Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Capital Regional District Board

Wednesday, August 10, 2022 | **1:10 PM** | **6th Floor Boardroom, 625 Fisgard Street, Victoria, BC**

The Capital Regional District strives to be a place where inclusion is paramount and all people are treated with dignity. We pledge to make our meetings a place where all feel welcome and respected.

1. TERRITORIAL ACKNOWLEDGEMENT

2. APPROVAL OF THE AGENDA

3. ADOPTION OF MINUTES

3.1. 22-481 Minutes of the July 13, 2022 Capital Regional District Board Meeting

Recommendation: That the minutes of the Capital Regional District Board meeting of July 13, 2022 be adopted as circulated.

Attachments: Minutes - July 13, 2022

4. REPORT OF THE CHAIR

5. PRESENTATIONS/DELEGATIONS

The public are welcome to attend CRD Board meetings in-person.

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 CRD Board at crdboard@crd.bc.ca.

5.1. Presentations

5.2. Delegations

5.2.1. 22-522 Delegation - Mick Collins; Representing Victoria Golden Rods and Reels Fishing and Social Club: Re: Agenda Item 6.4. Summary of Feedback - 2022 Regional Water Supply Master Plan

6. CONSENT AGENDA

6.1. 22-496 Core Area Wastewater System Commissioning and Operations Update and Capital Program Status Report

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

Attachments: Staff Report: Commissioning and Ops. Update & Capital Program Status

6.2. 22-490 Bowker Sewer Rehabilitation Recommendation to Award Contract 2022-743

Recommendation: That the Core Area Liquid Waste Management Committee recommends to the CRD Board:
That Contract No. 2022-743, Bowker Sewer Rehabilitation, be awarded to Insituform Technologies Ltd. for an amount of $7,500,000 (excluding GST) and authorize staff to expend up to an additional $500,000 in contract contingency funds as required during the execution of the project.
(WA)

Attachments: Staff Report: Bowker Sewer Rehabilitation Rec. to Award Contract 2022-743

Appendix A: Location Map

6.3. 22-435 Development Variance Permit for Lot 1, Section 32, Otter District, Plan 25866 - 8015 West Coast Road

Recommendation: The Land Use Committee recommends to the Capital Regional District Board:
That Development Variance Permit VA000157 for Lot 1, Section 32, Otter District, Plan 25866, to vary Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Part 2, Section 6.07(a), by reducing the front yard setback from 7.5 m to 3.8 m; and Part 1, Section 4.01(1)(d) by allowing an accessory building to be located closer to the front lot line than the principle building to authorize the siting of a utility building, be approved.
(NWP - Voting Block A: JDF EA, Colwood, Langford (Blackwell), Metchosin, Sooke)

Attachments: Staff Report: DVP for 8015 West Coast Rd.

Appendix A: Subject Property Map

Appendix B: Ministry of Transportation & Infrastructure Permit

Appendix C: Site Plan / Land Survey

Appendix D: Building Elevation Drawings

Appendix E: Site Photos

Appendix F: Permit VA000157

6.4. 22-457 Summary of Feedback - 2022 Regional Water Supply Master Plan

Recommendation: [On July 20, 2022, the Regional Water Supply Commission approved the recommendation as amended and directed staff to present the Board with the complete 2022 Master Plan - attached as supplemental:]
That the Regional Water Supply Commission recommends to the Capital Regional District Board:
Approve the 2022 Master Plan, as a guide to future water supply planning.
(WP - All except SGI & SSI)

Attachments: Staff Report: Summary of Feedback - 2022 RWS Master Plan
Appendix A: Public Engagement Report
Appendix B: Sample letter to First Nations Chief and Council
Appendix C: WAC Response to the 2022 Water Master Plan
Appendix D: WAC Addl Detailed Comments on the 2022 Water M. Plan
Supplemental 1: 2022 Master Plan Report-Complete
Supplemental 2: Malahat Nation Email Correspondence

6.5. 22-489 Speed Reader Boards

Recommendation: That the Salt Spring Island Transportation Commission recommends to the Capital Regional District Board:
That the Salt Spring Island Transportation Service 2022 Capital Plan be amended to include a project for the acquisition and installation of five (5) speed reader boards with the total project budget of $57,475, funded from ICBC Grant ($21,200) and Capital Reserve Fund ($36,275).
(WA)

Attachments: Staff Report - Speed Reader Boards

6.6. 22-350 Regional Trails - Widening & Lighting Policies

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

Attachments: Staff Report: Regional Trails - Widening & Lighting Policies

6.7. 22-347 Temporary Closures of Regional Trails

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

Attachments: Staff Report: Temporary Closures of Regional Trails
Appendix A: Summary of Services Provided for Temp. Closures - Reg. Trails

6.8. 22-491 Island Rail Corridor Advocacy Timelines

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

Attachments: Staff Report: Island Rail Corridor Advocacy Timelines

7. ADMINISTRATION REPORTS

7.1. 22-502 902 Foul Bay Road Housing Agreement and Bylaw - Agreement Rectification

Recommendation: 1. That Bylaw No. 4511, "Resale Control and Housing Agreement Bylaw (902 Foul Bay Road), 2022, Amendment Bylaw No. 1, 2022" be introduced and read for a first, second and third time; and
2. That Bylaw No. 4511 be adopted.
(WA with 2/3 on adoption)

Attachments: Staff Report: 902 Foul Bay Rd Housing Agmt & Bylaw

Appendix A: Bylaw No. 4511

7.2. 22-517 604 Nelson Street Housing Agreement and Bylaw - Agreement Rectification

Recommendation: 1. That Bylaw No. 4512, "Resale Control and Housing Agreement Bylaw (604 Nelson Street), 2022, Amendment Bylaw No. 1, 2022", be introduced and read for a first, second and third time; and
2. That Bylaw No. 4512 be adopted.
(WA with 2/3 on adoption)

Attachments: Staff Report: 604 Nelson St. Housing Agrmt & Bylaw Rectification

Appendix A: Bylaw No. 4512

7.3. 22-493 Federal Strategic Priorities Fund - Grant Application Resolution for Two Regional Parks Projects

Recommendation: That the Capital Regional District Board confirm submission authorization of the federal Strategic Priorities Fund grant applications for the Lochside Regional Trail and Brett Avenue Enhancement Project and the Lochside Regional Trail and Swan Lake Enhancement Project and that staff be directed to provide overall grant management.
(NWA)

Attachments: Staff Report: Federal Strategic Priorities Fund - Grant Application Resolution

Appendix A: Strategic Priorities Grant Application (Two Projects Combined)

Appendix B: Lochside Trail and Brett Avenue Enhancement Project - Map

Appendix C: Lochside Trail and Swan Avenue Enhancement Project - Map

7.4. 22-434 Bylaw No. 4502, “Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022”

Recommendation: 1) That Bylaw No. 4502, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022", be read a first, second, and third time;
2) That Bylaw No. 4502 be referred to participants for approval, and if approved by two-thirds of participants, be referred to the Inspector of Municipalities.
(NWA)

Attachments: Staff Report: Bylaw 4502 Fire Dispatch Cost Apportionment Amendent

Appendix A: Bylaw 4502 Cost Apportionment Amendment

7.5. 22-514 Bylaw No. 4507: Salt Spring Island Local Community Commission - Revision

Recommendation: 1. That third reading of Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022", be rescinded;
2. That Bylaw No. 4507 be amended as follows:
a. That section 8 be amended to read "The local community shall elect commissioners at the end of each four year term in accordance with the manner provided in Part 3 [Electors and Elections] of the Local Government Act."
b. That section 9 be deleted in its entirety and that all subsequent sections be renumbered in numerical order;
c. That the renumbered section 23 be amended to replace the reference words "section 23" after the words "by the methods set out in" with the words "section 22".
3. That Bylaw No. 4507 be read a third time as amended;
4. That Bylaw No. 4507 as amended be referred to the Inspector of Municipalities; and
5. That the July 13, 2022 resolutions approving proceeding by elector assent by referendum, appointing the Chief Election Officer, setting the referendum question, and setting the dates of general voting, and approving the synopsis of Bylaw No. 4507, be affirmed as applying to Bylaw No. 4507, as amended.
(NWA)

Attachments: Staff Report: SSI Local Community Commission Revision
Appendix A: Bylaw No. 4507 (as amended)
Appendix B: Bylaw No. 4507 (Redlined)

7.6. 22-495 Island View Beach Regional Park - Drainage Ditch Study

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

Attachments: Staff Report: Island View Beach Regional Park - Drainage Ditch Study
Appendix A: GreatPacific Engineering & Environment - Study
Appendix B: CRD Parks - IVBRP Drainage Ditch Maintenance - as of July 13
Appendix C: Duka Env. Services - 2022 IVBRP Summary of Conditions

8. REPORTS OF COMMITTEES

Juan de Fuca Land Use Committee

8.1. 22-436 Zoning Amendment Application for Lots A-H, and J and K, District Lot 87, Renfrew District, Plan EPP31225 - Kirby Creek Road

Recommendation: The Land Use Committee recommends to the Capital Regional District (CRD) Board:
1. That the referral of proposed Bylaw No. 4464, "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 155, 2022", to the Shirley/Jordan River Advisory Planning Commission, appropriate CRD departments, BC Hydro, District of Sooke, FLNR - Archaeology Branch, FLNR - Ministry of Forests, Lands, Natural Resource Operations and Rural Development, FLNR - Water Protection Section, Island Health, Ministry of Agriculture, Ministry of Transportation & Infrastructure, RCMP, Shirley Fire Department, Sooke School District #62, Pacheedaht First Nation and T'Sou-ke First Nation be approved and the comments received.
2. That proposed Bylaw No. 4464 be introduced and read a first time and read a second time; and;
3. That in accordance with the provisions of section 469 of the Local Government Act, the Director for the Juan de Fuca Electoral Area, or Alternate Director, be delegated authority to hold a Public Hearing with respect to Bylaw No. 4464.
(NWP - Voting Block A: JDF EA, Colwood, Langford (Blackwell), Metchosin, Sooke)

Attachments:
Staff Report: Zoning Amendment Application Kirby Creek Rd.
Appendix A: Subject Properties
Appendix B: Current Zoning - Forestry AF Zone
Appendix C: Proposed Zoning - Rural 2 RU2 Zone
Appendix D: Proposed Bylaw No. 4464
Appendix E: Referral Comments

8.2. 22-470 Comprehensive Community Development Plan Amendment Application for Blocks D and E, District Lots 751 and 911, Renfrew District, Plan EPC2056 (Crown Lease #927321)

Recommendation: The Land Use Committee recommends to the Capital Regional District (CRD) Board:
1. That the referral of proposed Bylaw No. 4473, "Comprehensive Community Development Plan for Port Renfrew, Bylaw No. 1, 2003, Amendment Bylaw No. 14, 2022", to Public Information Meeting, CRD departments, BC Hydro, Cowichan Valley Regional District, Department of Fisheries and Oceans, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR), FLNR - Archaeology Branch, Island Health, Ministry of Transportation & Infrastructure, Pacheedaht First Nation, RCMP, and Sooke School District #62 be approved and the comments received.
2. That proposed Bylaw No. 4473 be introduced and read a first time and read a second time; and;
3. That in accordance with the provisions of section 469 of the Local Government Act, the Director for the Juan de Fuca Electoral Area, or Alternate Director, be delegated authority to hold a Public Hearing with respect to Bylaw No. 4473.
(NWP - Voting Block A: JDF EA, Colwood, Langford (Blackwell), Metchosin, Sooke)

Attachments:
- Staff Report: Comprehensive Community Dev. Plan Amendment RZ000276
- Appendix A: Context Map
- Appendix B: Subject Property Map
- Appendix C: Current Zoning – Marine Zone
- Appendix D: Proposed Bylaw No. 4473
- Appendix E: Referral Comments

Regional Water Supply Commission

8.3. 22-468 Bylaw No. 4509, “Capital Regional District Greater Victoria Water Supply Area Protection Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022”

Recommendation: The Regional Water Supply Commission recommends to the Capital Regional District Board:
1. That Bylaw No. 4509, "Capital Regional District Greater Victoria Water Supply Area Protection Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022", be introduced and read a first, second, and a third time.
2. That Bylaw No. 4509 be adopted.
(WP - ALL except SGI and SSI, 2/3 on adoption)

Attachments:
- Staff Report: Bylaw 4509 Amendment Bylaw to Bylaw No. 2804
- Appendix A: Bylaw 4509 Amendment Bylaw
- Appendix B: Bylaw 2804 Unofficial Redline Showing Changes

9. BYLAWS

10. NOTICE(S) OF MOTION

10.1. 22-461 Motion with Notice: Funding Request for Aboriginal Coalition to End Homelessness (Director Helps)

Recommendation: [At the July 13, 2022 CRD Board meeting, this item was referred to staff requesting background information before making a decision - attached as supplemental:]
That the Capital Regional District continues to fund the Aboriginal Coalition to End Homelessness on an ongoing basis in the amount of $150,000 per year.
(WA)

Attachments: Supplemental Staff Report: Funding Request for ACEH

Supplemental Appendix A: Correspondence, August 6, 2019

Supplemental Appendix B: Correspondence, June 9, 2022

Supplemental Appendix C: 2021/2022 Annual Housing Report

11. NEW BUSINESS

12. MOTION TO CLOSE THE MEETING

12.1. 22-506 Motion to Close the Meeting

Recommendation: 1. That the meeting be closed for Appointments in accordance with Section 90(1)(a) of the Community Charter. [1 item]
2. That the meeting be closed for proposed service in accordance with Section (90)(1)(k) of the Community Charter. [1 item]
3. That such disclosures could reasonably be expected to harm the interests of the Regional District. [1 item]
4. That the meeting be closed for Intergovernmental Negotiations in accordance with Section 90(2)(b) of the Community Charter. [1 item]

13. RISE AND REPORT

14. ADJOURNMENT

Votinq Key:
NWA - Non-weighted vote of all Directors
NWP - Non-weighted vote of participants (as listed)
WA - Weighted vote of all Directors
WP - Weighted vote of participants (as listed)

Making a difference...together

625 Fisgard St.,
Victoria, BC V8W 1R7

Capital Regional District

Meeting Minutes

Capital Regional District Board

Wednesday, July 13, 2022 **1:10 PM** **6th Floor Boardroom**
625 Fisgard Street
Victoria, BC

PRESENT:
Directors: C. Plant (Chair), R. Mersereau (Vice Chair), D. Blackwell, P. Brent, S. Brice, B. Desjardins, L. Helps, F. Haynes, M. Hicks, G. Holman, B. Isitt (EP), J. Loveday, R. Martin, C. McNeil-Smith, K. Murdoch (EP), G. Orr, J. Ranns, D. Screech, M. Sahlstrom (for L. Seaton), N. Taylor, K. Williams, R. Windsor (EP), G. Young

Staff: R. Lapham, Chief Administrative Officer; N. Chan, Chief Financial Officer; L. Hutcheson, General Manager, Parks and Environmental Services; K. Lorette, General Manager, Planning and Protective Services; K. Morley, General Manager, Corporate Services; T. Robbins, General Manager, Integrated Water Services; D. Elliot, Senior Manager, Housing; M. Lagoa, Deputy Corporate Officer; S. Orr, Senior Committee Clerk (Recorder)

EP - Electronic Participation

Regrets: Directors L. Seaton, M. Tait

The meeting was called to order at 1:21 pm.

1. TERRITORIAL ACKNOWLEDGEMENT

A Territorial Acknowledgement was provided in the preceding meeting.

2. APPROVAL OF THE AGENDA

MOVED by Director Mersereau, SECONDED by Director Helps,
That agenda item 8.10. Victoria Family Court Committee - Central Saanich Withdrawal Request be removed from the agenda and the agenda for the July 13, 2022 Session of the Capital Regional District Board be approved as amended.
CARRIED

3. ADOPTION OF MINUTES

3.1. 22-334 Minutes of the June 8, 2022 Capital Regional District Board Meeting

MOVED by Director Mersereau, SECONDED by Director Blackwell,
That the minutes of the Capital Regional District Board meeting of June 8, 2022 be adopted as circulated.
CARRIED

4. REPORT OF THE CHAIR

It is great to see you again. I'd like to thank Vice-Chair Mersereau for chairing the Board meeting last month while I was away. We have an extensive agenda ahead of us so I will attempt to be brief. I'd like to start with our CAO, Bob Lapham. He was recently given an award by the Local Government Management Association. He was acknowledged with a professional award for volunteer service primarily for his work involved with the new legislation for the Emergency Program Act. This past week I had the pleasure of meeting with leadership and members of the Pacheedaht, Songhees and Esquimalt Nations. The Pacheedaht meeting was part of our regular bi-annual meeting and the meeting with the Lekwungen-speaking nations was based on an emergent issue. During these meetings we heard about the need to support the Nations in working with us. Simply put, some Nations currently do not have the capacity (both with personnel and finances) to thoroughly and effectively engage with us and ensure their Nations' interests are appropriately addressed. There is no doubt that the CRD wants to effectively and respectfully engage with First Nations and the provincial DRIPA framework is going to require more of local governments. However, as we chart this new path forward, it is becoming clear that other levels of government who have traditionally had the legislative responsibilities to work with First Nations are going to need to support local governments. Again, simply put, we as local governments have not traditionally taken on the role of providing capacity funding for First Nations. I would offer that we will need to advocate through our regional, provincial and federal advocacy bodies to see the other levels of government provide funding for local governments to ensure we can work effectively with First Nations. In consultation with staff, I will be bringing a Notice of Motion to the August Board meeting so we can begin to develop an advocacy plan. And as a last item, I just want to remind Directors of our Southern Gulf Islands tour next month. If you have yet to do so, please RSVP so we can do the appropriate planning. This opportunity is being provided to help the Board see and better understand the work we do as the CRD in the SGI. Thank you for listening to my remarks. Now let's get on with our meeting.

5. PRESENTATIONS/DELEGATIONS

5.1. Presentations

5.1.1. 22-266 Presentation: Ian Robertson (CEO) and Christine Willow (Chair), Greater Victoria Harbour Authority; Re: Member Agency Report

C. Willow and I. Robertson presented the Greater Victoria Harbour Authority's Member Agency Report.

Discussion ensued regarding:
- sewage treatment
- garbage disposal
- high risk waste
- traffic congestion

The Board thanked the presenters and Directors Brice and Martin for their work with the Greater Victoria Harbour Authority.

5.1.2. 22-455 Presentation: Larry Stevenson (Chief Executive Officer), Island Corridor Foundation; Re: Rail on Vancouver Island Update

L. Stevenson provided a presentation regarding a rail update on Vancouver Island.

The Board thanked the presenter and Directors Seaton and Desjardins for their work with the Island Corridor Foundation.

5.2. Delegations

MOVED by Director Holman, SECONDED by Director Mersereau,
That a late delegation, Darryl Martin, be permitted to speak.
CARRIED

5.2.1. 22-471 Delegation - Marg Gardiner; Representing James Bay Neighbourhood Association, Fair Sailing Initiative: Re: Agenda Item 6.6.: Disposal of International Cruise Ship Waste at Hartland Landfill - Follow-up

M. Gardiner spoke to Item 6.6.

Director Isitt left the meeting at 1:47 pm.

5.2.2. 22-472 Delegation - Brian Webster; Resident of Salt Spring Island: Re: Agenda Item 8.2.: Salt Spring Island Establishment of Local Community Commission

B. Webster spoke to Item 8.2.

5.2.3. 22-473 Delegation - Mike Best; Resident of Salt Spring Island: Re: Agenda Item 8.2.: Salt Spring Island Establishment of Local Community Commission

M. Best spoke to Item 8.2.

5.2.4. 22-488 Delegation - Darryl Martin; Resident of Salt Spring Island: Re: Agenda Item 8.2.: Salt Spring Island Establishment of Local Community Commission

D. Martin spoke to Item 8.2.

6. CONSENT AGENDA

- Item 6.2. was removed from the consent agenda and moved to be considered under Administration Reports as item 8.2.b.
- Item 6.4. was removed from the consent agenda and not considered.
- Item 6.6. was removed from the consent agenda and moved to be considered under Administration Reports as item 8.3.b

MOVED by Director Loveday, SECONDED by Director Mersereau,
That consent agenda items 6.1., 6.3., 6.5., and 6.7. though 6.17. be approved.
CARRIED

6.1. 22-431 Appointment of Officers

That 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, Jake Werrun, Simranjeet Singh, Attila Farkas, Zoey Westle, Lexus Simpson, Sean Ahara, Ethan Stewart, Sean Blacquiere, Mike Neumann, Branden Cameron, Inderpal Sran be appointed as an Assistant Bylaw Officer.
CARRIED

6.3. 22-445 Upgrade of Cooling System for the Salt Spring Island Public Library

That the Salt Spring Island Library Service 2022 Capital Plan to be amended to increase the Cooling System Upgrade Project budget from $102,500 to $195,150. The additional budget of $92,650 is to be funded from Community Work Fund ($60,000) and the service Capital Reserve Fund ($32,650).
CARRIED

6.4. 22-462 Motion with Notice: Wood Burning Appliance Operation in Electoral Areas (Director Holman)

This Action Report was withdrawn.

6.5. 22-373 Construction, Renovation and Demolition Waste - Thermal Pilot

That staff proceed with next steps to conduct research, investigate and report out on emerging waste management technologies, including a short-term pilot of thermal destruction of construction, renovation and demolition waste at Lafarge.
CARRIED

6.7. 22-398 Union of BC Municipalities Community Emergency Preparedness Fund - Extreme Heat Risk Mapping, Assessment and Planning - Capital Region Heat Vulnerability Dashboard Project

That the CRD Board support an application to the Union of BC Municipalities Community Emergency Preparedness Fund - Extreme Heat Risk Mapping, Assessment and Planning Grant to support the CRD as the regional lead (primary applicant) for the Capital Region Heat Vulnerability Dashboard Project, and direct staff to provide for overall grant management, including apply for, receive, and manage the grant funding.
CARRIED

6.8. 22-341 Capital Regional District External Grants Update

This Informational Report was received for information.

6.9. 22-068 Debt Term Implications

This Informational Report was received for information.

6.10. 22-414 Regional Housing First Program Second Quarterly Update

This Informational Report was received for information.

6.11. 22-420 Future Housing Priorities and Partnerships

1. That the CRD Board endorse the Future Housing Priorities and Partnerships in the Capital Region; and
2. That staff be directed to proceed with development of a Program Framework and identification of funding partnership contributions to address unmet housing needs in the capital region based on the priorities identified in Future Housing Priorities and Partnerships in the Capital Region; and
3. That the CRD Board direct staff to include a fourth area of focus in the Program Framework to ensure the rapid and ongoing expansion of newly built publicly owned affordable housing in the CRD; and
4. That funding for the establishment, and seed investment for a scaled up regional housing program be included in the 2023 preliminary budget; and
5. That staff explore creative opportunities for raising capital including from social impact investors with funds to invest in housing.
6. That the CRD Board advocate to the Province of BC to give the right of first refusal for public and non-profit agencies to purchase multi-unit rental buildings.
CARRIED

6.12. 22-355 Development Variance Permit for Section 42, Otter District Except That Part Lying 50 feet on Each Side of the Centre Line of the Right of Way Shown on Plan121 RW and Except That Part in Plan EPP63580 (Clark Road & Aythree Way)

That Development Variance Permit VA000155 for Section 42, Otter District Except That Part Lying 50 feet on Each Side of the Centre Line of the Right of Way Shown on Plan121 RW and Except That Part in Plan EPP63580 to vary:
a) Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Schedule A, Part 1, Section 3.10(4) by reducing the required frontage for:
i. Lot 2 from 231 m (10%) to 15.7 m (0.68%);
ii. Lot 3 from 112 m (10%) to 46 m (4.13%);
iii. Lot 4 from 116 m (10%) to 100 m (8.61%);
iv. Lot 5 from 134 m (10%) to 51.7 m (3.85%);
v. Lot 6 from 116 m (10%) to 38.3 m (3.3%);
vi. Lot 7 from 124 m (10%) to 49.4 m (3.99%); and
b) Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Schedule A, Part 1, Section 3.10(5)(b) by reducing the minimum width of a panhandle access strip from 20 m to 15.7 m;
for the purpose of creating a seven-lot subdivision, be approved.
CARRIED

6.13. 22-357 Temporary Use Permit Renewal for Lot 4, Section 47, Otter District, Plan 23769 - 7822 Tugwell Road

The Land Use Committee recommends to the Capital Regional District Board that a three year renewal for Temporary Use Permit TP000010 to authorize a federally licensed micro-cannabis cultivation facility be approved.
CARRIED

6.14. 22-356 Temporary Use Permit for Lot 4, Section 47, Otter District, Plan VIP52344 - 7861 Tugwell Road

1. That the referral of Temporary Use Permit TP000011, directed by the Juan de Fuca Land Use Committee on April 19, 2022, to the Otter Point Advisory Planning Commission, appropriate CRD departments, BC Hydro, District of Sooke, Island Health, Ministry of Transportation and Infrastructure, RCMP and T'Sou-ke First Nation, be approved and comments be received; and
2. That Temporary Use Permit TP000011, to allow for the continued operation of a microbrewery with new outdoor patio and expanded food service, on Lot 4, Section 47, Otter District, Plan VIP52344, be approved.
CARRIED

6.15. 22-358 Development Permit with Variance for Lot 12, Section 10, Otter District, Plan VIP77477 - 2193 Otter Ridge Drive

That Development Permit with Variance DV000088 for Lot 12, Section 10, Otter District, Plan VIP77477 to authorize the subdivision of land designated as a Sensitive Ecosystems Development Permit Area; and to vary Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Part 2, Section 3.10(4) by reducing the minimum frontage requirement from 10 % to 1.93 % for proposed Lot B, as shown on the plans prepared by West Coast Design and Development Services, dated August 3, 2021, be approved.
CARRIED

6.16. 22-437 Rocky Point Water Upgrade Budget Amendment

That the 2022 Juan de Fuca Water Distribution Service capital plan and Project 18-05, Rocky Point Water Upgrades, budget be amended to $9,725,000 to reflect an increase in Federal funding of $411,000 for the additional archeological and environmental monitoring costs.
CARRIED

6.17. 22-397 Grant Application for Regional Water Supply Main No.4 - Mt. Newton to Highway 17 Section Replacement

That staff be directed to prepare and submit an application for a Canada Community-Building Fund in British Columbia, Strategic Priorities Fund Capital Infrastructure Stream and Capacity Building Stream grant for the replacement of the Regional Water Supply Main No. 4 from Mt. Newton to Highway 17.
CARRIED

7. ADMINISTRATION REPORTS

7.1. 22-441 CAO Quarterly Progress Report No. 2 - 2022

R. Lapham spoke to Item 7.1.

This Informational Report was received for information.

7.2. 22-419 Monitoring Wastewater for COVID

L. Hutcheson spoke to Item 7.2.

This Informational Report was received for information.

7.3. 22-444 Bylaw No. 1857, Capital Regional District Ticket Information Authorization Bylaw, 1990, Schedule 18 Amendment

L. Hutcheson spoke to Item 7.3.

MOVED by Director Murdoch, SECONDED by Director Mersereau,
1. That Bylaw No. 4443, "Capital Regional District Ticket Information Authorization Bylaw 1990, Amendment Bylaw No. 73, 2021", be introduced, and read a first, second and third time.
CARRIED

MOVED by Director Murdoch, SECONDED by Director Mersereau,
2. That Bylaw No. 4443 be adopted.
CARRIED

7.4. 22-415 604 Nelson Street Housing Agreement and Bylaw

K. Lorette spoke to Item 7.4.

MOVED by Director Loveday, SECONDED by Director Mersereau,
1. That Bylaw No. 4500, "Resale Control and Housing Agreement Bylaw (604 Nelson Street), 2022" be introduced and read for a first, second and third time.
CARRIED

MOVED by Director Loveday, SECONDED by Director Mersereau,
2. That Bylaw No. 4500 be adopted.
CARRIED

7.5. 22-438 Mount Maxwell Conservation Covenant

L. Hutcheson spoke to Item 7.5.

This Informational Report was received for information.

8. REPORTS OF COMMITTEES

Arts Commission

8.1. 22-417 CRD Arts & Culture: 2021 Progress Report

Director Loveday provided a presentation and spoke to the Arts and Culture 2021 progress report.

MOVED by Director Loveday, SECONDED by Director McNeil-Smith,
That 100% participation in the Capital Regional District Arts & Culture Support Service be considered as a strategic initiative for the 2022-2026 Board.
CARRIED

Electoral Areas Committee

8.2. 22-465 Salt Spring Island Establishment of Local Community Commission

R. Lapham spoke to Item 8.2.

Discussion ensued regarding:
- due process and threat of litigation
- impact on operations
- Bylaw approval time-line

MOVED by Director Holman, SECONDED by Director Hicks,
1. Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022", be introduced and read a first, second, and third time.
CARRIED
Opposed: Brent

MOVED by Director Holman, SECONDED by Director Hicks,
2. That CRD staff be directed to implement the elector approval process by way of referendum;
3. That Kristen Morley be appointed Chief Election Officer with the power to appoint one or more Deputy Chief Election Officer(s);
4. That the wording of the referendum question for the purposes of the ballot shall be as follows:
Are you in favour of the Capital Regional District (CRD) Board adopting Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022", authorizing the establishment of a local community commission for the Salt Spring Island Electoral Area, to be comprised of four elected commissioners and the Electoral Area Director, to oversee and advise on economic development, wastewater disposal, community parks and recreation, small craft harbour facilities, transit and transportation, street lighting, grants-in-aid, compensation for livestock injured by dogs, and the contribution services for arts, public library, and search and rescue?
YES or NO?
5. That general voting be held on Saturday, October 15, 2022, with Advance Voting opportunities held on dates and voting places to be determined by the Chief Election Officer;
6. That the synopsis of Bylaw No. 4507, attached as Appendix B, be approved for advertising purposes.
CARRIED
Opposed: Brent

MOVED by Director Holman, SECONDED by Director Hicks,
7. That Bylaw No. 4508, "Salt Spring Island Local Community Commission Delegation Bylaw No. 1, 2022", be introduced and read a first, second, and third time.
CARRIED
Opposed: Brent

8.2.b. 22-424 Speculation and Vacancy Tax

Director Holman spoke to Item 8.2.b.

Discussion ensued regarding the electoral areas.

MOVED by Director Holman, SECONDED by Director Hicks,
That the Capital Regional District Board request the Province to include Salt Spring Island in the Speculation and Vacancy Tax specified area to help address the problem of rental and housing affordability and that the Southern Gulf Islands and the Juan de Fuca electoral areas be specifically excluded.
CARRIED

Director Murdoch left the meeting at 3:08 pm.

Environmental Services Committee

8.3. 22-387 Bylaw No. 4491, "Capital Regional District Climate Action and Adaptation Service Establishment Bylaw, 2008, Amendment Bylaw No. 3, 2022"

L. Hutcheson spoke to Item 8.3.

Discussion ensued regarding:
- regional solidarity with respect to climate change
- municipal autonomy
- Central Saanich climate leadership plan
- financial implications
- climate emergency
- management of assets that are collectively shared in the region
- staff to staff engagement

MOVED by Director Desjardins, SECONDED by Director Windsor,
1. That Bylaw No. 4491, "Capital Regional District Climate Action and Adaptation Service Establishment Bylaw, 2008, Amendment Bylaw No. 3, 2022", be introduced and read a first, second, and third time.
DEFEATED
Opposed: Blackwell, Brent, Brice, Haynes, Helps, Holman, Loveday, McNeil-Smith, Mersereau, Orr, Plant, Screech, Salhstrom, Taylor, Williams, Young

8.3.b. 22-386 Disposal of International Cruise Ship Waste at Hartland Landfill - Follow-up

Director Windsor left the meeting at 3:41 pm.
Director Murdoch re-joined the meeting at 3:42 pm by electronic participation.

