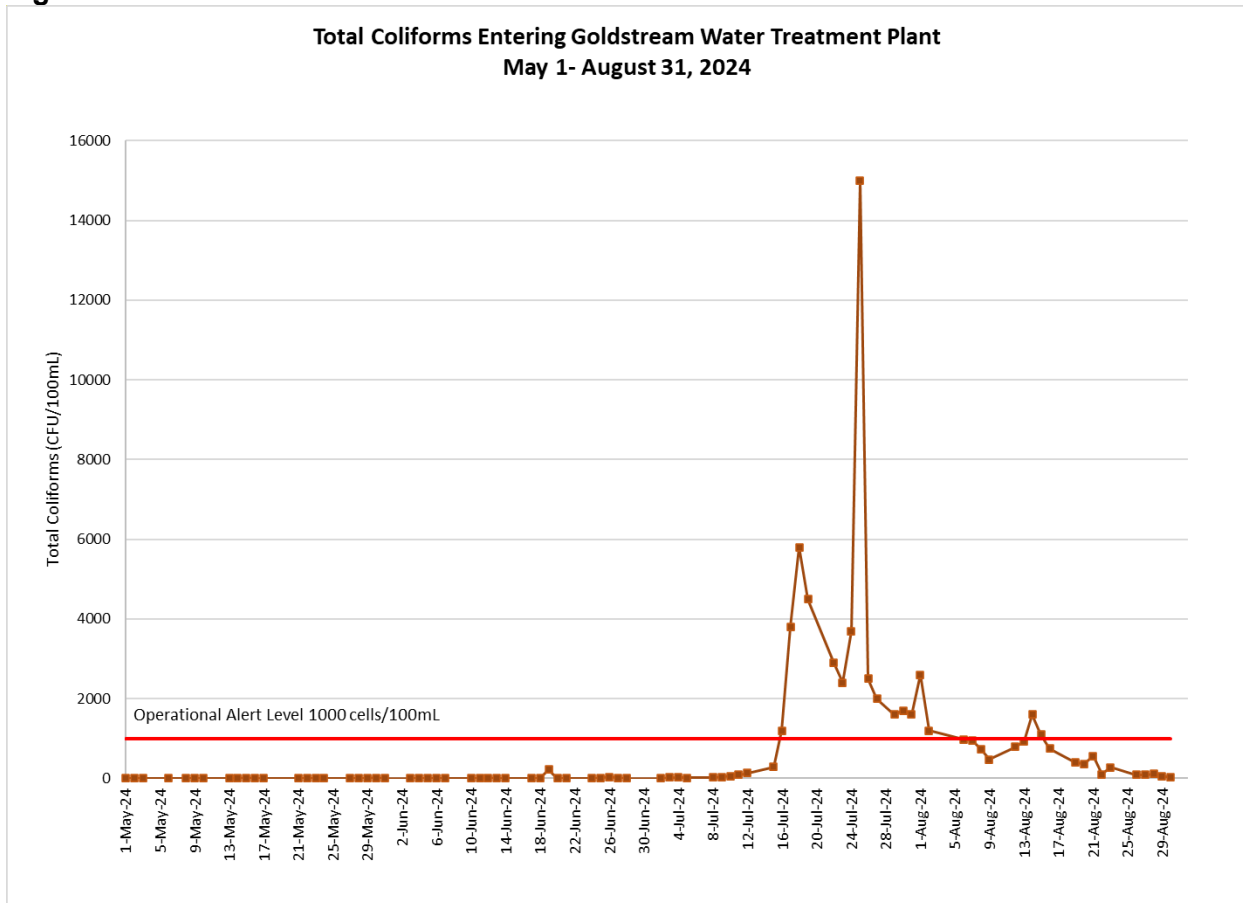
It appears that during peak water demand periods (typically 4-9 am) minor breakthroughs occurred. Sampling and testing confirmed that the bacteria breakthroughs were limited to low concentrations, only during morning hours and only within a short radius downstream of the Goldstream Water Treatment Plant. It is likely that these low concentrations of bacteria detected in the treated water at the two first customer sampling stations never reached any customer taps due to the continued disinfection through chlorine residuals in the treated water. No total coliform positive test result was recorded deeper into the system throughout this event. In 2017, a post-event investigation concluded that a strong internal seiche in Sooke Lake likely caused the sudden total coliform spike. Because of the exact timing and very similar appearance of this year's total coliform spike, it is assumed to have the same origin.

Since the group of total coliform bacteria includes a wide range of species, some pathogenic to humans and many not, CRD staff collected samples from Sooke Lake and the Goldstream Water Treatment Plant during the peak of the total coliform event. Genomic analyses in a University of Victoria microbiology laboratory confirmed conclusively that the particular bacteria species (*Enterobacter* sp. *Lelliottia nimipressuralis*) is a non-pathogenic lake dweller that is typically associated with consuming plants. That correlates well with the fact that the highest concentrations of these bacteria were found at the lake bottom near the water extraction site at the Intake Tower. It is assumed at this time that due to a wind-induced internal seiche event during a time when the thermocline was very near the lake bottom in the South Basin, the bacteria-rich benthic boundary layer was disturbed and high concentrations of naturally present decomposers of dead algae and other organic detritus got pushed into the water intake stream and also high in the water column as the stratification finally broke down and mixing occurred.

By the end of August, this event had subsided, and the total coliform concentrations were back to normal levels (see Figure 3).

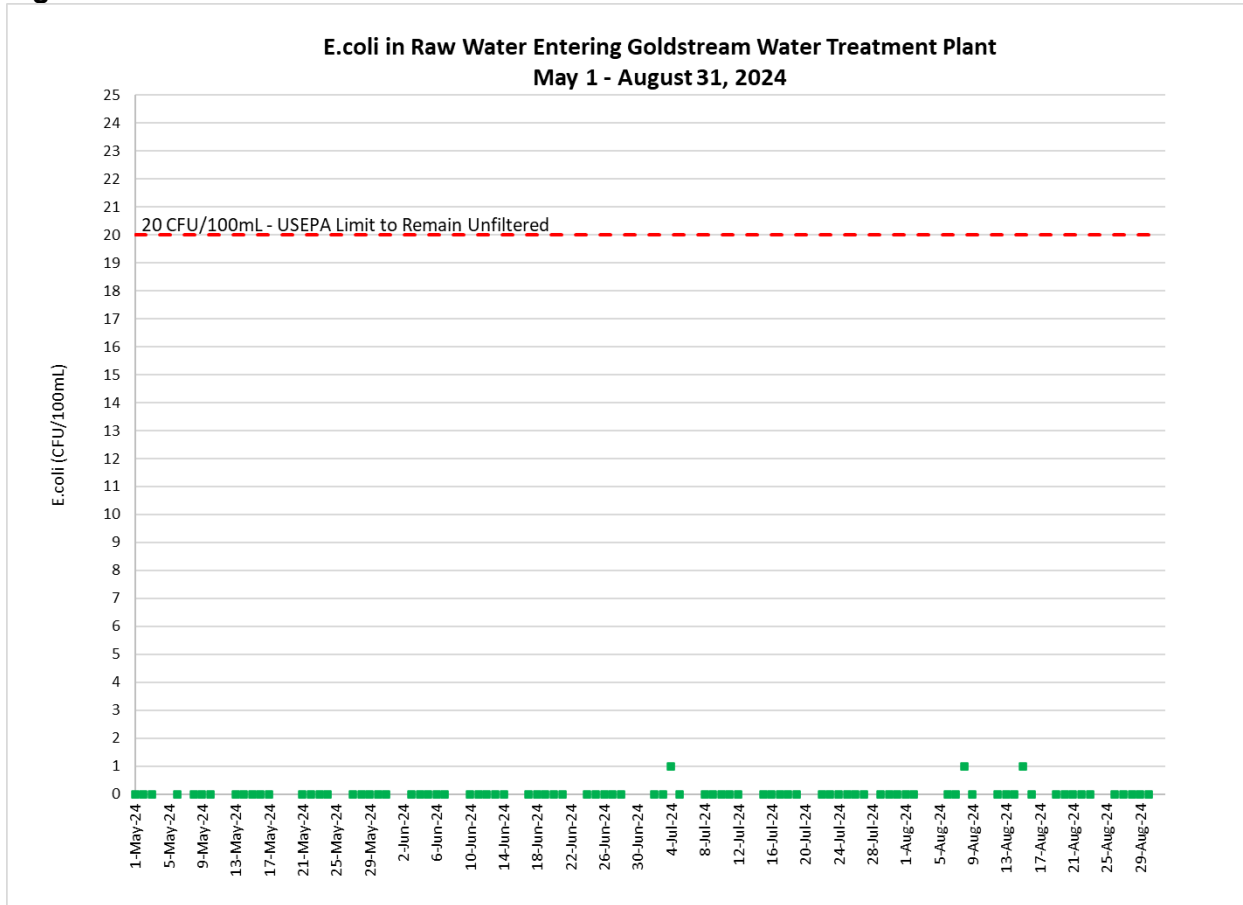
The United States Environmental Protection Agency (USEPA) Surface Water Treatment Rule for avoiding filtration has a non-critical total coliform criterion of maximum 100 CFU/100 mL at the 90th percentile of a six-month sample set. The 90th percentile of total coliform concentrations in the raw water between May and August 2024 was 1,850 CFU/100 mL and was therefore not compliant with this non-critical USEPA filtration exemption criterion.

Figure 3



E. coli concentrations during the reporting period, including during the total coliform event, were mostly non-detected or extremely low, and therefore, consistently well under the limit for meeting the critical USEPA filtration exemption criteria for surface water used for drinking water supply (Figure 4). Meeting this criterion means compliance with the USEPA Surface Water Treatment Rule for avoiding filtration. The E. coli concentrations were also well below the benchmark used in the 2020 BC Source Drinking Water Quality Guidelines (90th percentile E. coli ≤10 CFU/100 mL). These results are typical for Sooke Lake Reservoir during the summer season and also demonstrate that the total coliform event in late July was not caused by a fecal contamination of the source water.

Figure 4



(c) Nutrients

In general, the nutrient concentrations during the reporting period confirmed the ultra-oligotrophic status of Sooke Lake Reservoir, which is indicative of very low productivity in an upland lake with a virtually undisturbed catchment. This lake status is demonstrated by very low overall nutrient concentrations with a high nitrogen/phosphorus ratio and dissolved organic nitrogen being the dominant constituent of the total nitrogen. In particular, total nitrogen concentrations have been very low this summer. These conditions allow only limited biological activity in the lake, thus ensuring a good quality source for unfiltered drinking water. Slight temporary upticks were recorded in the total phosphorus concentrations, particularly in the South Basin. Since there was no rain-induced runoff introducing new nutrients to the lake during this reporting period, these episodes of increased phosphorus are likely the result of nutrient recycling from decomposing algal or planktonic matter. These recycled nutrients are then quickly consumed by aquatic organisms. This natural cycle is an indication of a healthy and functioning food chain in the lake's ecosystem (Tables 2 and 3).

Table 2

Sooke Reservoir, South Basin (1m) - SOL-00-01					
	Samples Collected	Unit of Measure	Minimum	Maximum	Mean
Total Nitrogen	3	ug/L	84	109	96.7
Total Phosphorus	3	ug/L	<1	6.40	3.20

Table 3

Sooke Reservoir, North Basin (1m) - SOL-04-01					
	Samples Collected	Unit of Measure	Minimum	Maximum	Mean
Total Nitrogen	3	ug/L	87	143	114
Total Phosphorus	3	ug/L	1.40	2.30	1.80

(d) Protozoan Parasites

In two test sets during this reporting period on the raw water entering the Goldstream Water Treatment Plant, no *Cryptosporidium* oocysts and no *Giardia* cysts were found.

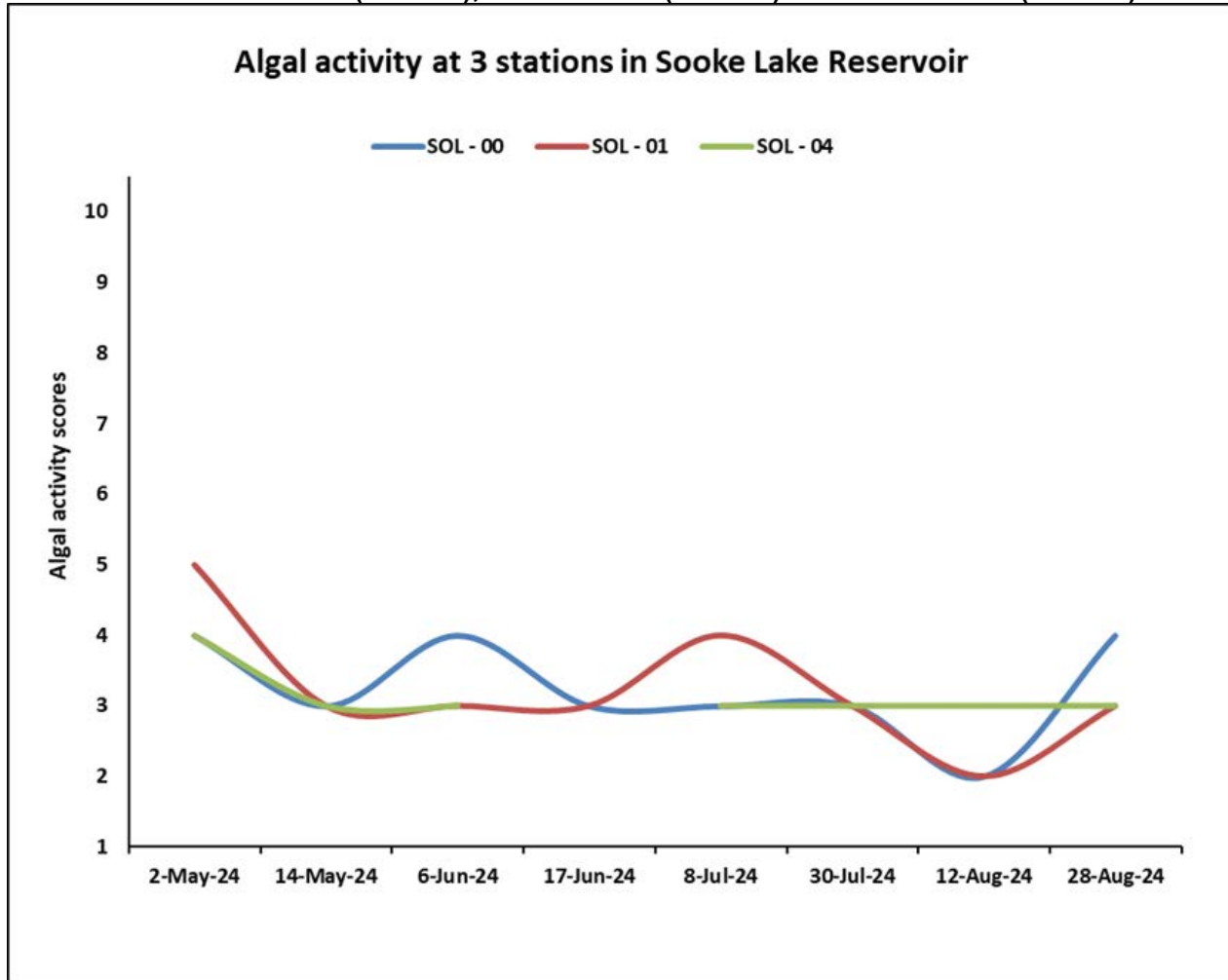
(e) Algae

To assess the algal activity and dynamics in Sooke Lake Reservoir, an algal activity index (AA Index) was applied, ranging from 1-10. This AA Index is derived from analyzing towed samples collected biweekly at three stations. This tow-sample methodology utilizes a 64-micron mesh-size net and aims to capture and quickly identify any algal taxa with immediate adverse potential. The AA Index fluctuated only very slightly and remained at a low average value of 3.2 from May to August and across the different parts of the reservoir (Figure 5). The algal composition during this period was dominated by common taxa such as the colonial diatom, *Asterionella formosa*, which normally contains eight cells per colony, or the colonial golden algae, e.g. *Dinobryon* spp., with each colony containing dozens of cells. Both species are common in Sooke Lake and can cause taste, odour and/or clogging issues when they are in bloom, but as demonstrated by the low AA Index during the reporting period, their population never reached a bloom level. The low nutrient concentrations did not allow for proliferated growth.

A potential cyanotoxin producer, i.e., *Dolichospermum* sp. also featured prominently in the algal composition during this summer period. This cyanobacterium can outcompete other algae under limited nutrient input and recycled-nutrient conditions in the middle of summer. But as with other species, lake conditions prevented any significant population growth so that cyanobacteria concentrations remain low, which impeded any potential toxin production.

In June, several customers (irrigators, Jubilee Hospital, customers with tap filters) reported filter clogging issues. Also, during that time, CRD water system operators had to frequently clean screens and strainers that protect certain infrastructure components. This clogging issue was mainly caused by the diatom of *Lindavia/Cyclotella bodanica*. The density of this diatom peaked in June, decreased significantly in early July and did not pose any further risks to the drinking water quality.

Figure 5: Algal Activity Index (AA Index) from May to August 2024, Sooke Lake Reservoir, Intake Location (SOL-00), South Basin (SOL-01) and North Basin (SOL-04)



2. WATER TREATMENT PLANTS

(a) Goldstream Water Treatment Plant

Turbidity. The raw water entering the Goldstream Water Treatment Plant was consistently well below 1 Nephelometric Turbidity Unit (NTU) during the reporting period (Table 4). On three consecutive Wednesday mornings (June 19, June 26 and July 3) the turbidity increased to peaks of up to 3.3 NTU. These turbidity exceedances were a result of high watering demand and peak flows that mobilized pipe sediments in the mains just upstream of the treatment plant. These early summer turbidity excursions are known to staff and the regulator and are typically mitigated annually through springtime flushing of the responsible main sections. Since introducing this flushing procedure, the number and severity of these summer turbidity excursions had significantly decreased. 2023 was the first year that saw no turbidity excursions in exceedance of 1 NTU. Unfortunately, this springtime flushing procedure could not be fully completed in 2024 due to operational challenges.