Discussion ensued regarding:
- landfill capacity
- high risk and low risk waste
- cruise ship fee structure

MOVED by Director Desjardins, SECONDED by Director Helps,
That the Hartland Landfill tipping fee for international high risk cruise ship waste be increased to $500 per tonne beginning January 1, 2024.

MOVED by Director Helps, SECONDED by Director Taylor,
That the main motion be amended by replacing "January 1, 2024" with "July 13, 2023".
DEFEATED
Opposed: Haynes, Brent, Brice, Blackwell, Desjardins, Martin, Murdoch, Orr, Ranns, Sahlstrom, Young

The Chair ruled that the vote on the amendment shall be a non-weighted majority.

Director Taylor challenged the Chair.
The Chair called for a vote on whether the Chair shall be sustained.
CARRIED
Opposed: Helps, Holman, Taylor, Young

The question was called on the main motion:
That the Hartland Landfill tipping fee for international high risk cruise ship waste be increased to $500 per tonne beginning January 1, 2024.
CARRIED

Finance Committee

8.4. 22-368 Bylaw No. 4495: Capital Regional District Recreation Services and Facilities Fees and Charges 2022-2023

MOVED by Director Brice, SECONDED by Director Williams,
1. That Bylaw No. 4495, "Capital Regional District Recreation Services and Facilities Fees and Charges Bylaw No. 1, 2009, Amendment Bylaw No. 16, 2022", be introduced and read a first, second and third time.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
2. That Bylaw No. 4495 be adopted.
CARRIED

8.5. 22-369 Bylaws Related to Municipal Finance Authority Security Issuing, Fall 2022

MOVED by Director Brice, SECONDED by Director Williams,
1. That Bylaw No. 4503, "Security Issuing Bylaw No. 2, 2022", be introduced and read a first, second, and third time.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
2. That Bylaw No. 4503 be adopted.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
3. That Bylaw No. 4504, "Security Issuing Bylaw No. 3, 2022", be introduced and read a first, second, and third time.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
4. That Bylaw No. 4504 be adopted.
CARRIED

MOVED by Director Mersereau, SECONDED by Director Loveday,
That the meeting be extended past the 3 hour scheduled time.
CARRIED

8.6. 22-370 Bylaw No. 4498: 2022 to 2026 Financial Plan Bylaw, 2022, Amendment Bylaw No. 2, 2022

MOVED by Director Brice, SECONDED by Director Williams,
1. That Bylaw No. 4498, "2022 to 2026 Financial Plan Bylaw, 2022, Amendment Bylaw No. 2, 2022", be introduced and read a first, second and third time.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
2. That Bylaw No. 4498 be adopted.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
3. That the amended Staff Establishment Chart as attached in Appendix B be approved.
CARRIED

8.7. 22-400 Bylaw No. 4506: Regional Parks Loan Authorization Bylaw No. 1, 2022

MOVED by Director Brice, SECONDED by Director Williams,
1. That Bylaw No. 4506, "Regional Parks Loan Authorization Bylaw No. 1, 2022", be introduced and read a first, second and third time.
CARRIED

MOVED by Director Brice, SECONDED by Director Williams,
2. That approval on behalf of the participating areas for Bylaw No. 4506 be obtained through the municipal and electoral area consent process, according to sections 346 and 347 of the Local Government Act, and if successful, that Bylaw No. 4506 be referred to the Inspector of Municipalities for approval.
CARRIED

Hospitals and Housing Committee

8.8. 22-410 902 Foul Bay Road Housing Agreement and Bylaw

MOVED by Director Loveday, SECONDED by Director Orr,
1. That Bylaw No. 4501, "Resale Control and Housing Agreement Bylaw (902 Foul Bay Road), 2022" be introduced and read for a first, second and third time.
CARRIED

MOVED by Director Loveday, SECONDED by Director Orr,
2. That Bylaw No. 4501 be adopted.
CARRIED

Juan de Fuca Land Use Committee

8.9. 22-364 New Bylaw for Juan de Fuca Electoral Area Advisory Planning Commissions

MOVED by Director Hicks, SECONDED by Director Blackwell,
1. That Bylaw No. 4120, "Juan de Fuca Advisory Planning Commission Bylaw No. 1, 2022", be introduced, read a first time, a second time and a third time.
CARRIED

MOVED by Director Hicks, SECONDED by Director Blackwell,
2. That Bylaw No. 4120, "Juan de Fuca Advisory Planning Commission Bylaw No. 1, 2022" be adopted.
CARRIED

Governance Committee

8.10. 22-351 Victoria Family Court Committee - Central Saanich Withdrawal Request

This Action Report was withdrawn.

Regional Parks Committee & Transportation Committee

8.11. 22-409 Renewed Regional Parks and Trails Strategic Plan

MOVED by Director Mersereau, SECONDED by Director McNeil-Smith,
1. That the Capital Regional District Regional Parks and Trails Strategic Plan 2022-2032 be approved on an interim basis for one year while engagement with First Nations continues.
2. That bike parking and e-bike charging stations be added to priority action 4-2e.
3. That the Regional Parks Committee direct staff to report back, as part of the review, on the advisability of including the following target in the plan: "That CRD work with indigenous, federal, provincial, and philanthropic partners to expand protected areas in the region to 25% of the region's land base by 2032."
4. That staff be directed to consider the expansion of camping opportunities as part of the development of the Outdoor Recreation Plan as well as the report back on the Regional Parks and Trails Plan.
CARRIED

Director Haynes left the meeting at 4:18 pm.

Transportation Committee

8.12. 22-393 Island Rail Corridor (E&N Corridor) Advocacy

Discussion ensued regarding:
- indigenous claims
- timeline
- collaboration with stakeholders
- advocacy

MOVED by Director Screech, SECONDED by Alternate Director Salhlstrom,
1. That the Board escalate advocacy for restoration and resumption for rail operations on the E&N Corridor and requests that the Chair communicates with provincial, federal, first nations, and other regional elected officials on behalf of the Board.
2. Request staff provide the Board with steps to be taken and timelines for heightened, urgent advocacy in support of protecting the corridor particularly with the federal government given the court deadline of March 2023.
CARRIED

Motion Arising:
MOVED by Director Mersereau, SECONDED by Director Blackwell,
That the CRD Board supports the Island Corridor Foundation request for the federal and provincial governments to work together to:
1) Equitably settle Indigenous claims within and along the island rail corridor; and,
2) Create a multi-disciplinary team, reflecting all affected interests, to advance rail as a transportation option on Vancouver Island.

MOVED by Director Desjardins, SECONDED by Director Blackwell,
That the motion arising be amended by adding the following:
3) That this action be ongoing and not delay decisions required by March 2023.
CARRIED

The question was called on the motion arising as amended:
That the CRD Board supports the Island Corridor Foundation request for the federal and provincial governments to work together to:
1) Equitably settle Indigenous claims within and along the island rail corridor; and,
2) Create a multi-disciplinary team, reflecting all affected interests, to advance rail as a transportation option on Vancouver Island.
3) That this action be ongoing and not delay decisions required by March 2023.
CARRIED

9. BYLAWS

9.1. 22-450 Public Hearing Report on Bylaw No. 4422, "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 152, 2021"

MOVED by Director Hicks, SECONDED by Director Blackwell,
1. That the minutes that form the Report of the Public Hearing for Bylaw No. 4422, "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 152, 2021", which are certified as a fair and accurate summary of the representations that were made at the public hearing held on January 24, 2022, for Bylaw No. 4422, be received.
CARRIED

MOVED by Director Hicks, SECONDED by Director Blackwell,
2. That Bylaw No. 4422 be read a third time as amended.
CARRIED

MOVED by Director Hicks, SECONDED by Director Blackwell,
3. That Bylaw No. 4422 be adopted.
CARRIED

10. NOTICE(S) OF MOTION

10.1. 22-461 Motion with Notice: Funding Request for Aboriginal Coalition to End Homelessness (Director Helps)

MOVED by Director Helps, SECONDED by Director Loveday,
That the Capital Regional District continues to fund the Aboriginal Coalition to End Homelessness on an ongoing basis in the amount of $150,000 per year.

Discussion ensued regarding:
- funding
- background information
- impact on 2023 budget

MOVED by Director Murdoch, SECONDED by Director Ranns,
That the item be referred to a future meeting to allow staff to provide background information before making a decision.
CARRIED
Opposed: Helps, Loveday, Mersereau, Taylor

Director Martin left the meeting at 4:37 pm.
Director Holman and Alternate Director Brent left the meeting at 4:39 pm.

11. NEW BUSINESS

There was no new business.

12. MOTION TO CLOSE THE MEETING

12.1. 22-454 Motion to Close the Meeting

MOVED by Director Mersereau, SECONDED by Director Blackwell,
1. That the meeting be closed for Appointments in accordance with Section 90(1) (a) of the Community Charter.
CARRIED

MOVED by Director Mersereau, SECONDED by Director Blackwell,
2. That the meeting be closed for Labour Relations under Section (90)(1)(c) of the Community Charter.
CARRIED

MOVED by Director Mersereau, SECONDED by Director Blackwell,
3. That the meeting be closed for Land Acquisition in accordance with Section 90(1)(e)
of the Community Charter.
CARRIED

MOVED by Director Mersereau, SECONDED by Director Blackwell,
4. That such disclosures could reasonably be expected to harm the interests of the Regional District.
CARRIED

MOVED by Director Mersereau, SECONDED by Director Blackwell,
5. That the meeting be closed for a Legal Update in accordance with Section 90(1)(i) of the Community Charter.
CARRIED

The Capital Regional District Board moved to the closed session at 4:51 pm.

13. RISE AND REPORT

The Capital Regional District Board rose from the closed session at 5:18 pm and reported on the following:
- Item 3.1. - Appointments to CRD Commissions and Committees:

In accordance with Bylaw No. 3693, that the following be appointed to the Cedars of Tuam Water Service Commission for a term expiring December 31, 2023: Julian Edwards, Peter Wypkema

In accordance with Bylaw No. 3486, that the following be appointed to the Galiano Parks and Recreation Commission for a term expiring December 31, 2023: Lorne Byzyna, Evelyn Dewinetz, Jim Henshall, Barry New, Stephen Rybak

In accordance with Bylaw No. 3693, that the following be appointed to the Maliview Sewer Local Service Commission for a term expiring December 31, 2024: Jodie Miller

14. ADJOURNMENT

MOVED by Director Mersereau, SECONDED by Director Brice,
That the July 13, 2022 Capital Regional District Board meeting be adjourned at 5:19 pm.
CARRIED

_____

CHAIR

CERTIFIED CORRECT:

_____

CORPORATE OFFICER

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REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, JULY 27, 2022

SUBJECT **Core Area Wastewater System Commissioning and Operations Update and Capital Program Status Report**

ISSUE SUMMARY

To provide the Core Area Liquid Waste Management Committee (Committee) a Core Area Wastewater System commissioning and operations update and a capital program status report.

BACKGROUND

On January 13, 2021, the Capital Regional District (CRD) accepted operational responsibility for the McLoughlin Point Wastewater Treatment Plant (MPWWTP). The CRD accepted operational responsibility for the other conveyance system components, including pump stations, pipelines, and the Arbutus Attenuation Tank between September 2020 and December 2021. Although the new conveyance and treatment infrastructure constructed under the project was tested and deemed ready for service commencement, as it was handed over to the CRD for operation, the commissioning period of the MPWWTP, and the system as a whole, continues to extend into the two-year performance period for the MPWWTP (ending December 2022). During this time, the commissioning activities at the MPWWTP and conveyance infrastructure facilities are expected to periodically impact plant performance and effluent quality, and some plant and conveyance facility systems, including odour management. While the following summary of ongoing commissioning activities and detailed information about regulatory compliance and deficiencies are provided to update the Committee on the status of the operation 18 months into the two-year performance period, staff are confident that the issues identified will be addressed and that the MPWWTP will achieve performance expectations.

IMPLICATIONS

Ongoing Commissioning Activities

Operational documentation – Documentation provided by the contractors and documentation prepared by the CRD during the first year of operation including, standard operating procedures, safety procedures, and preventative maintenance routines, are being continually updated to reflect changes resulting from actual operating experience. Many maintenance procedures developed at the design and start-up phases of the project, had not been carried-out in the field, so various documents have required revisions.

Equipment adjustments/failures – The MPWWTP and the Conveyance Pump Stations contain many components, including process mechanical equipment (treatment process equipment, screens, pumps, motors, valves, chemical feed systems), electrical, instrumentation and control equipment (motor controls, switchgear, generators, SCADA controls), that can require adjustment or fail once under normal operating conditions. Resolution of these equipment issues has had some impact on plant performance. At the MPWWTP, as expected with a newly constructed, large, complex facility, during the initial operating period some components and equipment failed or have not performed as expected. CRD staff continue to work with Harbour Resource Partners (HRP) at MPWWTP to identify and address these issues through the

warranty management process. Since January 2021 to date there have been 308 warranty or deficiency items identified, 236 of which have been addressed, 40 remain unresolved and 32 are being disputed.

MPWWTP optimization – CRD staff have been working closely with the HRP's commissioning and performance period representatives (one representative is stationed at MPWWTP until December 2022), the Owner's engineer, Stantec, as well as a plant optimization engineer (who was previously under contract with HRP and has since been retained by the CRD) to monitor plant process performance and make on-going recommendations to the CRD regarding plant operations.

Effluent Compliance and Reporting

The CRD manages its Core Area liquid waste in accordance with the Core Area Liquid Waste Management Plan (up to and including Amendment 12), and the Municipal Wastewater Regulation Registration (Registration) for the MPWWTP, issued on June 9, 2020 and revised on February 22, 2021 by the BC Ministry of Environment and Climate Change Strategy (ENV) under the *Environmental Management Act*. The Registration sets out the wastewater treatment and performance criteria for the MPWWTP and authorizes the CRD to discharge treated effluent to the receiving waters. The MPWWTP discharge must also meet the Federal Wastewater Systems Effluent Regulations (WSER), which fall under the *Fisheries Act*. The provincial Registration is the more stringent regulatory requirement; the MPWWTP is designed to achieve the criteria set out in the Registration, which were detailed in the July 28, 2021 report to the Committee.

Regular compliance reporting under federal and provincial legislation is carried out in accordance with requirements. The Province is notified immediately when effluent quality criteria are not met (e.g. exceedance of maximum suspended solids limits), and compliance reports for all seven of the CRD's wastewater facilities are submitted on a monthly basis. Reporting to the Federal government is completed via online submission on a quarterly basis. Staff have submitted the required regulatory reporting and continue to meet with representatives of ENV regularly to discuss compliance related issues.

The Federal WSER effluent quality criteria have been met each month, with the exception of total suspended solids (TSS) on single days in April 2021 and June 2022. The provincial Registration requirements for both carbonaceous five-day biochemical oxygen demand ($cBOD_5$) and TSS are monthly averages of 10 mg/L. The January 2021 – June 2022 monthly average TSS figures reported have ranged from 5.0 mg/L to 14.6 mg/L not including the exceedances noted above; TSS has been in compliance 8 of 18 months. The January 2021 – June 2022 monthly average $cBOD_5$ figures reported have ranged from 7.1 mg/L to 17.4 mg/L; $cBOD_5$ has been in compliance 8 of 18 months.

In addition, as per the Registration and WSER requirements, the CRD reports all treatment process interruptions or bypasses to ENV and/or Fisheries and Oceans Canada (DFO). This year to date there have been 15 reports to the regulators, including 9 related to plant bypasses or other unauthorized discharges resulting from commissioning, and 6 related to TSS or $cBOD_5$ discharge loadings above the maximum effluent quality limits. It is important to note that despite the observed instances of non-compliance with the Registration, there are no anticipated adverse impacts to health or the environment. These events have no significant environmental impact due to the generally low level of exceedances and discharge location. However, the goal continues to

be to operate MPWWTP consistently in full compliance as soon as possible, so each event that potentially contributes to non-compliance is carefully reviewed and an incident summary/probable cause and mitigation measures/corrective actions are documented.

The MPWWTP is a complex plant that involves complex treatment processes. In most cases a single cause and effect reason is unidentifiable for each non-compliance result, but rather a number of often compounding factors. The critical issues contributing to plant performance and reduced effluent quality, which are also the focus of the on-going plant optimization work are summarized as follows:

1. Fluctuating influent flow rates – Flows from the Trent and Clover Pump Station have fluctuated significantly which have resulted in higher flow velocities through the primary and initial secondary treatment processes resulting in solids carryover to downstream secondary and tertiary treatment processes. In March 2022, the CRD modified the operation of the Trent Pump Station to reduce the pump rate fluctuations.

2. Biological Aerated Filter (BAF) optimization – The CRD's plant optimization engineer is working closely with SUEZ, the BAF designer/manufacturer for HRP, to optimize the flow velocity through the 12 BAF cells and backwash process to achieve effective removal of solids.

3. Tertiary Disk Filters – Filter fouling is resulting in the need for filter cleaning at a frequency that exceeds the specified Operation and Maintenance (O&M) manual frequency which impacts available treatment capacity during maintenance.

4. Organic and fibrous material screening – At the Clover and Macaulay Pump Stations and MPWWTP, fine screening equipment continue to be adjusted and optimized to maximize solids capture and improve automated washing processes in order to maintain operational effectiveness and reduce solids entering the treatment processes.

5. Influent solids reduction – High influent solids levels related to the Residuals Treatment Facility (RTF) operation are being evaluated. The CRD is trialing Chemically Enhanced Primary Treatment to determine the potential benefits of removing more solids through the primary treatment process.

<u>Residuals Treatment Facility and Biosolids Plan</u>
The RTF has been receiving sludge from the MPWWTP and producing Class A biosolids during 2022. Unfortunately, due to unplanned shutdowns at the cement kilns at the Lafarge cement manufacturing facility (which is under contract with the CRD to receive Class A biosolids for use as an alternative fuel at the facility), the CRD has only been able to ship 422 tonnes of biosolids to the facility as of the end of June 2022. This has resulted in the need to landfill approximately 603 tonnes so far this year.

Harbour Resource Management Group (HRMG) and the CRD continue to resolve service failures related to the quality of effluent discharged from the RTF into the centrate return line.

The Long Term Biosolids Beneficial Use Strategy is expected be presented to the Committee by the fourth quarter of 2023, with the finalized biosolids strategy to be submitted for provincial approval no later than June 18, 2024.

Communications and Community Engagement

CRD staff continue to communicate and engage regularly with various stakeholders typically on commissioning and construction related matters. Questions or concerns are received via email (wastewater@crd.bc.ca) or phone (250-940-7400). In addition, commissioning and maintenance activity information is posted bi-weekly on the CRD website and public advisories are issued for specific activities that are likely to cause odour or noise impacts in localized areas.

The majority of the concerns received have been related to odour from the MPWWTP. CRD staff continue to respond to every complaint and are logging and mapping every complaint to try to correlate the occurrence with operational activities and other potential contributing factors.

The CRD continues to closely monitor the potential sources of odour at the MPWWTP. The following major improvements or tasks have recently or will be completed in relation to the odour treatment systems:

1. Replacement of odour treatment system activated carbon media – there are three cells containing activated carbon to 'scrub' the foul air exhausted from the treatment processes. The carbon was expected to have a five-year service life but was determined to be ineffective after approximately 15 months due to high moisture content. CRD replaced the carbon in one cell in June and will be replacing the carbon in the two remaining cells in July. However, the CRD is working with HRP to determine the cause of the high moisture content before bringing the two cells on-line and damaging the carbon.

2. A vent on a sludge holding tank was found to be exhausting odour laden air. An activated carbon odour filtration system has been added to the vent, eliminating the odour laden air discharge.

3. The MPWWTP odour treatment system was not designed to extract air from the tertiary treatment process tanks. The secondary odour treatment system will be modified to treat this potential source of odour laden air. The system is expected to be operational by October. Similar issues are arising at the Macaulay Point Pumpstation and there may be a need to modify the odour treatment system to include areas of the pumpstation that are not connected to the system.
4. The CRD will be undertaking an 'audit' of the design and performance of the MPWWTP odour treatment system and conveyance infrastructure with the owner's engineer (Stantec). This work is expected to begin in September.

5. The CRD has undertaken some initial odour investigation work with Vancouver Island University (VIU), who has done similar work with the Regional District of Nanaimo. With VIU, the CRD is hoping to 'fingerprint' the chemical odour profiles from different sources and associate these profiles with odour present in different locations. This work is expected to occur this Fall.

As noted, staff are still refining the plant operation and working through plant maintenance routines which staff are discovering can generate some odour depending on the type of maintenance activity, due to open tank hatches and exhaust fans not maintaining negative air pressure. In addition, through neighborhood odour surveys staff have identified other sources of odour in some areas and continue to work closely with the City of Victoria to identify potential sources along the City sewer system and Esquimalt sewer systems. We are also conducting work to ensure the underground chambers and odour control systems along the residuals conveyance pipeline are functioning properly and that other manholes along the gravity pipelines are sealed.

However, as per the Core Area Wastewater Project Agreement between the CRD and HRP, the plant is to have been designed such that odour laden air at the plant will be captured and treated prior to discharge such that all air exhausted from the plant will contain a maximum odour concentration at and beyond the plant site boundary of less than five odour units per cubic metre (not perceptible). In addition, the odour treatment systems are designed with sufficient redundancy in place to allow for all normal maintenance activities to occur without interruption or reduction in the level of odour treatment and without exceeding the plant site boundary concentration limit. The CRD remains committed to achieving the requirements of the Project Agreement.

Core Area Capital Program Status Report

There are 32 active projects under the current Core Area Wastewater Service capital program. Most of the projects are related to trunk sewer improvements. The projects have approved budgets totaling $21.9 million, of which approximately $16.5 million is currently committed to in-stream projects (including the Bowker Sewer Rehabilitation Project).

CONCLUSION

The CRD accepted operational responsibility for the various facilities constructed under the Core Area Wastewater Treatment Project between September 2020 and December 2021. The CRD has not accepted operational responsibility for the Arbutus Attenuation Tank yet. Although the new conveyance and treatment infrastructure constructed under the project was tested and deemed ready for service commencement as it was handed over to the CRD for operation, the commissioning period of the MPWWTP and the system as a whole continues to extend into the two-year performance period for the MPWWTP (ending December 2022). During this time, the commissioning activities at the MPWWTP and conveyance infrastructure facilities are expected to periodically impact plant performance and effluent quality, and some plant and conveyance facility systems, including odour management. Regular compliance reporting under federal and provincial legislation has been carried out in accordance with requirements.

RECOMMENDATION

There is no recommendation, this report is for information only.

Submitted by:	Ted Robbins, BSc., CTech., General Manager, Integrated Water Services
Concurrence:	Russ Smith, Acting General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

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REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, JULY 27, 2022

SUBJECT **Bowker Sewer Rehabilitation Recommendation to Award Contract 2022-743**

ISSUE SUMMARY

To seek Core Area Liquid Waste Management Committee and Capital Regional District (CRD) Board approval to award Contract 2022-743 for the Bowker Sewer Rehabilitation – Phase 1.

BACKGROUND

The Bowker Sewer was originally constructed around the year 1914 to serve Victoria, Oak Bay and the Saanich Panhandle. In 2008, portions of the sewer were rehabilitated by Cured-in-Place-Pipe (CIPP) lining, a cost-effective trenchless technology that largely eliminates the need to disturb the surface works. Based on recent closed-circuit television (CCTV) inspections, most of the remaining old sewer also needs to be rehabilitated with CIPP lining. Appendix A details the Bowker Sewer and which portions are to be lined.

In 2020-21, a Capital Plan was approved by the CRD Board and included a project to rehabilitate about 2,700 meters (m) of the Bowker Sewer with a budget of $8.6 million. A breakdown of budget components is as follows:

Project Name & No.	Engineering & Project Management	Construction	Contingency	Total Budget
Bowker Sewer Rehabilitation No. 21-09	$600,000	$7,500,000	$500,000	$8,600,000

The CRD retained AECOM Canada Ltd. (AECOM) to design and tender the project. Given current market conditions and the uncertainty of price escalation, AECOM broke the tender down into base bid, higher priority pipe segments (about 1,500m), and provisional price pipe segments (about 1,200m).

A request for qualification (RFQ) was issued for public response to pre-qualify competent contractors. On April 8, 2022, an invitation to tender (ITT) was provided to the two pre-qualified contractors. On May 13, 2022, the ITT closed and two tenders were received.

The low-bid tender was significantly below the estimated value for the project, and given the scope of work and estimated cost, was clearly submitted in error. After discussions with AECOM as to the ability of the vendor to perform the scope of work, the vendor confirmed they had erred and requested to withdraw their bid, which AECOM recommended CRD accept.

The only remaining bid was as follows:

Tenderer	Tender Amount of Base Bid (excl. GST)	Tender Amount of Provisional Items (excl. GST)	Total Amount (excl. GST)
Insituform Technologies Ltd.	$5,587,894	$3,328,831	$8,916,725

AECOM contacted ITL and verified it has a good understanding of the project and the tender met the ITT requirements. ITL's base bid of $5,587,894 is within the $7,500,000 construction budget and several provisional items can be included in the contract to utilize the full project budget (which will rehabilitate about 2,100m of the 2,700m of sewer pipe requiring relining). The remaining 600m of sewer pipe relining can be included in pipe rehabilitation work scheduled for 2024.

AECOM confirmed that ITL's tendered prices are within industry standards, based on the current market, and will provide good value to the CRD. IWS staff have conducted their own review of the tenders and concur with this assessment.

ALTERNATIVES

Alternative 1
That the Core Area Liquid Waste Management Committee recommends to the CRD Board:

That Contract No. 2022-743, Bowker Sewer Rehabilitation, be awarded to Insituform Technologies Ltd. for an amount of $7,500,000 (excluding GST) and authorize staff to expend up to an additional $500,000 in contract contingency funds as required during the execution of the project.

Alternative 2
That the Core Area Liquid Waste Management Committee recommends to the CRD Board:

That Contract No. 2022-743, Bowker Sewer Rehabilitation, not be awarded and direct staff to cancel or retender the project.

IMPLICATIONS

ITL has demonstrated that they understand the scope of work and their pricing will provide good value to the CRD. ITL has successfully completed lining projects for the CRD and other municipalities in Greater Victoria in the past. Staff can include additional pipe into the ITL contract (under Provisional Items) for a total length of about 2,100m at a total price of about $7,500,000. ITL have indicated that they can complete the work within the specified completion date of October 15, 2023. The 100-year-old sewer needs to be rehabilitated before it fails and using trenchless technologies to line the pipe minimizes impact on the public and environment. During construction, any noise resulting from bypass pumping and traffic impacts will be managed by the contractor in consultation with the CRD and the municipalities. Work will take place during the dry months and will be paused during the wet winter months when pipe flows are higher.

The tender could be cancelled and retendered to try to solicit interest from firms that did not qualify under the RFQ process; however, such cancellation and re-tendering without a change in the

scope of the project or the specifications would not be in line with CRD's policies and practices, would delay the rehabilitation of 100-year-old pipe, have serious schedule implications; may result in ITL choosing not to proceed with a further bid with CRD for this work; and the re-tendered cost will likely be more expensive due to continuing pressures of wages, equipment, fuel, and materials. Staff recommend proceeding with the qualified tenderer at this time.

CONCLUSION

The Bowker Sewer has exceeded typical design life expectations and now needs to be rehabilitated. The first phase of rehabilitation was included in the 2020-21 Capital Plan and approved by the Board with a budget of $8.6 million. AECOM completed the design and tender for rehabilitation work. Two tenders were received but CSS requested that their tender be withdrawn. AECOM confirmed that ITL understands the scope of work and their pricing will provide good value to the CRD. Their tender was compliant, and they have successfully completed numerous similar rehabilitation projects. About 2,100m of the 2,700m sewer pipe length can be rehabilitated at a cost of about $7,500,000. The delegated signing authority limit for the Chief Administrative Officer is $5 million, therefore approval of the award of contract by the CRD Board is required.

RECOMMENDATION

That the Core Area Liquid Waste Management Committee recommends to the CRD Board:

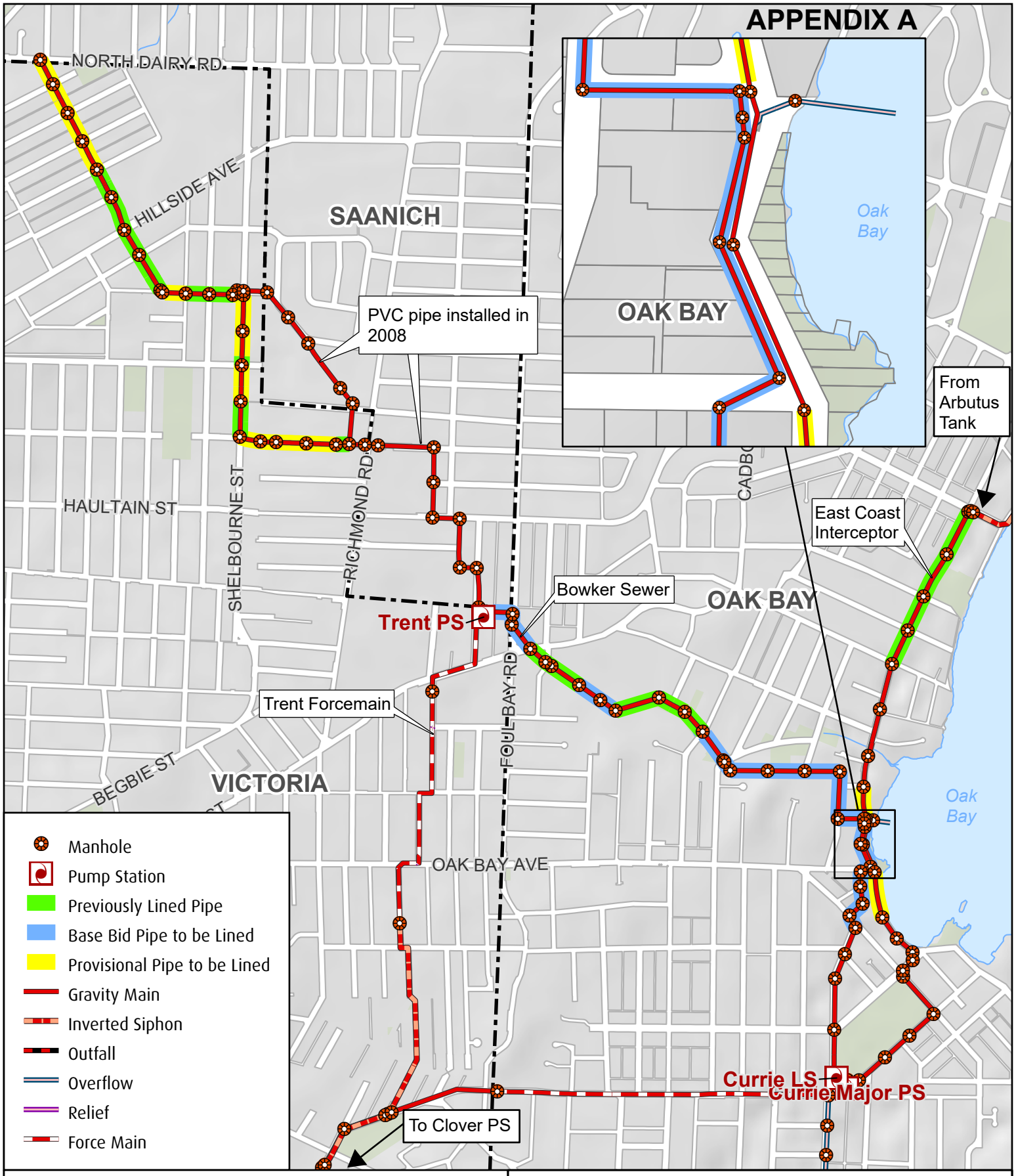
That Contract No. 2022-743, Bowker Sewer Rehabilitation, be awarded to Insituform Technologies Ltd. for an amount of $7,500,000 (excluding GST) and authorize staff to expend up to an additional $500,000 in contract contingency funds as required during the execution of the project.

Submitted by:	Ian Jesney, PEng., Senior Manager, Infrastructure Engineering
Concurrence:	Ted Robbins, BSc., CTech., General Manager, Integrated Water Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Location Map

APPENDIX A



1:15,000

Metres

0 140 280 560 840

UTM Zone 10N NAD 1983

N

W E

S

DISCLAIMER

This map is for general information only and may contain inaccuracies.

July 2022 | Bowker Sewer Rehabilitation.mxd | helpdesk@crd.bc.ca

Core Area Wastewater
Bowker Sewer Rehabilitation

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REPORT TO THE JUAN DE FUCA LAND USE COMMITTEE
MEETING OF TUESDAY, JULY 19, 2022

SUBJECT **Development Variance Permit for Lot 1, Section 32, Otter District, Plan 25866 – 8015 West Coast Road**

ISSUE SUMMARY

A request has been made for a development variance to reduce the front yard setback for an accessory building from 7.5 m to 3.8 m, and to allow an accessory building to be located closer to the front lot line than the principle building.

BACKGROUND

The 1,780 m^2 property is located at 8015 West Coast Road in Otter Point (Appendix A) and is zoned Rural Residential 2 (RR-2) under the Juan de Fuca Land Use Bylaw 1992, Bylaw No. 2040. The shoreline property was created by subdivision in 1972, prior to the adoption of zoning in the Otter Point area, and is less than the minimum parcel size now specified by RR-2 zone. The parcel has an irregular shape and is situated next to Strait of Juan de Fuca (Sooke Bay) with access from West Coast Road. Immediately adjacent parcels are also zoned RR-2. The property has a gradual slope down from West Coast Road towards the shoreline. The existing buildings are established on elevations that are roughly a meter or more below the road grade.

The landowner has constructed an accessory building within the front yard setback area and closer to the front lot line than the principle building. The established accessory building is also located within the Ministry of Transportation and Infrastructure's required setback from a highway right-of-way of 4.5 m.

Following a stop work order that was posted on the property on March 3, 2022, the landowner has obtained approval from the Ministry for placement of the accessory structure within the highway setback area (Appendix B). The landowner is now requesting a variance from the CRD, for the regulations of the Juan de Fuca Land Use Bylaw 1992, Bylaw No. 2040, which specify the front lot line setback and the siting of the accessory building relative to the location of the principle building.

ALTERNATIVES

Alternative 1
The Land Use Committee recommends to the Capital Regional District Board:
That Development Variance Permit VA000157 for Lot 1, Section 32, Otter District, Plan 25866, to vary Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Part 2, Section 6.07(a), by reducing the front yard setback from 7.5 m to 3.8 m; and Part 1, Section 4.01(1)(d) by allowing an accessory building to be located closer to the front lot line than the principle building to authorize the siting of a utility building, be approved.

Alternative 2
That the development variance permit be denied and the accessory building be required to comply with zoning requirements.

LEGISLATIVE IMPLICATIONS

The Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Part 2, Section 6.07(a), specifies that buildings and structures be placed a minimum of 7.5 m from the front lot line. Furthermore, the Juan de Fuca Land Use Bylaw 1992, Bylaw No. 2040, Part 1, Section 4.01(1)(d) specifies that no accessory building shall be located closer to the front lot line than the principal building except that where the principal building is more than 15 m away from the front lot line, the setback for an accessory building is 15 m. The accessory building does not meet this requirement; therefore, a variance is requested.

PUBLIC CONSULTATION IMPLICATIONS

Pursuant to Section 499 of the *Local Government Act*, if a local government is proposing to pass a resolution to issue a development variance permit, it must give notice to each resident/tenant within a given distance as specified by bylaw. Capital Regional District Bylaw No. 3885, Fees and Procedures Bylaw, states that the Board at any time may refer an application to an agency or organization for their comment. In addition, it states that a notice of intent must be mailed to adjacent property owners within a distance of not more than 500 m. Any responses received from the public will be presented at the July 19, 2022, Land Use Committee meeting.

LAND USE IMPLICATIONS

The RR-2 zone specifies that a minimum setback for buildings and structures and the general regulations for accessory buildings and structures specifies the location of an accessory building relative to the position of the principle building. Bylaw No. 2040 defines front lot line as, “the lot line that divides the lot from the highway, provided that in the case of having more than one lot line abutting a highway, the shortest lot line shall be deemed to be the front lot line.” In this case, the front lot line abuts West Coast Road.

The subject property is located within the Settlement Area 1 land use designation of the Otter Point Official Community Plan. Part 4.0, Section 4.11(3) of the Otter Point OCP requires that the following be considered with respect to development:

a. The development of the site will have minimal impact on the existing man-made and the natural physical features of the area.
b. The development is designed to control surface runoff.
c. The development is designed to prevent the depletion or contamination of existing wells.
d. All development must respond to the physical constraints of the site and must be consistent with the retention of the visual landscape or natural areas. Especially on or near hilltops and rides.
e. All residential development should endeavor to protect the natural native vegetation cover.

The accessory building is aligned with the considerations for development within the Settlement Area Land Use designation. The landowner has proposed that the accessory building be located closer to road rather than other possible locations on the property in order to limit potential impacts to the shoreline area of Sooke Bay. Other locations for siting this structure on the property are limited and would likely also require a variance request due to topographic constraints, the shape of the parcel and proximity to the shoreline. Staff have visited the site and are of the opinion that while there are other potential locations that the accessory building could have been located; the present location is less prominent compared to other areas on the property. Moreover, the location of the accessory building clusters existing development to one area, reducing the need to clear vegetation for the purposes of construction. The property’s irregularities and the placement of structures and/or buildings have a minimal impact on West Coast Road; are unimposing on the frontage of the road way, and are consistent with the community’s contextual character (Appendices C - E).

It is not anticipated that the accessory building imposes any hardships on neighboring properties; however, notice of the requested variance will be sent to owner and occupiers of land within 500 m of the subject property and any comments received will be forwarded to the Land Use Committee for consideration.

Staff recommend approval of development variance permit VA000157; subject to public notification and consideration of comments from neighbouring residents.

CONCLUSION

The applicant has requested a variance to reduce the front yard setback and siting of an accessory building regulations within Bylaw No. 2040 for an existing building that was constructed without a permit in the Rural Residential 2 (RR-2) zone, in response to a stop work order that was posted on March 3, 2022. The accessory building has received approval from the Ministry of Transportation regarding the Ministry's required setback from a highway and is sited in a location that is not expected to create hardship on the neighbouring properties. Development variance permit VA000157 is included in Appendix F for consideration.

RECOMMENDATION

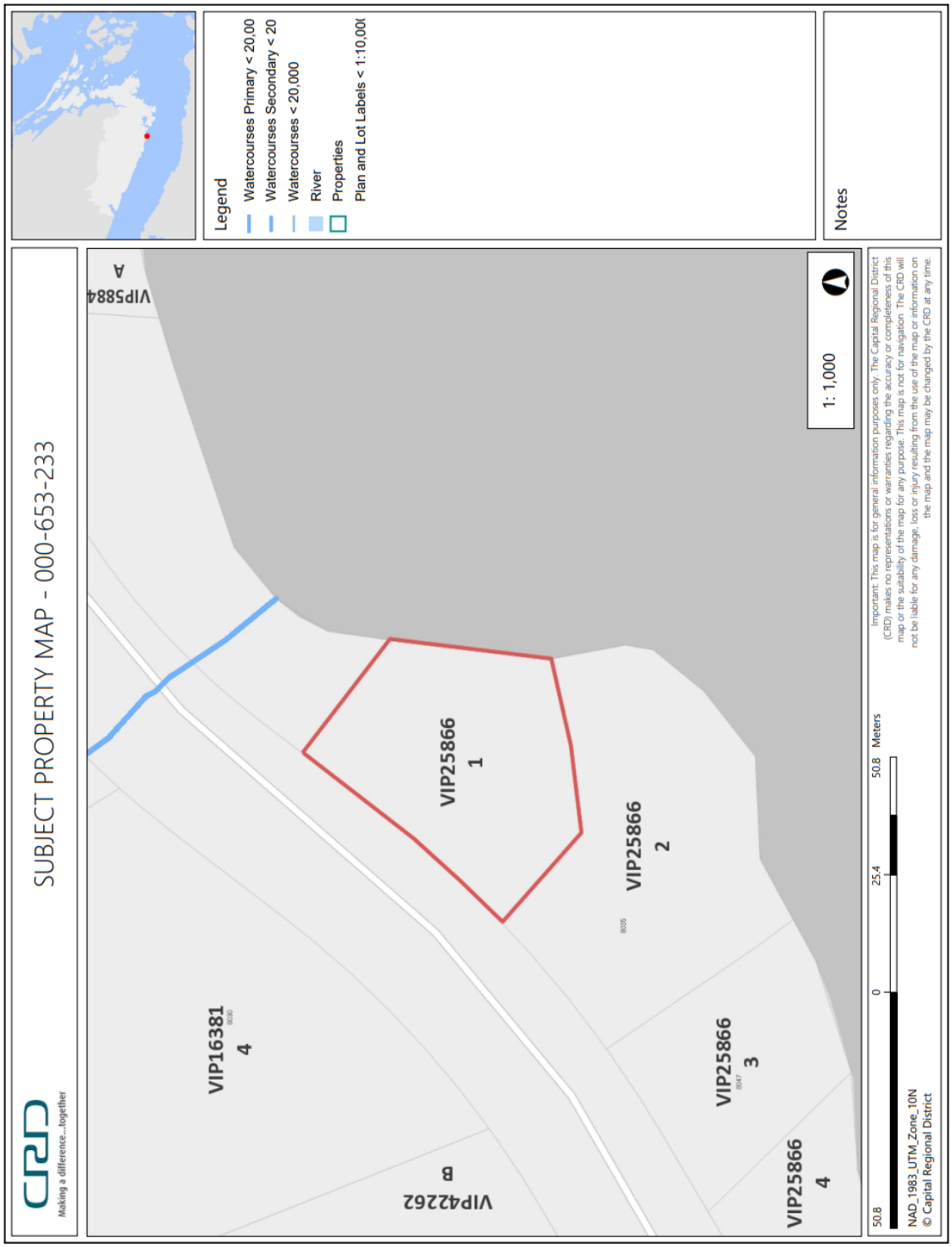
The Land Use Committee recommends to the Capital Regional District Board:
That Development Variance Permit VA000157 for Lot 1, Section 32, Otter District, Plan 25866, to vary Juan de Fuca Land Use Bylaw, 1992, Bylaw No. 2040, Part 2, Section 6.07(a), by reducing the front yard setback from 7.5 m to 3.8 m; and Part 1, Section 4.01(1)(d) by allowing an accessory building to be located closer to the front lot line than the principle building to authorize the siting of a utility building, be approved.

Submitted by:	Iain Lawrence, MCIP, RPP, Senior Manager, JdF Local Area Services
Concurrence:	Kevin Lorette, P.Eng., MBA, Acting Chief Administrative Officer

ATTACHMENTS

Appendix A: Subject Property Map
Appendix B: Ministry of Transportation permit to reduce building setback less than 4.5 metres.
Appendix C: Site Plan / Land Survey
Appendix D: Building Elevation Drawings
Appendix E: Site Photos
Appendix F: Permit VA000157

Appendix A: Subject Property Map



Appendix B: Ministry of Transportation & Infrastructure Permit

BRITISH COLUMBIA | Ministry of Transportation

Permit/File Number: 2022-02196
Office: Saanich Area Office

PERMIT TO REDUCE BUILDING SETBACK LESS THAN 4.5 METRES FROM THE PROPERTY LINE FRONTING A PROVINCIAL PUBLIC HIGHWAY

PURSUANT TO TRANSPORTATION ACT AND/OR THE INDUSTRIAL ROADS ACT AND/OR THE MOTOR VEHICLE ACT AND/OR AS DEFINED IN THE NISGA'A FINAL AGREEMENT AND THE NISGA'A FINAL AGREEMENT ACT.

BETWEEN:

The Minister of Transportation and Infrastructure

Saanich Area Office
240-4460 Chatterton Way
Victoria, British Columbia V8X 5J2
Canada

("The Minister")

AND:

[redacted]

("The Permittee")

WHEREAS:

A. The Minister has the authority to grant permits for the auxiliary use of highway right of way, which authority is pursuant to both the Transportation Act and the Industrial Roads Act, the Motor Vehicle Act, as defined in the Nisga'a Final Agreement and the Nisga'a Final Agreement Act;

B. The Permittee has requested the Minister to issue a permit pursuant to this authority for the following purpose:

The construction of a building, the location of which does not conform with British Columbia Regulation 513/04 made pursuant to section 90 of the Transportation Act, S.B.C. 2004, namely; to allow placement of a shed that is partially within the 4.5m setback from West Coast Road, located at LOT 1, SECTION 32, OTTER DISTRICT, PLAN 25866, as shown on drawing A9 Rev 3, submitted by Daniel Ross.

C. The Minister is prepared to issue a permit on certain terms and conditions;

ACCORDINGLY, the Minister hereby grants to the Permittee a permit for the Use (as hereinafter defined) of highway right of way on the following terms and conditions:

1. This permit may be terminated at any time at the discretion of the Minister of Transportation and Infrastructure, and that the termination of this permit shall not give rise to any cause of action or claim of any nature whatsoever.
2. This permit in no way relieves the owner or occupier of the responsibility of adhering to all other legislation, including zoning, and other land use bylaws of a municipality or regional district.
3. The Permittee shall indemnify and save harmless the Ministry, its agents and employees, from and against all claims, liabilities, demands, losses, damages, costs and expenses, fines, penalties, assessments and levies made against or incurred, suffered or sustained by the Ministry, its agents and employees, or any of them at any time or times, whether before or after the expiration or termination of this permit, where the same or any of them are based upon or arise out of or from anything done or omitted to be done by the Permittee, its employees, agents or Subcontractors, in connection with the permit.
4. Should the said structure be destroyed, removed or dismantled, this permit is automatically cancelled and another permit will not necessarily be granted for a new similar structure.
5. This permit is valid only for the specific works stated herein. Any alterations or additions must be covered by a separate permit.

BRITISH COLUMBIA | Ministry of Transportation

Permit/File Number: 2022-02196
Office: Saanich Area Office

6. The Permittee acknowledges that the issuance of this permit by the Minister is not a representation by the Minister that this permit is the only authority needed to carry out the Use. The Permittee shall give deference to any prior permission given for use of the right of way in the vicinity of the permit area, shall obtain any other permission required by law, and shall comply with all applicable laws regardless of their legislative origin.

7. The Permittee will at all times indemnify and save harmless Her Majesty the Queen in Right of the Province of British Columbia, as represented by the Minister of Transportation and Infrastructure , and the employees, servants, and agents of the Minister from and against all claims, demands, losses, damages, costs, liabilities, expenses, fines, fees, penalties, assessments and levies, made against or incurred, suffered or sustained by any of them, at any time or times (whether before or after the expiration or termination of this permit) where the same or any of them are sustained in any way as a result of the Use, which indemnity will survive the expiration or sooner termination of this permit

8. If any BCLS survey posts are removed, moved or damaged during the construction of the said Works they must be replaced by a registered BC Land Surveyor at the expense of the Permittee.

9. Permittee shall supply surveyed "As BUILT" drawings upon completion of the said works. Drawings must include offset from right-of-way boundary.

10. Any damage to the Ministry of Transportation and Infrastructure's right-of-way as a direct result of the permitted works, shall be repaired and maintained by the Permittee in perpetuity.

11. This permit in no way relieves the owner or occupier of the responsibility of adhering to all other legislation, including zoning, and other land use bylaws of a municipality or regional district.

12. The Ministry of Transportation and Infrastructure and/or the Maintenance Contractor shall not be held accountable for any damage(s) to the said structure, however caused.

13. The Permittee may not assign any part of this Agreement without the consent, in writing, of the Minister.

14. The Permittee must ensure that the most current editions of the following standards and specifications, manuals and guides are utilized and complied with during the installation, operation and maintenance of the Works:

    (a) Ministry Utility Policy Manual

    (b) Ministry Traffic Control Manual for Work on Roadways

    (c) Ministry Traffic Management Guidelines for Work on Roadways

    (d) Ministry Standard Specification for Highway Construction

15. It is the responsibility of the Permittee to ensure that all equipment and vehicles crossing Provincial highways or side roads have the proper approval and insurance as required and issued by the Commercial Vehicle Safety and Enforcement Division. For permits or inquiries please contact the Provincial Permit Centre at 1-800-559-9688.

16. A copy of this permit must be on site at all times during the said works.

17. The Permittee shall determine the location of highway right-of-way to ensure their permitted work is within Ministry jurisdiction. The Permittee is responsible for all trespass issues.

18. This permit in no way grants exclusive use to the Permittee for any portion of the access on right-of-way.

19. That where the said works are in the proximity of any bridge, culvert, ditch or other existing work, such work shall be properly maintained and supported in such manner as not to interfere with its proper function, and on the completion of the said works any bridge, culvert, ditch or other existing work interfered with shall be completely restored to its original condition.

20. No further additions or improvements shall be made to the said structure without prior consent of the Ministry of Transportation and Infrastructure.

21. The Permittee is responsible for ensuring that all works are contained to the highway right of way. Any works located within private property must have the owner's permission.

22. The Permittee will ensure that the works do not, impair, impede or otherwise interfere with; I. public passage on the Highways; II. the provision of highway maintenance services by the Province, or by its servants, contractors, agents or authorized representatives of the Province in connection with the Highways; or III. the operation of the Highways.

23. Permittee to be responsible for all future drainage problems as they pertain to said works.

24. The Ministry, or its contractors, will not be responsible for installation or maintenance of the landscaping.

25. The Permittee to be responsible for any settlement, erosion or other damage caused as a result of this construction for a period of two years from completion of construction.

26. All costs entailed in the construction and maintenance of the works are to be borne by the Permittee.

BRITISH COLUMBIA | Ministry of Transportation

Permit/File Number: 2022-02196
Office: Saanich Area Office

27. This permit may be terminated at any time at the discretion of the Minister of Transportation and Infrastructure, and that the termination of this permit shall not give rise to any cause of action or claim of any nature whatsoever.

28. The rights granted under this permit and certificate are for an indefinite period.

29. If the Permittee proceeds on this permit, it is deemed they have accepted all terms and conditions.

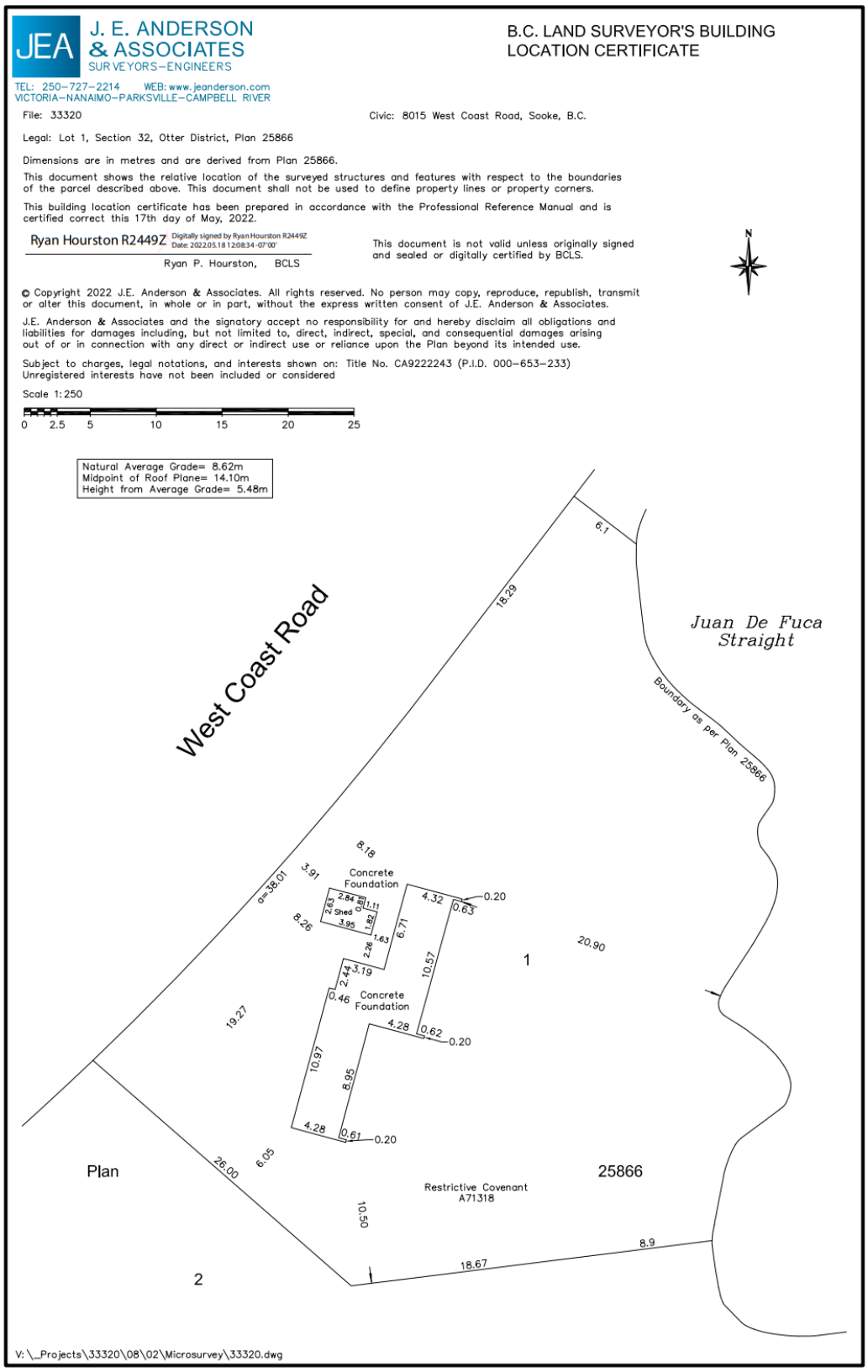
30. The Permittee must contact the Archaeology Branch immediately at (250) 953-3334 if archaeological site deposits are encountered on the subject property. In the event that any item of archaeological, heritage, historical, cultural, or scientific interest is found on the project site, the Permittee shall have a Chance Find Procedure in place and utilize it when required.

The rights granted to the Permittee in this permit are to be exercised only for the purpose as defined in Recital B on page 1.

Dated at Victoria, British Columbia, this 26 day of April, 2022

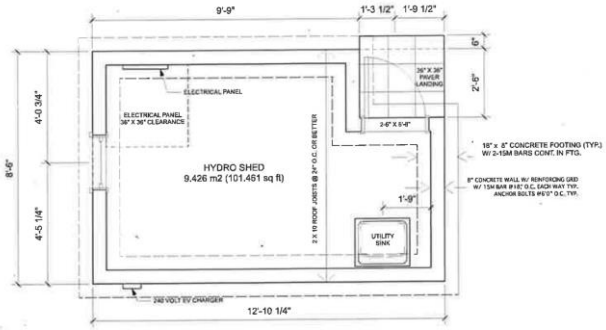
On Behalf of the Minister

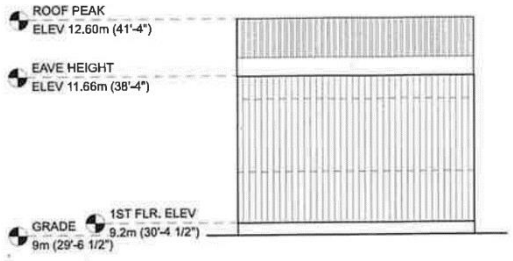
Appendix C: Site Plan / Land Survey



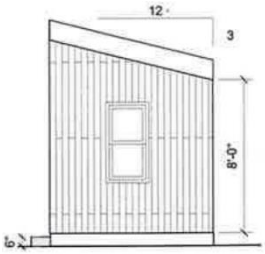
Appendix D: Building Elevation Drawings

1 Sht-10 SHED CUSTOM VIEW
Scale: 3/16" = 1'-0"

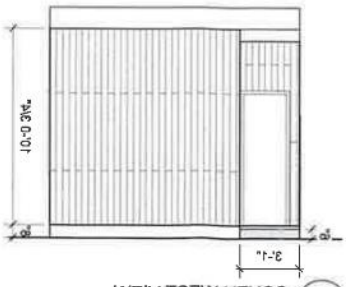




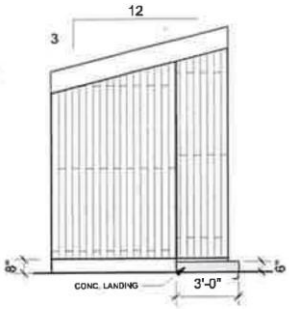
4 Sht-10 NORTH EAST VIEW
Scale: 1/4" = 1'-0"



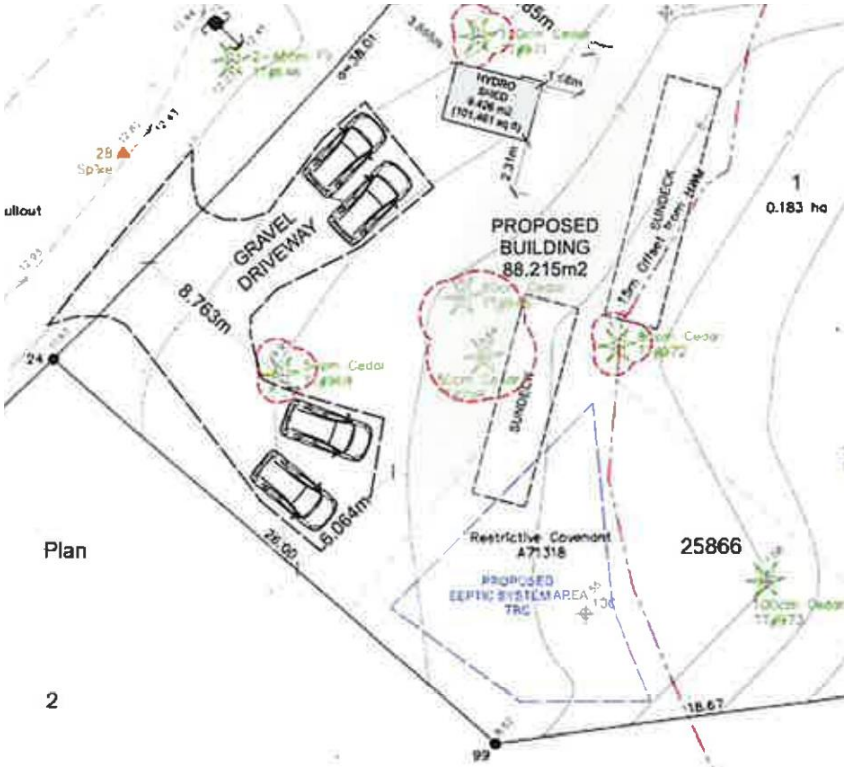
5 Sht-10 SOUTH EAST VIEW
Scale: 1/4" = 1'-0"



6 Sht-10 SOUTH WEST VIEW
Scale: 1/4" = 1'-0"



7 Sht-10 NORTH EAST VIEW
Scale: 1/4" = 1'-0"



Appendix E: Site Photos

Appendix F: Permit VA000157

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CAPITAL REGIONAL DISTRICT

DEVELOPMENT VARIANCE PERMIT NO. VA000157

1. This Development Variance Permit is issued under the authority of Section 498 of the *Local Government Act* and subject to compliance with all of the bylaws of the Regional District applicable thereto, except as specifically authorized by this Permit.

2. This Development Variance Permit applies to and only to those lands within the Regional District described below (legal description), and any and all buildings, structures, and other development thereon:

   PID: 000-653-233;
   Legal Description: Lot 1, Section 32, Otter District, Plan 25866

3. The Capital Regional District's **Bylaw No. 2040,** Schedule A, Part 1 and Part 2 is varied under Section 498 of the *Local Government Act* as follows:

   a. Part 1, section 4.01 (1) (d) is varied to permit an accessory building to be located closer to the front lot line than the principle building for the purpose of permitting the siting of an accessory building as shown on the Site Plan prepared by J. E. Anderson & Associates, dated May 17, 2022.
   b. Part 2, section 6.07 (a) is varied by reducing the front yard setback from 7.5m to 3.8m from the front lot line for the purpose of permitting the siting of an accessory building as shown on the Site Plan, prepared by J. E. Anderson & Associates, dated May 17, 2022.

4. Notice of this Permit shall be filed in the Land Title Office at Victoria as required by Section 503 of the *Local Government Act*, and the terms of this Permit (VA000157) or any amendment hereto shall be binding upon all persons who acquire an interest in the land affected by this Permit.

5. If the holder of a permit does not substantially start any construction permitted by this Permit within 2 years of the date it is issued, the permit lapses.

5. The land described herein shall be developed strictly in accordance with the terms and conditions and provisions of this Permit, and any plans and specifications attached to this Permit which shall form a part hereof.

6. The following plan and specification is attached:
   a) Attachment 1: Site Plan prepared by J.E. Anderson & Associates, dated May 17, 2022.

7. This Permit is NOT a Building Permit.

RESOLUTION PASSED BY THE BOARD, THE _____day of _____, 2022.