Table 4

Goldstream Water Treatment Plant Turbidity - Raw Water	
Samples Collected	85
Minimum	0.20 NTU
Maximum	3.3 NTU
Mean	0.44 NTU

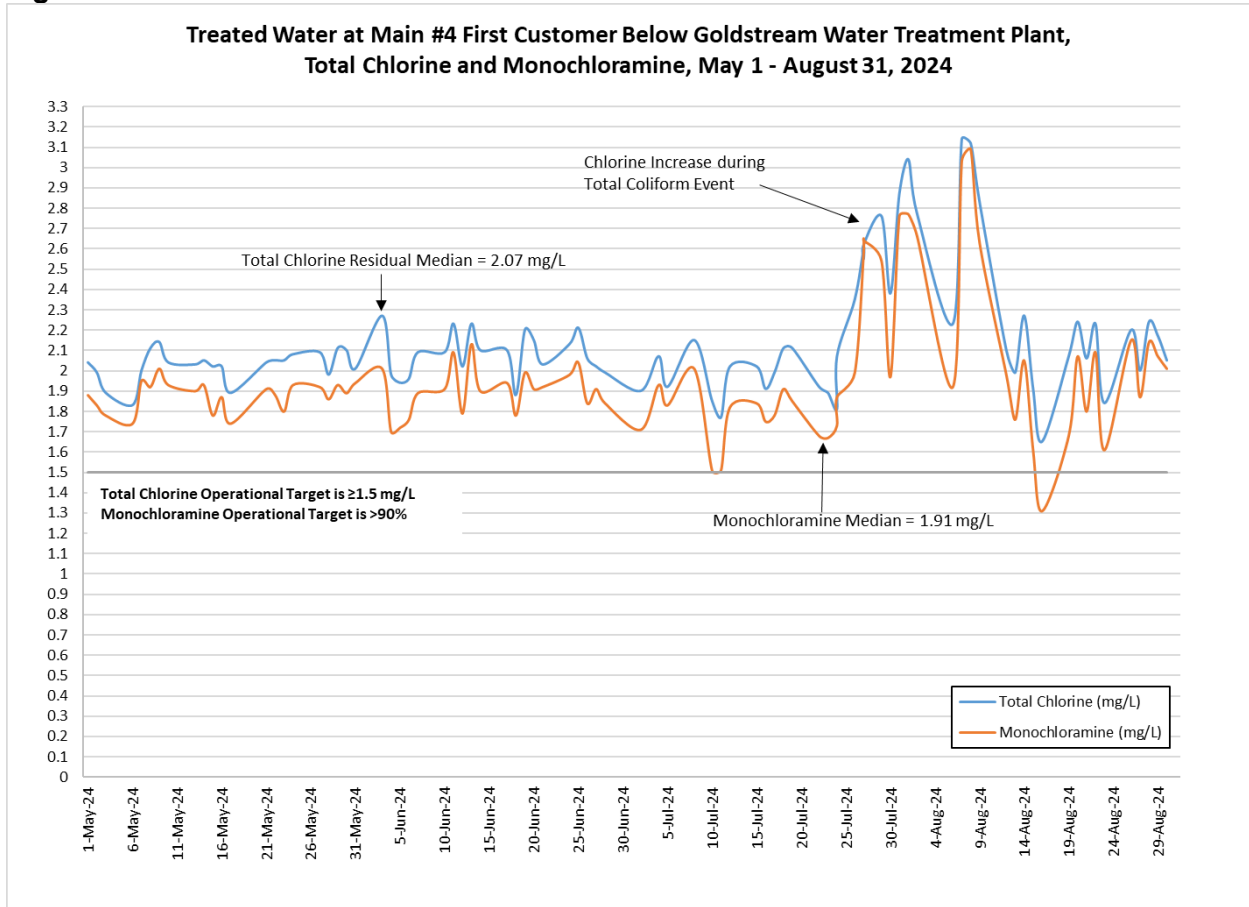
Main #4 First Customer Sampling Station Total Coliform Bacteria and E.coli. The Main #4 First Customer Sampling Station immediately downstream of the Goldstream Water Treatment Plant is sampled daily to monitor the efficacy of the disinfection treatment process. On seven days within this reporting period, a sample tested positive for total coliform bacteria (July 22, July 23, July 25, July 26, July 30, August 13 and August 14). The highest total coliform concentrations recorded were on July 30 with 330 CFU/100 mL. These total coliform positive results indicate a limited breakthrough at the Goldstream Water Treatment Plant in the wake of the total coliform event described in Section 1(b) above. Based on the nature of the bacteria species involved in this event and the narrow range of the affected area just below the treatment plant, the risk to public health was low throughout this event. The UV and chlorination dosage at the Goldstream Water Treatment Plant was increased to the maximum setting during this event until August 9, when total coliform concentrations in the raw water receded below the operational alert level of 1,000 CFU/100 mL for consecutive days. No E.coli bacteria were found in any sample collected from this site.

Main #5 First Customer Sampling Station Total Coliform Bacteria and E.coli. The Main #5 First Customer Sampling Station immediately downstream of the Goldstream Water Treatment Plant is also sampled daily to monitor the efficacy of the disinfection treatment process. On two days within this reporting period, a sample tested positive for total coliform bacteria (July 25 and August 6). The highest total coliform concentrations recorded were on July 25 with 2 CFU/100 mL. These total coliform positive results indicate a limited breakthrough at the Goldstream Water Treatment Plant in the wake of the total coliform event described in Section 1(b) above. Based on the nature of the bacteria species involved in this event and the narrow range of the affected area just below the treatment plant, the risk to public health was low throughout this event. The UV and chlorination dosage at the Goldstream Water Treatment Plant was increased to the maximum setting during this event until August 9, when total coliform concentrations in the raw water receded below the operational alert level of 1,000 CFU/100 mL for consecutive days. No E.coli bacteria were found in any sample collected from this site.

The results indicate a vulnerability of the primary disinfection process at the Goldstream Water Treatment Plant during periods with high bacteria load and high flows.

Secondary Disinfection. Figure 6 shows the total chlorine and monochloramine concentrations at the Main #4 First Customer Sampling Station. The target concentration of 1.5 mg/L for total chlorine was consistently achieved. The target ratio of 90% monochloramine was also consistently achieved. Adequate and effective secondary disinfection was provided across the entire system throughout the reporting period. During the total coliform event, the chlorine dosage was increased in two steps to 3 mg/L leaving the Goldstream Water Treatment Plant.

Figure 6



(b) Sooke River Road Water Treatment Plant

Turbidity. The raw water entering the Sooke River Road Water Treatment Plant was consistently well under 1 NTU (Table 5).

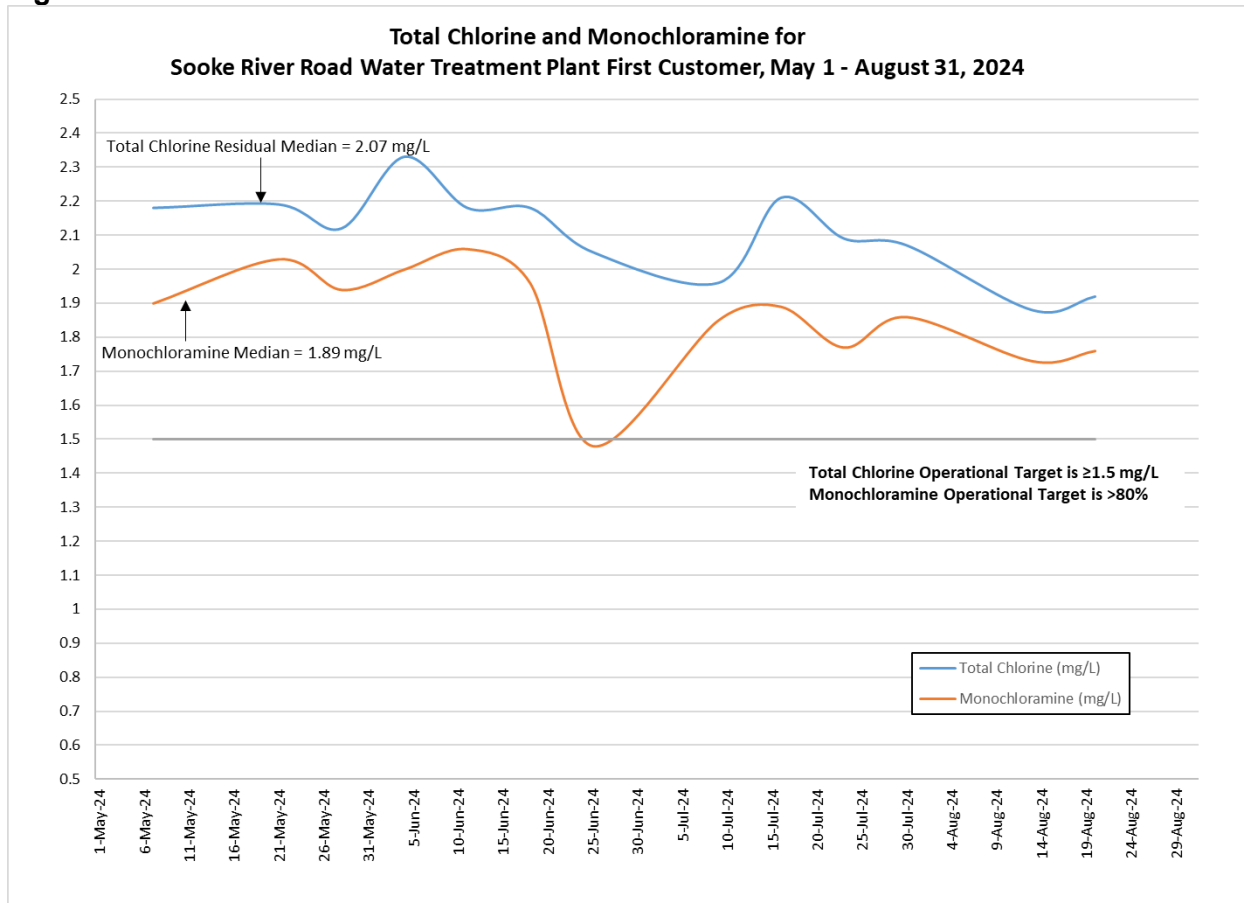
Table 5

Sooke River Road Water Treatment Plant Turbidity - Raw Water	
Samples Collected	13
Minimum	0.20 NTU
Maximum	0.35 NTU
Mean	0.28 NTU

Sooke First Customer Sampling Station Total Coliform Bacteria and E.coli. The Sooke First Customer Sampling Station, immediately downstream of the Sooke Water Treatment Plant, is sampled weekly to monitor the efficacy of the disinfection treatment process. No total coliform or *E.coli* bacteria were found in any sample collected from this site. The Sooke Water Treatment Plant disinfection process experienced no breakthrough during the total coliform event in late July and early August.

Secondary Disinfection. Figure 7 shows the total chlorine and monochloramine concentrations at the Sooke First Customer Sampling Station. The target concentration of 1.5 mg/L for total chlorine was consistently achieved during the reporting period. The target ratio of 80% monochloramine (older treatment plant, therefore not as precisely controllable) was consistently achieved except for a short period between June 20 and June 26 when the ammonia dosing was too low and had to be adjusted after the monochloramine drop was discovered. Adequate and effective secondary disinfection was provided across this much smaller distribution system.

Figure 7



3. DISTRIBUTION SYSTEMS

(a) Goldstream Service Area

Table 6

Goldstream Water Treatment Plant Service Area										
Month/Year	Samples Collected	Total Coliforms (CFU/mL)				E.coli (CFU/100mL)	Turbidity		Chlorine Residual	Water Temp.
		Samples TC > 0	Percent TC > 0	Resamples TC > 0	Samples TC > 10	Samples > 0	Samples Collected	Adverse > 1 NTU	Median mg/L as CL2	Median °C
May-24	412	0	0	0	0	0	32	0	1.6	12.7
Jun-24	367	0	0	0	0	0	29	0	1.65	15.3
Jul-24	412	4	1	0	1	0	33	0	1.59	18
Aug-24	396	3	0.8	0	1	0	30	1	1.68	19.6
Total:	1587	7	0.4	0	2	0	124	1	1.63	16.7

Total Coliform Bacteria and E.coli. Seven out of the 1,587 bacteriological distribution system samples tested positive for total coliform bacteria during the entire reporting period (Table 6). Four of these positive results were associated with water infrastructure that has not been fully commissioned yet and is in a state where water becomes stale and warm and therefore subject to bacterial regrowth (McCallum Pump Station). Operational measures have been taken to flush and refresh water in these lines. July 16 and July 18 recorded total coliform hits at the Markham Metering Station. Investigations revealed a buildup of sediments in the sampling line. This was rectified and subsequent samples were free of total coliform bacteria. No sample tested positive for *E.coli* bacteria (Table 6).

Turbidity. One of the 124 turbidity samples registered higher than 1 NTU (Table 6), likely as a result of water main flushing activities in the spring. Overall, these results are an indication of good drinking water quality.

Total Chlorine Residual. A median total chlorine residual concentration of 1.63 mg/L across the system indicates an effective secondary disinfection protecting the potability of the treated drinking water as it flows throughout the system (Table 6).

Water Temperature. The temperature of the drinking water in the system during this reporting period was below the aesthetic objective in the *Canadian Drinking Water Quality Guidelines* (15° C) in May. From June to August, the water temperature was consistently above the guidelines.

Water Chemistry. The average pH of the drinking water in the Goldstream Service Area was 7.7 during the reporting period. The pH ranged from 7.0 to 8.4, which is typical when operating the hypochlorite chlorination equipment. The average alkalinity was 18.3 mg/L. Both pH and alkalinity have increased since the commissioning of the hypochlorite chlorination equipment.

Disinfection Byproducts. The three typically monitored disinfection byproducts in a drinking water system have all been well below the Health Canada established health limits in the Goldstream Service Area (Table 7).

Table 7

Disinfection Byproducts - Goldstream WTP Service Area						
Parameter	Samples Collected	Unit of Measure	Minimum	Maximum	Mean	MAC (Maximum Acceptable Concentration)
Haloacetic Acids (HAAs)	8	ug/L	<5	19.0	12.7	80
Trihalomethanes (THMs)	8	ug/L	17.0	23.0	19.8	100
NDMA	8	ng/L	<1.9	2.8	2.1	40

Metals. A comprehensive metals analysis was conducted every second month at four different locations in the Goldstream Service Area: (1) where treated water enters the Victoria/Esquimalt System, (2) the Oak Bay System, (3) one in Langford and (4) one in North Saanich. Out of the 32 tested metals, five are monitored particularly closely: iron, manganese, lead, aluminum and copper. All metal concentrations were below the respective Health Canada maximum acceptable concentration or the aesthetic objective (Table 8).

Table 8

Metals - Goldstream WTP Service Area								
Parameter	Samples Collected	Unit of Measure	Minimum	Maximum	Mean	AO (Aesthetic Objective)	OG (Operational Guideline)	MAC (Maximum Acceptable Concentration)
Aluminum	8	ug/L	8.7	14.9	11.1		100	2900
Copper	8	ug/L	3.0	25.7	10.1	1000		2000
Iron	8	ug/L	9.7	28.7	19.8	300		
Lead	8	ug/L	<0.2	0.38	0.24			5
Manganese	8	ug/L	2.0	6.4	4.4	20		120

(b) Sooke Service Area

Table 9

Sooke River Road Water Treatment Plant Service Area										
Month/Year	Samples Collected	Total Coliforms (CFU/mL)				E.coli (CFU/100mL) Samples > 0	Turbidity		Chlorine Residual Median mg/L as CL2	Water Temp. Median °C
		Samples TC > 0	Percent TC > 0	Resamples TC > 0	Samples TC > 10		Samples Collected	Adverse > 1 NTU		
May-24	30	0	0	0	0	7	0	1.4	12.7	
Jun-24	42	0	0	0	0	8	0	1.11	14.8	
Jul-24	44	0	0	0	0	9	0	1.11	18.2	
Aug-24	26	0	0	0	0	6	0	0.83	17.9	
Total:	142	0	0.0	0	0	30	0	1.11	16.4	

Total Coliform Bacteria and E.coli. No bacteriological sample from the Sooke Service Area tested positive for total coliform or E.coli bacteria during the entire reporting period (Table 9).

Turbidity. None of the 30 turbidity samples registered above 1 NTU (Table 9). This is an indication of good drinking water quality.

Total Chlorine Residual. A median total chlorine residual concentration of 1.11 mg/L across the system indicates an effective secondary disinfection protecting the potability of the treated drinking water as it flows throughout the system (Table 9).

Water Temperature. The temperature of the drinking water in the system during this reporting period was below the aesthetic objective in the *Canadian Drinking Water Quality Guidelines* (15° C) in May and June. During the following two months, the water temperature was consistently above the guidelines.

Water Chemistry. The average pH of the drinking water in the Sooke Service Area was 7.7 during the reporting period. The pH ranged from 7.3 to 8.1 and is typically very stable and consistent across this system. The average alkalinity was 17.7 mg/L.

Disinfection Byproducts. The three typically monitored disinfection byproducts in a drinking water system have all been well below the Health Canada established health limits in the Sooke Service Area (Table 10).

Table 10

Disinfection Byproducts - Sooke River Road WTP Service Area						
Parameter	Samples Collected	Unit of Measure	Minimum	Maximum	Mean	MAC (Maximum Acceptable Concentration)
Haloacetic Acids (HAAs)	2	ug/L	20.0	25.0	22.5	80
Trihalomethanes (THMs)	2	ug/L	32.0	32.0	32.0	
NDMA	2	ng/L	<1.9	<1.9	<1.9	40

Metals. A comprehensive metals analysis was conducted every second month in one location in the Sooke Service Area: at the end of the distribution system near Whiffen Spit. Out of the 32 tested metals, five are monitored particularly closely: iron, manganese, lead, aluminum and copper. All metal concentrations were well below the respective Health Canada maximum acceptable concentration or the aesthetic objective (Table 11).

Table 11

Metals - Sooke River Road WTP Service Area								
Parameter	Samples Collected	Unit of Measure	Minimum	Maximum	Mean	AO (Aesthetic Objective)	OG (Operational Guideline)	MAC (Maximum Acceptable Concentration)
Aluminum	2	ug/L	6.7	11.5	9.1		100	2900
Copper	2	ug/L	8.9	9.6	9.2	1000		2000
Iron	2	ug/L	24.2	28.8	26.5	300		
Lead	2	ug/L	0.25	0.30	0.28			5
Manganese	2	ug/L	1.8	3.6	2.70	20		120

CONCLUSION

During this summer reporting period (May to August 2024), most parameters from source water to treated water indicate stable conditions and good water quality. Most trends are in line with historic data and confirm the adequacy of existing water treatment and performance of all major infrastructure components.

A second total coliform event since 2017 exposed the two regional water treatment plants for a period of about two weeks to high concentrations of a particular bacteria belonging to the regulated total coliform group. For a few days, low concentrations of total coliform bacteria appeared to break through the Goldstream Water Treatment Plant disinfection process. The breakthrough was likely limited to the early morning hours with high flows through the treatment plant. Effective secondary disinfection through chlorine residuals also limited the area potentially affected by viable total coliform bacteria in the treated water to a narrow range below the Goldstream Water Treatment Plant. A genomic analysis confirmed that the particular bacteria species involved is non-pathogenic to humans. Therefore, the risk to public health was low. This rare event indicated a vulnerability of the Goldstream Water Treatment Plant disinfection process to high bacterial loads. At the same time, the Sooke Water Treatment Plant disinfection process was uncompromised by the same bacterial loads. This latest total coliform event was likely caused by a wind-induced internal seiche in Sooke Lake Reservoir based on the findings of the post-event investigations of the 2017 total coliform event.