ISSUED this _____ day of _____, 2022

_____
Corporate Officer

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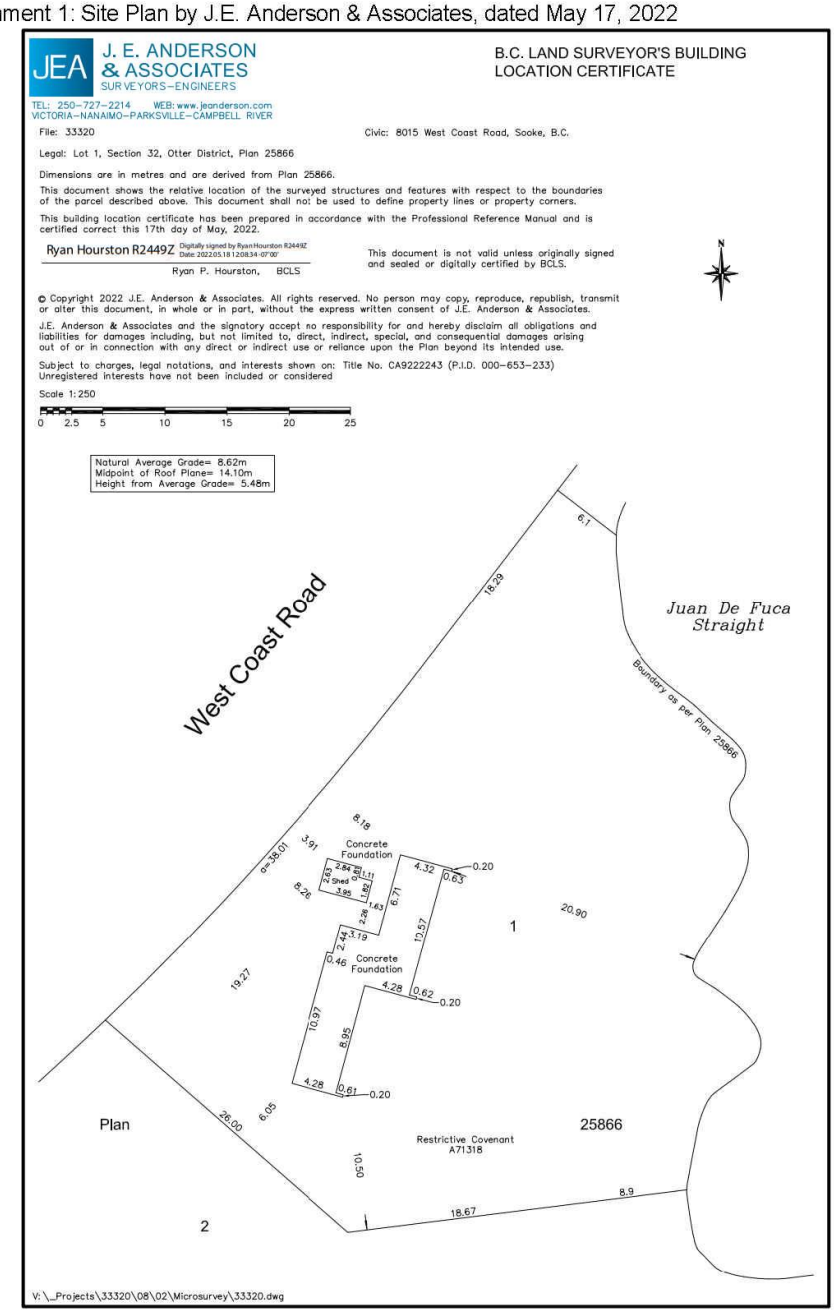
VA000157

Attachment 1: Site Plan by J.E. Anderson & Associates, dated May 17, 2022



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RWSC 22-12

REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF WEDNESDAY, JULY 20, 2022

SUBJECT **Summary of Feedback - 2022 Regional Water Supply Master Plan**

ISSUE SUMMARY

To present a summary of the public and stakeholder engagement activities conducted to gather feedback on the 2022 Regional Water Supply Master Plan for the Regional Water Supply Commission's consideration in endorsing the Plan.

BACKGROUND

The Regional Water Supply Commission (Commission) received the 2022 Regional Water Supply Master Plan (Master Plan) at its May 18, 2022 meeting and directed staff to seek public feedback on the Master Plan through the Capital Regional District (CRD) website public engagement portal and report back to the Commission. The CRD Board received the Master Plan at its June 8, 2022 meeting.

Public Engagement Summary

The CRD's digital engagement site (GetInvolved.crd.bc.ca) was used to share details of the Master Plan and invite feedback between June 9 and July 6, 2022. Comments were collected using an online form and through the water@crd.bc.ca email.

During the feedback period, the site was visited 753 times resulting in three levels of participation:

1. Aware: 383 participants visited at least one page
2. Informed: 157 participants downloaded documents such as the Master Plan executive summary, and visited multiple pages
3. Engaged: 22 participants shared comments or asked questions

The feedback is provided verbatim in the attached Public Engagement Report (Appendix A).

There were some general themes that emerged from the feedback:

1. There is general support for the Master Plan including adding filtration to the water treatment process.
2. There is a need to consider future water demand necessary to support agriculture and local food security.
3. There are some concerns about the financial implications of the Master Plan and water rate structures.
4. There are some local interests and concerns:
    a. environmental and social benefits of Smith Hill Reservoir
    b. construction related environmental and social impacts
    c. need to consider extending water service area/infrastructure to areas that are currently not serviced as ground water sources become less reliable
5. There is a need to consider how the Master Plan impacts First Nations and their water supply needs.

Social media was also used to raise awareness of the Master Plan, promote the engagement site, and invite the public to provide their feedback. In total, Facebook posts reached 12,352 users with 328 engagement site link clicks and Twitter posts resulted in 837 impressions, with 32 engagement site link clicks.

First Nations Engagement
The CRD Board has stated its commitment to engage First Nations communities respectfully and appropriately in regional plans, strategies, decision making and shared interests. Staff engaged directly with First Nations, by sending individual letters to 16 Nations across southern Vancouver Island, whose traditional territories overlap the CRD (sample letter included as Appendix B).

Nations were invited to advise the CRD of their interests in relation to the Master Plan. CRD staff also provided an on-line overview and information session on the Master Plan for First Nations in June. Although the CRD has not received written responses from First Nations to date, given the timeframe for engagement and acknowledging the other engagement and referral demands on First Nations communities, the CRD does not consider the response reflective of the interests and concerns of the Nations. The CRD will be conducting more and specific engagement with First Nations on a project-by-project basis as each project proceeds through further study and design phases.

Water Advisory Committee Feedback
The Master Plan was presented to the Water Advisory Committee (Committee) on May 13, 2022, and staff responded to initial questions and comments regarding the Plan. The Committee then met without staff in June to discuss the Master Plan. The Committee provided a written submission (Appendix C) summarizing its comments and concerns. From the submission, the Committee states, *"Overall, the Plan is comprehensive and the data and analyses supporting the conclusions are well presented. The Committee supports the recommended approach and the Plan overall."*

The Committee did identify some concerns as follows:

Population growth projections – *"The Committee feels population growth in the region has been underrepresented and hence some items will need to come online sooner than later."* For the Master Plan planning horizon, a 1.25% annual population growth rate was used, resulting in a projected population in the service area of 569,000 by 2050. This population projection is in alignment with the Regional Growth Strategy (RGS) population projections. Although, the planning horizon for the RGS is 2038, at which time the population for the Region is estimated to be 478,500. Staff will continue to review actual population and future population growth rates every five years moving forward. If the population and water demand estimates vary from the Master Plan estimates, staff will re-evaluate the timing of projects required to meet the service area water demand and make recommendations to the Commission to adjust the capital plan accordingly.

First Nations engagement – *"The Plan was absent on any reference to engagement with First Nation communities and how this Plan will affect them."* This is addressed above. As the Commission is aware, a new approach to First Nations water servicing is in the early stages of implementation.

Degenerative water use vs. regenerative water use – *"The Committee recommends differentiating between 'degenerative water use vs. 'regenerative' water use; applying a one water approach where different departments (water, wastewater, stormwater) develop integrated policies and programs to better reuse water."* The primary purpose of the Master Plan was to determine the potable water supply needs for the Greater Victoria area to 2050. When there is more interest in using recycled water for non-potable purposes, (such as agriculture, and irrigation for landscape, parks and golf courses, or larger scale grey water re-use in the residential and commercial sectors), and there is a willingness to invest in the construction of non-potable water treatment, storage and distribution infrastructure, then staff can evaluate the potential reduction in 'potable' water demand for these types of uses. CRD staff continue to monitor guidelines and criteria for the beneficial use of recycled water established in other parts of North America and potential policy implications for the Region.

Filtration plant process water usage and treatment of process water – *"The Committee has concerns that process water usage in filtration is underestimated, as well, the wastewater from filtration was not addressed in the report."* This concern, along with other technical concerns form the majority of the comments are outlined in the Committee's detailed submission (Appendix D). Given the nature of the document, the Master Plan did not consider this level of design detail, which will result from further detailed study and design for each of the projects.

Agricultural water use – *"The Committee also recommends that agricultural water use in the Plan be highlighted given agricultural water usage occurs when water reserves are lowest and agricultural consumption may surpass population growth over time given the effects of climate change."* As noted in the Master Plan, agricultural water demand currently accounts for approximately 3% of the total annual water demand for the service. This has remained fairly constant for many years. Staff will continue to monitor actual and projected agricultural water demand and adjust the total annual water demand to reflect any demand shifts. The Agricultural Water Rate Study is currently underway, and depending on the outcomes of this study, agricultural water demand may change in the future due to rates and rate applicability.

Public engagement – *"The Committee feels that the in-person public engagement forums are useful and would also support additional public engagement tools such as video presentation."* As noted in the May staff report, the CRD is now using the CRD website's digital public engagement site as the primary engagement tool to share engagement materials and receive feedback on key initiatives. As noted above, the Master Plan engagement site received 753 visits. For comparison, when staff conducted the five in-person public open houses as part of the public engagement plan for the Regional Water Supply Strategic Plan in 2017, there were 45 attendees in total.

The Committee closed their submission by noting, *"In summary the Water Advisory Committee generally supports the 2022 Water Master Plan. After addressing the comments and concerns highlighted above, the Committee would recommend that the Regional Water Supply Commission support the Plan, and advise this of the CRD Board."*

Media

A media release highlighting the Master Plan purpose, timelines, planned projects and costs, and opportunity for public input, was issued on June 9, 2022. The Master Plan received local television, radio and print media coverage through the month of June. In most cases, the coverage included a reference to the public engagement site and opportunity for public input.

ALTERNATIVES

Alternative 1
That the Regional Water Supply Commission:

1. Approve the Regional Water Supply 2022 Master Plan; and,
2. Recommend that the Capital Regional District Board approve the Regional Water Supply 2022 Master Plan.

Alternative 2
That the 2022 Master Plan be referred back to staff for more information.

IMPLICATIONS

Intergovernmental Implications
The proposed projects in the 2022 Master Plan are located in traditional territories of local First Nations and some projects are likely located in areas of cultural significance to Nations. The CRD is committed to engaging with First Nations on the projects in the early phases of project development on a project-by-project basis.

The Regional Water Supply Service provides drinking water service to 13 municipalities and one Electoral Area across Greater Victoria, via the water distribution systems operated by the municipal and sub-regional service providers, who in turn provide drinking water to eight First Nations. All local and First Nations governments will be engaged as the plan is implemented over time. The plan will inform how municipal and sub-regional service providers plan for the future needs of their water distribution systems, particularly with respect to system capacity, infrastructure improvements and financial sustainability.

Financial Implications
The financial implications of implementing the Master Plan over the next 30 years were detailed in the May staff report to the Commission. Specific financial implications will be assessed by the Commission and CRD Board through the annual and five-year service planning and budget processes moving forward.

Future Plan Updates
As noted in the May report, the 2022 Master Plan recommendations and proposed infrastructure will continue to be reassessed, on a five-to-10-year cycle, to consider new information and latest trends in population growth and water demand, and evaluate risks to the service, including climate change and water quality. Current technology and construction costs will also be evaluated. As a result of this continuous and adaptive process, the 2022 Master Plan implementation will be adjusted moving forward, to reflect any changes in assumptions or conditions.

CONCLUSION

The Regional Water Supply Commission received the Regional Water Supply 2022 Master Plan in May and directed staff to seek public feedback on the Plan through the CRD website public engagement portal and report back to the Commission. The CRD Board received the Master Plan at its June meeting. The engagement period has now closed, and the public feedback has been provided for the Commission's consideration. The CRD provided information about the Master Plan to 16 First Nations and will be conducting more and specific engagement with First Nations

on a project-by-project basis as each project proceeds through further study and design phases. The Water Advisory Committee reviewed the Master Plan and has provided written feedback and indicated support for the recommended approach and Master Plan overall. Staff are now seeking the Commission's endorsement of the Master Plan.

RECOMMENDATION

That the Regional Water Supply Commission:

1. Approve the Regional Water Supply 2022 Master Plan; and,
2. Recommend that the Capital Regional District Board approve the Regional Water Supply 2022 Master Plan.

Submitted by:	Ted Robbins, BSc., CTech., General Manager, Integrated Water Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: 2022 Master Plan Public Engagement Report
Appendix B: Sample letter to First Nations Chief and Council
Appendix C: Water Advisory Committee: Response to the 2022 Water Master Plan
Appendix D: Water Advisory Committee: Additional Detailed Comments on the 2022 Water Master Plan

2022 RWS Master Plan

Public Engagement Report

This report provides a summary of public engagement activities conducted following the release of the 2022 Regional Water Supply Master Plan.

Integrated Water Services has developed the 2022 Regional Water Supply Master Plan that includes a proposed infrastructure program intended to improve the water supply and transmission system and add redundancy to critical components to address hazards and risks. The Plan recommends projects to be implemented over the next 30 years based on the projected population, the impacts of climate change, and water treatment needs resulting from changing raw water quality characteristics and regulatory requirements over time.

Residents were informed about the Master Plan and invited to provide feedback through various engagement methods.

Engagement Methods

"Get Involved" Website

The CRD's new digital engagement site **GetInvolved.crd.bc.ca** was used to share details of the Plan and invite feedback between June 9 and July 6. Comments were collected using an online form, and through the water@crd.bc.ca email. Regional Water Supply Master Plan information remains available online at: Regional Water Supply Master Plan | Get Involved CRD

During the feedback period, 753 visits resulted in three levels of participation:

- Aware (visited at least one page): 383 participants
- Informed (downloaded documents, visited multiple pages): 157 participants
- Engaged (shared comments or asked questions): 22 participants

The most popular documents viewed were the 2022 Regional Water Supply Master Plan Executive Summary (101 downloads), the Project Overview Map (43 downloads), and the 2022 Regional Water Supply Master Plan Presentation (35 downloads).

Media & Stakeholder Information

A media release was issued on June 9, 2022 (attached). The release highlighted the projects, why they are needed, the timeline, and the engagement platform.

2022 RWS Master Plan

Public Engagement Report

Agenda items from the May 18 Regional Water Supply Commission meeting included a Regional Water Supply 2022 Master Plan staff report recommending that 1) staff be directed to seek public feedback on the Plan to be reported back to the Commission as well as the Water Advisory Committee feedback, and that the Commission consider endorsing the Plan, and 2) that the 2022 Master Plan be forwarded to the CRD Board for information. The Board Vice-Chair also highlighted the Master Plan in the monthly CFAX update.

- CRD Board Highlights June 8, 2022
- CFAX Update June 8, 2022
- Regional Water Supply 2022 Master Plan Released (crd.bc.ca) June 9, 2022

Local media coverage:

- CTV June 21, 2022
- CBC June 21, 2022
- Sooke News June 22, 2022
- CFAX June 22, 2022

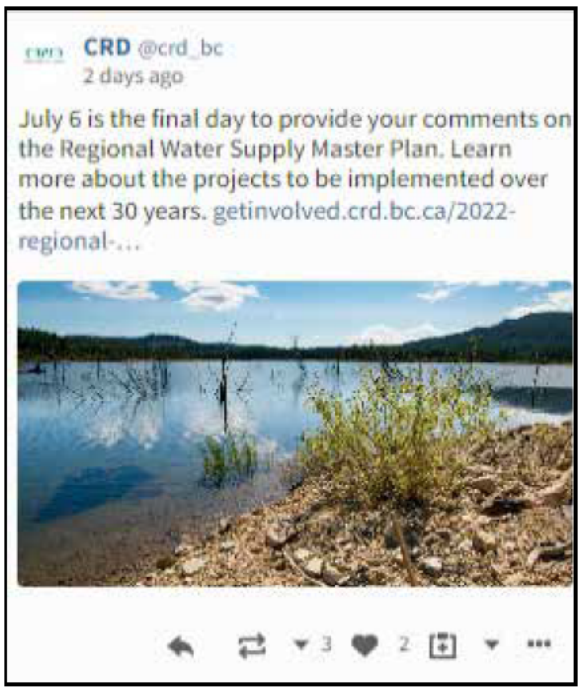
Social Media

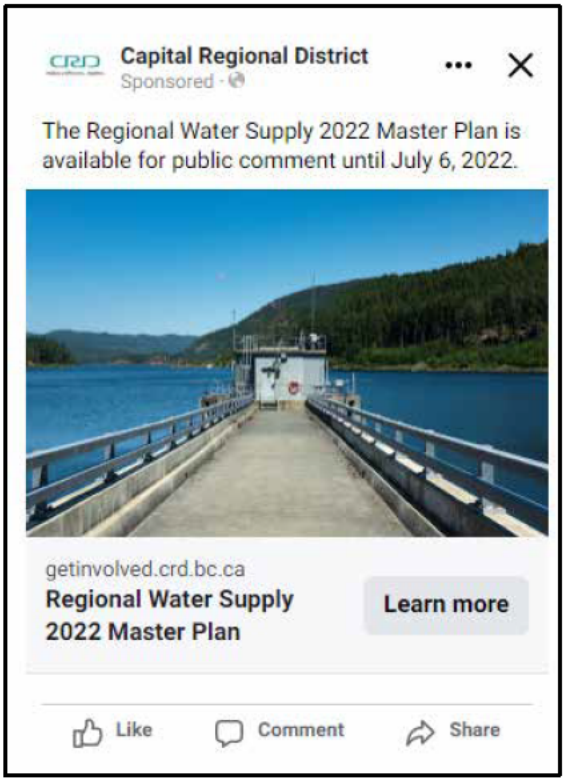
Staff scheduled social media posts to raise awareness of the Master Plan and to invite the public to provide their feedback via the engagement platform. In total, Facebook posts reached 12,352 users with 328 link clicks and Twitter posts resulted in 837 impressions (number of times a tweet was seen) with 32 link clicks.

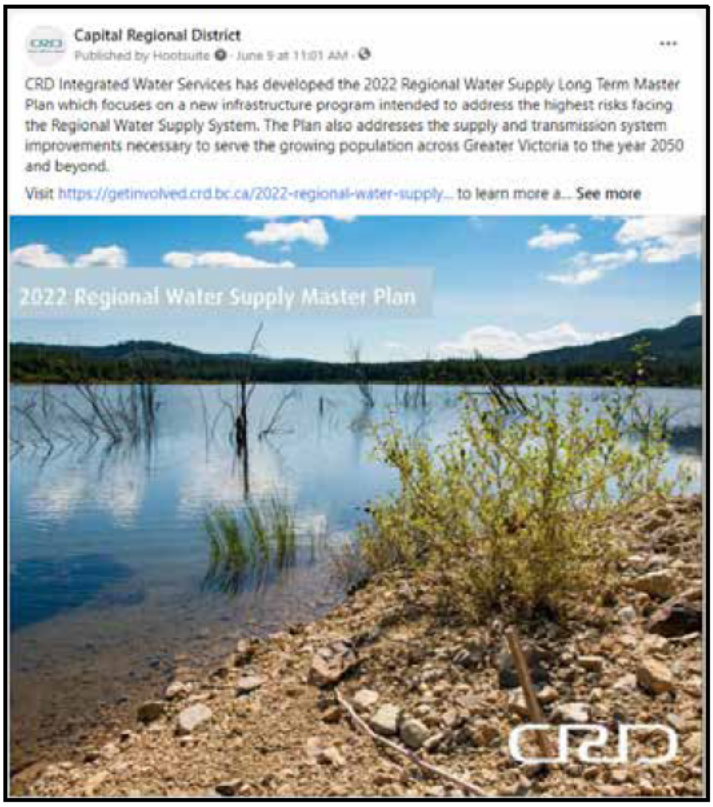
2022 RWS Master Plan

Public Engagement Report

Making a difference...together







2022 RWS Master Plan

Public Engagement Report

Responses

Comments

The following comments were received by the CRD via an online comment form.

Municipality	Please provide your feedback on the CRD's provisional financial plan.
Colwood	How do you think the public is going to pay for that the well is running dry so to speak .....
Victoria	I think this is a great idea and I fully support it. The price is completely reasonable for securing something so important. We are lucky to have the water system we currently have, but we should not put off planning and building for our future needs.
Colwood	Water filtration should be the highest priority. If there is a wildfire, the water supply will be contaminated. Don't wait until there is an emergency to build the filtration plant.
Esquimalt	On behalf of our family and extended family, we wish to register our objection to any plan calling for the filtration of the water.
Saanich	I can't believe the water restrictions that have been on here for decades now with all the development still going on, Gvrd and Saanich are completely scorched, Broadmead was the first neighbourhood that should have showed that, I would like to sit in to any panel or discussion that could possibly help, when I was 12 here you could water your yard here, grass/shrubs and gardens and they were good for at least a week, the ground is stripped and paved over and where it isn't rain water flows over rocks and dries up, could go on about this forever but there are too many people, glad I will be dead when I am in 30 years, seen so many area's die already around here

Langford	This work is needed to safeguard our supply for future generations. Manage our risk by making the changes sooner than later.
Sooke	Lots of good work plans to add redundancy to the current infrastructure. Good to build on the accomplishments of the strategic plan now that the Wastewater Treatment Plant finally completed. The right-of-way from the old flow line should be seriously considered for use to run the pipeline from the filtration plant at Japan Gulch (once completed) to Sooke. Currently, even with existing population levels, interuptions to traffic flow on Sooke Road are challenging and highly unpopular, as well as potentially hazardous to construction crews. Costs of installation and maintenance of this pipeline would be increased significantly if traffic management had to be considered as well. The pipeline from the filtration plant to Sooke should double as a bike path/walking trail. Currently, the Galloping Goose meanders too far from the highway to allow for use as a commuter path or even an effective recreational path. With population pressures and climate change anticipated to create significant demands and increased rate of change, we need to get the most out of infrastructure, especially linear corridors. Should be a three-tier system for water rates: agriculture (cheapest), suburban food production (cheap), and home use (regular rate). At current water rates, people are already discouraged from food production. Healthy communities/ecosystems of the future will need to utilize yards for food production and pollinator etc. habitat rather than concrete and burnt grass. Need to ensure that the filtration plant does not filter out the body-replenishment minerals from our fantastic water supply. Lower Cragg Main and MacDonald Main useful parcels if Leech to be fully utilized for storage as well as topping up Sooke Lake Reservoir?
Sooke	With the exponential growth of population in the Sooke/Otter Point area and the monopolization of bulk water delivery in the region during the summer months when wells run dry, piped water is essential to many growing families to access a more affordable and dependable water source. [redacted] commented that there is no discernible sprawl in this area. Growth is inevitable. Please consider adding a water main extension of infrastructure service in this region for our future. Thank you.

2022 RWS Master Plan

Public Engagement Report

Nanaimo	How does this impact First Nations and their water supply needs?
Victoria	Yes please build it! I want our water supply to have better filtration. Sometimes the tap water tastes like lake, which is gross!I hope it will be built soon.
Langford	This seems like a no brainer. Credit to the Crd for the foresight to propose this and be ahead of the game to protect our most valuable resource.
Saanich	Clearly the water supply must be improved and protected going forward. The proposed projects seem reasonable, although I have not delved into the details. I didn't see anything about seismic stability, but presumably that is a significant consideration? The cost part requires clarity. Are we to expect up to a 20% cost increase per year for over a decade? That would be problematic to say the least. The wording on that part is particularly muddy and unclear; it was probably written by politicians or communications experts...
Victoria	For the construction of various sites, I assume there are going to be many trees removed. Will the CRD be planting equivalent trees in nearby areas to replace the lost ones? Will an environmental assessment be carried out by a third party prior to construction?
Esquimalt	I found the plan to be a very intensive engineering report. However The Sooke reservoir area has some 8900 hectares of forests and the leech some 9600 hectares of forest; with climate change the fire risk for these forest has been increased and I see nothing in the master plan for any fire mitigation program. The watershed forest should be fire-smart managed. One big conflagration would be a major disaster. Check with UBC Forestry Faculty Professor [redacted] and associate professor [redacted] for the latest on the science in fire proofing and the Logan Lake Fire Smart-Program in their surrounding forests that helped save their community in 2021 for an example that worked.. Their are ,also forestry consultants who are up to speed in this area., [redacted] and [redacted] being two I would recommend for a fire risk assessment. Looking forward to seeing a fire-smart program in Watershed Forests soon, [redacted].

2022 RWS Master Plan

Public Engagement Report

Juan de Fuca	Hello- Thank you for asking for public input. I am not an engineer nor an expert but have been reading and observing water, watersheds and human impact on both - sometimes with terrible consequences. In California the Central Valley aquifer has been so drained for agricultural irrigation and piped away for city use that the land is sinking as much as twenty feet due to the collapse of the aquifer. The same situation has been happening since the early 1930s with the Ogallala Aquifer under several Midwest states. Water behind several US dams is so low the potable water availability and the hydropower are both being severely rationed. We need to learn from the poor choices elsewhere before we see major irreversible problems here. Rather than taking the rain water from where it belongs on the land where it falls, we need to rethink our water sourcing and think of roof rainwater harvesting and cisterns instead of expensively piping in water and expensively (and wastefully) thinking of rain water as "waste water" and sending it down pipes to be treated (expensively) in plants before being released (wasted) into the sea. Educate people here to think like people in Australia and in Bermuda where there is no water supply except rainwater saved and treated in tanks with lime to keep it potable. Educate people to value and judiciously use only as much water as they need and understand that, as Aristotle noted, it is not rational to value diamonds highly but take water for granted. People in the Juan de Fuca area who are not on "piped" city water are quite good at harvesting and being frugal with water due to being on wells, stream water licenses or having it trucked in. We are not a special breed and would be happy to share in educating people. We have the healthiest watersheds where the rain stays where it falls.
Juan de Fuca	Ongoing, Water will be one of our most precious resources on the South Island. Development and commercial use of watersheds will seriously reduce the ability of watersheds to receive and store rainfall. Even a small percent of development can lead a natural 1% runoff into a 25% runoff. An increase that will lead to local flooding, land and stream bank erosion, and incursion into sensitive riparian ecosystems. Massive development, like leveling mountains to build housing, and commercial parking lots and wider roads can lead to a 75% runoff from the changes to the natural watershed's ability to manage the natural distribution of water. Humans cannot recreate the watershed once it is destroyed. No amount of money poured into "wastewater" infrastructure will handle this water resource as effectively as Nature.

	Trying to provide potable water for everyone is a laudable endeavour. The problem is that such undertakings will cost millions and ultimately we may still run out of water as climate and populations put pressure on our system. Worse yet - people don't think about where or how the water comes to their home. They will only be angry when it stops coming out of the tap. It is possible in our geographic location to become self-sufficient in water on a personal domestic and local level. Rainwater harvesting is a well established technology and any freestanding house unit with a roof is capable of storing three to six thousand gallons of water a year. This is sufficient for a family to use for some or all their needs. It will greatly reduce the need for costly budgets to secure piped water resources, to maintain and build the drainage system and to charge increasingly higher water rates to consumers. So - Harmonise the building codes (at least on this one thing) and require all new detached buildings to have rainwater storage on site which can be used and released back to the land. If developers say "No, that will be too expensive to require a $10,000 system for every house" what their really are saying is that the future costs of supplying water and managing "wastewater" will have to paid by the municipalities and the CRD.
Metchosin	No mention of farming. That should be our top priority. Food security is a real issue. CRd is a perfect place to grow food. We need to plan for more agriculture and farm water supply in droughts Also, so many developments are going in with high water use homes. Any water used for frivolous or hedonistic purposes needs to be billed out for big money whereas water going for community gardens, obviously farming and environmental restoration needs to be billed with a recognition of its value as an investment to the region.
Central Saanich	I was pleased to see that you have included future water demands from agricultural users as well as residential and commercial users. Access to water will be a key part of future food security and supporting farmers, especially those in the Agricultural Land Reserve that have access to CRD water. As a residential user, I wholeheartedly support farmers continuing to access CRD water at a special agricultural water rate.
Metchosin	I am very concerned about three areas not incorporated in the report. 1- no growth strategy for local food security with any growth in agriculture. Climate change and

	global unrest are making growing local food critical. 2- no mention of holding all new development in the CRD to a higher water conservation standard with bathrooms, grey water recycling, etc. as well as a CRD wide retrofit campaign to bring up to date older homes and residences. 3- some kind of billing penalty for business and activities that are wasting water like car washing, lawn watering, etc. How unacceptable is it to have Royal Bay install lawns in a gravel pit? We have to be doing better as local city planners on items like this and the CRD can lead the way.
Victoria	The Smith Hill Reservoir is an important asset to birders, joggers and walkers from the Quadra and Hillside neighbourhood. Any changes to the reservoir should protect and enhance the current usage of these users. The reservoir is also an important stopover point for hundreds of migrating water fowl. Rare species have been found in recent years attracting birders far and wide. The City of Victoria in the past had discussed options with the CRD for the potential conversion of the reservoir space to park. Conversion could double the size of the existing Summit Park, extending the endangered Garry Oak ecosystem and introducing ponds for migrating water fowl. Please involve the neigbourhood stakeholders and the City in the design and implementation of the The Smith Hill tank and pump station project. Thank you.

Making a difference...together

Media Release

For Immediate Release
June 9, 2022

Regional Water Supply 2022 Master Plan Released

Victoria, BC- The Capital Regional District (CRD) Regional Water Supply Commission has released the 2022 Master Plan that includes a proposed infrastructure program to improve the water supply and transition system and add redundancy to critical components to address hazards and risks. The Plan recommends projects to be implemented over the next 30 years based on the projected population, the impacts of climate change, water treatment requirements resulting from changing raw water quality characteristics and regulatory requirements.

"The 2022 Master Plan builds on previous system infrastructure investments, which have been largely focused on securing supply, and takes a forward-looking approach to create a resilient water supply system that will serve Greater Victoria for the next 30 years," says Lillian Szpak, Chair of the Regional Water Supply Commission and City of Langford Councillor.

The plan advances the commitments, strategic priorities and actions adopted in the 2017 Regional Water Supply Strategic Plan, recommending 21 major projects to meet anticipated water supply and treatment needs based on projected population for the year 2050. The recommendations also consider climate change impacts on water supply and demand, anticipated changes in raw water characteristics and regulatory requirements. Modeling indicates that by 2045 additional water will need to be sourced from the deep northern basin of Sooke Lake Reservoir and the Leech River water supply catchment area. The recommended projects will require significant investment over a 30-year period, approximately $2 billion, to be paid for through water rates with the potential for grant funding.

The plan is available for public review and comment until July 6, 2022 at getinvolved.crd.bc.ca/2022-regional-water-supply-master-plan.

Feedback collected will be presented to the Regional Water Supply Commission and will be used to guide how the plan is implemented over time, with further engagement carried out as each project is designed and implemented.

About the Regional Water Supply System

The CRD Regional Water Supply System delivers safe and sustainable drinking water to more than 400,000 people living in Greater Victoria. This work includes protecting the source, disinfecting the water

and monitoring water quality, operating and maintaining transmission and distribution systems and investing in infrastructure renewal. The Regional Water Supply Service delivers water to customers situated in 13 local municipalities, 8 First Nations and the Juan de Fuca Electoral Area through a mix of sub-regional and local distribution systems.

Learn more: Greater Victoria Water Supply System: An Overview (Video)

Proud to be recognized as one of BC's Top Employers and Canada's Greenest Employers, the CRD delivers regional, sub-regional and local services to 13 municipalities and three electoral areas on southern Vancouver Island and the Gulf Islands. Governed by a 24-member Board of Directors, the CRD works collaboratively with First Nations and all levels of government to enable sustainable growth, foster community well-being, and develop cost-effective infrastructure while continuing to provide core services to residents throughout the region. Visit us online at www.crd.bc.ca.