The multi-barrier approach applied to the Greater Victoria Drinking Water System ensures the otherwise excellent drinking water quality achieved during the reporting period.

Proposed Recommendation from the Water Advisory Committee to the Water Commission on Agricultural Water Rates

This proposal is for discussion at the next WAC full meeting in May, 2024. When agreement is reached by the WAC, the proposal is to be forwarded to the Regional Water Commission for adoption and action.

Rationale

The WAC considers food security to be a priority in view of the increasing challenges of climate change. Vancouver Island is especially vulnerable to food security risks because it is an island, it has relatively small pockets of good agricultural soil, much of the native soil has poor water holding capacity, and there are episodic summer droughts which are becoming more severe.

The low agricultural water rate set by the CRD is just one mechanism to support, enhance, maintain and create agricultural enterprises on the island. The cost to the CRD is relatively low in terms of the potential social, environmental and financial return on the investment.

In consideration of the urgency of action to adapt to climate change, any increase in the agriculture water rate would be counter to the goal of improving food security. Since the total amount of the subsidy is relatively small in terms of the CRD budget, any minor increases in the rate would be insignificant and would not further the goals of the CRD for food security. Moreover, the associated, and the administrative costs would likely outweigh any real benefits to the CRD. It could also be argued that the ag water rate should be reduced to further encourage farming on the island.

This proposal aligns with the CRD's 2016 Food and Agriculture Strategy.

Food security should not be leveraged only on the efforts of Integrated Water Services (IWS), but should be a joint responsibility of the CRD as a whole as well as the individual municipalities and electoral districts and other regional partners including the provincial government. A more integrated and broad agreement on water for farming and food security needs to be reached with CRD partners.

Recommendations

The Water Advisory Committee makes the following recommendations for updates to the agricultural water rate.

- Make no change to the agricultural water rate. This issue has been discussed many times over many years. The rationale for this recommended is elaborated in the bullets following. The Regional Water Commission should make a firm decision in alignment with the WAC recommendations and CRD policies and strategies and make a commitment to developing agriculture in the CRD to enhance long term food security.
- The cost of the subsidy paid directly to municipalities and electoral districts should show as a budget item in the larger CRD budget rather than coming directly out of the IWS budget. This would position this agricultural subsidy as a regional food security commitment.
- The 2025 Strategic Plan should be more explicit on agriculture and food security, water needs and resilience, and refer to the 2016 CRD Food and Agriculture Strategy.
- The CRD should focus on ensuring an adequate water supply for food security in the region. This could include developing incentives for water catchment, conservation, and re-use, as well as maintaining and enhancing the water holding capacity of the agricultural soils and landscape by specifically developing and using local island food waste compost and mulch materials locally, re-foresting, re-wilding, and creating or restoring lowland water basins like marshes.
- Much of the discussion around the ag water rate has been focussed on non-farm properties that benefit from the low water rate, and active farms that do not benefit from the ag rate because they don't have access to the distribution system, are considered commercial, or are in urban areas. This is a result of the CRD's reliance on the BC provincial government BC Assessment services and its characterization of which properties are 'agricultural.'
 - It is highly recommended that the CRD develop a different, more accurate reference or mechanism to determine which properties can benefit from the ag water rate.
 - The CRD should consider a permitting process where farmers must apply for the ag water rate by providing information about their land and operations. The subsidy should be limited to properties that are producing

food or animal feed, animals for food, or other horticultural crops that contribute to food security, social well being and positive health outcomes.

- Farmers who are not yet on the water distribution system could also apply for the ag water rate and thereby be registered as bona fide farms within the CRD. This could make them eligible for other supports from the CRD or their local municipality, such as subsidies for installing the water pipes, water meters and back flow preventers to their properties.
 - When the CRD issues a permit, the conditions in the permit must be met by the farmer. Failing to meet the conditions, such as using the ag water to fill a swimming pool, could result in cancellation of the permit.
 - This would allow the CRD much more flexibility in who gets the low water rates, to collect and use information about the agricultural community in the CRD, and to limit abuses.
- Currently, the CRD pays \$2 million to municipalities to replace the revenue they did not earn from applying the full water rate to farms. For the municipalities this is a low cost way for them to benefit from enhancing agriculture in their jurisdiction. It is highly recommended that the CRD motivate municipalities and electoral districts to share the responsibility for improving food security and encouraging agriculture in their jurisdictions by putting conditions on receiving the ag water rate benefit.
- The municipalities and electoral districts should update their internal budgeting/accounting procedures so that the financial benefit they receive as a result of the lower ag rates is clearly identified as an agricultural subsidy and that this financial benefit is applied to further supports for the agricultural community. This might be a politically positive way to leverage this financial benefit back into local agriculture.
 - If the municipalities commit to further supporting their local agricultural enterprises, they could allocate the \$2M in revenue from the CRD toward additional supports to their local agriculture industry. This could be in the form of subsidies to farms for installing new water delivery systems where the farms where access the water delivery system is currently constrained. It could also include incentives for building water catchment systems, water conservation systems, water re-cycling such as re-using non-potable water for agricultural purposes.
 - The municipalities may already have programs to support agriculture and the revenue from the CRD subsidy may already be used, indirectly, for

these purposes. The municipalities support for agriculture should not be limited to only the subsidy provided by the CRD. For political optics, it would be best if the agriculture supports were the same or more than the CRD subsidy.

- Asking the municipalities to use the \$2M on agriculture would make it easy for them to justify this investment in their local agricultural enterprises and food security. The farmers get a low water rate, and the CRD and the municipalities can leverage the \$2M earmarked for agriculture in a more focussed way.



**REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF WEDNESDAY, OCTOBER 16, 2024**

SUBJECT Dam Safety Program Update

ISSUE SUMMARY

To provide the Regional Water Supply Commission (Commission) with an update regarding the ongoing implementation of the Integrated Water Services Dam Safety Program and related dam safety projects and initiatives for the Regional Water Supply System dams.

BACKGROUND

The Integrated Water Services Department (IWS) of the Capital Regional District (CRD) manages a portfolio of 23 dams, 15 of which are directly related to the Regional Water Supply (RWS) System and are noted below. Refer to Appendix A for a map of CRD-managed dams and Appendix B for RWS dam details. The following list of 14 of the 15 dams are currently being utilized for the region's water supply:

- Sooke Lake Watershed Dams (2)
 - Sooke Lake Dam
 - Sooke Lake Saddle Dam
- Deception Gulch Watershed Dams (1)
 - Deception Gulch Dam
- Goldstream Watershed Dams (11):
 - Butchart Lake Dams No.1 – No.5
 - Lubbe Lake Dams No.1 – No.4
 - Goldstream Lake Dam
 - Japan Gulch Dam

One other dam, Charters River Dam, is a concrete gravity dam that has been retired from the active drinking water supply for many years but still requires compliance activities, including surveillance, maintenance and operational tasks.

IWS also manages eight other water supply dams: Magic Lake Estates Water Service on Pender Island (4), Lyall Harbour/Boot Cove Water Service on Saturna Island (1) and Wilderness Mountain Water Service in East Sooke (3).

B.C. Dam Safety Regulation Compliance Requirements

Dams in British Columbia (BC) are regulated under the Water Sustainability Act and the *B.C. Dam Safety Regulation #32/2023*, enforced by Provincial Dam Safety Officers (DSO) within the Ministry of Water, Land, and Resource Stewardship. The Act allows the Province to issue water licenses for surface water use, storage, and diversion.

The Regulation provides specific obligations for dam owners including:

- Determination of the Dam Failure Consequence Classification (refer to Appendix D)
- Responsibilities for dam condition and safety
- Preparation and updating of an Operation, Maintenance and Surveillance manual
- Preparation and updating of Dam Emergency Plans
- Site surveillance and formal inspections
- Dam Safety Reviews and reporting

- Maintenance of dam safety records (refer to Application of the Dam Safety Regulation, Province of BC - Appendix C)

IWS engineering and operations staff undertake the required activities to meet the regulatory compliance requirements listed above.

DAM SAFETY PROGRAM

Since the last Dam Safety Program update to the Commission in November of 2019, staff have continued to work on many tasks for formalizing and developing the Dam Safety Program while in parallel undertaking the various reviews and capital upgrades identified. The following sub-sections provide an update on the ongoing program development.

Major Development Objectives Achieved

Since 2016, staff undertaking the development of a formalized Dam Safety Program (DSP). The initial three objectives of the DSP are now complete, briefly described below as follows:

1. Determine the condition of all of the dam assets in the portfolio

- Staff have completed a legislated Dam Safety Review (DSR) for each of the 15 RWS dams.
- The DSRs have resulted inputs to the mandatory Action Plans as well as the capital and operating plans.
- Recommended improvements include further study of specific issues including seismic hazards, surveillance improvements, dam breach analysis and inundation zone mapping, and emergency planning.

2. Validate the Dam Failure Consequence Classification of each of the dams

- Each dam requires a dam breach assessment and inundation zone mapping to determine the Dam Failure Consequence Classification (DFCC). DFCC is based on population (life) that may be at risk in the event of a failure of the dam (or dams in the case of a cascading effect), and potential impact to the environmental and cultural values, infrastructure and economy – additional details are provided in Appendix D.
- Dam breach assessments and inundation zone mapping has been completed for all of the RWS dams. The findings recommended to reduce the DFCC of seven of the 15 dams. The current DFCC for each dam is provided in Appendix B.
- Validating the DFCC is an important initial goal because the DFCC level is used to set the magnitude of dam design and rehabilitation criteria (e.g. design earthquake, inflow design flood, etc.), as well as the frequency of future DSRs.

3. Establish a risk-informed approach to manage the many dam safety deficiencies within the portfolio

- Staff have prepared a Dam Safety Risk Register (DSRR) as a tool to summarize the pending safety deficiencies, risk score, priority, resources, background and budget. The number of safety deficiencies is now at approximately 300 items, all of which require resourcing by IWS staff, consultants/contractors, or both to resolve. In order to deliver dam safety improvements, Standing Offer Agreements with several dam safety consultants have been executed.

To support completion of these objectives, an independent dam safety expert was engaged to review of the IWS Dam Safety Program. The review concluded that IWS dam safety practices are partially compliant with the Guiding Principles of the Canadian Dam Association's Dam Safety

Guidelines but need improvement, and do not comply with the Guiding Principle that a comprehensive Dam Safety Management System (DSMS) be in place. Preparation of a DSMS is now in the planning phase.

Staff are developing the Dam Safety Program in a changing regulatory environment with a recent trend of increasing oversight and guidance from the Dam Safety Office and Engineers & Geoscientists of BC. This has required a net increase in effort to deliver capital studies, safety audits, and dam safety improvement projects. The Dam Safety Group is working closely with regulators to ensure compliance with the Regulation is maintained.

Completed and Ongoing Dam Safety Projects Update

A list of completed improvements and studies since the last Commission update in 2019 is listed in Appendix E. In general, these projects were selected through the DSRR process and included various major and minor dam remediations as well as full replacement of Lubbe Dam No.4 and major repair to the foundation of Butchart Dam No.5. In addition, various dam safety reviews, audits, assessments and analyses have been completed.

Many major dam safety capital projects are currently in progress, and a list with details is provided in Appendix E. Some of the project highlights include:

- Sooke Lake Dam – 2023 Dam Safety Review Audit
- Sooke Lake Dam Instrumentation Improvements – Detailed Design and Construction
- Sooke Watershed Dams – Breach Risk Reduction Measures
- Deception Gulch Dam – Low-level Outlet Gate and Air Vent Pipe Replacement
- Flood Forecasting System and Hydrotechnical Projects
- Seismic Stability Improvements: Sooke Lake Dam Spillway and Deception Gulch Dam

IWS Dam Safety Group Staffing Update

An Initiative Business Case (IBC) was prepared in 2023 to request resources to continue to develop and improve the IWS Dam Safety Program. The IBC requested a total team of eight staff phased over several years, consisting of a mix of engineers and operators to continue to resolve dam safety issues, improve operations, maintenance, and surveillance activities, and continue to prioritize regulatory compliance activities to lower dam safety risks.

In 2024, the following roles were approved and have been filled:

- **Manager, Dam Safety**, was appointed to lead the new Dam Safety Section within the Infrastructure Engineering Division (IE) and started work in that role on May 6, 2024. The Manager, Dam Safety currently undertakes work in conjunction with existing staffing resources from other IWS departments.
- **Team Lead, Dam Safety Operations**, was also selected and has started work, reporting to the Manager, Water System Operations.

NEXT STEPS

The following summarizes the next steps in the development of a robust Dam Safety Program.

Dam Safety Management System (DSMS)

Proceed with the development of the DSMS, which will establish a systematic and consistent way of managing the RWS dams. The DSMS will include: Policy and Objectives, Planning, Implementation, Risk Assessment, Monitoring and Evaluation, Audit, Review and Reporting, etc.

The DSMS will also define roles and responsibilities for dam safety within the IWS department's divisions and sections currently working with dams: Infrastructure Engineering, Water Infrastructure Operations, Water System Maintenance, Watershed Protection, Business Support Services, and Asset Management.

Upcoming Dam Safety Projects

The 2024 RWS Capital Plan includes budget to start the following dam safety-related capital projects for the eleven Goldstream Watershed Dams, including a Dam Safety Review in 2025, a drilling investigation at the major dams, design of instrumentation improvements, and updated seismic hazard and stability assessment. Recent DSRs have highlighted the importance of improving existing dam instrumentation systems to current industry best practices. Additionally, given the high regional seismic and flood hazard risks, there are many recommendations from experts for completing updated seismic stability assessments and associated structural upgrades, as well as preparing for and building resiliency to large flood events at the dams.

Building Capacity of the IWS Dam Safety Team

To ensure regulatory compliance, address the growing list of dam-related deficiencies and undertake the ongoing operation and maintenance activities, the CRD needs to continue to ensure the necessary in-house expertise and capacity. This capacity development is being achieved through staff augmentation and training of existing staff.

The 2025 RWS budget includes, two new engineers and a new operator to support the operation, maintenance, and surveillance of the dams, as well as regulatory compliance activities and resolving safety issues through capital and operational safety improvements. Staffing levels will continue to be assessed in a phased approach.

In accordance with the Regulation, the CRD maintains a series of Operation, Maintenance and Surveillance Manuals for each dam, as well as Dam Emergency Plans which are resources to be used in the event of a dam emergency such as earthquake, flood or dam breach. Dam Emergency Plans are shared annually with Local Emergency Authorities. Training and exercising around emergency preparedness and response is considered by experts as an essential part of an effective Dam Safety Management System. IWS staff who conduct duties related to dam safety obtain formal dam inspection training. This training will continue to be supplemented with emergency management training and planned exercises.

Building Public Awareness of Dam Safety Program

To raise awareness and educate the public about the importance and impact of dams, a webpage dedicated to the Dam Safety Program with educational materials is being developed. Several other dam owners in BC already have active public webpages to provide information related to dams and building safety awareness for those living near dams. Examples include BC Hydro, Metro Vancouver, Regional District of Nanaimo, and the City of Parksville. Materials that will be presented include frequently asked questions, emergency management/preparedness content, basic background on the Dam Safety Program and a basic map that shows the location of all IWS

dams. The content will be posted to a new CRD webpage. The target date for the completion of this work is December 31, 2024.

CRD staff currently coordinate preparation for response to any IWS dam-related emergencies directly with each Local Emergency Authority, per requirements of the Regulation. Furthermore, the CRD is considering a targeted communication plan for all property owners within each dam inundation zone. The intent is to raise awareness with property owners regarding the risk of the unlikely event of a dam failure situation and to provide information about opportunity for emergency notifications. Staff plan to present the communication strategy and implementation options at a future meeting, in the first quarter of 2025.

CONCLUSION

The Integrated Water Services Department manages 23 dams with the primary purpose of providing a reliable supply of clean and safe drinking water to the residents of our region. A comprehensive Dam Safety Program is being developed to manage the dams within the legislated framework. It is proposed to continue to evolve the Dam Safety Program with the advice and support of independent expert engineering consultants and build a robust Dam Safety Management System that will utilize a probabilistic risk-informed approach to mitigate dam safety issues. Staff continue to develop the Dam Safety Risk Register and track and resolve the large number of dam safety deficiencies in a prioritized manner. Continuing to review and add to the internal resources of the Dam Safety team in a phased approach is essential to maintaining regulatory compliance, resolving the many safety issues, and continually improving the program over time. The Capital Regional District (CRD) also plans to increase the public’s awareness of the CRD’s Dam Safety Program through a public website and targeted communication plans.

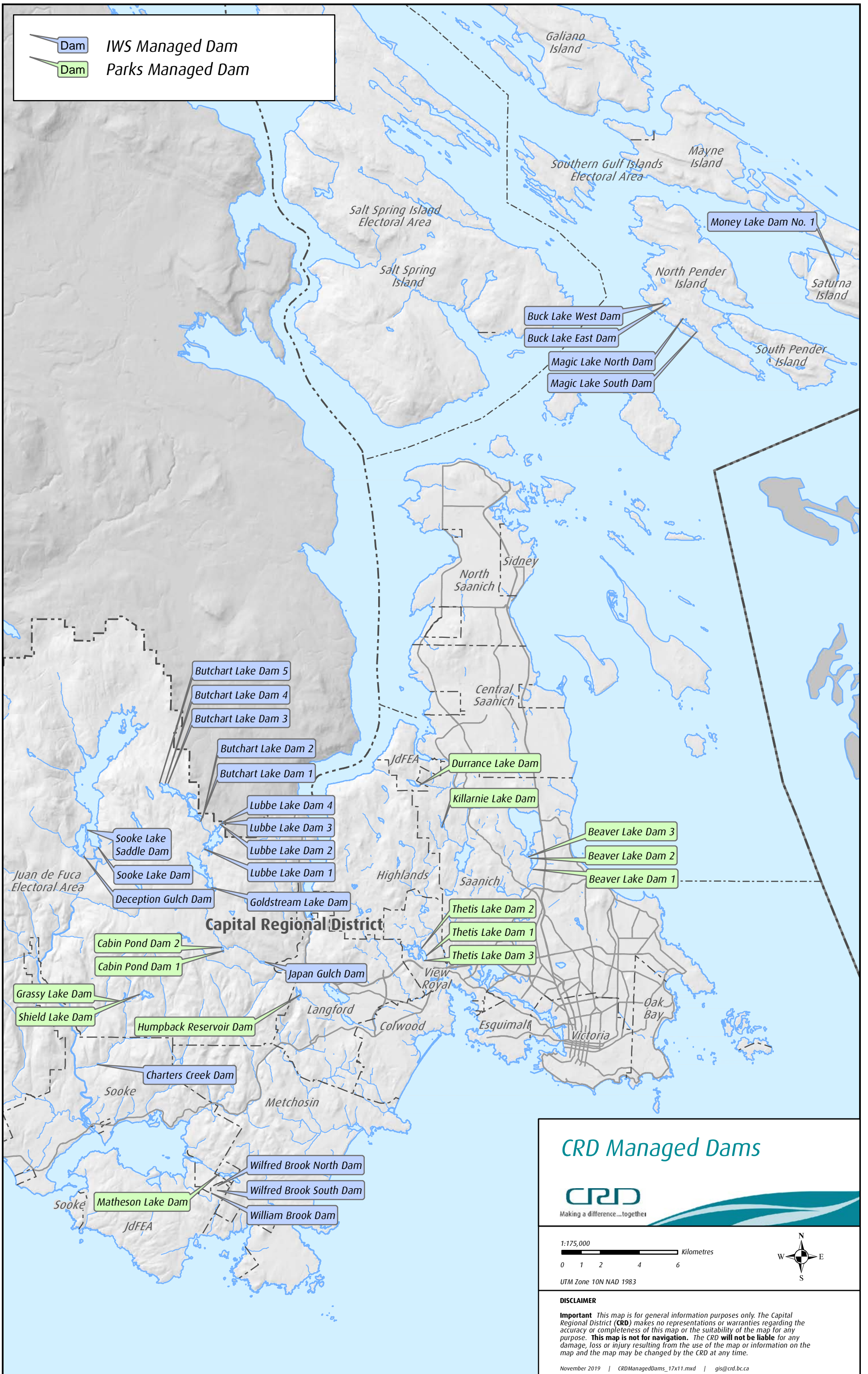
RECOMMENDATION

There is no recommendation. This report is for information only.