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For media inquiries, please contact:
Ted Robbins, General Manager
Integrated Water Services
Tel: 250.360.3061
Cell: 250.217.9084

APPENDIX B

June 10, 2022

File: 0400-60
First Nations Governments

Chief and Council
First Nation
Address
Address

By Email:

Dear Chief and Council:

RE: Regional Water Supply Master Plan

I am writing to invite your input into the Capital Regional District's (CRD) 2022 Regional Water Supply Master Plan (Plan), regarding the Lake Cowichan First Nation's interests. I'd also like to begin a conversation on how the Lake Cowichan First Nation would like to be involved in water supply infrastructure implementation in the Greater Victoria area and the CRD water supply landsover the next 30 years.

The CRD is committed to maintaining safe, reliable and sustainable drinking water service delivery for all residents in the region. Given this, it is critical that we proactively address the highest risks facing the Regional Water Supply system, including lack of redundancy of critical components, climate change impacts, seismic vulnerabilities and changing water treatment needs, as well as a growing population.

To this end, the CRD's Regional Water Supply Commission contracted the development of a Regional Water Supply Master Plan, which was received by the Commission in May 2022. The Plan focuses on a new water supply infrastructure program that will address these risks. In total, 21 projects are being proposed for implementation over the next 30 years. For the purpose of the Plan, each of the proposed projects have been conceptualized, but will require more engagement, planning and design prior to construction. Some of the projects are located in the watershed lands, while others are located in municipalities across the CRD's water transmission system. The Plan builds on the commitments and strategic priorities outlined in the 2017 CRD Regional Water Supply Strategic Plan.

Attached is a backgrounder outlining the infrastructure projects, a map showing proposed locations, and the Regional Water Supply Master Plan Executive Summary.

Please let us know your interests in relation to the Plan. **We would appreciate a response by July 6th** as the CRD Regional Water Supply Commission will consider endorsing the Plan in July. If more time is needed, please let us know.

SAMPLE

Prior to implementation of the water supply infrastructure projects, the CRD will reach out to the Lake Cowichan First Nation on a project by project basis over the next 30 years, as the projects become more defined (such as specific projects sites, scope of work, site impacts).

First Nation staff and representatives are invited to attend an online session where I will deliver **a summary of the CRD's Regional Water Supply Master Plan**. This online session for First Nations will be **Thursday June 16th, from 10-11:30 am**. Please email water@crd.bc.ca to register, by Tuesday June 14th. If you are unable to make this session, or would prefer a direct phone call instead, please don't hesitate to contact me for more information. I can be reached at trobbins@crd.bc.ca or 250-360-3061.

Sincerely,

Ted Robbins
General Manager, Integrated Water Services
Capital Regional District

Enclosures:
1. Backgrounder
2. Map
3. Stantec Master Plan Executive Summary

SAMPLE

July 4th, 2022

To: Ted Robbins, General Manager of Integrated Water Services, CRD

From: Water Advisory Council

Re: Response to the 2022 CRD Water Master Plan

The Water Advisory Committee (the Committee) recognizes the privilege to review and comment on the 2022 Water Master Plan (the Plan), recognizing the last opportunity was 28 years earlier. Looking back on the 1994 plan it is clear the role these long-term plans play in the directions taken by the utility to support the strategic goals of the region, and continued supply of safe drinking water.

Overall, the Plan is comprehensive and the data and analyses supporting the conclusions are well presented. The Committee supports the recommended approach and the Plan overall. While extremely expensive, the Plan is reasonable due diligence to increase resiliency and redundancy in our regional water supply and is supported by the committee. As the Plan outlines, we recognize that more advanced science and better modelling tools at our disposal will provide us a more mature understanding of the various implications of climate change, population growth, seismic risks, and evolving health protection regulations and guidelines over the next 30 years.

The need for filtration in the future is inevitable and tying in the additional source waters of the Leech, collecting cooler water from a North Intake, and designing balancing storage on the treated distribution to avoid fluctuations in peak flow all work together. Following through on the 1994 recommendation for an east-west connector makes sense, though the Committee believes when that time comes that a close review of population growth of Sooke and the potential changes to the Regional Growth Strategy be considered. The resiliency that comes from the upgraded and redundant transmission lines from Goldstream, raw water, and treated water systems are also supported.

Regarding climate modeling predictions, the Committee recommends utilizing an adaptive management approach to the Plan, where additional climate data is evaluated on a regular basis to re-assess if the predicted conditions, including potential impacts on water demands and quality, hold true over the years and need to be adjusted. Further, if different watersheds need to be used concurrently to meet water demands, it is recommended that monitoring and modeling for this potential use be incorporated into an adaptive management plan. The Committee also supports the recommended watershed improvement measures and management practices that will help buffer and improve water quality over time.

There are a variety of concerns the Committee has identified with the Plan. Firstly, the Committee feels population growth in the region has been underrepresented and hence some items will need to come online sooner than later. Secondly, the Plan was absent on any reference to engagement with First Nation communities and how this Plan will affect them. Thirdly, the Committee recommends differentiating between 'de-generative' water use vs. 'regenerative' water use; applying a one water approach where different departments (Integrated Water Services, Wastewater, Stormwater) develop integrated policies and programs to better reuse water. With this significant investment in our regional water supply, we should consider how we want to invest that water back into our region.

Specifically, to the water treatment component of the Plan, the Committee has concerns that process water usage in filtration is underestimated, as well, the wastewater from filtration was not addressed in the report. The Committee also recommends that agricultural water use in the Plan be highlighted given agricultural water usage occurs when water reserves are lowest and agricultural consumption may surpass population growth over time given the effects of climate change.

Lastly, regarding the public engagement piece of the Plan, the Committee feels that the in-person public engagement forums are useful and would also support additional public engagement tools such as a video presentation. The committee also thinks it would be valuable for each distribution commission to have the opportunity to provide input. For further consideration, the Committee suggests including a water literacy component into the Plan, or supporting the Plan to help inform and encourage the public and all associated stakeholders to re-evaluate local water systems and water usage.

In summary the Water Advisory Committee generally supports the 2022 Water Master Plan. After addressing the comments and concerns highlighted above, the Committee would recommend that the Regional Water Supply Commission support the plan and advise this of the CRD board.

The WAC has prepared a second response document sent alongside this initial response highlighting various comments in further detail regarding the Water Master Plan.

June 30, 2022

To: Ted Robbins, General Manager of Integrated Water Services, CRD

From: Water Advisory Council

Re: Additional detailed comments on the 2022 CRD Water Master Plan

Wildlife

- What would be the impact on wildlife if any of the recommendations outlined in the Master Plan are implemented?

Water Use: Differentiating between 'de-generative' water use vs. 'regenerative' water use

- not all water use provides the same value to our region
- when it comes time to pay for this, we need to find creative ways of distributing the cost fairly between those who are using it for regenerative uses and those who are not
- some megaliters grow acres of crops for local consumption while others irrigate estate lawns for properties that sit dormant half the year
- it is important to maintain a significant subsidy rate for those engaged in agriculture & landscape restoration and find better ways to either tax poor water usage; or reward beneficial water use

Agriculture: Little Recognition of the Importance of Agricultural Water Use in the Master Plan

- there is a logical reason for this as it stands now; agriculture only represents 3% of annual demand (according to page 65)
- however, agricultural water usage occurs when water reserves are lowest (drought), so it should already be weighted more heavily weighted as a risk factor
- The plan states: "There is an assumption that water use segregation between residential, ICI and agricultural consumption will remain consistent with population growth." While this is logical for forecasting, it does not take into account any large-scale shocks to food/energy markets that might suddenly make agriculture in the CRD become several orders of magnitude more necessary and important

Treatment and Design (previously submitted to Ted by Wilf but included here for completeness)

- To me the most important upgrade that should be at the front of the line is to design and build a water treatment plant that can deal with the above issues and is also designed to quickly adapt in a modular fashion to new threats such as an outbreak of toxic blue green algae, forest fire ash and debris, changes to the aquatic environment and damage from invasive species such as the giant American bullfrog, large quantities of storm - flood debris, new nasties on the horizon such as rare but deadly parasitic brain eating amoeba which are now found as far north as Minnesota and Seattle (Balamuthia mandrillaris).

- Page 51 from the executive summary:

- I am in favor of the deep intake and Leech River future supply option. Also, yes to the floating pump station if gravity flow is deemed not a viable option.
- use gravity flow if possible.
- two treatment plants - at Sooke and Japan Gulch are my preference _ if possible and in the future allow backup treated water flow from each plant to the other, if an event occurs and the Sooke treatment plant is used for supplying the rest of the region the volume produced would be to supply emergency water volumes only. This would require an east west connector.
- filtration using T5 and T6. Plus have a plan in place to handle unexpected events like a bloom from blue green algae.

General Comments:

1) due to the sensitive environmental location for a new treatment plant the disposal of chemicals used in the treatment process needs to be carefully regulated and monitored to avoid discharge to fish bearing streams and the environment in general. All drainage sources from the plant need to be carefully engineered and be capable of containment in an emergency where they can be neutralized prior to discharge. Secure storage of chemicals on site with spill retention is required.

2) the plant will produce large quantities of backwash and rinse water that will need to be cleaned and disposed of. Part of the waste stream can be cleaned and recycled back to the plant inlet piping, but a large quantity of sludge will still be produced. The quantities shown in the plan seem very optimistic for a filter train that will most likely use DAF, multi media filters, carbon media filters, and membranes. Further engineering is required to confirm the percentage of waste water used and this could also result in larger gross water supply requirements than the plan shows. Also where will the waste line end up - piped to the Victoria sewage system?? I understand the new Victoria sewage plant is pretty close to capacity as it is. Don't see where it can be disposed of anywhere near the plant or reservoir.

3) use of centrifuges and/or filter presses can result in removal of as much as 80% of solids from backwash water. The solids are then compressed into filter cake bars that can be trucked to landfill. The volumes need to be established and a clear disposal plan presented to the landfill operator and sewage plants who will be receiving solid waste and liquid waste at their doorsteps. This issue can be included in the testing of selected filter systems for performance evaluation. Does the budget include provision for advanced disposal techniques?

4) the plan points out there is not much storage for flow balancing in Greater Victoria and additional reservoirs need to be built. More storage means large savings as the water treatment plant can be smaller and is not designed to handle peak flows which is a very inefficient and costly way to run a treatment plant. The CRD should work closely with munies to help them evaluate their storage needs for water usage as well as sufficient reserves for fire fighting and emergency use in case an earthquake knocks out the water supply. Proscrastination only means the price tag will soar. CRD water should not be subsidizing munies that have insufficient storage capacity and are relying on upsized water mains and filter systems. As the study shows there are some potentially enormous booster pumps required that will be very costly to purchase, maintain and operate. The system should be designed to be as efficient as possible and sized to complement a set of strategic storage facilities located in the CRD region. Some pain to taxpayers in areas that do not currently have sufficient storage will result.

5) I believe the water treatment system that includes membranes is the best choice even though it is the most expensive. Consideration should be given to include a treatment train but at a reduced rate for emergency supply levels should blue green algae emerge as a threat. This could include UV and hydrogen peroxide injection with specific NSF carbon filters rated for the application along with daily EPA limit testing for the microcipline limit of 0.3 ug/l and the cylindrospermopsis limit of 0.7 ug/l. Should blue green algae become established in the supply most water usage would have to stop without advanced treatment. This would have an immediate and very negative effect on hospitals and especially dialysis clinics. It might be time for hospitals to consider adding on site emergency water storage tanks that they could pull into service for hopefully short term emergencies.

Also pH and alkalinity needs to be boosted to prevent copper corrosion in piping systems as well as lead leeching. The allowable copper levels and lead levels could be lowered by Health Canada in the future which would be difficult for the system to meet. As well - water with low alkalinity, very low negative reading LSI (Langlier Saturation Index) low TDS (total dissolved solids) can cause issues with effective water treatment. It is possible to dose the water prior to the filtration plant. Contact time is required which would be the piping and head tank, in-line mixers would be helpful also.

6) Water draw from the deep north part of Sooke Lake should be pursued. I recommend a floating pump station with 2 or 3 floating HDPE supply pipes to the south end. Modular pump packages will be easier to pull for maintenance. Floating pipes would save big money over a tunnel or piping thru rock. Some innovative engineering is required to make this work. There is a good example serving Seattle.

7) Question- is it possible to use a siphon(s) system to draw water from the north end of the lake with large diameter floating HDPE piping and only a small pump station would then be required to fill and activate the siphons? Could save a large amount of money on construction and operation. also electrical costs will be greatly reduced. A new head tank may be required.

8) Look for opportunities for placement of power generating turbines to generate power from the system. Involve a third party to own the power generation system(s) install and maintain the equipment and pay CRD a fee for use of the water. It may take some time to make this feasible depending on future power rates. However adding tees and connections for future power generation at suitable locations will be inexpensive and would save money in the future.

9) The overall water plan should include some provisions for providing access to the public to obtain water in case of an earthquake knocking out the water supply long term. Educate the public on solutions - for example every hot water tank that is strapped to the wall could survive and hold 40 to 60 gallons of safe drinking water, all they need is a short washing machine hose to connect to the drain!!!! Let the public know where they can pick up water in containers. Set up an emergency supply protocol with hospitals. There are locations in Victoria which have private wells drilled for example in Fernwood, Vic West, Oak Bay, adjacent to Beacon Hill Park that can supply high quantities of well water. Perhaps an arrangement with the owners would be a good idea - they would need standby power to operate and should have some basic filtration installed.

10) more on emergency supply - encourage large condo and apartment buildings to install water storage tanks in their parkades sufficient for 2 weeks or more of emergency usage in case of earthquake induced water system shutdown.

11) ban using once thru water cooled condensers for refrigeration and air conditioning applications.

Many of the facilities like pubs who use water cooled condensers for their big walk in coolers could reclaim heat extracted by a closed loop cooling system and use it to provide free heat for their kitchen make up air units, space heating and high domestic hot water production.

12) the shaft horsepower shown for pumps for the new overland route, (13,302) - Goldstream connection (41,366) - overland highway (41,366) are extremely high requirements. What is the estimated cost for a sub station, wiring to the pumps, electrical costs, pump costs, etc. are pumps that large even feasible? Gravity flow should be used wherever possible. Huge locomotive sized generators for standby power will be required.

13) more work needs to be done with munies to verify how much actual water storage is required in areas of Greater Victoria to allow efficient and optimal sizing for supply mains and treatment plants, to satisfy fire loads and the Fire Underwriters of Canada, we need multiple emergency storage facilities in case of earthquakes. Not all reservoirs will survive a big shake.

14) detailed discussions with BC Hydro should be initiated now to determine the cost and technical requirements of supplying 3 phase power to the very large water booster pumps specified in the report. Also note that the pump motors will most likely be high voltage 1000 to 2000 volts to keep wire sizing to a reasonable level and require so special reduced voltage starter systems. High voltage pump starters and components require special maintenance and can be very hazardous to work on. Work safe BC (WCB) and Technical Safety BC should be consulted early on to determine their requirements so the regulatory requirements can be allowed for in the initial design.

15) a 5% contingency allowance per 8.1.3 is definitely too low, I think based on the complexity and size of this plan it could easily end up at 20% or more.

16) move up pilot plant studies on effectiveness of filter trains and membranes for application on Sooke Lake and Leech River supply water. Also carefully evaluate how suspended solids, silt, algae, organics, tannins, are collected over a year for a measured ratio of treated water. Also verification of backwash levels required to clear filters in the test stage are required as the stated 5% is very optimistic.

17) see 5.4.1 large water mains can quickly become a home for invertebrates, biofilm, algae, etc. they can also become a reservoir for bacteria that attacks piping systems and causes pinholes. Tiny Invertebrates carry up to 4000 bacteria each which can be pathogenic to humans see paper by E. Wolmarans on pubmed.com. As well the masking of bacteria tests, odor and taste problems, production of regulated by products can be increased. An aggressive program of removing interior pipe coating and buildup is required - plan for cleaning the mains with pipe pigs, increased flushing and disinfection. The current municipal system in greater Victoria has a very heavy dirt buildup in piping especially on older lines. As well in buildings entry valves, PRV stations, control valves and backflow devices can be almost totally blocked by layers of debris buildup. Building operators need to be educated on cleaning their equipment to assure high water quality.

18) see 5.4.2 I believe the CRD has under estimated the amount of corrosion caused by The water supply. The water shows a negative Langlier Index, has very low TDS and alkalinity. By definition it is very corrosive. It is said that water is the greatest solvent in the world. With the change in plumbing code in 1992, pipe sizes were upsized substantially so where a small 42 unit condo previously was served by a 2 inch main with new code that changed to 4 inch and all the branch lines were also upsized. At the same time As the code water pipe sizing was increased flow rates were decreasing due to more efficient

fixtures and regulations reduced water closet flush volumes. Plumbing code does not consider diversity - and actual flow rates in residential buildings are far lower than that calculated for design. Many condo buildings in Victoria show blue green staining on shower walls and fixtures from copper deposition. A report on waste sitting on the ocean floor in 2016 from years of raw sewage dumping noted that the there were elevated levels of copper shown in chemical analysis of the waste material. I'm pretty sure that copper was dissolved from copper piping in local buildings. Condo Buildings are choosing to install expensive chemical injection systems to treat incoming water from the CRD supply to stop corrosion. Water treatment at source to raise alkalinity and pH should be enacted to correct this issue.

19) 5.5.2 power supply ~ as the natural gas main for Vancouver Island runs south of Shawnigan Lake under the right of way it will be easy to connect gas service to provide fuel for the standby generation plants that are required at pump stations and the treatment plant. Diesel fuel should not be considered as it is higher in cost and potential spills could be a big problem.

20) building a diesel fuel tank farm at the site of the treatment plant is not a great idea. With a damaging earthquake the diesel fuel spill could result in major environmental damage as the tanks rupture and raw fuel runs down the mountain. The island natural gas main is located very close to the site in the corridor between Shawnigan Lake and Sooke Lake. The standby generators should be gas fired instead. Also maintenance and operating costs will be far less. No tank farm required. Natural gas also runs cleaner. Tank farms need to be filled on a regular basis which means fuel trucks running up and down in a very delicate environment. Bound to be one roll over and have a potential nasty spill. Remember the one that flipped in Goldstream Park a few years ago plus there was another rolled right by the Salmon River by Sayward up island. Both were major incidents that could have easily polluted vast areas of pristine rivers and oceanfront.

21) with the unparalleled rise in material costs, inflation, material shortages, Surety Companies will be raising rates on bid bonds, performance bonds, and labour - material bonds from the current low rates that we have been used to for many years. I can see these rates easily doubling. Contractor insurance rates will also rise substantially over the next few years saddling larger projects with additional costs.

22) how accurate are the cost estimates in appendix B, how detailed was the information and design data that allowed the Stantec engineers to come up with the numbers and how confident are they that the construction budgets proposed are based on hard data. Did they estimate the numbers on actual quotes from suppliers. Did Stantec review the scope of the project and projected costs with any of the large experienced contractors who would be potential bidders for their opinion?? Any comment either way on this item from CRD engineering? Might be a tough call for CRD to confirm an accurate cost review as this project is far larger and more complex than anything they have done in the past.

23) borrowing costs are going up, up, up so the financing of the tiered water project will cost much more and this will come as a direct hit to the water customers in the Greater Victoria area and beyond. Hopefully Federal and Provincial funds can be secured to cover some of the costs.

24) as soon as CRD starts providing filtered treated water the value of the water rises significantly and its sell price will become much higher. Municipalities need to recognize due to lack of investment in upgrading old infrastructure, high leakage rates mean money down the drain. Old piping mostly blocked by accumulated dirt and buildup means the clean filtered water will, still come out of the tap with color as the water picks up dirt in the piping and appurtenances.

25) performance bonds and labour- material bonds both of which CRD requires from their contractors to protect them from defaults are good for one year, and as a lot of this work will take 2 or 3 years to complete (maybe longer) the budget allowance shown for bonds is only 50% or 33% of what the actual cost will be. Plus, there is also a strong possibility the net cost for bonding to contractors is going to rise as I mentioned in the previous submittal.

Insurance for contractors is also sold by the year, and contractors are required to provide and hold significant and costly liability insurance which names the CRD as a beneficiary on claims for the whole length of the project from day one thru the whole term of contract, plus the one year warranty period that starts after satisfactory job completion completion. These costs are significant on large complex projects.

26) The consultants should show an operating budget yearly for the booster pumps showing anticipated amperage draw converted to KWH and costed out. I imagine the BC Hydro rate will be based on a demand meter system which means the price of electricity is based on the highest draw in the billing period which then sets the rate to be charged. This will be quite costly and we know BC Hydro rates will continue to climb up.

Capital Regional District | Regional Water Supply
2022 Master Plan

MAY 2022

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SUPPLEMENTAL 1

Capital Regional District
Regional Water Supply Service

2022 Master Plan

IWS Report No. 1186

Stantec

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111700675

May 2022

Revision Record

Revision	Description	Date	Author	Quality Check	Independent Review
1	Draft	Sept. 29, 2021	Stantec Team	AG	RF
2	Draft	March 16, 2022	Stantec Team	MP	SS
3	Final Draft	April 8, 2022	Stantec Team	SS	TB
4	Final	May 3, 2022	Stantec Team	RF	TB

Sign-off Sheet

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ABBREVIATIONS

AC	Asbestos Cement
ACH	Aluminum Chlorohydrate
ADD	Average Day Demand
AEP	Annual Exceedance Probability
ALA	American Lifelines Alliance
AWWA	American Water Works Association
BC	British Columbia
BCBC	British Columbia Building Code
CDA	Canadian Dam Association
CFU	Colony Forming Units
CIP	Clean-in-place
CRD	Capital Regional District
CWH	Coastal Western Hemlock
DAF	Dissolved Air Flotation
DCS	District of Central Saanich
DGR	Deception Gulch Reservoir
DMF	Devil's Mountain Fault
DNS	District of North Saanich
DOC	Dissolved Organic Carbon
DWOs	Drinking Water Officers
DWOG	Drinking Water Officers' Guide
DWPA	Drinking Water Protection Act
DWPR	Drinking Water Protection Regulation
ECCC	Environment and Climate Change Canada
EDGM	Earthquake Design Ground Motion
EFNP	Environmental Flow Needs Policy (BC Water Sustainability Act)
EGBC	Engineers and Geoscientists BC
FCM	Federation of Canadian Municipalities
FLNRORD	Forests, Lands, Natural Resource Operations and Rural Development
FUS	Fire Underwriters Survey
GAC	Granular Activated Carbon
GDS	Goldstream Disinfection Facility
GVWSA	Greater Victoria Water Supply Area
GVWD	Greater Victoria Water District

HGL	Hydraulic Grade Line
HP	Horsepower
ID	Identification
IHA	Island Health Authority
ICI	Industrial/Commercial/Institutional
IESWTR	Interim Enhanced Surface Water Treatment Rule
IWS	Integrated Water Services
JDFWD	Juan De Fuca Water Distribution
JGDF	Japan Gulch Disinfection Facility
JGR	Japan Gulch Reservoir
KWL	Kerr Wood Leidal Consulting Engineers
L/c/d	Litres /capita/day
LRVF	Leech River Valley Fault
LOS	Level of Service
L/S	Litres Per Second
1994 Plan	Long Term Water Supply Plan (Greater Victoria Water District, Long Term Water Supply Plan, Montgomery Watson, and Dayton & Knight, 1994)
MAC	Maximum Acceptable Concentration
MAMP	Municipal Asset Management Program
MCL	Maximum Contaminant Level
MDD	Maximum Day Demand
MF	Microfiltration
ML	Million Litres
MLD	Megalitre Per Day (million litres per day)
MMCD	Master Municipal Construction Documents
MoE	Ministry of Environment
Mm^3Y	Million cubic metres Per Year
MTBM	Micro Tunnel Boring Machine
NBC	National Building Code
NOM	Natural Organic Matter
NPV	Net Present Value
NTU	Nephelometric Turbidity Unit
OD	Outside Diameter
ORP	Oxidation-Reduction Potential
OTC	Once-Through Cooling
PCIC	Pacific Climate Impacts Consortium – University of Victoria

PCS	Pressure Control Station
PCCP	Prestressed Concrete Cylinder Pipe
PHD	Peak Hour Demand
PRV	Pressure Reducing Valve
PS	Pump Station
PSHA	Probabilistic Seismic Hazard Analysis
PVC	Polyvinyl Chloride
QMRA	Quantitative Microbial Risk Assessment
RCP	Relative Concentration Pathway
RFP	Request for Proposal
RISC	Resources Information Standards Committee
RWS	Regional Water Supply
RWSC	Regional Water Supply Commission
SCADA	Supervisory Control and Data Acquisition
SDWA	Safe Drinking Water Act
SHR	Smith Hill Reservoir
SLR	Sooke Lake Reservoir
SRRDF	Sooke River Road Disinfection Facility
SUVA	Specific Ultraviolet Absorbance
SWTR	Surface Water Treatment Rule (USEPA)
TAD	Total Annual Demand
TBD	To Be Determined
TBM	Tunnel Boring Machine
TCU	Temperature Control Unit
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TP	Total Phosphorus
TSD	Total Summer Demand
TWL	Top Water Level
UF	Ultrafiltration
US	United States
USEPA	United States Environmental Protection Agency
UV	Ultraviolet
UVIC	University of Victoria

UVR	Ultraviolet Radiation
UVT	Ultraviolet Transmittance
WDD	Winter Day Demand
WFT	Water Filtration Plant
WSA(s)	Water Supply Area(s)
WTP	Water Treatment Plant

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Appendices

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EXECUTIVE SUMMARY

The CRD supplies bulk drinking water for residential, commercial, institutional, and agricultural uses to approximately 400,000 people throughout the Greater Victoria area by the Regional Water Supply (RWS) service. The RWS operates the watersheds, dams, reservoirs, treatment (disinfection) and transmission systems which supply municipal water systems at metered transfer points to each municipality and sub-regional water services. The CRD supplies water to sub-regional water services, including the Juan de Fuca Water Distribution Services, 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 E.1.**

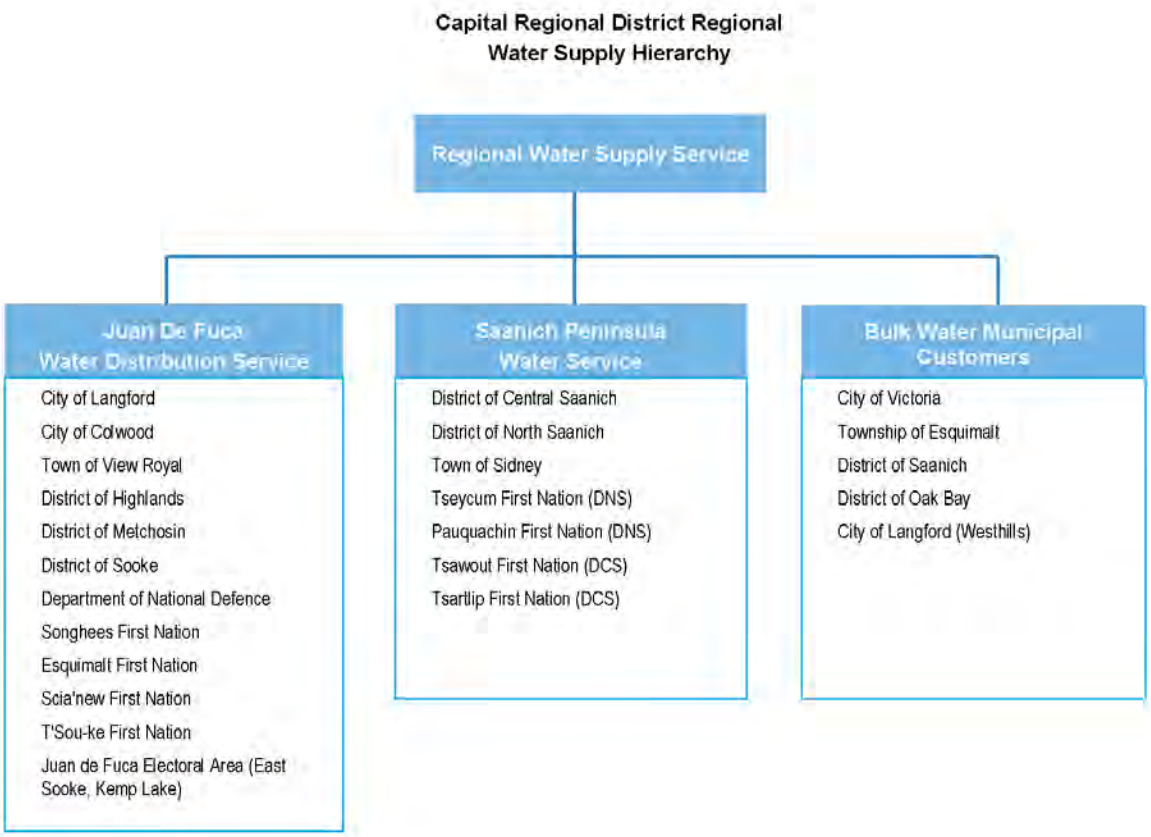


Figure E.1: Regional Water Supply Hierarchy

The primary water supply source for the RWS is the Sooke Lake Reservoir (SLR). 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 Canadian guidelines for drinking water quality. **Figure E.2** illustrates the components and service area of the RWS.

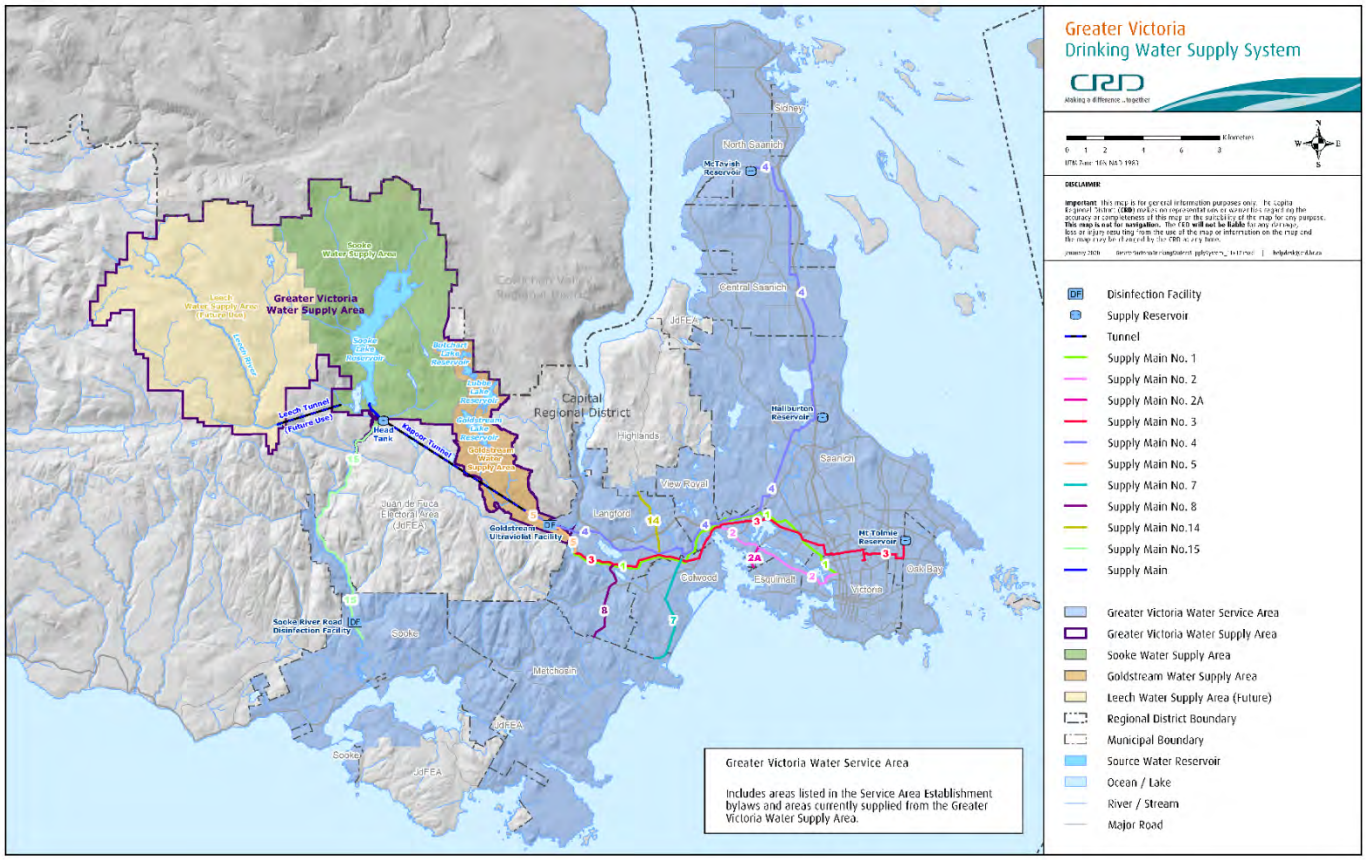


Figure E.2: RWS Water Service Area

The last Long Term Water Supply Plan for the Regional Water Service was completed in 1994 by Montgomery Watson and Dayton & Knight Ltd.(1994 Plan). The 1994 Plan outlined recommended improvements to increase the capacity and resiliency of the water supply and treatment facilities. Many of the critical improvements such as raising of the Sooke Lake Reservoir Dam, replacement of critical transmission mains, and installation of UV disinfection facilities to improve treatment were completed. This Master Plan for the Regional Water Service has been completed to update the 1994 Long Term Water Supply Plan, address key objectives identified in the 2017 Strategic Plan for the Regional Water Supply Service and sets out requirements for service upgrades based on a 2050 planning horizon.