Submitted by:	Joseph Marr, P.Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Alicia Fraser, P. Eng., General Manager, Integrated Water Services
Concurrence:	Ted Robbins, B. Sc., C. Tech., Chief Administrative Officer

ATTACHMENT(S)

- Appendix A: CRD Managed Dams Map
- Appendix B: Summary of Regional Water Supply Dams
- Appendix C: Application of the Dam Safety Regulation
- Appendix D: Dam Failure Consequence Classification
- Appendix E: Dam Safety Program – Major Project Descriptions



Dam IWS Managed Dam
Dam Parks Managed Dam

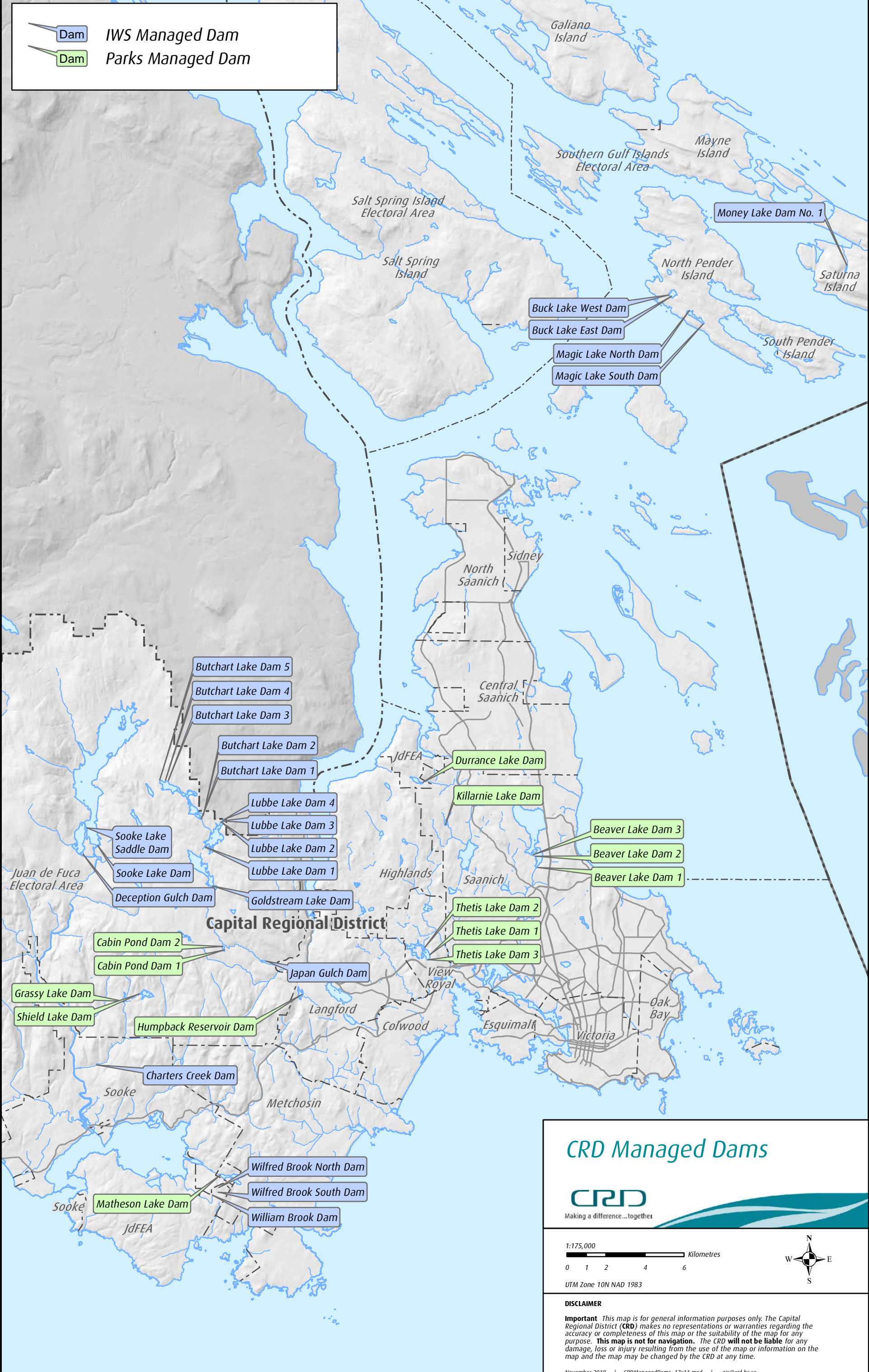
CRD Managed Dams

CRD
 Making a difference...together

1:175,000
 0 1 2 4 6 Kilometres
 UTM Zone 10N NAD 1983

DISCLAIMER
Important This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. **This map is not for navigation.** The CRD will not be liable for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

November 2019 | CRDManagedDams_17x11.mxd | gis@crd.bc.ca



Appendix B – Summary of Regional Water Supply Dams

	Name	Consequence Classification Rating (see Appendix E)	Year Constructed - Original / Upgraded	Dam Crest Width	Dam Crest Length	Dam Crest Elevation / Height	Maximum Useable Water Storage (ML)
1	Sooke Lake Dam	Extreme	1970 / 2002	7.3m to 10m	533m (includes 63m spillway)	El. 190.75m / 24.75m	92,700
2	Saddle Dam	Very High	1970 / 2002	5m to 14m	1080m	El. 190.75m / varies up to 16m	n/a
3	Deception Gulch Dam	Very High	1979 / 1981 / 2002	7m	460m	El. 190.75m / 24m	4,050
4	Japan Gulch Dam	High	1900 / 1995	6.1m	97.5m	El. 134.6m / 12.5m	80
5	Charters River Dam	High	1976 / n/a	0.91m	30.48m (includes spillway)	El. 83.23m / 16.76m	19
6	Goldstream Lake Dam	High	1892 / 1995	NA	302m	El. 459.96m / 12.0m	3,550
7	Lubbe Lake Dam 1	High	1900 / 1995	NA	44m	El. 482.34m / 12.2m	3,000
8	Lubbe Lake Dam 2	Significant	1900 / n/a	4m	15.2m	El. 481.1m / 3.0m	3,000
9	Lubbe Lake Dam 3	Significant	1900 / n/a	4m	15.2m	El. 481.1m / 3.0m	3,000
10	Lubbe Lake Dam 4	Significant	1900 / 2019	5m	30m	El. 481.1m / 5.8m	3,000
11	Butchart Lake Dam 1	High	1900 / 1995	5m	60m	El. 546.6m / 11m	3,250
12	Butchart Lake Dam 2	High	1900 / 1995	NA	40.2m	El. 546.6m / 14.6m	3,250
13	Butchart Lake Dam 3	Low	1900 / n/a	NA	17.4m	El. 545.1m / 1.8m	3,250
14	Butchart Lake Dam 4	Significant	1900 / n/a	NA	48.5m	El. 545.2m / 7.3m	3,250
15	Butchart Lake Dam 5	Significant	1900 / 1995	NA	157m	El. 545.4m / 7.3m	3,250

Appendix C – Application of the Dam Safety Regulation



Ministry of
Forests, Lands and
Natural Resource Operations

INFORMATION SHEET

APPLICATION OF THE DAM SAFETY REGULATION

The **British Columbia Dam Safety Regulation (B.C. Reg. 44/2000)** was repealed and replaced with the **Dam Safety Regulation (B.C. Reg. 40/2016)** on February 29, 2016. This Information Sheet provides general information about the new regulation however dam owners are responsible for familiarizing themselves and complying with the regulation in its entirety. The new regulation is available at the link provided at the end of this document. In case of discrepancy between information contained herein and the regulation, the regulation takes precedence.

INTRODUCTION

The BC Dam Safety Regulation was first passed into law under the *Water Act* as Regulation 44/2000, effective February 11, 2000. This regulation was repealed and replaced with the Dam Safety Regulation (O.I.C. 114, B.C. Reg. 40/2016) under the *Water Sustainability Act*, effective February 29, 2016.

The objective of the regulation is to mitigate loss of life and damage to property and the environment from a dam breach by requiring dam owners to inspect their own dams, undertake proper maintenance on them, and ensure that these dams meet ongoing engineering standards.

WATER SUSTAINABILITY ACT

The *Water Act* was replaced with the *Water Sustainability Act* (Act) on February 29, 2016. The new Act has authority over dams (considered works) and holds owners of dams liable for any damage caused by the construction, operation or failure of their dam. Under the Act, owners of dams are responsible for obtaining a water licence and complying with its terms and conditions.

TO WHOM THE REGULATION APPLIES

The regulation applies to owners of dams that store or divert water from a stream or aquifer or both (see Part 1, Section 1 of the regulation for a full definition of “owner” and “dam”). The height, storage capacity and dam failure consequence classification of the dam determines which parts of the regulation, if any, apply (Figure A):

1. Owners of **Minor Dams**, that meet the following criteria are exempt from the entire regulation unless the Comptroller of Water Rights (comptroller) or water manager determines otherwise:
 - less than 7.5 metres in height, and
 - able to impound no more than 10,000 m³ of water.

2. With the exception of the exempt minor dams above and regardless of consequence classification, dam height, or storage volume all dam owners must comply with all parts of the regulation except Part 3.
3. The entire regulation applies to owners of dams that meet the criteria specified in Part 3, Section 7:
 - 1 metre or more in height and capable of impounding a volume of water greater than 1,000,000 m³,
 - 2.5 metres or more in height and capable of impounding a volume of water greater than 30,000 m³,
 - 7.5 metres or more in height, or
 - Classified as significant, high, very high or extreme failure consequence.

CLASSIFICATION SYSTEM

All dams are classified according to their potential consequence of failure. Owners of dams have varying levels of obligations under the regulation which are directly related to the dam’s failure consequence classification (see Schedule 1 of the regulation).

REGULATION REQUIREMENTS

All owners of dams, other than owners of *minor dams*, must satisfy the requirements specified in Part 2, and may also need to meet requirements in Part 4 and Part 5.

1. The ongoing regulatory requirements for all dams, except the exempt *minor dams* include:
 - determine the dam failure consequence classification, and annually review and if necessary revise and submit to the Dam Safety Officer for acceptance,
 - comply with the provisions of the regulation that apply to a dam having that consequence classification,
 - properly inspect, maintain and repair their dam in a manner that keeps the dam in good operating condition, and

- prevent unauthorized operation of their dam.
2. Owners of dams meeting the criteria set out in Part 3, Section 7 of the regulation must undertake the following:
- prepare, review and update the operation, maintenance and surveillance plan and dam emergency plan (except for low consequence dams) and submit to the Dam Safety Officer for acceptance,
 - as part of the Dam Emergency Plan, prepare a record containing information to be submitted to the local emergency authorities for the purpose of their preparing local emergency plans,
 - prepare and erect signage at all dams located on Crown Land (except for low consequence dams) notifying passersby to report any problems to the owner of the dam and/or the emergency response authorities,
 - obtain authorization under the Act when alternations or improvements to, or replacement of their dam is considered,
 - operate their dam in a manner, and initiate remedial actions, that will safeguard the public and dam in response to hazardous conditions at their dam,
 - prepare a plan in response to any potential safety hazard,
 - notify and get authorization from the Dam Safety Officer prior to removing, decommissioning, deactivating or stopping normal operation of their dam,
 - report all significant findings resulting from inspections and/or dam safety reviews to the Dam Safety Officer,
 - install any instrumentation necessary to adequately monitor the performance of a dam,
 - carry out dam safety reviews (except for low and significant consequence dams), and
 - submit to the Dam Safety Officer, upon request, records relating to the inspection, test or review carried out in relation to their dam including recorded data on the dam, reservoir, downstream area, or watershed upstream of the dam.
3. Additional requirements for all dam owners may include:
- where there are two or more owners of a dam, these owners must designate one of the owners for the purpose of receiving, providing and retaining information and records in relation to the dam,
 - where there are two or more owners of a dam, an owner may be exempt from the requirements of

this regulation if the comptroller is satisfied that proper arrangements have been made for one or more of the other owners to take on responsibility for their dam and the owner holds no more than 5% of the total storage rights in respect of the dam, and

- an owner of a dam may be required to obtain independent expert advice in relation to an issue respecting their dam, with qualifications and experience in dam design, construction and analysis or in dam operation and maintenance or in hydraulic, hydrological, geological, geotechnical, mechanical or structural analysis.

TRANSITION

To allow owners sufficient time to meet new requirements in the regulation, transitional provisions are included. These are found in Part 5 of the regulation.

ROLE OF THE RESPONSIBLE MINISTRY

The comptroller instituted the Provincial Dam Safety Program in 1967. The program's goal is to set design, construction, maintenance, and surveillance standards, and assist dam owners in meeting these standards.

Dam Safety Officers, located in each region and in Victoria, protect public safety by monitoring and auditing the activities of dam owners, providing education and awareness training and taking compliance and enforcement action when necessary.

The Dam Safety Regulation is an important component of the Provincial Dam Safety Program's objective to minimize the impact of dam failures.

MORE INFORMATION

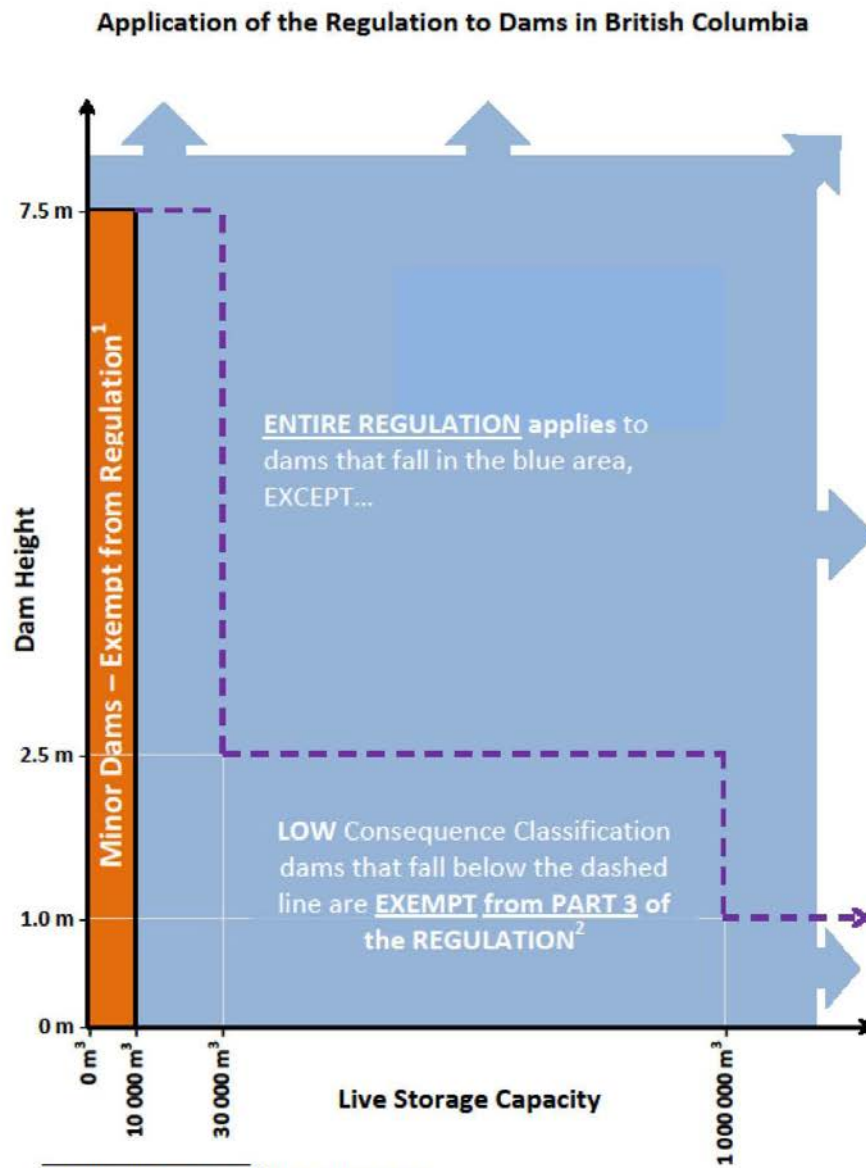
The regulation and more information on dam safety can be obtained from the Dam Safety Program website: <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/drought-flooding-dikes-dams/dam-safety>

Or by contacting:
 Dam Safety Section
 Water Management Branch
 PO Box 9340 Stn Prov Govt
 Victoria BC V8W 9M1

Email: dam.safety@gov.bc.ca

Visit the Canadian Dam Associations' Dam Safety Guidelines and website at <http://www.cda.ca/>

Figure A. Graph of dam height vs. dam storage capacity which, along with dam failure consequence classification, determines what parts of the Dam Safety Regulation applies.