2017 Strategic Plan

The CRD's 2017 Strategic Plan for Regional Water Service identified three primary commitments as follows:

1. To provide high quality, safe drinking water
2. To provide an adequate, long-term supply of drinking water
3. To provide a reliable and efficient drinking water transmission system

The Strategic Plan also identified Areas of Focus, strategic priorities, and actions including:

- CRD Board Priorities – Sustainable and Livable Region
- Climate Change Impacts – Mitigation and Adaptation
- Preparation for Emergencies and Post-Disaster Water Supply
- Supply System Infrastructure Investment – Renewing Existing and Preparing for New Infrastructure
- Planning for the Future Use of the Leech Water Supply Area
- Demand Management – Addressing Changing Trends in Water Demand

This 2022 Master Plan has been prepared to address the primary objectives and strategic priorities outlined in the 2017 Strategic Plan.

Concurrent Studies Informing the Master Plan

As part of this RWS 2022 Master Plan, three concurrent studies were completed by Stantec to inform this report. Key findings from these studies have been considered in this 2022 Master Plan. The studies and their content are summarized as follows and have been published by Stantec as stand-alone documents for use by the CRD.

Study 1 – Deep Northern Intake, Transmission and Treatment Study

This study investigated the option of installing a second intake to access deeper water in the north basin of the Sooke Lake Reservoir. The deeper intake would improve overall system resiliency and provide a more robust system in the event that the watershed is impacted by natural occurrences such as wildfires. Even though the proposed Deep Northern Intake would improve overall water quality, the deep intake would not enable the SLR to be drawn down below elevation 177m during a 1:50 year drought conditions without diversion of the Leech River to the SLR. Future diversion of Leech River water to SLR would assist in filling of the Sooke Lake Reservoir and reducing potential for water supply shortages during drought conditions. Excessive drawdown of SLR would also likely lead to water quality issues. The study also investigates transmission facilities necessary to connect the second intake to the existing RWS transmission system and outlines water treatment requirements.

Study 2 – Supply System Risk and Resiliency Study

Using the AWWA J100 methodology, the RWS has been assessed to determine potential vulnerabilities, risks, and threats to the water supply system associated with natural disasters, climate change, failure of equipment and other considerations such as damage to water supply infrastructure from seismic events.

Study 3 – Seismic Assessment of Critical Facilities (Phase 1)

A Phase 1 seismic assessment was completed for critical CRD water supply facilities. This study was a high-level screening assessment to evaluate the vulnerability of a limited number of priority CRD water supply facilities consistent with screening level assessment. The Phase 1 seismic assessment identified facilities that will require further Phase 2 detailed seismic evaluations and likely future seismic improvements pending the outcome of the Phase 2 evaluations.

Population Growth, Projected Water Demands, and Demand Management

Future population, within the CRD, has been projected using annual growth rates ranging from a low 1% annual growth to a high of 1.5% annual growth from the current population. The projections to 2050 planning horizon are outlined in **Table E.1**. A mid-range 1.25% annual population growth rate was selected for the purposes of planning future water supply facilities.

Table E.1: Projected Population of Regional Water Supply Service Area for Three Population Growth Scenarios

Year	Low (1.00%)	Med (1.25%)	High (1.50%)
2030	432,000	444,000	456,000
2050	527,000	569,000	615,000

The CRD has a very successful water demand management program. RWS water demands are amongst the lowest in British Columbia for a major metropolitan area. Per capita demands have declined from 559 L/c/d in 1998 to the current per capita demand of 337 L/c/d (combined residential, ICI and agricultural). **Figure E.3** illustrates the benefit of targeting even lower demand rates. With a modest reduction to 300 L/c/d, the Sooke watershed could supply enough water to meet demand until 2060. The red dashed line in **Figure E.3** depicts an estimate of the safe 1:50 year drought yield (67Mm^3Y) of SLR and illustrates the impact of different consumption levels on extending the life of the SLR. If demand continues at the current rate (no decline curve), the SLR source will be at its capacity limit by 2045. The CRD should continue to promote water conservation throughout the region and strive to lower per capita demands from current levels. Given the finite capacity of the Sooke watershed, planning for the future diversion of Leech River to SLR should commence within the next 10 years.

Recommendations arising out of this Master Plan include continued demand management and conservation programs on a regional basis with all RWS member municipalities including ICI and agricultural customers served by RWS.

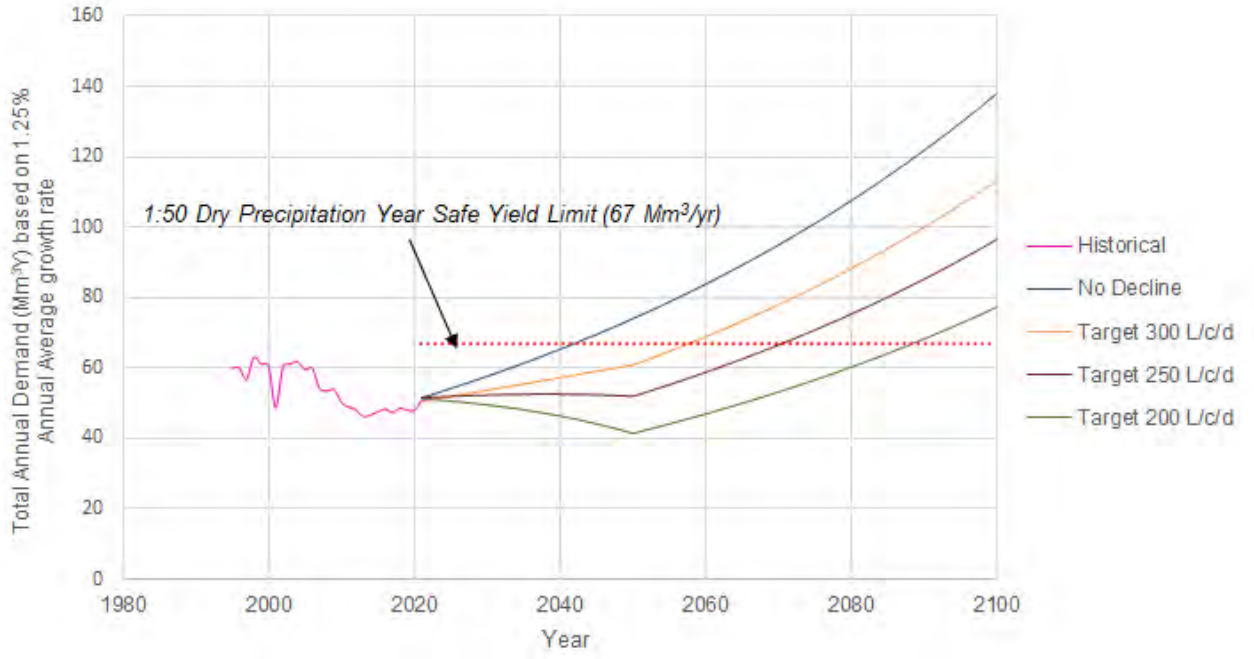


Figure E.3: Water Demand Projections

Water Quantity

A hydrological assessment has been completed for the Sooke and Leech watersheds. It is estimated that the Sooke watershed has the capability to supply an additional 40% increase in annual demand (up to 67 Mm^3 Y) over the current demand of 48 Mm^3Y. Projecting from the current annual demand level using a population growth rate of 1.25%, the Sooke watershed safe yield capacity will be reached before the 2050 planning design horizon in the year 2045. **Figure E.4** illustrates the Sooke Lake Reservoir water level response to varying increases in annual demand ranging from a 10 to 50% increase over current annual demand levels for a 1:50 year drought precipitation year followed by a year of normal precipitation.

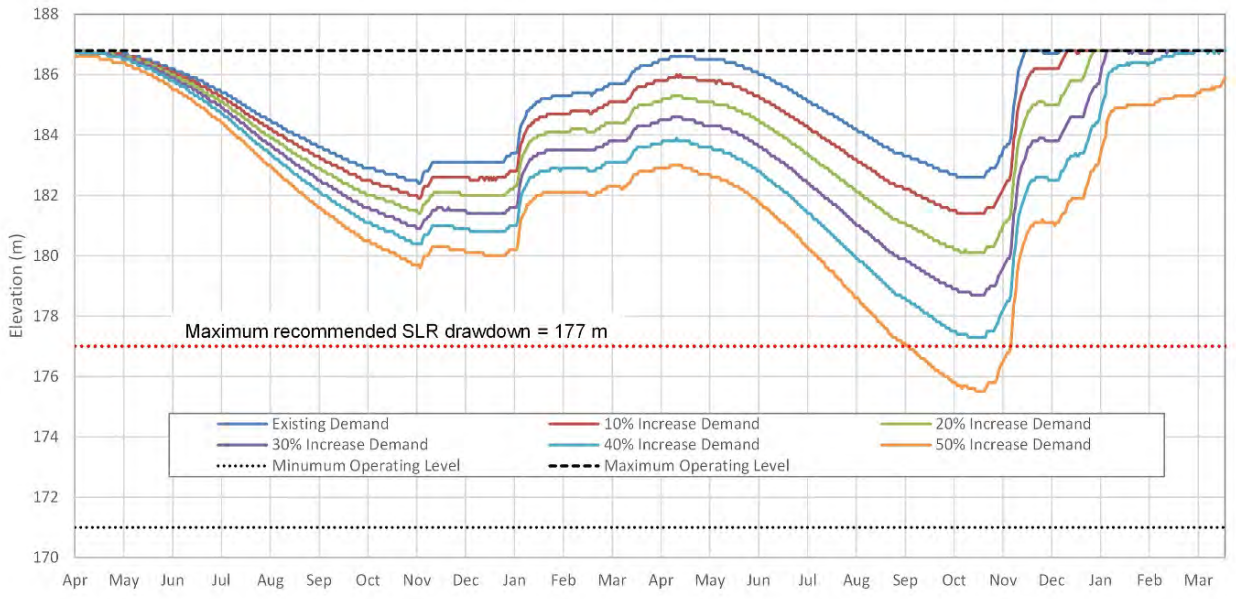


Figure E.4: Simulated Water Level in Sooke Lake Reservoir for a 1:50 Dry Precipitation Year

The SLR response assumes there is no multi-year drought condition experienced, which is consistent with historical records for this source. This figure indicates that an increase of 40% over current annual demand is the maximum that can be sustained without impacting the ability of the SLR to fill during a normal precipitation year following a 1:50 drought year.

Leech Watershed

The Leech watershed has been identified as a possible long-term additional supply for the RWS. The Leech watershed has a large catchment area of 9,600 hectares in comparison to Sooke watershed with 8,862 hectares. The Leech watershed has the capability of producing significant flows in the winter months. However, during the summer months the Leech River inflows are negligible. Development of storage on the Leech River or direct diversion will be required to augment flows to SLR. The amount of water that can be diverted to Sooke Lake will depend on the outcome of a further detailed hydrology and water balance model as well as discussions with the Province on the Environmental Flow Needs Policy requirements under the Water Sustainability Act. In lieu of construction of a dam, another possibility is a direct intake into Leech River and diverting flows to SLR via the Leech tunnel during periods of higher flow in the shoulder seasons depending on SLR water levels. Direct diversion would also improve SLR resiliency during drought conditions and assist in refilling of the SLR to protect against multi-year drought conditions impacting SLR water levels. This would require development of a reservoir water balance and operating model to determine the optimal operation of the combined SLR and Leech River diversions. This model would also assist in managing water levels in SLR for dam safety. The Deception Gulch Reservoir could be used to transfer flows to SLR, but upgrades to Deception Gulch Dam and spillway would be required as well as improvements to the Sooke Lake Reservoir Saddle Dam.

As population grows in the CRD water demands will also increase to a threshold limit and ultimately the finite capacity of the Sooke watershed will be reached and the Leech watershed will have to be brought into service. At a mid-range demand growth of 1.25% annually it is projected that the Leech water supply would have to be in service by the year 2045. This is the approximate year when demands will reach the 1:50 year safe drought yield of the Sooke watershed.

Planning for diversion of the Leech River should commence by 2032 as it can take some time to conduct the required planning, environmental studies, permitting, design, and construction of works necessary to develop this source. The Leech River source should be in service no later than 2042 several years ahead of time when the safe yield of the Sooke watershed is reached.

Goldstream Watershed

The Goldstream watershed and the series of upland lakes serve as a valuable secondary source with an available storage of 10 Mm^3. This storage is suitable for suppling RWS when the Kapoor Tunnel must be taken out of service for inspection and maintenance. Potential landslides in the Goldstream Canyon limit the use of this source during wet weather but if an intake to Goldstream Lake and a transmission main are constructed to Japan Gulch then this source could serve as a year-round supply and provide up to 20% of the current annual demand. Detailed hydrology was not completed for the Goldstream watershed as it primarily serves as a secondary supply for RWS.

Deep Northern Intake and Transmission

The possibility of installing an intake to extract water from the deeper basin of the SLR has been investigated and is discussed in detail in the *Deep Northern Intake, Transmission and Treatment Study* (Stantec 2021). Major findings of the study indicate that a deeper intake would be useful to provide a second redundant intake into the SLR which would improve system resilience and enable extraction of water below the existing intake tower low port elevation of 169 m. While the Deep Northern Intake provides improved water quality and resiliency during drought conditions, reservoir operation below levels of 177 m would make it more difficult to replenish the reservoir during average winter precipitation periods following a 1:50 year drought condition unless water from Leech is diverted to the SLR. In addition, drawing the SLR below 177 m could also lead to water quality issues from low water levels in some areas of the reservoir and siltation associated with shore erosion. The deeper intake does provide added benefits of better water quality, more stable temperature, and less likelihood of algae related water quality concerns. It would also serve as a redundant supply if the existing intake tower were to fail during a seismic event or if an extended multi-year drought condition is experienced.

A preliminary location has been identified for the deep northern intake approximately 2 km north of the boat launch. This intake location will be confirmed by further investigations including geotechnical, and further water quality sampling.

Connection of a proposed Deep Northern Intake could be made in a staged approach by connecting to the existing Head Tank downstream of Sooke Lake Dam. This would enable the CRD to draw from deeper sections of the SLR to better manage water quality as well as provide improved resiliency during emergency conditions or drought periods. Ultimately, the intake could be connected to a second transmission system (1994 Jack Lake alignment) connecting to Japan Gulch Reservoir to provide redundancy to the Kapoor Tunnel.

A variety of options have been investigated for connection of the proposed Deep Northern Intake to a secondary transmission system for Kapoor Tunnel. These include a second intake and gravity conveyance tunnel, pumped overland transmission mains along different alignments, a floating pump station and submerged marine pipeline, or a hybrid tunnel and pumped transmission system. The final selection of the preferred option can be made at the preliminary design phase, but all options are feasible. A lower level of service suitable to supply the year 2100 ADD would be suitable for sizing of this transmission main and reducing the overall pumping power required to deliver water via a transmission main corridor which was referenced in the 1994 Plan as the Jack Lake alignment. The intake, pump station, and transmission main for delivery of flows to the Head Tank would be sized for the year 2100 MDD so the pump station can serve as a complete redundant intake serving the Head Tank and Kapoor Tunnel. The second phase of the project would involve construction of additional booster pumping stations and the transmission main following the Jack Lake alignment.

A floating pump station is an option that could be considered for the Deep Northern Intake. A similar size facility was constructed for Seattle Public Utilities Chester Morse Lake pump station and large capacity facilities have been built overseas. The decision on which option to pursue, a fixed land-based pump station and micro tunneled intake or a floating pump station can be made at the preliminary design phase.

The Kapoor Tunnel has sufficient hydraulic capacity to convey demands to the year 2100. IWS has been effective in managing this critical asset through regular inspections and maintenance repairs.

One of the recommendations of this 2022 Master Plan is to complete a seismic assessment of the tunnel to assess its vulnerability to seismic events.

Water Quality and Treatment

The RWS currently operates as an unfiltered system with advanced disinfection. Water quality from SLR with UV, chlorine and chloramine disinfection meets current provincial *Drinking Water Treatment Objectives for Surface Water Supplies* and Health Canada's *Guidelines for Canadian Drinking Water Quality.* The current practice of advanced disinfection using Ultraviolet light, chlorine, and ammonia provides an acceptable level of protection for RWS water customers. However, the disinfection systems can become compromised if turbidity, colour, and organic levels increase due to wildfires in the watershed or other environmental factors including climate change.

Many previously unfiltered sources serving large populations across North America are now considering or have installed filtration. These include the Portland Bull Run source and the New York Croton source. The Comox Valley Regional District also recently commissioned a new water filtration facility in July 2021. The long-term plan for Metro Vancouver's unfiltered Coquitlam source is to install filtration. With the trend to more stringent water quality requirements, it is likely just a matter of time before provincial or federal health authorities will be requiring filtration on all surface waters serving major population centres. Filtration has other benefits including improving overall water quality consistency, improvements in transmission system water quality and providing operational resiliency during periods of changing raw water quality. Filtration will also be required once Leech River water is brought online. A recommendation of this 2022 Master Plan is to plan for construction of filtration by the year 2037.

Several feasible multi-barrier filtration and disinfection process options have been identified and evaluated including direct filtration, DAF plus filtration and membranes. Based on the existing SLR raw water quality and life cycle cost evaluation direct filtration is a viable option for filtration of Sooke Lake Reservoir water. Further evaluation including filtration pilot studies is required to confirm the process selection. If Leech River water is used in the future it may require the addition of a sedimentation, flotation, or other clarification process to treat elevated turbidity, organics, and colour. A recommendation is that a filtration piloting program be completed for Sooke Lake and blended Leech River and Sooke Lake Reservoir water.

Three sites were evaluated for future filtration facilities. A potential water filtration site has been identified adjacent to the Japan Gulch Reservoir. This site offers advantages as it is central to CRD operations, readily accessible, and the plant can easily be connected to Kapoor Tunnel and the RWS transmission system. Further refinement of the final filtration plant location will depend on a variety of factors including geotechnical investigations and preliminary design details. The final site can be determined once further investigations are completed. Under the current configuration of the water transmission system, the Japan Gulch location would be unable to provide filtered water for the District of Sooke. Providing filtered water for the District of Sooke would require the construction of a new east – west transmission main, or a second filtration plant could be constructed at the Sooke River Road Disinfection Facility.

Planning for filtration and pilot investigations should commence in the next several years with a goal to having new filtration plant online by 2037. This timeline will provide sufficient time for the CRD to complete the necessary studies, investigations, and preliminary designs for the proposed facilities.

Water Storage Tanks

Water storage is required in a regional transmission system to balance peak hour demands and to provide for discretionary emergency storage. Currently there are only three in-service storage tanks (Head Tank, McTavish and Mount Tolmie) in the RWS system and most of the system operates as an on-demand system providing flows for peak hour balancing and fire protection via the RWS transmission system from Sooke Lake Reservoir. This operational approach places significant hydraulic capacity demands on the CRD transmission system and consumes residual hydraulic capacity for future growth. Balancing storage for the transmission system combined with distribution system balancing and fire storage is the recommended approach to reduce hydraulic demands on the RWS transmission system and defer future capacity improvements in the transmission system. The Mount Tolmie storage tank does not have sufficient capacity to meet the peak hour balancing demands of the service areas. It is recommended that an additional peak hour balancing tank and pump station be constructed at Smith Hill to serve major demand areas including the City of Victoria, District of Oak Bay, and District of Saanich. This tank will conserve the RWS transmission system capacity and enable the system to operate at the same or higher HGL with pumping and defer future capital investments in transmission mains as well as water filtration plant capacity expansion. A second clearwell equalization storage tank is also recommended immediately downstream of a proposed future water filtration plant at Japan Gulch. This clearwell will balance flows through the filtration plant so the plant is only sized to provide maximum day demand rather than peak hour demand. Elevated balancing storage or service pumping at the proposed Japan Gulch Filtration Plant site could be constructed at an HGL of 169 m (same as Head Tank) so filtered water could be pumped to this TWL so the transmission system hydraulic operation would be the same as current operations.

The provision of transmission system balancing storage has mutual benefits for treatment. The filtration plant can be “downsized” to supply the maximum day demand rather than the peak hour demand. The future water filtration facilities would have to be built with an additional 35% capacity without the installation of balancing storage on the transmission system.

Options Screening and Alternatives Evaluation

The development of Alternatives for this 2022 Master Plan used a similar methodology to the 1994 Plan, but the methodology employed was more complex. The principal considerations for this 2022 Master Plan are:

1. Security of supply (i.e., redundancy)
2. Conveyance of water between SLR and Japan Gulch
3. Siting of the Filtration Treatment Plant

Eighteen (18) options were identified for infrastructure improvements (see **Table E.2)** that support the principal considerations shown above. These options were evaluated with advantages and disadvantages summarized for each option and a numerical scoring was applied to each option to result in an initial screening of the preferred alternatives for further evaluation including cost considerations.

Table E.2: Master Plan Options Evaluation

Category	Component	Option	Description
Supply	Sooke Lake Reservoir (Intake)	S1	Deep Northern Intake
		S2	Lake Bottom Marine Intake
		S3	Floating Pump Station Intake
	Leech River (Intake)	S4	Leech River Diversion Intake to Leech Tunnel
		S5	Leech River Dam
Raw Water Transmission	Leech River to Sooke Lake Reservoir	RWT1	Leech Tunnel to Deception Gulch Reservoir
		RWT2	Leech Tunnel to Sooke Lake Reservoir deep basin
	Sooke Lake Reservoir to Japan Gulch	RWT3	Sooke Lake Reservoir to Japan Gulch tunnel
		RWT4	Hybrid pumping/tunnel alternative
		RWT5	Overland route through Leechtown and Jack Lake – 3 PS (DNI PS + 2 PS)
		RWT6	Overland Council Lake Alignment – 3 PS (DNI PS + 2 PS)
		RWT7	Overland Malahat Alignment - 3 PS (DNI PS + 2 PS)
Filtration	Filtration Plant Sites	T1	Sooke Lake Reservoir site
		T2	Japan Gulch site
		T3	Japan Gulch site + Sooke River Road site
	Filtration Technology	T4	Direct Filtration with granular media filtration
		T5	Dissolved Air Flotation (DAF) with granular media filtration
		T6	Membrane Filtration

The 18 options were evaluated and scored for alignment with the 2017 Strategic Plan Commitments and Areas of Focus. Each option was evaluated and then scored based on meeting the three primary objectives outlined in the 2017 Strategic Plan, including:

1. Level of Service Maintenance/Improvement
2. Resolving a RWS infrastructure improvement needs gap
3. Redundancy and security of supply

The results of the options scoring evaluations are shown in **Table E.3.**

Table E.3: Options Scoring Evaluation

Option	Description	Raw Score	Weighted
S1	Deep Northern Intake	37	80
S2	Lake Bottom Marine Intake	33	73
S3	Floating Pump Station Intake	33	69
S4	Leech River Diversion Intake to Leech Tunnel	27	57
S5	Leech River Dam / Storage	32	67
RWT1	Leech Tunnel to Deception Gulch Reservoir	29	60
RWT2	Leech Tunnel to Sooke Lake Reservoir deep basin	31	66
RWT3	Sooke Lake Reservoir to Japan Gulch tunnel	36	75
RWT4	Hybrid pumping/tunnel	31	64
RWT5	Overland route through Leechtown and Jack Lake – 3 PS	30	62
RWT6	Overland Council Lake Alignment – 3 &1 PS	30	62
RWT7	Overland Malahat Alignment - 3 &1 PS	28	56
T1	Sooke Lake Reservoir site	31	68
T2	Japan Gulch site	36	78
T3	Japan Gulch site + Sooke River Road site	30	66
T4	Direct Filtration	32	68
T5	Dissolved Air Flotation (DAF) with granular media filtration	32	68
T6	Membrane Filtration	33	70

This assessment resulted in a recommended priority capital improvement program which is outlined in **Table E.4.** The major capital works included in recommendation include a proposed Deep Northern Intake and pump station on the SLR, a transmission main sized for ADD to supply water from SLR to Japan Gulch in the event of an outage of Kapoor Tunnel and a direct filtration water filtration plant at Japan Gulch. Transmission mains to improve the hydraulic level of service as recommended in the 2018 GeoAdvice report and a new balancing storage tank and pump station at Smith Hill are also included in the recommended capital works plan. **Figure E.5** illustrates the recommended plan of improvements.

Table E.4: Capital Works Recommendations

	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**

*Jack Lake alignment with Pump Stations and transmission main sized for 2100 ADD Level of Service flow ~375 MLD

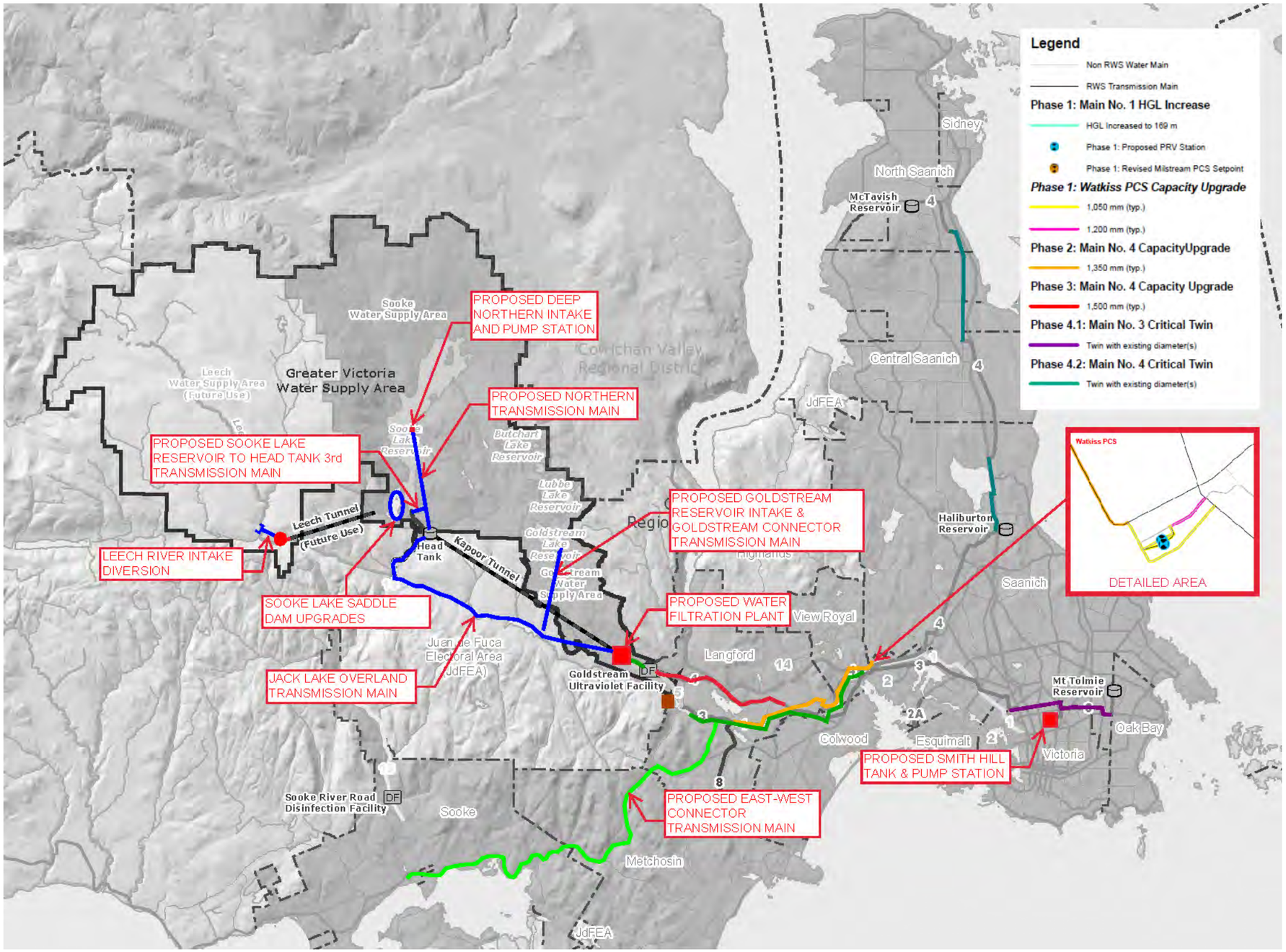


Figure E.5: Recommended RWS Capital Improvement Program

1.0 INTRODUCTION

1.1 Background

In October 2020 the CRD Integrated Water Services invited consultants to respond to a RFP to complete a Master Plan Update for the Regional Water Supply Service. The previous Long Term Water Supply Plan (1994 Plan) was completed in 1994 *(Montgomery Watson and Dayton & Knight Ltd*). Based on the 1994 Plan, "Alternative A" was adopted by the Greater Victoria Water Commission. Since that time a number of the recommended Alternative A projects have been completed which have improved the resilience and reliability of the water supply system as well as provided a higher degree of treatment by the incorporation of UV disinfection to protect against *Giardia* and *Cryptosporidum* pathogen.

The RWS was established under the RWS Establishment Bylaw No. 3322. The RWS supplies bulk drinking water for residential, commercial, institutional, and agricultural uses to approximately 400,000 people throughout the Greater Victoria area by the Regional Water Supply Service. The RWS operates the watersheds, dams, reservoirs, treatment (disinfection) and transmission systems which supply municipal water systems at transfer points to each municipality. The RWS raw water supply is one of the few remaining unfiltered sources in British Columbia serving a large population. The RWS also manages sub-regional water services, including the Saanich Peninsula Water Service and the Juan de Fuca Water Distribution Services, 8 First Nation communities, and Bulk Water Municipal Customers. The customers supplied by each system forming part of the RWS are shown in **Figure 1.1** below.

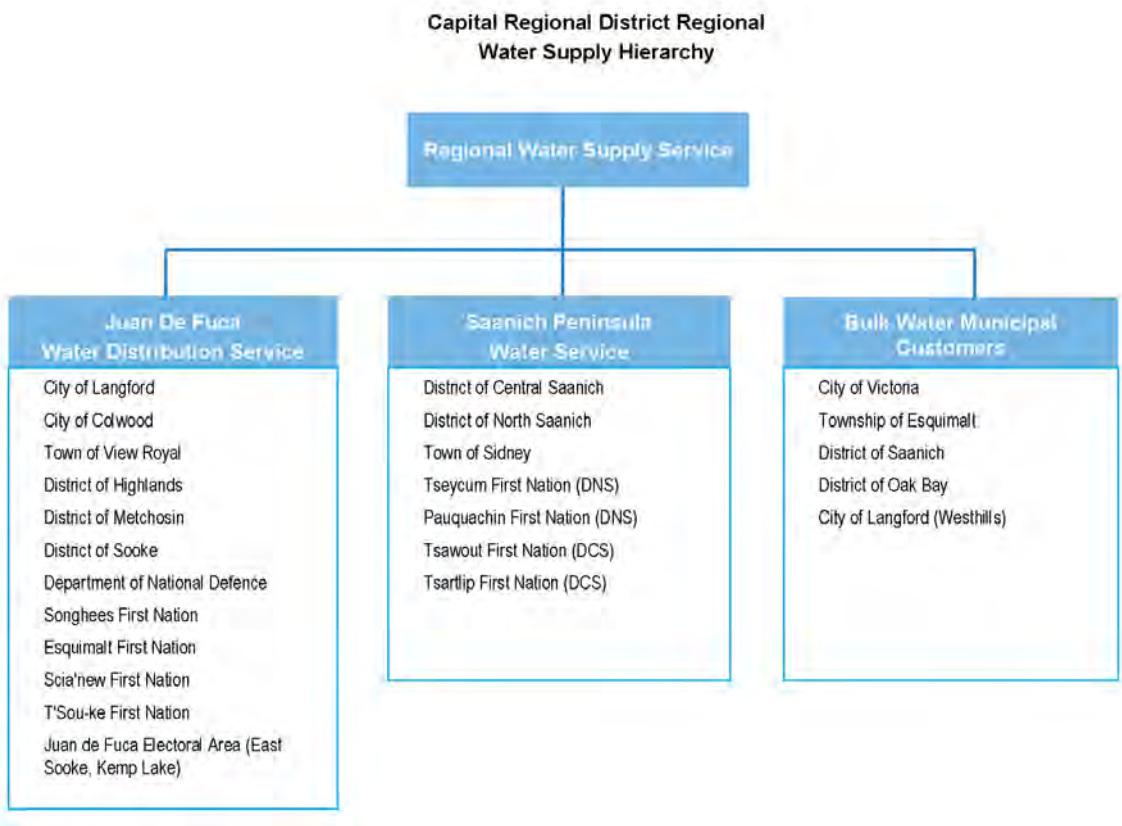


Figure 1.1: Regional Water Supply Hierarchy

An overall layout of the Regional Water Service Area is provided in **Figure 1.2**.

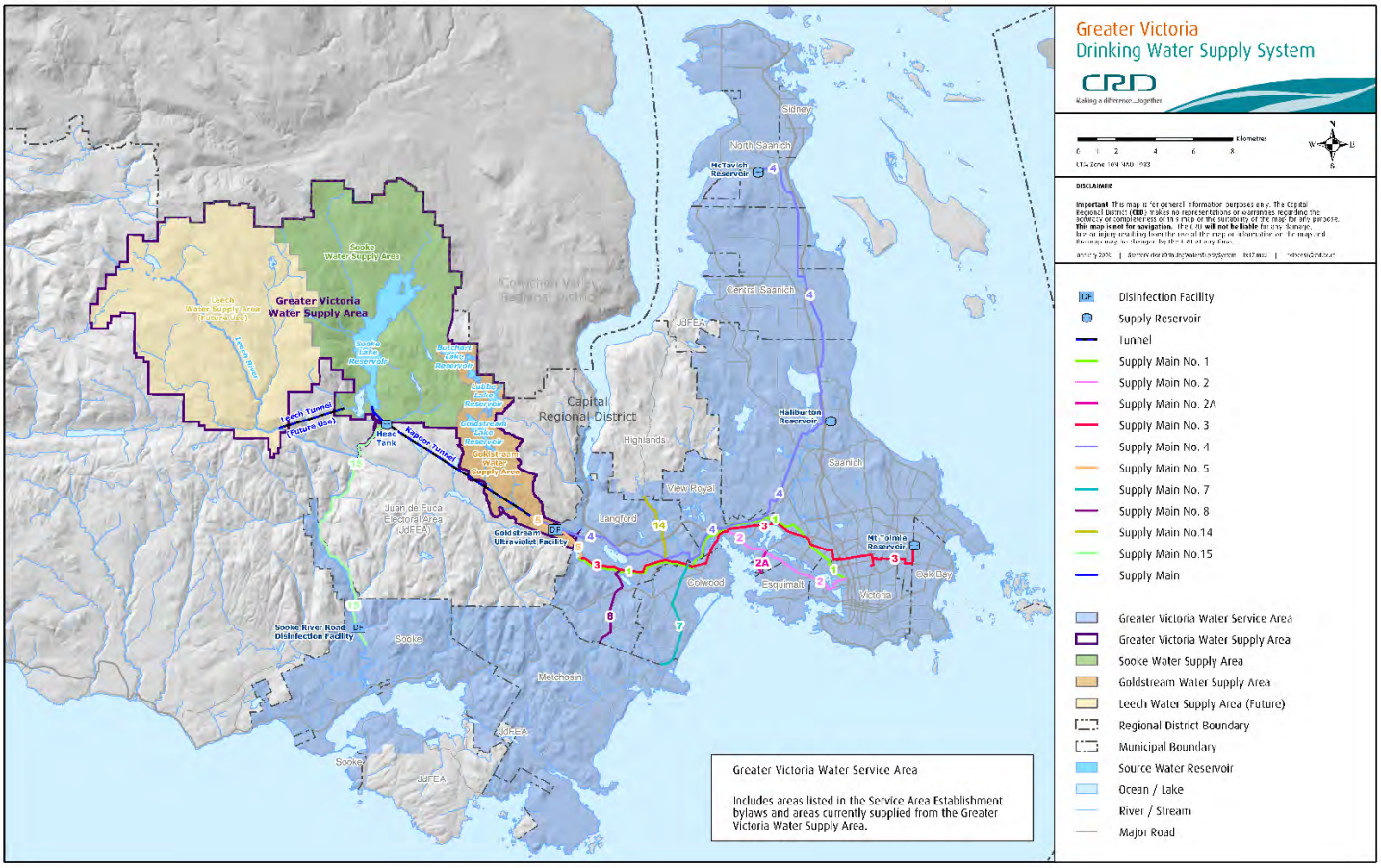


Figure 1.2: Overall Layout of Water Service Area

The major components of the RWS service include:

- Three watersheds including Sooke (primary), Goldstream (secondary) and Leech (planned for future use)
- 15 dams with 3 in Sooke watershed, 11 in Goldstream watershed, 1 off catchment, and 1 out of service.
- The 8.8 km Kapoor Tunnel to convey water from Sooke Lake Reservoir and the Leech watershed (future) to the transmission system
- 3.5 km Leech Tunnel (not in service, future use for diversion of Leech Watershed water)
- Two disinfection facilities using UV, chlorine and ammonia located at Goldstream Treatment Facility and Sooke River Road Disinfection Facility
- Approximately 120 km of transmission mains with varying materials and diameters ranging from 300 mm to 1530 mm
- Four storage tanks; a head tank downstream of Sooke Lake Dam to maintain system head; McTavish and Mount Tolmie balancing tanks; and Haliburton tank which is not in service
- Five major pressure control stations and numerous water meters

The RWS has historically provided cost effective service to customers which meets all Provincial and Federal drinking water quality objectives.

1.2 Assumptions and Limitations

This 2022 Master Plan has a defined scope of work and therefore some assumptions and limitations have been established. More significant assumptions and limitations are summarized as follows:

1.2.1 Master Planning

Best management practices for a water utility include the preparation and implementation of many types of plans including Strategic Plan, Master Plan, Capital Plan, Business Plan, Business Continuity Plan, Asset Management Plan and Emergency Management Plan. Each type of plan has a specific scope or focus and ultimately the plans should be integrated to result in a comprehensive management plan.

This assignment is specifically a Master Plan, which has been defined by AWWA as follows:

> *"…a utility a master plan usually documents medium-term and long-term plans for major projects, provides a comprehensive description of significant capital improvements, the concepts that justify their inclusion, and their relation to urban design, infrastructure, service delivery, and regulatory requirements. It consists of images, texts, diagrams, statistics, reports, maps, and aerial photos that describe how specific projects will be developed. Ideally, it provides a structured approach and creates a clear framework for planning and decision making."* (Water Utility Management, Manual of Water Supply Practices M5, 3rd Ed., AWWA)

The preparation of a Master Plan utilizes a process whereby the level of service expectations is identified (i.e., legislated obligations) and the existing system is weighed against a variety of expectations resulting in deficiencies for which mitigation is identified. These deficiencies tend to be related to engineered assets (e.g., enhanced water treatment process) that are required to supplement the existing assets. Although there is some relationship between an asset management plan and a master plan, an asset management plan is generally focused on the management of existing assets (e.g., asset capacity, condition, renewal/replacement, etc.) and improvements related to existing assets that are in-service.

1.2.2 Water Sources

The 1994 Plan identified many options for water supply within lands owned at the time by the CRD and other sources beyond the limits of ownership. Although those sources of water may be considered in the future, this 2022 Master Plan was limited toward optimizing the existing sources of water from the three existing watersheds (Sooke, Goldstream, and Leech) before sourcing water beyond these limits. Further, other long-term opportunities for water supply include the following, but detailed assessments of these sources were not included in this 2022 Master Plan:

- Desalination
- Groundwater
- "Off-catchment" land/watersheds

1.2.3 Financial

This Master Plan established a list of system deficiencies and high-level cost estimates for many options that have been identified. Identification of funding sources and potential senior level government grant opportunities are beyond the scope of this assignment. Opinions of Probable Cost should be updated as additional investigations and detailed engineering are completed.

1.2.4 Ongoing Master Planning

Best management practices for a water utility include routine and ongoing reassessment of earlier plans. In preparation of this 2022 Master Plan, many assumptions have been made and it is recommended that the Master Plan be updated on a regular schedule. Examples of issues that may influence or change the outcomes of this 2022 Master Plan include serviced population and the rate of growth, demand for water, changes in water use, land use policies, and drinking water standards and the results of more detailed modelling and analyses. A recommendation of this 2022 Master Plan is to conduct a review of the plan on a not more than 10-year schedule to monitor the progress of recommended improvements.

1.2.5 Regional Water Supply Service Area

This 2022 Master Plan was developed based on the existing service area of the Regional Water Supply Commission as established by Bylaw No. 2539/3371, a Bylaw for the Establishment and Operation of a Regional Water Supply Commission. Should the service area be increased in the future, then the Master Plan should be revised for implications such as increase in service population, water demand, conveyance, etc.

1.2.6 Legislation and Regulation, and Sector Guidelines and Standards.

The 2022 Master Plan was developed based on the existing legislation and regulation specifically related to drinking water (e.g., BC Drinking Water Protection Act, BC Drinking Water Regulation). Although there are many legislative obligations for water suppliers (e.g., worker safety, etc.) they will be identified and addressed in subsequent plans (e.g., preliminary, and detailed design phases). Many technical resources exist for drinking water guidance and standards. These resources are prepared by a variety of provincial, national, and international organizations such as Health Canada and the USEPA; while they are not necessarily required to be applied, they do provide good guidance on standard practice.

1.2.7 Existing Water System and Land Ownership/Rights

This 2022 Master Plan was developed based on the existing water system assets being located on lands owned by the CRD or lands for which the CRD has rights to occupy. Any land ownership or rights issues including negotiations and compensation have not been included in this 2022 Master Plan. If there is need to purchase land for construction of any recommended works, these costs are not included in the estimates.

1.2.8 Detailed Dam Assessments

The 2022 Master Plan did not include conducting detailed water supply dam assessments. The CRD diligently manages the dam assets related to the RWS system. The CRD has undertaken a variety of studies including dam safety reviews, capital improvements, preliminary failure mode analysis, etc., and the conclusions and recommendations have been added to the Master Plan by CRD to ensure that it is comprehensive.

1.2.9 Capital Cost Estimates

This 2022 Master Plan provides planning level evaluations and cost estimates for various options assessed during the study consistent with industry standards for similar work. This report is to be used by the CRD to provide an overall plan for improving the reliability and resiliency of the water supply system. Specific conclusions and recommendations are provided in later sections of the report along with recommendations for further investigations and preliminary engineering to refine concepts and costs.

1.3 Regional Water Supply 2017 Strategic Plan

The CRD completed a Strategic Plan for the Regional Water Supply in 2017. The Strategic Plan identified three primary commitments as follows:

1. To provide high quality, safe drinking water
2. To provide an adequate, long-term supply of drinking water
3. To provide a reliable and efficient drinking water transmission system

The Strategic Plan has identified Strategic Areas of Focus including :

- CRD Board Priorities – Sustainable and Livable Region
- Climate Change Impacts – Mitigation and Adaptation
- Preparation for Emergencies and Post-Disaster Water Supply
- Supply System Infrastructure Investment – Renewing Existing and Preparing for New Infrastructure
- Planning for the Future Use of the Leech Water Supply Area
- Demand Management – Addressing Changing Trends in Water Demand

The Strategic Plan identified the planning horizon to the year 2050.

1.4 Master Plan Objectives and Planning Horizon

The 2017 Strategic Plan identified commitments and Areas of Focus and an update to the previous planning studies and the 1994 Plan. The CRD has made significant improvements to the system since completion of the 1994 Plan and this 2022 Master Plan will update the findings of the previous plan and include other priorities that have developed in the Regional Water Supply since 1994.

The 2022 Master Plan includes the following major topics of study:

- Water Sources and Supply
- Water Quantity
- Water Quality and Treatment
- Water Transmission and Storage

Relevant and related topics include the potential effect of climate change on the RWS system and potential mitigations. The CRD has also undertaken a number of relevant studies related to dam safety reviews and this information is not considered as part of the 2022 Master Plan. However, the CRD has provided relevant background information on the dams for inclusion in this report for context and completeness. This 2022 Master Plan also provides relevant or future topics of study for the purposes of outlining the requirements for future work to refine the recommendations in this study.

The planning horizon for the 2022 Master Plan is to the year 2050. This horizon is considered a reasonable horizon for planning of water supply facilities. Some of the facility components, such as the proposed deep northern intake into Sooke Lake Reservoir and transmission main upgrades, would be better served by a longer planning horizon because the incremental costs to install a larger intake pipe are not significant and the design service life for intake pipes and transmission mains is typically 75 to 80 years. For the intake, a planning horizon to the year 2100 has been selected. It is good practice to look beyond the planning horizon of 2050 when assessing the long-term adequacy of water sources so the CRD can plan for additional sources and related infrastructure. A similar long term horizon was also considered when the Kapoor Tunnel was planned.

1.5 Concurrent Studies Informing the 2022 Master Plan

Three concurrent studies were completed to inform the 2022 Master Plan. The studies and their content are summarized as follows and have been released as stand-alone documents for use by the CRD.

Study 1 – Deep Northern Intake, Transmission and Treatment Study (IWS Report No. 1187)

This study investigated the option of installing a second intake to access deeper water in the north end of the Sooke Lake Reservoir. The study also investigates transmission facilities necessary to connect the second intake and water treatment requirements for Sooke Lake Reservoir and Goldstream watershed. A second intake is considered as an option to increase supply resiliency and access better water quality in the deeper northern basin of the Sooke Lake Reservoir. It also provides a second seismic resilient intake should there be an issue with the existing intake tower or failure of the Sooke Lake Dam.

Study 2 – Supply System Risk and Resiliency Study (IWS Report No. 1188)

Using the AWWA J100 methodology, the RWS has been assessed to determine potential risks, vulnerabilities and threats to the system associated with natural disasters, failure of equipment, and other considerations. This report helps inform the Master Plan in terms of identifying additional measures necessary to improve the reliability and resiliency for the water system, consistent with the 2017 Strategic Plan.

Study 3 – Seismic Assessment of Critical Facilities Study (Phase 1) (IWS Report No. 1189)

A phase 1 seismic assessment was completed for critical RWS facilities. This study was a high-level screening assessment to evaluate the vulnerability of primary RWS facilities consistent with a screening level assessment. It is noted that this study was a Phase 1 assessment which identified facilities that will require further Phase 2 detailed seismic evaluations.

1.6 Reference Information Provided by CRD IWS

CRD IWS provided the study team with significant background data including reports, water demand information and drawings. This information was uploaded to a dedicated project Sharepoint site for use by the study team. The list of information was voluminous; therefore, only a partial listing of previous significant work referenced is provided below.

- IWS Regional Water Supply – 2017 Strategic Plan, CRD
- 2012 Strategic Plan for Greater Victoria Water Supply System, April 2012, CRD
- 2004 Review of Strategic Plan for Water Management, CRD
- Greater Victoria Water District – Long Term Water Supply Plan, Montgomery Watson and Dayton and Knight Ltd., January 1994
- RWS Transmission Mains Hydraulic Capacity Analyses – Final Report, GeoAdvice Engineering Ltd., December 2020
- Various CRD Staff Reports including:
    - 2001-108: Use of Leech River to Supplement Sooke Lake Reservoir
    - 2001-40: History of Leech Tunnel
    - 2002-12: Deception Gulch Reservoir Change of Designated Use
    - 2003-72: Seismicity Hazard , Leech River Fault
    - 20-09:2021: Operating and Capital Budget
    - 2017-21: Post Disaster Emergency Water Supply and Distribution
    - 2019-05: Fisheries Water Release Program
    - 21-155: Demand Management Program Update
    - 2016-18: Limitation and Implications of Additional Raising of Sooke Lake Dam
- Historical Water Consumption Data, CRD
- Historical Sooke Lake Reservoir Water Levels, Precipitation Data, CRD
- CRD Water Quality Division Data
- CRD Watershed Mapping
- Archive drawings of existing major CRD water supply facilities

1.7 Work Arising Out of Recommendations from 1994 Long Term Water Supply Plan (1994 Plan)

1.7.1 Major Recommendations (Alternative A)

The 1994 Long Term Water Supply Plan investigated a number of "Alternatives" for improving the Regional Water Supply. "Alternative A" (see **Figure 1.3**) was selected as the recommended option for implementation.

"Alternative A" included the following capital works recommendations as listed in **Table 1.1**. Table 1.1 also provides a summary of the capital work completed since 1994 arising out of the recommendations from the 1994 Plan. Several of the key recommended projects were modified pending further engineering study and these include :

- The Goldstream UV Disinfection Facility was constructed instead of ozonation at Sooke Lake Reservoir. Advances in UV disinfection made it more practical and cost effective to install UV instead of ozonation.
- Main No. 15 and the Sooke River Road Disinfection Facility were constructed before the City of Langford to District of Sooke watermain..
- The transmission main from Leech Tunnel outlet to Sooke Lake Reservoir was not constructed as further detailed water sampling of Leech River was required and SLR is able to supply water for at least another 25 years. Diversion of Leech River water to SLR is discussed further in this 2022 Master Plan.
- Table 1.1 provides further information on the 1994 Plan projects status under the comments column including recommendations on whether specific projects should be completed in future years.

The CRD has completed most of the recommended projects outlined in the 1994 Plan. Major works include raising of Sooke Lake Dam, installation of enhanced disinfection (UV), and improving the capacity and the reliability of the regional transmission system. Other major works, including connection of the Leech Watershed, a second transmission system from Sooke Lake Reservoir to Japan Gulch, and filtration are yet to be completed and are investigated further in this 2022 Master Plan.

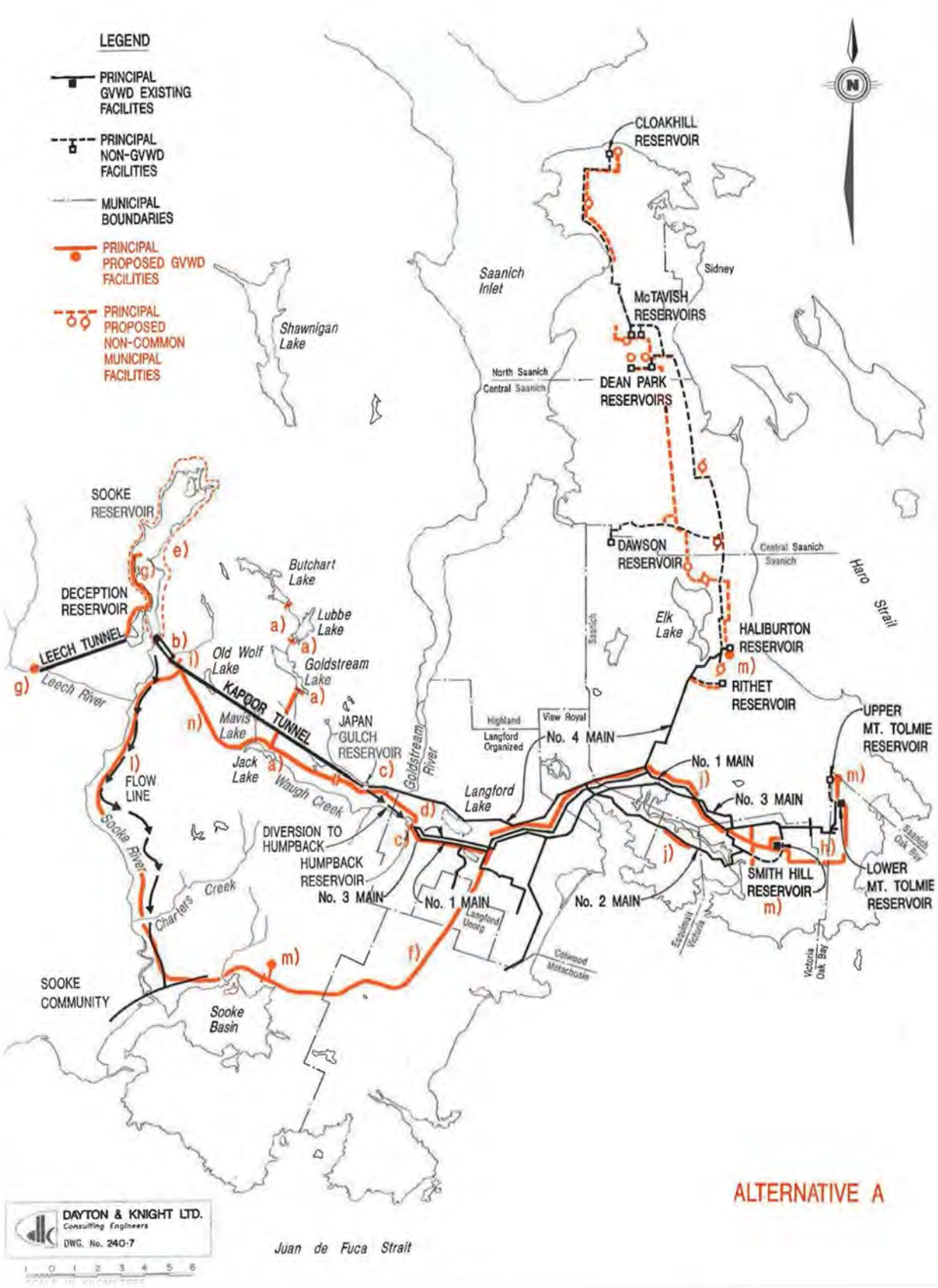


Figure 1.3: Diagram of 'Alternative A' – 1994 Long Term Water Supply Plan (Montgomery Watson / Dayton & Knight Ltd.)

Table 1.1: 1994 Long Term Water Supply Plan (Montgomery Watson / Dayton & Knight Ltd.) "Alternative A" Capital Works Recommendations

Item	Recommendation	Capital Project Name	Year Constructed	Status	Comments	2022 Master Plan Commentary
a1)	Rehabilitate three Upper Goldstream Reservoirs (Butchart, Lubbe and Goldstream Reservoirs)	Goldstream Dams Rehabilitation	1995	Completed	Capital project included Butchart Dam #1, 2 & 5, Lubbe Dams #1-4, Goldstream Dam and Japan Gulch Dam (not included in report recommendation)	Work was completed to improve reliability of this critical secondary source.
a2)	Connect Goldstream Reservoirs with a 600-750 mm transmission main to Kapoor Tunnel outlet for use during emergencies and tunnel maintenance	NA	Not completed	No action	No action since 1994. This pipeline is still an option and should be evaluated further to provide a secondary supply to RWS when Kapoor Tunnel is taken offline for inspection.	This is included as a recommendation of the 2022 Master Plan with connection to Japan Gulch.
a3)	Pilot test water filtration for Leech River/Sooke Lake Reservoir water integration	Leech River-Sooke Lake Reservoir Mixing Experiment	2008	Started (not completed)	Preliminary PowerPoint was completed by UVic but not in sufficient detail for planning of water treatment facilities. Further piloting is recommended as part of this Master Plan.	Recommendation of 2022 Master Plan. Blending will be assessed during the pilot program.
b)	Ozonation	UV Disinfection System Installed instead of ozonation	2004	Completed	Ultraviolet facility (alternative to ozonation) was constructed at Goldstream Disinfection Facility location, downstream of tunnel outlet adjacent to Japan Gulch Reservoir.	UV is a more cost-effective treatment for unfiltered source water than ozone. Once the final filtration process is selected the requirement for UV will be assessed.
c1)	Replacement of Humpback Reservoir with a smaller flood control facility	Deactivation of Humpback Dam	1999	Completed	Works included Humpback Dam stabilization berm and Humpback Reservoir overflow structure and channel along Kapoor Main (Humpback Dam and reservoir out of service)	NA
c2)	Decommission/remove Japan Gulch Dam	NA	Not completed	No action	Japan Gulch Dam rehabilitated in 1995 (refer to Item a1 above). Used to accept Goldstream River water during inspections and maintenance of Kapoor Tunnel.	Japan Gulch is critical reservoir for transfer of Goldstream water to RWS until Goldstream transmission main is constructed.

Item	Recommendation	Capital Project Name	Year Constructed	Status	Comments	2022 Master Plan Commentary
d)	Connect Kapoor Tunnel to No. 1 and No. 3 Mains	Kapoor/Humpback Watermain	1996	Completed	Main No. 5 installed from Kapoor Tunnel outlet to Humpback Reservoir (included Humpback PCS)	NA
e)	Raise Sooke Lake Reservoir	Raising Sooke Lake Reservoir	2002	Completed	Dam raised to provide additional storage.	Raising of SLR has provided source reliability consistent with 2017 Strategic Plan.
f)	Langford to Sooke Community water main	New Supply Pipeline to Sooke (3 Phases)	2007-2009	Completed	Alternative alignment (Main No. 15) installed from Sooke Head Tank to the District of Sooke (includes SRRDF).	Recommendation to install this main included in 2022 Master Plan (subsequent to Filtration Plant construction)
g1)	Leech River diversion Stage 1 to north end of Sooke Lake Reservoir	NA	Not completed	No action	No action since 1994. Further investigation required to determine best method for diversion of Leech River water to Sooke Lake Reservoir.	Diversion will be reviewed further as part of hydrology study and reservoir operating rules for combined Leech /SLR supply. It may be possible to transfer Leech water through DGR to SLR.
g2)	Leech River diversion Stage 2 - Pressurize Leech Tunnel to increase hydraulic capacity	NA	Not completed	No action	No action since 1994. This will require further investigation pending investigation of direct diversion of Leech River or construction of dam on Leech River.	This will be explored in hydrology study see g1) commentary above. Leech River not required for 20 years.
h)	Plan phase 3 work in Victoria to increase supply to south Victoria, Oak Bay, and southeast Saanich	NA	Modeling completed	No action	No action since 1994.	Hydraulic modeling has been completed and upgrades to Main No. 3 are recommendation of 2022 Master Plan. See Section 6.1.3.
i)	Water filtration plant at Kapoor Tunnel inlet	NA	Not completed	No action	Refer to CRD IWS Report No. 279 -Compliance with Surface Water Treatment Rule for Filtration Avoidance. Installation of UV enables compliance with SWTR Filtration Avoidance for most criteria as well as IHA requirements.	Future water filtration recommended to improve resiliency and a potential site recommended as part of this 2022 Master Plan.

Item	Recommendation	Capital Project Name	Year Constructed	Status	Comments	2022 Master Plan Commentary
j)	Progressively replace No. 1 Main with larger diameter steel system	Main No. 1 Replacement program	1994-2006	Completed	Entire Main No. 1 replaced in 12 phases	
k)	Deep Intake at northern basin of Sooke Lake Reservoir	NA	Not completed	No action	No action since 1994. Stantec report in 2021 studied this further.	Study completed to assess options.
l)	Second major transmission system from Sooke Lake Reservoir	NA	Not completed	No action	Alignment assumed to follow Sooke River to District of Sooke and loop back to the City of Langford. Partially completed (Main No. 15 installed)	An east west Juan De Fuca Water Services supply main is proposed to supply filtered water to Sooke after new plant is constructed. Overland “Jack Lake” alignment recommended in this Plan
m1)	Increase system storage volume - Sooke Community Tank	Sooke Community Water System Improvements	1998	Completed	JDFWD service improvements completed.	NA
m2)	Increase system storage volume - New Upper Mount Tolmie Tank	NA	Not completed	No action	No action since 1994. Not required.	Not required
m3)	Increase system storage volume - Haliburton Tank Expansion	NA	Not completed	No action	Haliburton Tank out of service since 2017	Not required.
m4)	Increase system storage volume - Smith Hill "Reservoir"	NA	Not completed	No action	No action since 1994.	Tank recommended at Smith Hill as part of this Master Plan.
n)	Diversion of Upper Goldstream Reservoirs to Sooke Lake Reservoir	NA	Not completed	No action	No action since 1994. Not necessary if pipeline from Goldstream to Japan Gulch is constructed. Diversion to Japan Gulch rather than Sooke Lake.	Goldstream Reservoirs will be diverted to recommended filtration plant site at Japan Gulch; transmission main included in 2022 Master Plan.

2.0 EXISTING WATER SYSTEM

2.1 Description of Existing Regional Water Supply System

2.1.1 Water Sources

Figure 2.1 illustrates the three contiguous watersheds that collectively form the CRD's Greater Victoria Water Supply Area (GVWSA). The GVWSA has an area of 20,611 hectares of protected, forested land largely owned and managed by the CRD. This area is the supply for the current and potential future water needs of the CRD's Regional Water Supply. The Sooke watershed is the primary water source, with the Goldstream watershed serving as a secondary or emergency backup source when the Kapoor Tunnel is out of service for inspection and maintenance. The Leech River Watershed is intended to provide additional water to meet future needs. A storage dam on the Leech River has not been constructed but the Leech tunnel has been constructed to enable future use of this source. Additional infrastructure will be required to enable effective capture of this water for use in the RWS system. Collectively, the GVWSA extends over an area of 20,611 hectares of protected, forested land largely owned and managed by the CRD.