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

Appendix D – Consequence Rating

	Column 1	Column 2	Column 3	Column 4	Column 5
Item	Dam failure consequences classification	Population at risk	Consequences of failure		
			Loss of life	Environmental and cultural values	Infrastructure and economics
1	low	none ¹	no possibility of loss of life other than through unforeseeable misadventure	minimal short-term loss or deterioration and no long-term loss or deterioration of (a) fisheries habitat or wildlife habitat, (b) rare or endangered species, (c) unique landscapes, or (d) sites having significant cultural value	minimal economic losses mostly limited to the dam owner's property, with virtually no pre-existing potential for development within the dam inundation zone
2	significant	temporary only ²	low potential for multiple loss of life	no significant loss or deterioration of (a) important fisheries habitat or important wildlife habitat, (b) rare or endangered species, (c) unique landscapes, or (d) sites having significant cultural value, and restoration or compensation in kind is highly possible	low economic losses affecting limited infrastructure and residential buildings, public transportation or services or commercial facilities, or some destruction of or damage to locations used occasionally and irregularly for temporary purposes
3	high	permanent ³	10 or fewer	significant loss or deterioration of (a) important fisheries habitat or important wildlife habitat, (b) rare or endangered species, (c) unique landscapes, or (d) sites having significant cultural value, and restoration or compensation in kind is highly possible	high economic losses affecting infrastructure, public transportation or services or commercial facilities, or some destruction of or some severe damage to scattered residential buildings

	Column 1	Column 2	Column 3	Column 4	Column 5
Item	Dam failure consequences classification	Population at risk	Consequences of failure		
			Loss of life	Environmental and cultural values	Infrastructure and economics
4	very high	permanent ³	100 or fewer	significant loss or deterioration of (a) critical fisheries habitat or critical wildlife habitat, (b) rare or endangered species, (c) unique landscapes, or (d) sites having significant cultural value, and restoration or compensation in kind is possible but impractical	very high economic losses affecting important infrastructure, public transportation or services or commercial facilities, or some destruction of or some severe damage to residential areas
5	extreme	permanent ³	more than 100	major loss or deterioration of (a) critical fisheries habitat or critical wildlife habitat, (b) rare or endangered species, (c) unique landscapes, or (d) sites having significant cultural value, and restoration or compensation in kind is impossible.	extremely high economic losses affecting critical infrastructure, public transportation or services or commercial facilities, or some destruction of or some severe damage to residential areas

1. There is no identifiable population at risk.
2. People are only occasionally and irregularly in the dam-breach inundation zone, for example stopping temporarily, passing through on transportation routes or participating in recreational activities.
3. The population at risk is ordinarily or regularly located in the dam-breach inundation zone, whether to live, work or recreate.

Dam Safety Program - Major Project Descriptions

Major Dam Safety Projects completed since 2019

Remediation of Butchart Dam #5 – Grouting of Karst Limestone Foundation

During a routine inspection of Butchart Dam #5, a sinkhole was observed on the downstream slope in 2014. An investigation and remedial options study was conducted, and it was concluded that the issue was related to the dissolution of the limestone bedrock on which the dam was founded upon. Geotechnical engineering consultant, Thurber, was hired and the preferred option of grouting the bedrock foundation to remove voids was selected. The work was designed, and the project was successfully completed in the summer of 2021 by a team consisting of a specialist ground improvement contractor, an engineering consultant, and IWS staff. A total volume of more than 95 cubic metres of grout was injected in 24 drilled boreholes at the right abutment area. Visual inspections of the seepage weir area since the project completion in 2021 show that the foundation leaking issue has been resolved. Surveillance of the dam during weekly inspections continues. After an extended multi-year period of operating the reservoir at a lower level to reduce risk, the Butchart Reservoir is now maintained at the normal full-pool operating water level.

Replacement of Lubbe Dam #4

In 2011, routine inspections identified unusual seepage flows at the toe of the dam. A geotechnical consultant was hired to conduct a leakage assessment and determined that internal erosion of the of Lubbe Dam #4 was causing leaking to occur. After further monitoring and study by consultants, it was concluded that the dam needed replacement. The design and construction was completed in 2019. Routine surveillance of the replacement dam continues and there has been no dam performance issues identified with the new dam since its construction.

Sooke Lake Dam Spillway Gates Hydraulic System Replacement

IWS staff hired Janox Fluid Power Ltd. (Janox) to replace the hydraulic components of the gate actuator system for the Sooke Lake Dam Spillway Gates in 2020. The project was successful, and the two large outlet gates are now operational. Further improvements to the gate control system are needed. IWS staff are planning to hire resources to complete and commission the improvements.

Charters River Dam Decommissioning Study

Kerr Wood Liedel Associates Ltd. was hired in 2021 to develop and assess decommissioning options for Charters River Dam. The options analysis was used to assist with decision-making regarding whether to decommission the concrete gravity dam. Three options were assessed: Maintain the dam, partially remove the dam, and fully decommission the dam. Based on the comparison of the three options, the most cost-effective option, considering current costs and net present value analysis, is continuing to operate and maintain the dam. One of the key considerations in the decision to maintain the dam was that extensive resources (both internal and external) would be needed for an extended multi-year, multi-million-dollar project to plan and execute the dam decommissioning work. IWS staff are using the Dam Safety Risk Register process to prioritize resources to resolving the highest risk dam safety issues, and therefore the dam decommissioning work will not proceed until resources are available.

Sooke Lake and Deception Watershed Dams - Seasonal Reservoir Operating Strategy

Capital Regional District (CRD) is developing a Seasonal Reservoir Operating Strategy (SROS) to support goals related to climate change adaptation and dam safety risk mitigation. This new SROS will target lower than historical winter water levels at both the Sooke Lake Reservoir and the Deception Gulch Reservoir. This SROS will, in turn, create a new reservoir flood zone (or flood compartment storage) suitable for attenuating and storing the relatively higher incoming winter storm flows when water demand to customers is lower. Hatch was retained by CRD in 2023 to evaluate its plans for changing the currently passive water management reservoir operation to an active SROS, to identify and prioritize key considerations for implementing the SROS and, in turn, suggest the next high-level steps to completing the plan. Hatch provided in the report a SROS outline with recommended next steps for implementing the changes, which includes hydrological and dam operations modelling. In 2024, IWS staff have begun actioning the Flood Forecasting System project with Hatch to complete the required modelling and development of the Reservoir Operating Rules. Implementation of the strategy is anticipated to take several more years to allow for tools to be tested and validated.

Sooke Lake Dam Spillway Gate Isolation System Options

There are currently one set of stop logs for isolating the two spillway gates, which are the primary outlet for the dam. The stop logs can only be deployed for planned maintenance of a single gate at a time. There is currently no way to isolate the gates in the event of a gate failure during a high flow flood condition. IWS staff hired Hatch in 2023 to conduct an options analysis for the improvement of the existing gate isolation system for the two spillway gates. A preferred option has been selected to procure and install a set of two wheeled bulkhead gates. The Capital Projects team is working on the next phase of the project.

Sooke Lake Dam Spillway – Concrete Surface and Joints Rehabilitation

IWS staff are currently working on a plan to conduct Phase 2 of concrete repairs to the surface of the 64-metre-wide ogee spillway. A dive team has been hired in 2024 to conduct a condition assessment of the vertical upstream face of the ogee spillway and prepare for repairs to the vertical construction joints and concrete surface cracks. The condition assessment part of the work is planned to be completed in Q4 2024. Phase 1 of surface crack repairs was completed at the less steep portions of the spillway in 2021, following a condition assessment of the construction joints and seepage by Northwest Hydraulic Consultants' expert structural engineer.

Sooke Lake Saddle Dam – 2021 Dam Safety Review Audit

Hatch submitted the DSR report to the CRD on May 2, 2022. A copy of the DSR Audit report has been provided to the B.C. Dam Safety Office, and has been accepted by the DSO. Hatch concluded that:

- the dam is “reasonably safe”; and
- the overall total of outstanding issues to resolve is now 11. Of these, nine are non-conformances and two are potential deficiencies related to the seismic performance of the conduit and the bent gate stem.

The 11 outstanding issues that are recommended by Hatch to be resolved have been reviewed and validated by IWS staff. The issues are a mix of operations, maintenance and

surveillance related items, along with proposed site investigation and dam safety analyses work. IWS staff have used Hatch's recommendations and priority ranking to develop an Action Plan that considers necessary sequencing of dam safety analyses projects and minimizing dam safety risk.

Deception Gulch Dam – 2021 Dam Safety Review Audit

Hatch submitted the final report for the DSR to the CRD on May 2, 2022. A copy of the DSR Audit report has been provided to the B.C. Dam Safety Office and has been accepted by the DSO. Hatch concluded that:

- The dam is “in a reasonably safe condition”.
- The overall total of outstanding issues to resolve is now 26. Of these, 24 are non-conformances and two are potential or actual deficiencies.

Major dam safety deficiencies have been confirmed as follows:

- The dam cannot withstand the design earthquake loading conditions. Design and construction of a granular buttress at the downstream face of the dam is recommended.
- It is unknown if the dam is capable of passing flows as required under earthquake loading conditions.
- Existing manual instrumentation, (versus an automated data acquisition system), does not provide real-time/advanced warning of dam failure and continues to have reliability concerns. Several aging piezometers are unresponsive.

A multi-phase Action Plan has been prepared by IWS staff to resolve the dam safety issues and conduct a business case assessment for the future configuration for the earthen dam and concrete spillway. The current maximum reservoir water level is being reviewed, as well as the benefits versus costs of increasing the storage volume in the reservoir.

Charters River Dam – 2021 Dam Safety Review Audit

Hatch submitted the final report for the DSR Audit to the CRD on June 3, 2022. A copy of the DSR Audit report has been provided to the B.C. Dam Safety Office and has been accepted by the DSO. Hatch concluded that:

- the dam is “reasonably safe”; and
- the overall total of outstanding issues to resolve is now 12. Of these, 12 are non-conformances and no potential or actual deficiencies.

The 12 outstanding issues to be resolved that are recommended by Hatch have been reviewed and validated by IWS staff. The issues are a mix of operations, maintenance and surveillance related items, along with proposed site investigation and dam safety analyses work. IWS staff have used Hatch's recommendations and priority ranking to develop an Action Plan that considers necessary sequencing of dam safety analyses projects and minimizing dam safety risk.

Goldstream Watershed Dams (11 total) Dam Breach Assessment and Inundation Zone Mapping

The 2015 Dam Safety Review (Thurber) recommended that the 1993 dam breach analysis and inundation zone mapping be updated. An engineering consultant, Hatch Ltd., was hired in 2018 and provided its final report in late November, 2019. This was a similar assignment to the dam breach assessment completed for the Sooke Watershed Dams by the consultant NHC. The project scope was completed following guidelines as per CDA Dam Safety Guidelines. The major tasks included:

- Review of background information and hydrology review and development.
- Dam breach model development, dam breach analysis including cascade failure analysis, Dam Failure Consequence Classification (DFCC), and inundation mapping for Butchart Dam Nos. 1, 2, 3, 4 and 5, Lubbe Dam Nos. 1, 2, 3 and 4, Goldstream Dam and Japan Gulch Dam.
- Structural and non-structural mitigation concepts, evaluation and prioritization, and
- Emergency and evacuation routes.

Overall, the assessment used the most recent industry standards and guidance along with conservative but reasonable assumptions to produce a comprehensive and defensible analysis of the effects of dam breach events for all 11 dams along the Goldstream River. Over 80 individual simulations were conducted to assess the various load cases and evaluate each of the DFCCs. These DFCCs were established by looking at the potential for incremental loss of life, economic and infrastructure damages, and environmental and cultural losses. For each dam a set of inundation zone maps were developed for the “flood-induced” and “sunny-day” dam failure type scenarios.

The results of the engineering assessment indicate that there is a very limited potential for incremental loss of life and economic damages. As a result, seven of the DFCCs previously adopted have been reduced by 1 or 2 classification levels which corresponds to a reduction in required spill capacity and adjusts ‘down’ the risk profile of those dams. The most critical potential damages throughout the system were reviewed and several mitigation measures were conceptualized, evaluated for value, and prioritized. Many of the recommendations are consistent with those raised during the 2015 Dam Safety Review Audit, and include improving emergency preparedness, improving dam safety instrumentation, developing a flood forecasting system, and developing emergency repair strategies for critical watermains that cross the inundation zone. The timing of this study was strategic to understand the risk profile prior to making any major investments in dam analyses and rehabilitation.

Dam Emergency Training and Exercises

The B.C. Dam Safety Regulation obligates dam owners to have a Dam Emergency Plan (DEP) and it is best practice to complete emergency response training and exercising of the DEP periodically. Dam Safety related training is occurring periodically within the IWS department, focussed on training staff who have responsibilities with operating, maintaining, and monitoring dams. A “Fully Functional” dam emergency exercise was held over two sessions (September 22, 2022, and October 28, 2022) which tested the CRD’s response to an escalating dam emergency. The training and exercise involved setting up an Emergency Operations Centre (EOC) and a Department Operations Centre (DOC) with incident command inspections and communication with external emergency authorities including Emergency Management BC, Local Emergency Authorities, Dam Safety Office, and the RCMP. The session was based on the British Columbia Emergency Management System and included notational elements of Incident Command,

activation of the IWS DOC and the CRD's Corporate EOC and included Local Emergency Authority content specific to evacuation of persons in a dam breach inundation zone.

Major Dam Safety Projects in progress now:

Sooke Lake Dam – 2023 Dam Safety Review Audit

Hatch is currently working on the DSR report and submitted a draft of the report to the CRD in March 2024. Hatch has concluded that "The Dam will be Reasonably Safe, conditional on implementation of the additional Established Good Practice recommendations, to compensate for physical Deficiencies and/or regulatory, procedural and operational Non-Conformances that have been identified and documented within Hatch's report".

IWS staff have hired geotechnical expert Thurber Engineering Ltd., who acts in the role of Dam Owner Technical Expert, to conduct a third-party review of the DSR Audit report and provide a list of considerations and additional information for Hatch to review prior to finalizing the DSR Audit report. It is anticipated that the final report will be completed by the end of 2024, with IWS staff planning to prepare a mandatory Action Plan to resolve the outstanding dam safety issues.

Sooke Lake Dam Instrumentation Improvements – Detailed Design and Construction

The 2016 Dam Safety Review Audit identified many dam safety deficiencies with the existing instrumentation system, including failing and unreliable instruments. Data collection from critical piezometers and seepage weirs is happening manually at all instruments, except for one automated seepage weir. Dam safety expert consultants have recommended to design and build an automated data acquisition system for the dam and integrate it with the CRD's IWS SCADA system so that water operators can continuously monitor dam performance remotely from the control room. Additionally, some of the existing piezometers in Sooke Lake Dam used to monitor the embankment are at the end of their service life and therefore need to be replaced. Reading of remaining manual instruments is planned to continue for comparative and validation purposes.

The detailed design phase is planned to be complete by end of 2024, with installation of new instruments planned for Q3 2025, when the reservoir level is lower. Instrumentation improvements will include: Twenty (20) vibrating wire type piezometers to measure internal pore water pressures in the dam, three (3) upgraded and instrumented seepage weirs, shape arrays to measure dam deformation, cameras, a tiltmeter at the intake tower, and three (3) seismographs. Temporary platforms are anticipated to be constructed to install new piezometers at the upstream face of the dam. Commissioning of the system is anticipated to be completed by mid-2026. IWS staff have coordinated a third-party review of the design and are coordinating with the Dam Safety Office to complete a permit application.

Sooke Watershed Dams – Breach Risk Reduction Measures

The results of the 2018 dam breach assessment and inundation mapping project included a prioritized list of recommendations from the consultant, NHC, to lower risks associated with the unlikely event of a dam breach at one of the Sooke Watershed Dams. The highest priority recommendations and status are as follows:

1. Implementing an Emergency Warning System – prior to proceeding with a feasibility study of installing an Emergency Warning System (e.g. siren) downstream of the dams, IWS

staff are actively working on a communication and engagement plan in order to raise awareness regarding the dam safety risks and providing information to property owners in and around the modelled dam breach inundation zone. Capital budget has been approved to complete the feasibility study of installing the Emergency Warning System, pending the results of the communication plan.

2. Implementing Structural Upgrades at the Dam – IWS staff have completed stockpiling of emergency riprap materials as the first structural upgrade in 2018, followed by instrumentation system improvements at the dams, starting with Sooke Lake Dam.
3. Adjusting Reservoir Levels at Sooke Lake and Deception Reservoirs – Seasonal adjustments to lower the Sooke Lake and Deception Reservoir maximum operating water levels during winter has been identified by dam safety experts as an opportunity to balance dam safety risks and water supply risks. Operating at lower winter operating level lowers the risk in the unlikely event of a dam breach, in a period of time when water demand is at its lowest. The operating level is then returned to full pool for the high water demand spring and summer seasons. The project involves setting Seasonal Reservoir Operating Rules and developing Flood Informed Reservoir Operations. An initial strategic assessment has been completed by dam safety expert consultant, Hatch Ltd., which resulted with confirmation that development of the SROR and FIRO would enable the CRD to lower dam safety flood risks during winter, without jeopardizing the reliability of the water supply system.

The potential inundation zone includes areas within both the CRD's Juan de Fuca Electoral Area and the District of Sooke (DoS), CRD staff are working with the Local Emergency Authority staff for both the CRD and DoS to coordinate emergency management efforts and preparedness. The roles and responsibilities for both will be further defined and additional communication is planned.

Deception Gulch Dam – Low-Level Outlet Gate and Air Vent Pipe Replacement.

During the annual formal dam inspection on October 17, 2023 by IWS staff, Water Infrastructure Operations (WIO) staff were executing a planned water release order separate to the inspection work, to increase flow to the Sooke River for conservation purposes. Soon after opening the low-level outlet gate, turbid water was observed discharging from the outlet of the LLO pipe, followed by the air vent pipe. An investigation of the issue has resulted in the action plan to decommission the existing air vent pipe, install a new air vent pipe in a more optimal location, and replace the existing low-level outlet gate, which is near end of useful life and experiencing mechanical issues. The new gate has been ordered and the plan is to complete the construction work during the lower reservoir water conditions in summer 2025.

Dam Emergency Plan (DEP) and Operation, Maintenance and Surveillance Manual (OMS) Updates

A comprehensive DEP based on industry accepted content was finalized and issued in 2020 and has been updated annually since that year. In addition to the DEP update, the OMS manual for Sooke Lake and Goldstream Watershed dams is being updated and is planned to be reissued in 2024, and will be sent to the Dam Safety Office for review and acceptance. The Dam Safety Office has requested that the updated OMS manual be submitted for review by January 31, 2025.

Flood Forecasting System and Hydrotechnical Projects

CRD IWS staff have compiled a bundle of inter-related hydrotechnical and dam safety related issues to be resolved under a single project. Dam Safety expert consultant, Hatch Ltd., was selected as the preferred consultant through RFP and hired in 2023 for the project.

The dam safety issues to be resolved are related to dam and reservoir operating procedures at Sooke Watershed Dams. The procedures need improvement in order to reduce dam safety risk, particularly during the winter storm season, but also maximize security of the water supply. The project involves development of new Watershed Simulation Models which includes hydrological modelling of the watersheds, dam operations modelling, hydraulic modelling of rivers, and engineering analyses. The Watershed Simulation Models are replacing the current hydrological model which is out-of-date. The models are being integrated using proprietary software called DELFT Flood Early Warning System (DELFT-FEWS) to develop a Flood Forecasting System (FFS) and a series of new Reservoir Operating Rules (ROR). The ROR will be based on the results of the Sooke Lake Reservoir Operating Strategy completed separately by Hatch and will consist of:

1. *Seasonal Flood Compartment Storage* - seasonally reduce the operating level of the Sooke Lake Reservoir and Deception Gulch Reservoir during the winter season when water demand is lowest, and flood risk is highest.
2. *Forecast Informed Reservoir Operating Rules* - the Flood Forecasting System will be utilized to implement Forecast Informed Reservoir Operations (FIRO). FIRO will include rules to monitor weather forecasts, predict effects of incoming storm systems on dams and reservoirs, and make forecast informed decisions regarding the need for temporary reservoir water level adjustments to safely pass increased reservoir inflows (i.e. major flood events).
3. *Other Reservoir Operating Rules* – The project involves looking at opportunities to develop additional ROR to improve dam safety and security of the water supply.

Important note: The Flood Forecasting System will provide a “decision-support” tool to be used by IWS staff to inform decisions around flood operations and dam safety risk reduction measures during winter. Prior to any implementation of new ROR, IWS staff plan to conduct a desktop testing of the tools and simulate operations during a winter season using the new modelling and decision support tool. This period of commissioning will allow staff to test and validate the new models to gain confidence in the new decision support tool and proposed changes to the reservoir operating strategy.

Additionally, the Watershed Simulation Models are being used to resolve other related dam safety deficiencies, namely:

1. *Emergency Reservoir Drawdown Analysis and Procedures*
2. *Inflow Design Flood Estimation and Dam Freeboard Analysis*

Phase 1 of the project is focused on the Sooke Lake Watershed Dams and is anticipated to be completed in 2025. Future phase(s) are planned to follow to expand the Flood Forecasting System to include the adjacent Goldstream Watershed Dams and expand the hydrological modelling to the Leech Watershed.

Outlet Gates, Valves, and Actuators Assessment

As a result of routine inspections and audits, issues such as the failure and unreliability of valve actuators were observed. This has resulted in the approval and completion of a comprehensive

actuator assessment study for all RWS Dams and potential future recommendations for capital improvements. Valve projects completed since last Dam Safety Program Update in November 2019:

1. Sooke Lake Dams Spillway Gate Hydraulic System Replacement
2. Replacement of High-Level Outlet Gate at Lubbe Dam No.1
3. Sooke Lake Saddle Dam Valve Stem Repairs

Other prioritized projects currently in design with construction to follow in 2025 & 2026 include:

1. Deception Gulch Dam Low-Level Outlet Gate and Vent Pipe Replacement
2. Replacement of High-Level Outlet Gates at Goldstream Dam and Butchart Dam No.1

Seismic Stability Improvements: Sooke Lake Dam Spillway, Sooke Lake Saddle Dam and Deception Gulch Dam

The CDA Dam Safety Guidelines state that engineering analyses are required to demonstrate that a dam will remain stable under all hazards and loading conditions based on the current Dam Failure Consequence Classification. In 2016, the CRD retained the professional engineering services of Thurber to lead a team of consultants and complete a seismic stability assessment of Sooke Lake Dam, Sooke Lake Saddle Dam and Deception Gulch Dam. Details of the project objectives and analyses were provided in the previous Dam Safety Update staff report dated November 20, 2019.

The consulting team led by Thurber provided a list of recommended structural and seismic retrofits for the dam spillway and intake tower and non-structural operational improvements and further studies to consider, to improve seismic resiliency. The following improvements have been prioritized and are currently in a scope definition phase:

1. *Sooke Lake Dam Spillway and Gates Retrofit project*, which includes design of seismic restraint of the 65m wide concrete spillway, and retrofitting of the two primary spillway gates, supporting walls surrounding the gates, and gate isolation system.
2. *Deception Gulch Dam – Safety/Risk Reduction Measures project*, which includes design of a large granular buttress to be constructed at the downstream face of the dam to increase resiliency to the updated design earthquake loads.

Additionally, the CRD staff are currently implementing the following risk-reduction measures: designing new dam safety instrumentation improvements, assessing valves and controls and updating Dam Emergency Plans. Also, the risk reduction benefits of operating the reservoirs at a lower water level during the winter months, when drinking water demand is lower, is a work in progress (Please see project description for Flood Forecasting System and Hydrotechnical Services for more details). IWS staff plan to complete similar seismic stability analyses of the remaining RWS dams (including the 11 Goldstream Watershed dams). The work will begin with a seismic hazard assessment for each of the four reservoirs in the Goldstream System and will be followed by a drilling investigation to classify dam materials and conduct deformation analysis on each of the major dams to determine what, if any, seismic upgrades are needed due to the updated seismic hazard.

Integrate Dam Performance and Hydromet to SCADA

A project team consisting of Dam Safety and IT staff has been assembled to prepare a plan for integrating all dam performance data to the current SCADA system, and plan for connecting remote dams in the Goldstream Watershed to the CRD's SCADA system. The project plan has identified the following key objectives:

1. Develop a standardized field cabinet complete with hardware which meet all appropriate regulations and can house equipment needed for an automated data acquisition system (e.g. datalogger, radio, etc.) that is scalable, flexible, robust, and compatible with the current SCADA system. The cabinets will be installed at remote dam sites, as well as key weather station sites that support dam safety decision making.
2. Conduct a pathway study for enabling improved communications to remote dam and hydrometeorological station sites located in the Goldstream Watershed.
3. Implement installation of new hardware and cabinets at the remote sites, in a prioritized manner.
4. Commission the new automated data acquisition system and integrate it with the SCADA system.

Work on the project will continue in 2024 and is anticipated to take several years to complete. Separate and parallel to this project, IWS staff are planning dam safety instrumentation improvements, such as automated piezometers and seepage weirs, at many of the major dams.

Dam Deformation Monitoring Program

IWS staff are coordinating annual dam deformation surveys at Sooke Lake Dam with support from Thurber and a local professional surveying firm. Survey benchmarks and targets were installed at the dam in 2019. Results of the annual surveys since 2019 show that the dam has not deformed or settled any significant amount since the baseline survey was conducted. In 2024, IWS staff hired Thurber Engineering to provide engineering advice developing a comprehensive Dam Deformation Monitoring Program for the 15 Regional Water Supply Dams. The DDMP will be a phased program that includes a mix of technologies (e.g. manual survey, drone, satellite, etc.) to collect topographic data for all the major dams. The data will support long-term monitoring of potential slow movements of the embankment dams, as well as the opportunity to provide baseline data for conducting post-earthquake surveys at the regional water supply dams. IWS staff are planning to continue with annual surveys of Sooke Lake Dam and begin the first phase of the broader program later in 2024.

APPENDIX “A” – SCOPE OF SERVICES

BACKGROUND

The Integrated Water Services (IWS) Department of the Capital Regional District (CRD) manages many water and wastewater utilities (totaling 22) across the region. The Regional Water Supply (RWS) service is the water supply service for Greater Victoria servicing approximately 400,000 people.

Regional Water Supply Service

The Capital Regional District (CRD) supplies bulk drinking water for residential, commercial, institutional, industrial and agricultural uses throughout the Greater Victoria area by the Regional Water Supply Service (RWS). The RWS operates the watersheds, dams, reservoirs, treatment (disinfection) and transmission systems. The CRD supplies water through the transmission systems to sub-regional water services, including the Juan de Fuca Water Distribution Service, Saanich Peninsula Water Service, bulk water municipal customers, and eight First Nation communities. The overall organization of the RWS service and their major customers is shown in **Figure 1**.

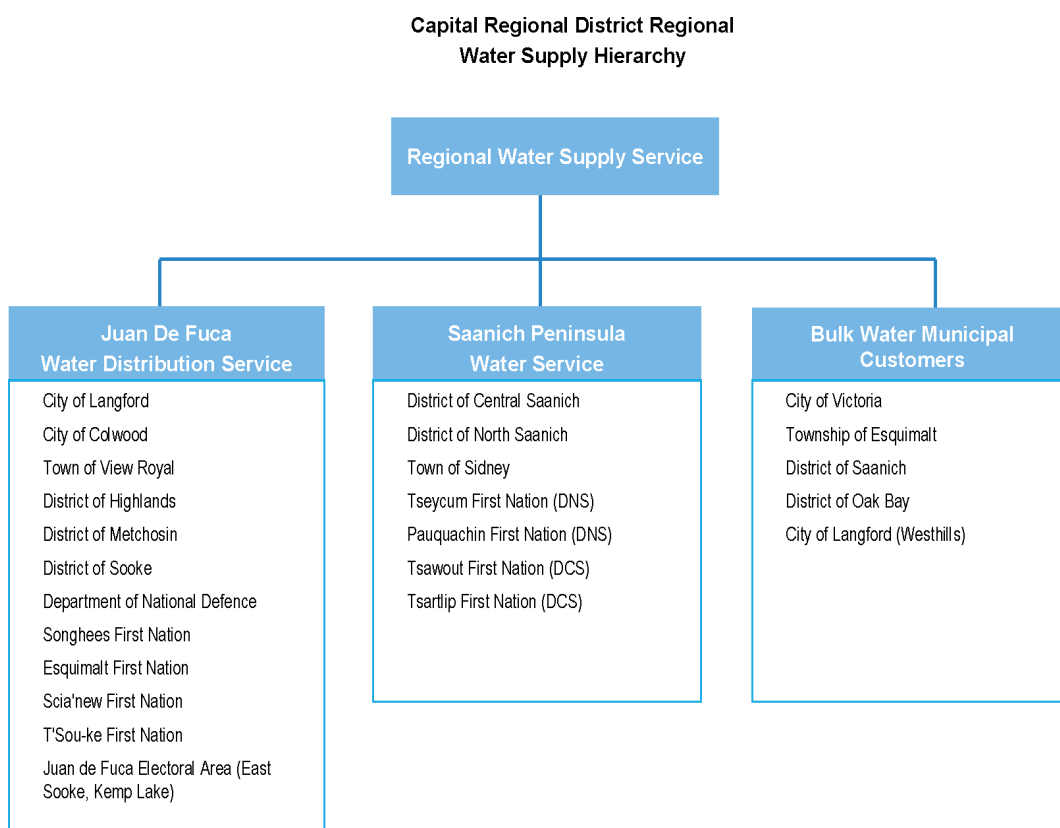


Figure 1: Regional Water Supply Customers

The primary water supply source for the RWS is the Sooke Lake Reservoir. The Sooke Watershed Supply is a high-quality, low turbidity source which enables the RWS to currently operate as an unfiltered source. Advanced disinfection facilities consisting of UV, chlorine and ammonia are used for treatment. The water produced by the RWS meets all Provincial and Federal guidelines for drinking water quality. In the future, diversion of additional water from the Leech Watershed to meet growing demands is anticipated.

Figure 2 illustrates the components of the water supply system and service area of the RWS.

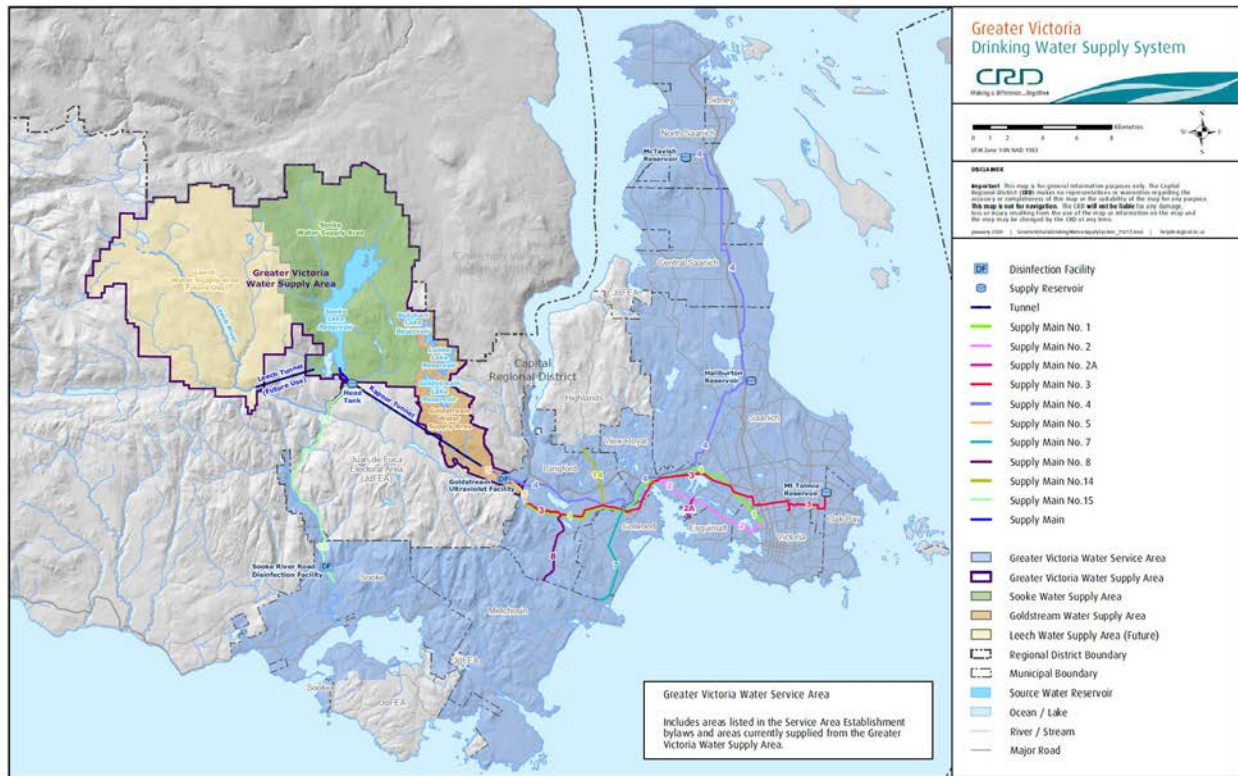


Figure 2: Regional Water Supply Water Service Area

RWS Master Planning

The Greater Victoria Water District adopted the Long Term Water Supply Plan in 1994 (1994 Master Plan) and the 2022 Master Plan was prepared to update the 1994 Master Plan and to advance the Commitments, Strategic Priorities and Actions set out in the Regional Water Supply Strategic Plan that was adopted in 2017 (2017 Strategic Plan).

The 1994 Master Plan recommended many system improvements, 21 in total, many of the improvements and subsequent decisions have focused on securing supply, such as raising of Sooke Lake Dam, rehabilitating the Goldstream Water System dams, and the acquisition of the Leech Water Supply Area.

The 2022 Master Plan focused on a new infrastructure program intended to address the highest risks facing the RWS System including lack of redundancy of critical components, climate change impacts, seismic vulnerabilities, and changing water treatment needs, as well as increasing water supply to serve a growing population to 2050 and beyond.

The Capital Regional District (CRD) retained Stantec Consulting Ltd. (Stantec) to prepare the 2022 Master Plan, along with three other system related assignments: Deep Northern Intake Feasibility Study, Risk and Resiliency Assessment and Seismic Assessment - Phase 1 Facility Screening Level. The 2017 Strategic Plan Commitments, Areas of Focus, and Strategic Priorities were used to guide the master planning process, with a goal of providing recommendations that would be adaptable over time but would ultimately result in new resilient supply system infrastructure that would mitigate or address near and long-term water supply and system risks.

The Master Plan recommended 21 system improvements, which are attached as a summary in Table E.4 of Appendix C. Details of how these improvements were identified and selected are explained within the Master Plan document.

Table E.4 (source: 2022 Master Plan)

	Option	2022\$	Mid-Point of Construction	Inflated \$
Supply				
Deep Northern Intake/Floating Pump Station	S3	\$72,505,000	12/31/2031	\$87,929,000
Leech River Diversion	S4/RWT1	\$16,700,000	12/31/2044	\$26,204,000
Sooke Lake Saddle Dam Hydraulic Improvements	M1	\$10,000,000	12/31/2044	\$15,691,000
Water Treatment				
Japan Gulch Dam Decommissioning	T2/T4	\$10,256,000	12/31/2033	\$12,940,000
Direct Filtration	T2/T4	\$736,155,000	12/31/2035	\$966,353,000
Clearwell	T2/T4	\$23,999,000	12/31/2036	\$32,134,000
Treated Water Pump Station	T2/T4	\$29,780,000	12/31/2036	\$39,873,000
Japan Gulch Water Filtration Plant Stage 2 Balancing Tank	M2	\$15,384,000	12/31/2036	\$20,599,000
Raw Water Transmission Mains				
DNI Transmission Main to Head Tank	M3	\$38,768,000	06/30/2032	\$47,483,000
3rd Main - Sooke Lake Dam to Head Tank	M4	\$7,384,000	12/31/2032	\$9,134,000
Jack Lake - Head Tank to Japan Gulch + 2 PS @ 2100 ADD	RWT5*	\$208,649,000	12/31/2037	\$284,959,000
Goldstream Reservoir Connector				
Goldstream Dam to Japan Gulch	M5	\$67,075,000	12/31/2030	\$82,971,000
Stage 1 Balancing Tank	M6	\$5,538,000	12/31/2030	\$6,850,000
Treated Water Transmission Mains				
Phase 1 Upgrades	M7	\$7,499,000	6/30/2024	\$7,838,000
Phase 2 Upgrades	M8	\$38,204,000	6/30/2029	\$44,085,000
Phase 3 Upgrades	M9	\$55,293,000	6/30/2039	\$77,792,000
Phase 4.1 Upgrades	M10	\$47,670,000	6/30/2049	\$81,771,000
Phase 4.2 Upgrades	M11	\$48,928,000	6/30/2049	\$83,930,000
East-West Connector				
Option 2 Transmission Main	M12	\$58,562,000	6/30/2036	\$77,639,000
Storage Tank				
Smith Hill Tank	M13	\$12,820,000	12/31/2038	\$17,859,000
Smith Hill Tank Pump Station	M14	\$17,148,000	12/31/2038	\$23,887,800
Total Estimated Cost		\$1,528,000,000		\$2,048,000,000

Since the delivery of the 2022 Master Plan, the CRD has been actively planning for the implementation of the plan and has proceeded with the design of a portion of the Treated Water Transmission Main work. In addition, the CRD has been working towards implementing a Development Cost Charge Bylaw to fund or assist with funding of growth-related projects.

CRD/IWS Capital Improvement Planning / Project Delivery

IWS typically manages a collective capital improvement plan totalling approximately \$80 to \$90 million per year across all the services, of which approximately \$30 to \$50 million annually is related to the RWS service.

The addition of the 2022 Master Plan related projects will be a significant increase in effort for the CRD to deliver. Further, the 2022 Master Plan projects are relatively large and complex and will need to consider integrated planning, project delivery, technical proficiency, specialized procurements, risks and critical path management. Although the CRD has recently delivered the regional sewerage collection and treatment works totalling approximately \$800 million, the term project management office and resourcing has since demobilized and resources, systems and procedures will need to be developed for this program.

RWS Capital Improvement Plan (CIP)

Since the delivery of the 2022 Master Plan, several projects have been included in the CIP, namely the Project Delivery Strategy, Filtration Plant Planning & Design, East-West Connector, Deep Northern Intake and Sooke Lake Pumping Station, Transmission Main – Sooke Lake Pumping Station to Head Tank, Gravity Main - Sooke Lake to Head Tank, Goldstream Connector plus the pending update to the 2022 Master Plan, all totaling nearly \$40 million in the five year plan. Additionally, the CIP includes previously approved and funded expenditures related to new acquisitions and renewals; some of which have relation to the 2022 Master Plan (e.g. transmission main upgrade program, water quality studies and research projects).

SCOPE OF SERVICES

The overall long-term plan, spanning decades, will see the delivery of many 2022 Master Plan projects and others. In general, the current scope of work will detail and result in the delivery of a “Road Map” for long-term guidance. The “Road Map” will provide comprehensive guidance on all matters related to the delivery of the works.

CRD’s Consultant

The CRD is seeking the services of an experienced consultant to provide Program Development and Project Delivery advice related to implementing the recommended improvements of the Regional Water Supply Services’ 2022 Master Plan (e.g. a “Road Map”). It should be noted that this assignment is not for design, tender, or construction related services, all of which will be realized in later phases. The consultant through this assignment will address and provide the CRD with guidance on the typical program and project delivery, as well as provide a review and recommendations based on the specifics of the projects identified. Proponents’ proposals shall provide details of methodology, but the CRD offers the following framework to consider and build upon:

TASK 1 –Orientation and Visioning

Upon project award and project initiation, it is expected that the consultant will require orientation including review of existing materials and documentation. This may include an initial workshop meeting with CRD staff and tours of current and potential facility sites (see below for more detail). The CRD will provide existing materials and documents (see summary of resources below).

The consultant will also conduct a workshop to define the vision for the team that guides future decisions and actions. This workshop should include input and alignment of key stakeholders including various CRD departments (Infrastructure Engineering, Operations, Water Quality, Watershed Protection etc.), identify potential opportunities and challenges, outline current system risks, initial delivery risks, confirm strategic goals and foster collaboration.

Task Deliverables: Outputs from this workshop will be summarised by the consultant and will be used as inputs to the subsequent tasks.

- A comprehensive summary document of the feedback received from the workshop along with a standalone actions log
- A draft “placemat” document that communicates the vision for the program to both staff at various levels and the public.

TASK 2 – Program Refinement and Risk Review

The consultant shall review the 2022 Master Plan and existing approved capital improvement plan for familiarity (Task 1 – Orientation and Visioning). It is expected the consultant would complete a risk-based

assessment of the recommended projects of the Master Plan and validate the timing, priority, and sequencing of the projects. The consultant will assess the following to validate the project list prior to undertaking the assessment:

- Potential efficiencies or mutual benefits across the various IWS operated services, the consultant shall review, include and integrate other related approved and pending capital improvement projects and programs that have been raised independently of the 2022 Master Plan. This could include other RWS approved 2025 capital improvement plans for the Juan de Fuca Water Distribution System, Saanich Peninsula Water System, and Core Area Wastewater System.

The risk-based assessment should follow a systematic and defensible approach to quantifying risks prior to and after implementation of the identified projects. The methodology, assumptions and output from the assessment will be documented in a report and summarised in a format that can be clearly communicated to technical and non-technical audiences. The approach will be reviewed and approved with CRD staff. The Consultant is not expected to re-evaluate the methodology and rationale used to conceptualize and develop the project list, but rather evaluate the projects from a risk mitigation perspective and consider aspects such as criticality, redundancy and reliability to validate the project schedule. The Consultant shall also identify potential triggers for changes to the schedule such as changing regulations (including but not limited to changing regulations for critical utility responsibilities related to Emergency and Disaster Management Act), changes in water quality, population growth and system performance.

Task Deliverables:

- Validated project list with high level scope and description of project benefits along with other pertinent information. This deliverable should be in a format that can be easily maintained, with version control over the life of the program and flexibility to add additional attributes related to each project in the remaining phases of this assignment and into subsequent assignments.
- Risk Assessment framework tailored to the scope of the projects, including quantitative and qualitative triggers that can be used as guidelines to assess priority and future potential changes in delivery schedule as a result.
- Prioritized project list based on outputs of the completed risk assessment, documented rationale and assumptions for current priority.

TASK 3 – Project Scope Definition

The consultant shall prepare a detailed project scope definition including a summary of all studies, permits, consultation activities, etc. that are required to delivery each of the identified projects in the project list. For each project scope definition, a work breakdown structure (WBS) or Gantt chart will be developed outlining the specific tasks.

As the CRD will utilize the consultant's WBS to inform its future capital improvement planning, Class D cost estimates are required for each project and each associated task.

The project tasks may include, but not limited to, various site and field investigations, archeological investigations and field work, environmental site investigations and remediation, planning, conceptual design and implementation management of various early and enabling works, including ground improvements and select ecological projects, land tenure and permitting tasks, development of works and other design procurements, pilot and demonstration studies for water treatment processes, permitting and approval engagement with federal, provincial and municipalities, stakeholder and public engagement, First Nations engagement and partnership opportunities.

Task Deliverables:

- A memorandum summarizing the detailed project scope for each project on the validated project list, including cost estimates for each sub-task and a schedule for delivery. The key requirements, objectives and deliverables of each of the project's tasks should be clearly outlined in sufficient detail that they could be used to identify the scope of service for a future RFP.
- Building on the validated project list from Task 2, the consultant will complete a project tracking document including the WBS with details of each sub task, cost estimates and schedule details for each project.

TASK 4 – Program Delivery Review

Building on the deliverables of Task 3, the consultant will review all projects identified and develop a delivery strategy for the projects, which would include bundling/packaging alternatives. For each of the alternatives/packages consider both conventional and collaborative delivery models as applicable. Assess options such as conventional design bid build, progressive design build, fixed price design build and construction management at risk (CMAR) options for project delivery.

The consultant will work with CRD staff to determine the evaluation framework for the alternatives and will assess the alternatives and document the pros and cons associated with each. The assessment of each alternative will consider both the risks to delivery with each of the alternatives and financial benefits but also the change in the risk profile of the water systems over course of the implementation of the program delivery using the risk assessment framework developed in Task 2. Based on this assessment the consultant will recommend a preferred delivery strategy for the identified projects, which may include a combination of standalone projects and larger programs.

Task Deliverables:

- Report summarising the alternatives assessment and the preferred alternative including cost and schedule implementations.
- Develop a detailed schedule for delivery of each of the major projects/programs considering procurement, planning, stakeholder consultation, permitting, funding, preliminary engineering, detailed engineering, construction, commissioning, and asset transfer phases. Schedule will consider project interdependencies, pre and post requisites. Additionally, the consultant will identify the subsequent next steps or tasks including critical path items to pursue for each project (“Roadmap”).
- Updates to the project tracking document based on the preferred alternatives.
- Presentation, with supporting visual aids, suitable for technical and non-technical audiences. Assume attendance and presentation to one Regional Water Supply Commission and one Water Advisory Committee meeting.

TASK 5 – Program Implementation Plan

Based on the preferred alternative, the consultant will collaborate with the CRD to develop a Program Implementation Plan which will compile key aspects of the previous tasks along with the following plans:

- *Project Governance Framework* that aligns with the existing Governance of RWS. Identify key senior CRD staff or specific hires that support key management roles within the Governance Framework. Identify reporting requirements for the Regional Water Supply Commission and Water Advisory Committee. Identify key functional positions and outline the roles and responsibilities.
- Building on the Governance Framework develop a *Long Term Resourcing Plan* for both internal and external staffing needs. CRD goal is to hire internal key positions that will support the ongoing operations of the system as well as that positions that will hold key institutional knowledge and relationships. Also consider opportunities for training and development of existing staff.
- *Funding and Grant Strategy* which could include potential sources of grants and funding with Provincial and Federal governments and will assist the CRD with determining the required technical and costing information to support grant applications. In addition, will consider potential alternative sources of funding which may be available depending on the project delivery strategy used to deliver the projects.
- *Permits and Regulatory Management Plan* which will summaries key stakeholders, engagement process, required background documentation, risks and mitigation measures.

- *Communications Plan* aimed at raising awareness among the public, the Regional Water Commission, First Nations, and other interested parties. The goal is to foster support and understanding for the projects as they progress.

Task Deliverables:

- A Program Implementation Plan that brings together the outcomes from the previous tasks, along with each of the plans detailed above. This will form an overview of the overall program implementation.
- Presentation, with supporting visual aids, suitable for technical and non-technical audiences. Assume attendance and presentation to Regional Water Supply Commission and Water Advisory Committee.
- A final “placemat” document that communicates the vision for the program to both staff at various levels and the public.

OTHER SCOPE OF SERVICES DETAILS

1. Project Management - The Consultant shall provide the following Project Management services:
 - a) Project initiation meetings, periodic update meetings as proposed, preparation of meeting minutes, and meetings to deliver major deliverables,
 - b) Prepare project delivery schedules for this assignment and periodic updates as required,
 - c) Prepare invoices and project progress reports, including documented updates on completion of tasks, deliverables, scheduled milestones, schedule updates, and any concerns with progress to date,
 - d) Consistent, reliable, and proactive communication with CRD’s project manager throughout the project, and
 - e) Provide documentation of quality control process or procedures that will be followed for submission of all deliverables.
2. Project Schedule – It is anticipated that the consultant will be directed to initiate the assignment by the end of Q1, 2025. The CRD requires any budget related information by June of 2025 for inclusion in the subsequent capital improvement plan (2026 to 2030). The schedule for this scope of services is to conclude by 2026, and follow-on work may be approved subject to CRD purchasing policy. The Consultant shall provide a “Project Approach and Activity Schedule”.
3. Project Budget – A budget of \$300,000 will be allocated to this consultant assignment/scope of services.
4. Site Orientation - The CRD expects that the consultant team will require a field orientation to be conducted by the CRD staff and therefore, it is proposed that three (3) days of facility touring of the RWS facilities will be conducted with the core Consultant’s team.
5. Cost Estimates – The Consultant shall provide cost estimates for all recommended actions whether they are related to further detailed study, design, construction or other. In addition, where applicable cost estimates for operating and capital cost estimates shall be comprehensive and include estimates for administration expenditures, financing, land, decommissioning, etc. The Consultant will utilize the EGBC guidelines for estimating costs.
6. CRD Team and Effort – The CRD team will consist of a core project management team from the Infrastructure Engineering (IE) Division. Other CRD staff including Senior Management and subject matter experts will be available as required. The consultant will work directly and primarily with and through the IE team. It is expected that the consultant will provide resourcing within its company or company and sub-consultant (i.e. only one contract will be issued for this work). The CRD Staff will

be an integral part of the work and will participate in meetings, review of draft reports, provision of existing plans, reports, etc. The Consultant shall allow for a minimum two-week review period for any work requiring review by the CRD staff.

7. Proponent Presentations – In accordance with Appendix “C,” if the proponent is selected for a presentation, it will be held in person at IWS’s office at 479 Island Hwy, View Royal. The Project Manager, along with a maximum of two other team members identified in the proposal are asked to attend. The format for the presentation will be a 30 minute presentation of the team’s proposal followed by questions and answers. It is anticipated presentations will be held the week of January 13, 2025.
8. Project Deliverables – Deliverables shall include but not be limited to meeting agendas and minutes, reports/memorandums, presentations as outlined above in each of the Task Deliverables. The Consultant shall provide a detailed list of foreseen project deliverables with its proposal, highlighting any deviations to the identified deliverables. For each deliverable, the consultant should assume 2 draft submissions prior to finalising.
9. Consultants’ Committee/Commission Presentations– in addition to the Consultants’ deliverables and presentations to CRD staff, the Consultant shall include two (2) in person presentations to CRD committees/commissions. In essence, the presentation content would be based on the outcomes of the scope of services.
10. Regulatory Approvals and Testing - No regulatory approvals, testing and exploratory work are expected to be completed by the Consultant.
11. Standards/References - The Consultant will utilize industry standards and guidance resources (e.g. PMBOK, IIMM, AWWA Manual of Water Supply Practices, Standards, etc.) and include references to such resources in the Consultants proposal.
12. Available Documentation - Hardcopies of existing studies, master plans, reports, etc. will be made available for viewing by appointment at CRD Integrated Water Services located at 479 Island Highway, Victoria, B.C. The remaining information will be made available to the successful proponent.
13. CRD Expectations - The CRD has the following expectations for Consulting Services:
 - a) Quality - The intent is for all Proponent deliverables to be of high quality and meet industry standard best practices. If significant errors and/or omissions are encountered during the review of a deliverable, the entire deliverable will be returned for revision and resubmittal at the proponent’s expense. The following will trigger a resubmission (this list is not exhaustive):
 - i) Excess spelling, grammar and terminology mistakes.
 - ii) Inconsistent, incomplete or incorrect formatting.
 - iii) Inconsistent, incomplete or incorrect information.
 - iv) Excess information (inclusion of information which is clearly not required for the execution of this project).
 - v) Lack of information.
 - vi) Lack of clarity.
 - b) Project Team - Any changes to the proposed Proponent’s team members will require the CRD’s written approval. Team member changes may not be approved if there is a decrease in value to the CRD.
 - c) Hourly Tasks
 - Consultant progress invoicing will be monthly with a detailed invoice itemizing charges per Schedule “A” of the Pro Forma contract included with this RFP.
 - The Maximum Upper Limit will not be exceeded without an approved Contract Change Order.
 - All personnel billing to hourly tasks are to be approved by the CRD.

d) Additional Fees:

-Fees in excess of the amounts proposed will not be paid without prior CRD approval via Change Order being signed by both the Proponent and the CRD (refer to Proforma Agreement terms).

- Requests for additional fees due to the following reasons will not be considered:

- Time mismanagement.
- Deficiencies, errors and/or omissions.
- Unapproved scope of work

14. Innovation and Alternatives - The CRD encourages all Proponents to present opportunities to add value to the project through innovation and alternatives. Pricing of alternatives need to be included with the proposal. However, sealed financial information should consider only the items above, so that all proposals can be evaluated equally.

Resources

1. Greater Victoria Water District, Long Term Water Supply Plan, Montgomery Watson, Dayton & Knight Ltd., January 1994 (CRD Ref. # 344)
2. Strategic Plan for Water Management, four volumes, Reid Crowther, Aqualta and Context, March 1999 (CRD Ref. # 556)
3. 2004 Review of the Strategic Plan for Water Management, Capital Regional District, November 2004 (CRD Ref. # 376)
4. 2012 Strategic Plan for the Greater Victoria Water Supply System, Capital Regional District, April 2012 (CRD Ref. # 868)
5. 2017 Strategic Plan, Regional Water Supply, Capital Regional District, 2017 (https://www.crd.bc.ca/docs/default-source/crd-document-library/plans-reports/drinking-water/iws2017stratplan.pdf?sfvrsn=417009ca_4)
6. [2022 Master Plan, Stantec Consulting Ltd., 2022](#) (CRD Ref. # 1186)
7. [RWSC Staff Report](#) of May 18, 2022 and [presentation](#)
8. 2022 Master Plan Webpage - <https://www.crd.bc.ca/project/water-supply-master-plan>
9. RWSC Proposed DCC Bylaw Webpage <https://www.crd.bc.ca/project/proposed-regional-water-supply-development-cost-charge-program>



Capital Regional District

HOTSHEET AND ACTION LIST

Regional Water Supply Commission

Wednesday, October 16, 2024

11:30 AM

CRD Board Room
6th Floor, 625 Fisgard Street
Victoria, BC

The following is a quick snapshot of the FINAL Regional Water Supply Commission decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

3. ADOPTION OF MINUTES

The minutes of the September 25, 2024 meeting were adopted as circulated.

8. COMMISSION BUSINESS

8.1 Regional Water Supply Service 2025 Operating and Capital Budget

Recommendation: The Regional Water Supply Commission recommends that the Committee of the Whole recommend that the Capital Regional District Board:

1. Approve the 2025 Operating and Capital Budget and the Five Year Capital Plan;
2. Approve the 2025 wholesale water rate of \$0.8631 per cubic metre;
3. Approve the 2025 agricultural water rate of \$0.2105 per cubic metre;
4. Direct staff to balance the 2024 actual revenue and expense on the transfer to the water capital fund;
5. Direct staff to update carry forward balances in the 2025 Capital Budget for changes after year end; and
6. Direct staff to amend the Water Rates Bylaw accordingly.

CARRIED

The following items were received for information:

- 7.1 Recommendations from Other Water Commissions
- 7.2 Water Watch Report
- 8.2 Water Quality Summary Report – May to August 2024
- 8.3 Dam Safety Program Update
- 8.4 GVWSA 2024 Wildfire Management Update



Capital Regional District

HOTSHEET AND ACTION LIST

Regional Water Supply Commission

Wednesday, September 25, 2024

11:30 AM

Board Room, 6th Floor
625 Fisgard Street
Victoria, BC

The following is a quick snapshot of the FINAL Regional Water Supply Commission decisions made at the meeting. The minutes will represent the official record of the meeting. A name has been identified beside each item for further action and follow-up.

3. ADOPTION OF MINUTES

The minutes of the July 17, 2024 meeting were adopted as circulated.

7. CONSENT AGENDA

7.1. Regional Water Supply Strategic Plan Update

Recommendation: 1. That the revised draft 2025 Strategic Plan for the Greater Victoria Water Supply System be endorsed; and
2. That staff be directed to proceed with the engagement plan.

CARRIED

7.2. Designation of Watershed Security Officers

Recommendation: The Regional Water Supply Commission recommends that the Capital Regional District Board: Appoint Nathan Prenger as Watershed Security Officer for the purpose of Section 233 of the Local Government Act and Section 28(3) of the Offence Act, and in accordance with Capital Regional District Bylaw No. 2681.

CARRIED

8. COMMISSION BUSINESS

8.1. Update on Regional Water Supply Development Cost Charge Program

Recommendation: That staff be directed to complete further public and development community engagement related to the draft Regional Water Supply Development Cost Charges Background Report, attached as Appendix B, prior to drafting the Regional Water Supply Development Cost Charge Bylaw.

CARRIED

8.2. Regional Water Supply Service 2025 Budget Requirement for Bear Hill Extension Project

Recommendation: That the cost of the Bear Hill Trunk Watermain Extension capital project No. 21-05 be cost-shared between the Regional Water Supply and Saanich Peninsula Water services, with up to 50% of the total cost being included in the 2025 Regional Water Supply Capital Plan

CARRIED

The following items were received for information:

7.3. Recommendations from Other Water Commissions

7.4. Water Watch Report

8.3. Demand Management Program Update

Action:

Provide the Commission with a wildfire update report in October.

Annette

CAPITAL REGIONAL DISTRICT - INTEGRATED WATER SERVICES

Water Watch

Issued November 18, 2024

Water Supply System Summary:

1. Useable Volume in Storage:

Reservoir	November 30 5 Year Ave		November 30/23		November 17/24		% Existing Full Storage
	ML	MIG	ML	MIG	ML	MIG	
Sooke	72,975	16,055	65,479	14,405	68,414	15,051	73.8%
Goldstream	7,732	1,701	7,835	1,724	9,879	2,173	99.6%
Total	80,707	17,755	73,314	16,129	78,292	17,224	76.3%

2. Average Daily Demand:

For the month of November	106.0 MLD	23.31 MIGD
For week ending November 17, 2024	105.5 MLD	23.21 MIGD
Max. day November 2024, to date:	109.7 MLD	24.13 MIGD

3. Average 5 Year Daily Demand for November

Average (2019 - 2023)	102.1 MLD ¹	22.46 MIGD ²
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¹MLD = Million Litres Per Day ²MIGD = Million Imperial Gallons Per Day

4. Rainfall November:

Average (1914 - 2023):	261.8 mm
Actual Rainfall to Date	165.5 mm (63% of monthly average)

5. Rainfall: Sep 1- Nov 17

Average (1914 - 2023):	376.3 mm
2023/2024	480.0 mm (128% of average)

6. Water Conservation Action Required:

To avoid possible leaks this spring, now is the time to winterize your sprinkler system.
Visit our website at www.crd.bc.ca/water for more information.

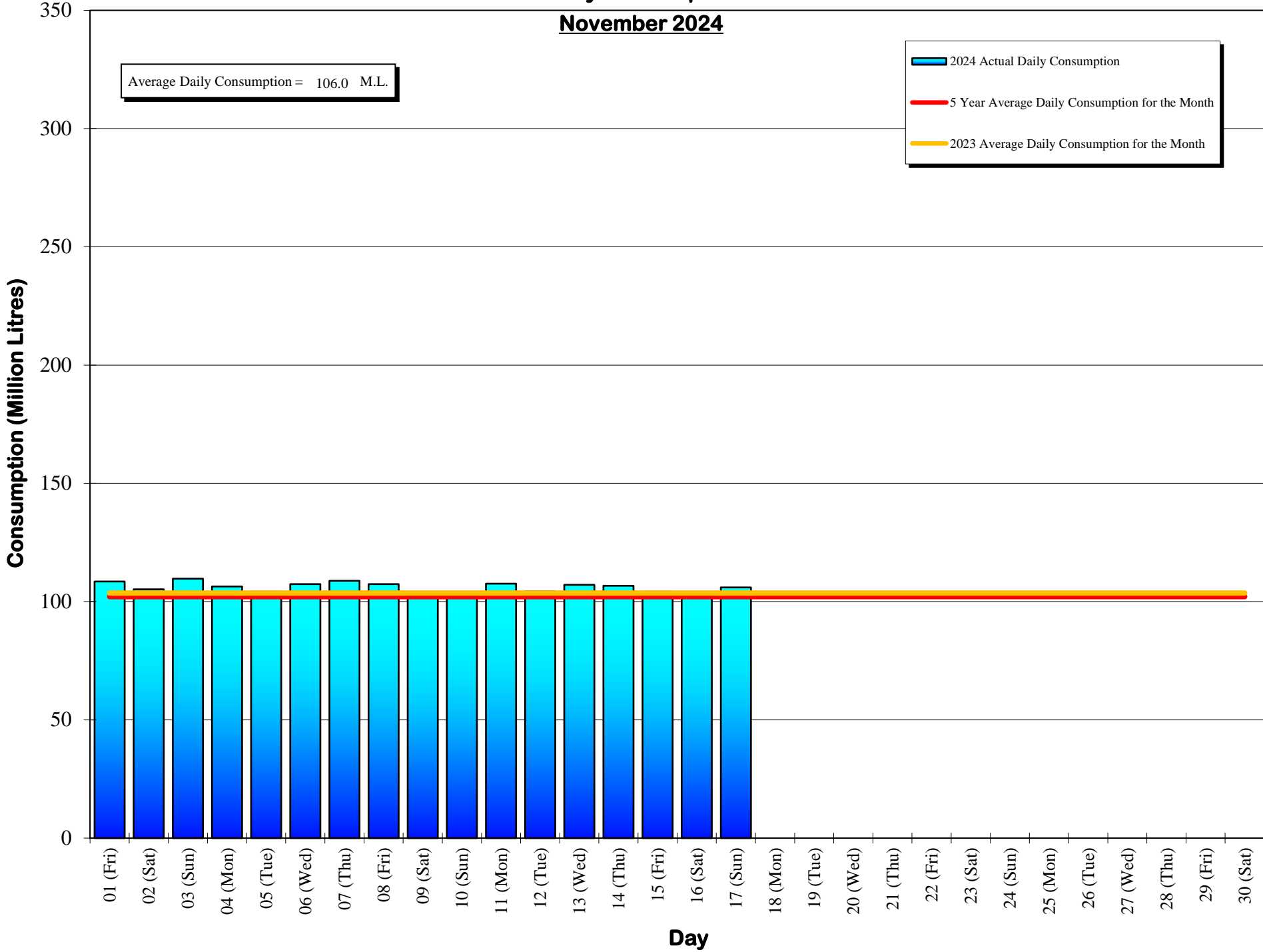
If you require further information, please contact:

Alicia Fraser, P. Eng.
General Manager, CRD - Integrated Water Services
or
Glenn Harris, Ph D., RPBio
Senior Manager - Environmental Protection

Capital Regional District Integrated Water Services
479 Island Highway
Victoria, BC V9B 1H7
(250) 474-9600

Daily Consumption

November 2024



Daily Consumptions: - November 2024

Date	Total Consumption		Air Temperature @ Japan Gulch		Weather Conditions	Precipitation @ Sooke Res.: 12:00am to 12:00am			
	(ML) ¹	(MIG) ²	High (°C)	Low (°C)		Rainfall (mm)	Snowfall ³ (mm)	Total Precip.	
01 (Fri)	108.5		23.9	9	7	Cloudy / Showers	11.4	0.0	11.4
02 (Sat)	105.2		23.1	9	7	Cloudy / Showers	1.5	0.0	1.5
03 (Sun)	109.7	<=Max	24.1	10	6	Cloudy	0.0	0.0	0.0
04 (Mon)	106.4		23.4	11	5	Cloudy / Rain	23.6	0.0	23.6
05 (Tue)	104.2		22.9	9	5	Cloudy / P. Sunny	0.0	0.0	0.0
06 (Wed)	107.4		23.6	10	5	Cloudy	0.0	0.0	0.0
07 (Thu)	108.8		23.9	12	5	Sunny / P. Cloudy	0.0	0.0	0.0
08 (Fri)	107.4		23.6	10	5	Cloudy / P. Sunny / Showers	3.8	0.0	3.8
09 (Sat)	102.2	<=Min	22.5	9	9	Cloudy / Showers	13.7	0.0	13.7
10 (Sun)	103.0		22.7	10	8	Cloudy / Showers	13.7	0.0	13.7
11 (Mon)	107.6		23.7	10	7	Cloudy / Rain	20.1	0.0	20.1
12 (Tue)	104.3		23.0	9	7	Cloudy / Showers	11.2	0.0	11.2
13 (Wed)	107.1		23.6	10	8	Cloudy / Rain	36.8	0.0	36.8
14 (Thu)	106.7		23.5	9	2	Sunny / P. Cloudy / Showers	2.3	0.0	2.3
15 (Fri)	104.2		22.9	6	1	Sunny / P. Cloudy	0.0	0.0	0.0
16 (Sat)	102.9		22.6	6	2	Cloudy / Rain	22.6	0.0	22.6
17 (Sun)	106.0		23.3	8	3	Cloudy / Showers	4.8	0.0	4.8
18 (Mon)									
19 (Tue)									
20 (Wed)									
21 (Thu)									
22 (Fri)									
23 (Sat)									
24 (Sun)									
25 (Mon)									
26 (Tue)									
27 (Wed)									
28 (Thu)									
29 (Fri)									
30 (Sat)									
TOTAL	1801.6 ML	396.34 MIG					165.5	0	165.5
MAX	109.7	24.13	12	9			36.8	0	36.8
AVG	106.0	23.31	9.2	5.4			9.7	0	9.7
MIN	102.2	22.49	6	1			0.0	0	0.0

1. ML = Million Litres

2. MIG = Million Imperial Gallons

3. 10% of snow depth applied to rainfall figures for snow to water equivalent.

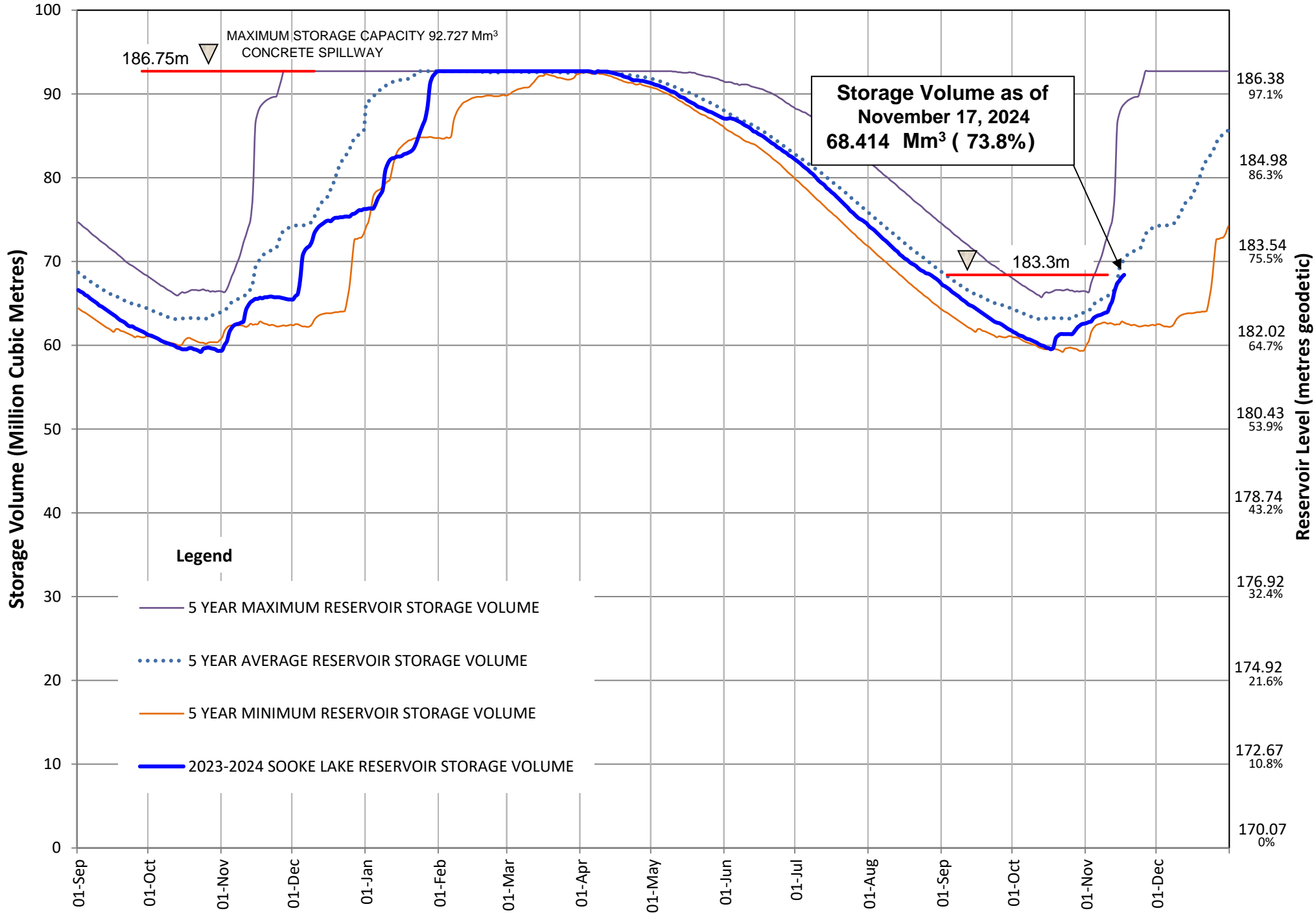
Average Rainfall for November (1914-2023)	261.8 mm
Actual Rainfall: November	165.5 mm
% of Average	63%
Average Rainfall (1914-2023): Sept 01 - Nov 17	376.3 mm
Actual Rainfall (2023/24): Sept 01 - Nov 17	480.0 mm
% of Average	128%

Number days with precip. 0.2 or more
12

Water spilled at Sooke Reservoir to date (since Sept. 1) = 0.00 Billion Imperial Gallons
 = 0.00 Billion Litres

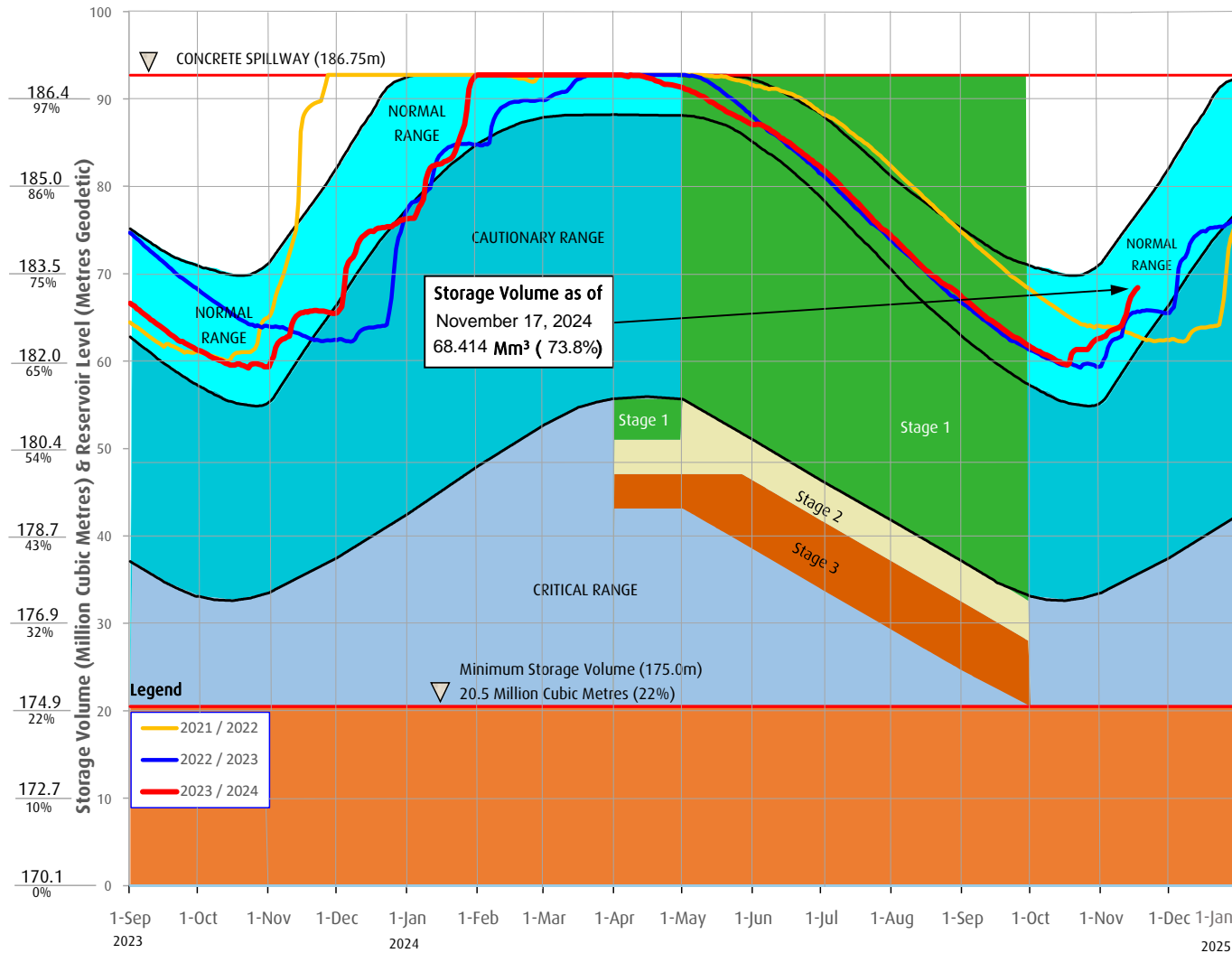
SOOKE LAKE RESERVOIR STORAGE SUMMARY

2023 / 2024



Sooke Lake Reservoir Storage Level

Water Supply Management Plan



FAQs

How are water restriction stages determined?

Several factors are considered when determining water use restriction stages, including,

1. Time of year and typical seasonal water demand trends;
2. Precipitation and temperature conditions and forecasts;
3. Storage levels and storage volumes of water reservoirs (Sooke Lake Reservoir and the Goldstream Reservoirs) and draw down rates;
4. Stream flows and inflows into Sooke Lake Reservoir;
5. Water usage, recent consumption and trends; and customer compliance with restriction;
6. Water supply system performance.

The Regional Water Supply Commission will consider the above factors in making a determination to implement stage 2 or 3 restrictions, under the Water Conservation Bylaw.

At any time of the year and regardless of the water use restriction storage, customers are encouraged to limit discretionary water use in order to maximize the amount of water in the Regional Water Supply System Reservoirs available for nondiscretionary potable water use.

Stage 1 is normally initiated every year from May 1 to September 30 to manage outdoor use during the summer months. During this time, lawn watering is permitted twice a week at different times for even and odd numbered addresses.

Stage 2 is initiated when it is determined that there is an acute water supply shortage. During this time, lawn water is permitted once a week at different times for even and odd numbered addresses.

Stage 3 is initiated when it is determined that there is a severe water supply shortage. During this time, lawn watering is not permitted. Other outdoor water use activities are restricted as well.

For more information, visit www.crd.bc.ca/drinkingwater



Useable Reservoir Volumes in Storage for November 17, 2024