There are also several off catchment sources including Jack Lake, Mavis Lake, Cabin Pond and Charters River which have been used for water supply in the past but are no longer used.

The watersheds are shown in Figure 2.1. **Table 2.1** provides the net watershed areas and other information for each of the contributing watersheds.

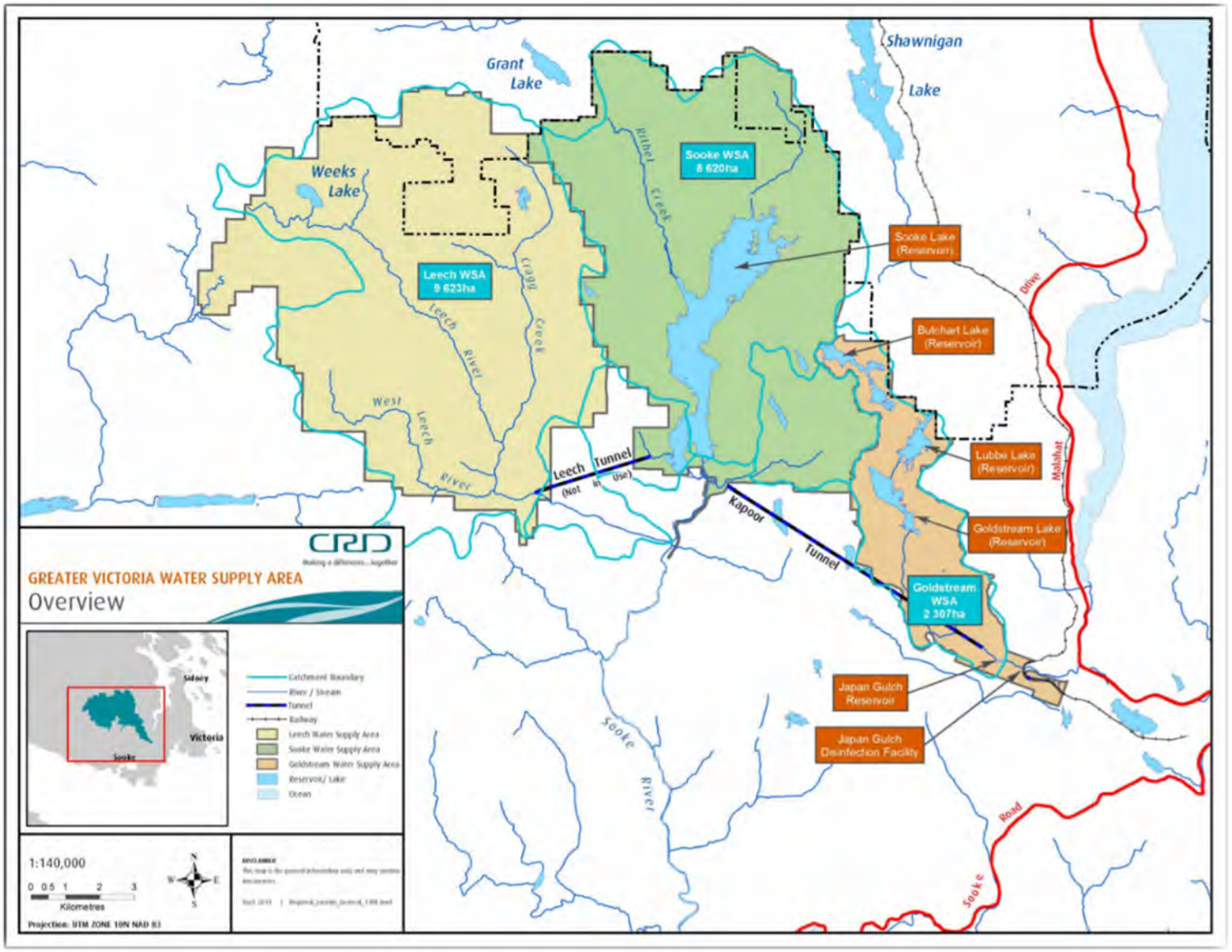


Figure 2.1: Greater Victoria Water Supply Area

Table 2.1: Watershed Information

Watershed	Catchment Area (ha)	Reservoir	Available Storage Volume (Mm3)	Comment	
				Quality	Quantity
Sooke	8,682	Sooke Lake	92.7	High quality, especially in hypolimnion. Extensively monitored.	Accessible volume limited by existing intake elevation and finite watershed basin yield.
Goldstream	2,300	Butchart Lake	3.3	High quality. Monitored monthly (Goldstream) and quarterly (Butchart).	Can supply sufficient water during maintenance of Kapoor Tunnel, but storage is limited. Has up to 10 Mm^3 available for use. Not currently available for use in JDFWD Service and District of Sooke.
		Lubbe Lake	3.0		
		Goldstream Lake	3.6		
		Japan Gulch	0.08	High quality except if slides encountered on Goldstream River or algae due to shallow reservoir depth.	Minimal storage in Japan Gulch but storage reservoir is supplied from Goldstream River and releases from higher level Goldstream dams. Japan Gulch Reservoir HGL 132 m provides driving head to RWS when Head Tank HGL 169 m out of service.
Leech (Future)	9,600	Possible future reservoir or direct diversion from Leech River via Leech Tunnel	None	Generally good quality but has higher colour levels. Long-term watershed restoration and rehabilitation in progress.	Use of this source during summer requires development of a new impoundment dam and reservoir. Transferable flows to Sooke Lake Reservoir are possible by direct diversion during higher flow seasons. Potential to divert to Deception Gulch Reservoir and then SLR.
Council Creek	1,068	Council Lake (No dam)	No firm reservoir volume available	High quality	Has been used as a Sooke Lake Reservoir augmentation supply via Council Creek diversion structure and pipe (Main No. 12). The watershed area of 1068 hectares is included in the Sooke Lake Reservoir total catchment area. Potential for reservoir storage development to be investigated.
Deception	650	Deception Gulch	4.0 Mm^3 to 6 Mm^3 at full supply level of 186.75 m	Currently not tested	Watershed not currently owned by CRD so unknown as to future use, but reservoir could be used as it is currently operated by CRD.

Sooke Watershed

Sooke Lake Dam and Sooke Lake Saddle Dam impound the Sooke Lake Reservoir. The Sooke watershed is the primary water source serving the RWS and consists of approximately 8,682 hectares (1,068 hectares Council Creek included) of forested land. Approximately 98% of the watershed is owned and managed by the CRD. Sooke Lake Reservoir was initially impounded in 1915, with the original dam replaced by larger ones, first in 1970 and a second time in 2002 to provide increased storage. Two long ridges on either side of the reservoir define the watershed. The main tributary to the Sooke Lake Reservoir is Rithet Creek. It supplies about 25% of the water entering the reservoir from a drainage area of about 1,740 hectares. A portion of water from the Council Lake releases to Sooke Lake Reservoir via a diversion pipeline (Main No.12) and a channel.

Figure 2.2 is a photograph of the Sooke Lake Reservoir which shows the significant surface area of the reservoir. The deep northern basin is approximately the middle left of the photo.

Figure 2.2: Sooke Lake Reservoir and Watershed (Looking East, Sooke Lake Dam on Right)

Figure 2.3 is a plan and section of the Sooke Lake Reservoir. The intake tower is located on the south end of the reservoir near the Sooke Lake Dam. The spillway crest maintains the full supply level of the reservoir at elevation 186.75 m +/-. The reservoir is normally drawn down up to 5 m over the summer demand period at existing consumption levels. The deeper sections of the SLR northern basin are not accessible because the lowest intake tower gate inverts are at elevation 169 m.

Sooke Lake Reservoir tributary creeks cease significant inflow into the reservoir during the dry season from late spring until substantial rains return in late fall and winter. Consequently, during the period from approximately May to October the level of Sooke Lake Reservoir experiences a net decrease because of higher summer demands, fisheries releases, and evaporative losses. Replenishment of this volume depends on the resumption of winter rains.

A 2021 study completed by Stantec, *Deep Northern Intake, Transmission and Treatment Study* assessed the viability of installing a deep northern intake to access deeper sections of the reservoir. This intake would increase reliability during drought conditions or post wildfire event

and provide additional resiliency in the event of failure of the existing intake tower from a severe seismic event. The study concluded that while the deep northern intake would increase reliability and access cooler higher quality water, additional withdrawals should be limited to an increase of 40% above the current annual demand to enable replenishment of the reservoir on an annual basis during a 1:50 year drought event. Section 4.2 of this report provides the results of a hydrological assessment of the Sooke watershed and recommendations on safe drought yield and minimum reservoir operating levels.

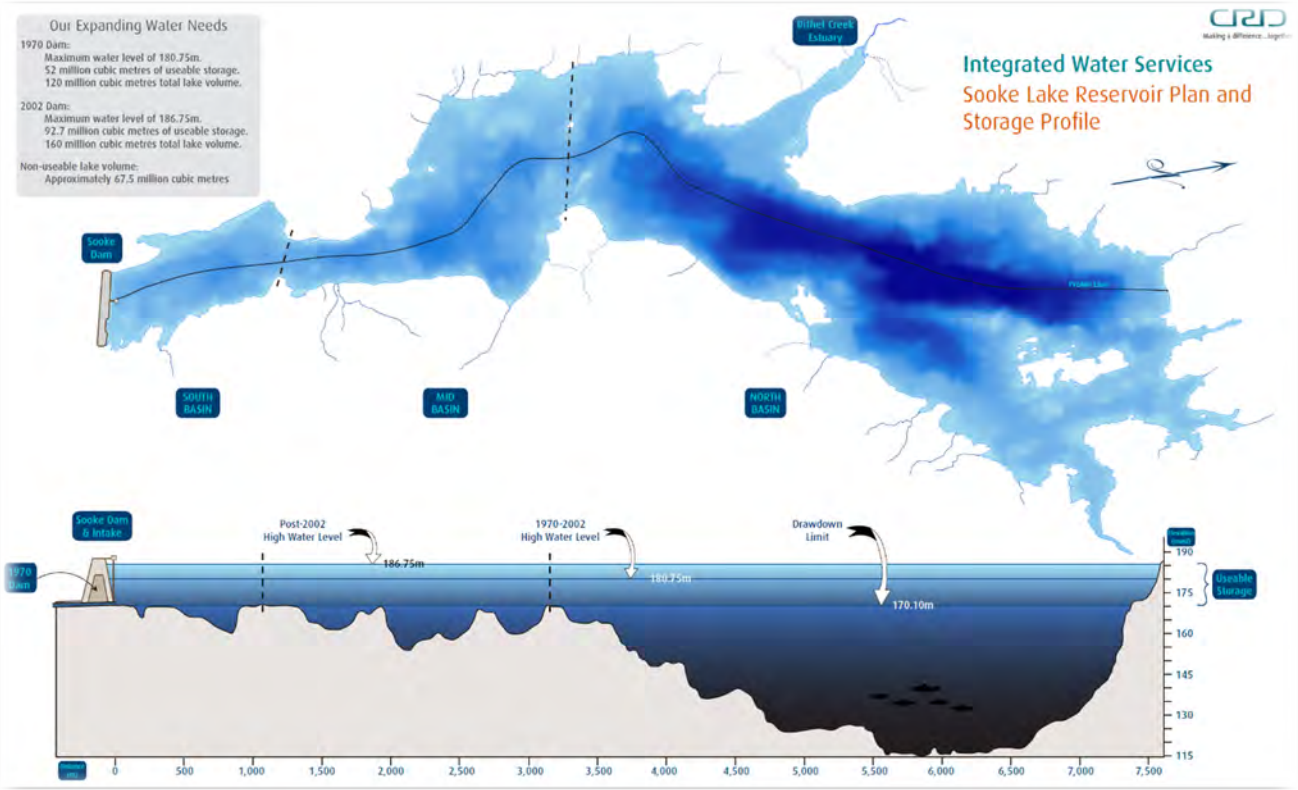


Figure 2.3: Sooke Lake Reservoir Plan and Profile (Provided by CRD)

Goldstream Watershed

The Goldstream watershed is approximately 2,300 hectares in size and is used as a secondary or emergency source of water when the Sooke Lake Reservoir Watershed is out of service for Kapoor Tunnel maintenance. The Goldstream source is unable to supply water to the District of Sooke, but water can be supplied directly from SLR via main No. 15 when Kapoor Tunnel is out of service. Approximately 98% of the watershed is owned and managed by the CRD. A series of four reservoir impoundments store water from the Goldstream Watershed, consisting of the Butchart, Lubbe, Goldstream and Japan Gulch Reservoirs. Flows from the upper impoundments are released into Goldstream River and diverted through Japan Gulch Reservoir where the water is extracted, screened (coarse), and disinfected prior to delivery to the transmission system. An intake facility in Japan Gulch Reservoir can supply the Goldstream Disinfection Facility when activated. Typically, this system is reserved for emergency use or as a temporary source during brief shutdowns of the Sooke Lake Reservoir system for inspection and maintenance of the Kapoor Tunnel and related facilities.

The Goldstream system provides an additional storage capacity of up to 9.9 Mm^3 (see Table 2.1). A portion of the water from the Goldstream watershed is allocated for downstream fisheries and amounts to 4.8 Mm^3 per year, potentially reducing the volume available for emergency and backup use.

Council Creek Watershed

The Council Creek watershed is 1068 ha in size with a small natural lake. Water from this small sub watershed can be diverted to Sooke Lake Reservoir from Main No. 12 and diversion structure to provide replenishment flows. Management of the timing of the diversion should be considered to optimize the replenishment of SLR. Ideally the water should be diverted during periods established by the Sooke Lake Reservoir water balance and operating rules.

Leech Watershed as a Potential Future Supply

A land area of just over 9,600 hectares was purchased from private forest landholders in 2007 and 2010 for use as a future source of water to the CRD's Regional Water Supply. As most of the original forest in the area has been harvested and an extensive road system developed, a long-term rehabilitation program is in progress to prepare the watershed for future use for water supply. Such activities include the reforestation, slope stability and soil erosion control, wildfire protection and forest fuel management, road deactivation, and fencing to reduce unauthorized access. Previous studies have indicated that portions of the watershed have unstable slopes which could have negative impacts on water quality in the Leech River. The photo below shows the Leech Watershed prior to rehabilitation activities.

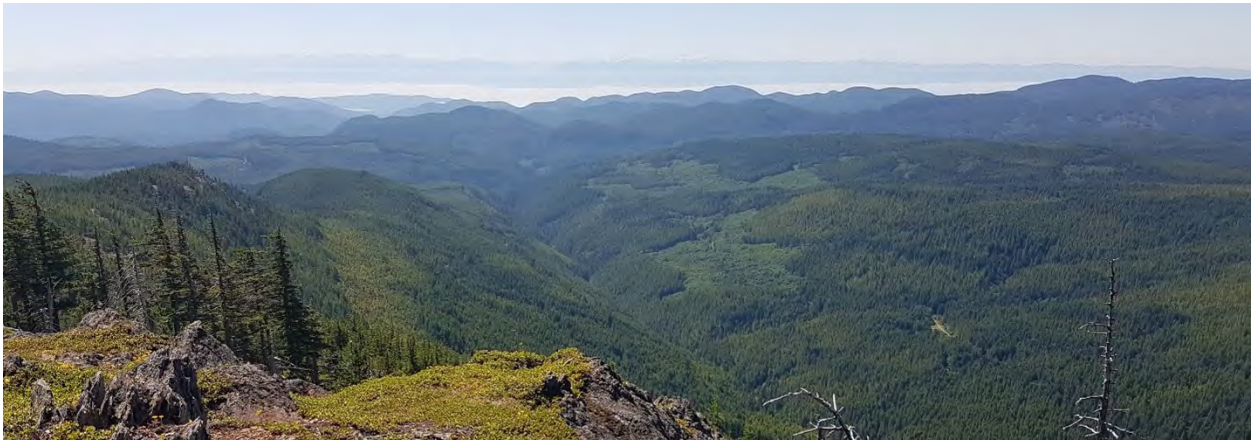


Photo 2.1: Leech Watershed

Water quality data collected by the CRD as part of the October 2021 *Leech River Watershed Water Quality Analyses* report indicates that water in the Leech River generally has low turbidity but does have elevated colour and turbidity levels during higher intensity first flush rainfall events. Further continued long-term water quality sampling of this source is recommended.

The northern portion of the watershed consists of a high elevation plateau with three small lakes and numerous wetlands. These areas drain south along deeply incised river valleys with slope stability issues, posing significant risk of erosion and increased turbidity and colour during periods of saturated soils and extreme precipitation. Restoring the watershed ecology and stabilizing slopes may assist in improving water quality but the outcome of these activities is uncertain and may not provide significant benefit for the capital expenditure.

While the precipitation captured by the Leech watershed is estimated to be greater than that of the Sooke and Goldstream watersheds combined, low summer flows require the development of storage impoundment dams or Leech River diversion works to incorporate this source into the Regional Water Supply System. The Leech River watershed also has similar hydrology to the Sooke Lake Reservoir watershed in that inflows into the river are negligible between May and October so without storage this source cannot provide any flow in the critical summer demand period. However, with a river diversion structure water from the Leech River could be used directly to augment SLR during drought periods and to provide additional supply to DGR and replenish SLR for emergency water use.

The Leech tunnel was constructed in the 1980s to divert water from Leech River to Deception Gulch Reservoir and ultimately Sooke Lake Reservoir. It is a 3.5 km - 2.5 m diameter concrete lined tunnel and was used once to supply water to SLR during a severe drought condition prior to raising of the Sooke Lake Dam.

The 1994 Plan considered several storage options. A low dam at the inlet of the Leech tunnel was estimated to impound 1 Mm^3 of storage, as well as provide adequate surcharge of the Leech tunnel to increase the capacity of the tunnel to convey water to Sooke Lake Reservoir. In addition, the 1994 Plan proposed a high dam at the confluence of the Sooke and Leech River to provide a reservoir with 7 Mm^3. Also considered was the impoundment of Weeks Lake in the upper portion of the Leech Watershed using a drawdown channel and dam combination to provide an additional 10 Mm^3 of storage. The primary advantage of using Leech will be as a replenishment supply to Sooke Lake Reservoir. Section 4 of this 2022 Master Plan discusses the hydrology of the Leech Watershed.

Deception Gulch Watershed as a Potential Future Supply

The Deception Creek watershed is a relatively small watershed with an area of 650 hectares. Deception Gulch Reservoir is immediately adjacent to Sooke Lake Reservoir and is separated by a saddle dam. It is not currently used for drinking water supply and there is no significant water quality information available and there is lack of understanding of seasonal water quality variations. The reservoir storage is 4 Mm^3 at low water level and 6Mm^3 at full supply level. If it is to be utilized as a potential source in the future, water quality information remains a gap and further sampling should be completed in the future.

2.1.2 Tunnels

2.1.2.1 Kapoor Tunnel

The Kapoor Tunnel is the major conveyance system for transmission of raw water from the Sooke Lake Reservoir to the transmission system. The tunnel inlet is adjacent to the Head Tank south of the Sooke Lake Dam. Construction on this tunnel commenced in the 1960s and was completed in 1969. The construction method for most of the alignment was drill and blast and a short section was completed using a tunnel boring machine (TBM). The tunnel is a circular concrete lined tunnel with a short section of horseshoe shaped cross section and is approximately 2.3 m diameter and 8.8 km long. The tunnel originally operated as a gravity open channel and in 1995 it was pressurized to a head of approximately 18 metres (169m HGL). Regular routine inspections have indicated that the tunnel is in good condition.

The Kapoor Tunnel is a critical single conveyance asset in the water supply system and failure would render the Regional Water Supply without water once the Goldstream reservoirs are depleted. Water supply to Sooke River Road Disinfection Facility is provided via Main No. 15 upstream of Kapoor Tunnel. Water supply to the District of Sooke is maintained when Kapoor Tunnel is taken out of service for inspection. The 2021 *Supply System Risk and Resiliency Study* completed by Stantec identified the Kapoor Tunnel as critical infrastructure with no redundancy and ideally, redundancy from a second pipeline or tunnel from Sooke Lake Reservoir would be desirable to increase resiliency. Failure of the Kapoor Tunnel (seismic event) would result in loss of water supply to the Regional Water Service from Sooke Lake Reservoir. Redundancy would be desirable, but constructing a second tunnel or transmission main would involve significant capital expenditure. Investigating the seismic resiliency and, if necessary, seismic strengthening of Kapoor Tunnel may be a more cost-effective, long-term measure to improve resiliency. The hydraulic capacity of the Kapoor Tunnel is sufficient to supply projected maximum day water demands to the year 2100.

2.1.2.2 Leech Tunnel

Leech Tunnel was constructed in the 1980s as a conduit for the future diversion of water from Leech Watershed to Sooke Lake Reservoir via Deception Gulch Reservoir. The tunnel is a concrete lined tunnel with an approximate length of 3.5 km and a diameter of 2.5 metres. Other than being used one time for emergency use prior to raising of the Sooke Lake Dam, the tunnel has not been used because the SLR has had adequate water to supply RWS demand. Flows from the tunnel can be diverted through Deception Gulch Reservoir, a relatively shallow impoundment adjacent to Sooke Lake Reservoir. It may be possible to increase the storage volume of Deception Gulch Reservoir by excavating the reservoir area deeper. However, this would be at considerable expense along with the issue of disposing of waste soil in the watershed or elsewhere.

2.1.3 Goldstream UV Disinfection Facility

The 1994 Plan recommended ozonation be installed at the inlet to Kapoor Tunnel to improve disinfection and provide protection against protozoa. The ozonation facility was not constructed as subsequent research on the use of UV light would provide good inactivation of *Giardia and Cryptosporidium*. CRD decided to use UV technology instead of ozone and the Goldstream UV Disinfection Facility (GDF) was constructed in 2004. This facility includes installation of 15 UV trains with 600 mm diameter UV reactors and associated equipment as shown in **Figure 2.4**. The Goldstream UV Disinfection Facility is located downstream of Japan Gulch Reservoir.

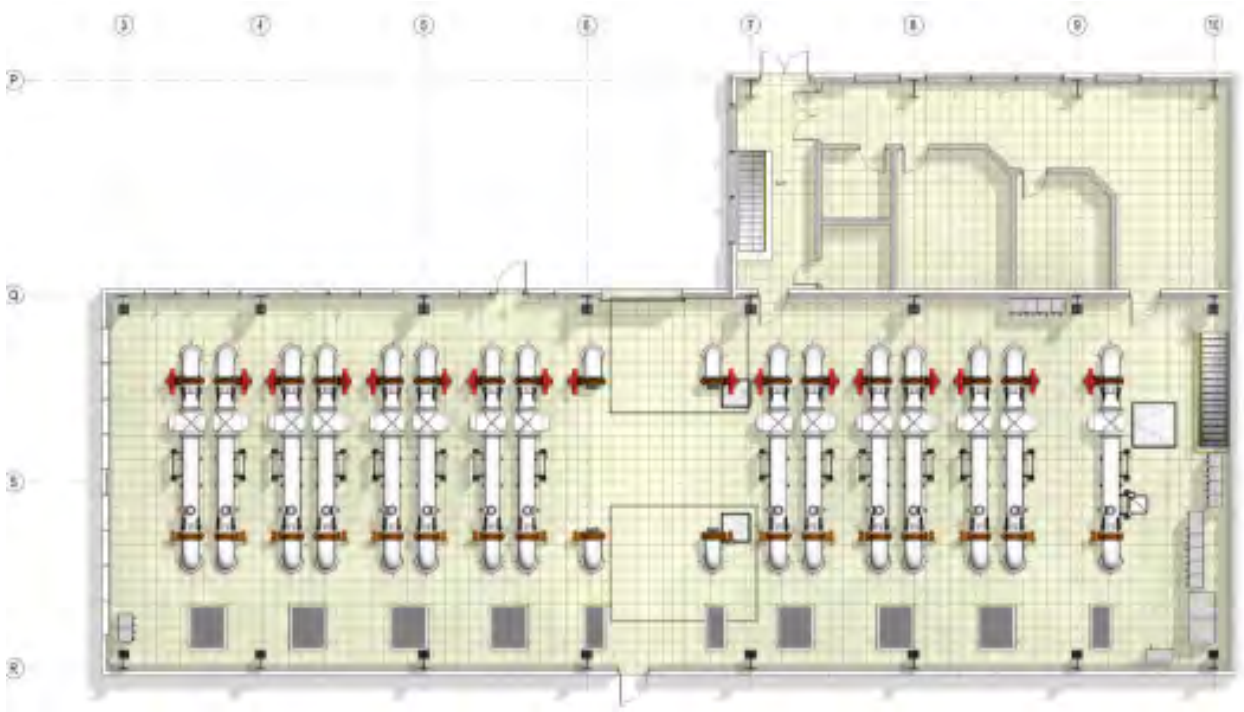


Figure 2.4: Goldstream UV Disinfection Facility

The facility operates as an on-demand UV disinfection system and is subject to peak hour flows. The CRD has recently completed a study *Goldstream UV Facility Upgrade* (Stantec 2021) and is planning to upgrade the UV equipment and capacity of the facility as the UV equipment is nearing the end of its useful life. The design criteria for the upgraded facility are outlined in **Table 2.2.**

Table 2.2: Design Parameters for Goldstream UV Upgrade

Design Parameter	Design Requirement
Design Flow	532 Megalitre per day (MLD)
UV Disinfection Level	Minimum of 3-log inactivation of Giardia cyst and Cryptosporidium oocyst always
Raw Water UV Transmittance	85%/cm
UV Reactor (UVR)Redundancy	n duty + 1 standby
UVR Number and Configuration	Symmetrical configuration including an even number of UVR, with 50% of the UVRs installed on each side of the facility (stream 1 and stream 2).
UV Transmittance Sensor Redundancy	2 UVT sensors per reactor
UV Facility Modularity	Able to operate half of the facility and isolate the other half for installation/maintenance purposes, using the existing piping by-pass configuration.
Controllers	Each UVR unit should have its own controller. The facility control system architecture should ensure that reactors can operate independent of each other.

The Goldstream UV facility provides primary disinfection in combination with chlorine for the majority of the CRD water supply. Primary virus inactivation is accomplished using sodium hypochlorite and a chloramine transmission system residual is maintained by the addition of aqua ammonia. This system currently meets IHA requirements for inactivation of protozoa. The existing UV system could easily be incorporated into a water filtration process in the future but depending on the process ultimately selected it may not be required.

2.1.4 Sooke River Road Disinfection Facility

The Sooke River Road Disinfection Facility (SRRDF) is supplied from Main No. 15 and serves CRD Juan De Fuca Water Distribution Service. This facility has a capacity of 20 MLD and is similar to the Goldstream Disinfection facility but at a much smaller scale. The facility has 2 duty and 1 standby medium pressure UV reactors. The facility also uses chlorine for virus inactivation. The secondary disinfection residual is maintained by producing a chloramine residual after the addition of ammonia. This system currently meets IHA requirements for inactivation of protozoa and viruses.

2.1.5 Major Transmission Mains and Pressure Control Stations

There are a number of major transmission mains in the Regional Water Supply. The transmission system is largely comprised of steel pipe with some pressure concrete lined steel cylinder pipe (PCCP). Pressure reducing valves (also referenced as pressure control stations) are located throughout the transmission system. The system is generally a branch lateral system which is gravity fed from the Sooke Lake Head Tank (HGL 169m). The major transmission system components are summarized in **Table 2.3**.

Table 2.3: Regional Water Supply Transmission Mains

Raw Water Supply Mains	
Kapoor Tunnel	8.8-kilometre, 2.3 m diameter concrete-lined tunnel that carries raw water from Sooke Lake Reservoir (via Head Tank) to upstream of the Goldstream Disinfection Facility
RW Main No.10	1.2 kilometre, 1219 mm diameter steel pipe (Sooke Lake Reservoir to Head Tank.
RW Main No. 11	1.2 kilometre, 1219 mm diameter concrete pipe (Sooke Lake Reservoir to Head Tank)
RW Main No. 12	1.15 kilometre , 1,200 mm diameter main used to replenish SLR from Council Lake
RW Main No. 15	14.7 kilometre, 610 mm diameter PVC and ductile iron pipe that carries raw water from Sooke Lake Reservoir (upstream of the Head Tank from Main No. 10 and Main No.11) to the SRRDF. Supplies water to the Sooke River Road Disinfection Facility. Unable to convey water from Goldstream watershed.
Leech Tunnel (out of service)	3.5 kilometre, 2.5 m diameter lined concrete tunnel for future diversion of Leech River Water to Sooke Lake Reservoir
Treated Water Transmission Mains	
Main No. 1	17.5-kilometre, 1524 mm, and 1067 mm diameter steel pipe (Humpback Reservoir Dam to Gorge Road E and David Street valve chamber in City of Victoria)
Main No. 2	7.6-kilometre 813 mm and 762 mm diameter steel and ductile iron pipe (Island Highway at Thetis overpass and Craigflower Road. Terminates at Main No. 1)
Main No. 2a	1.2-kilometre ductile iron pipe (Admirals Road from Craigflower Road to Esquimalt boundary)
Main No. 3	21.8-kilometre 1219 mm and 991 mm diameter steel pipe (Humpback PCS to Mount Tolmie Tank)
Main No. 4	34.7-kilometre 1321 mm, 1219 mm, 762 mm diameter steel and PCCP pipe, (Kapoor Tunnel outlet to McTavish Tank located in District of North Saanich)
Main No. 5	3.8-kilometre 1524 mm diameter steel pipe running (Kapoor Tunnel outlet to the Humpback PCS via GDF)
Main No. 7	6.2-kilometre 610 mm diameter steel and ductile iron pipe (Goldstream Avenue to Metchosin Road / District of Metchosin)
Main No. 8	6.1-kilometre 450 mm diameter steel and AC pipe (Belmont School to Happy Valley Road /District of Metchosin)
Main No. 14	3.5-kilometre 500 mm and 400 mm diameter ductile iron pipe (Goldstream Avenue and Veterans Memorial Parkway to District of Highlands border on Millstream Road)

Pressure Control Stations (PCS)	
Humpback PCS	Pressure control station located adjacent to the old Humpback Dam. Reduces pressure to main No. 1 and main No.3, fed from main No. 5. Hydraulically operated using pressure reducing valves (3 valves total).
Alderley PCS	Pressure control station located off Alderley Road north of Sayward Road. Reduces pressure to main No. 4 downstream of the PCS (pre-stressed concrete cylinder pipe section).
Millstream PCS	Feeds Main No.3 from Main No.4 (HGL setpoint of 114.0 m)
Burnside PCS	Feeds Main No.1 from Main No.4 (HGL setpoint of 104.0 m)
Watkiss PCS	Feeds Main No.1 from Main No.4 (HGL setpoint of 109.0 m)
Sooke River Road PCS	Maintains a HGL of 91 to 98 m, connection upstream of Head Tank.

Figure 2.5 provides a hydraulic schematic of the overall system operation. The schematic depicts the RWS starting with the Sooke Lake Reservoir (TWL 186.75m), a variable level intake tower at Sooke Lake Dam, and the Head Tank downstream of Sooke Lake Dam. The Head Tank provides a driving head HGL of between 170.2 to 169 m at the top end of the transmission system adjacent to the entrance to Kapoor Tunnel. A connection upstream of the Head Tank supplies the Sooke River Road Disinfection facility via Main No. 15. The secondary system is from the Goldstream reservoirs provides water to Japan Gulch Reservoir (TWL 132 m) and is used when the Kapoor Tunnel is out of service for maintenance and inspection.

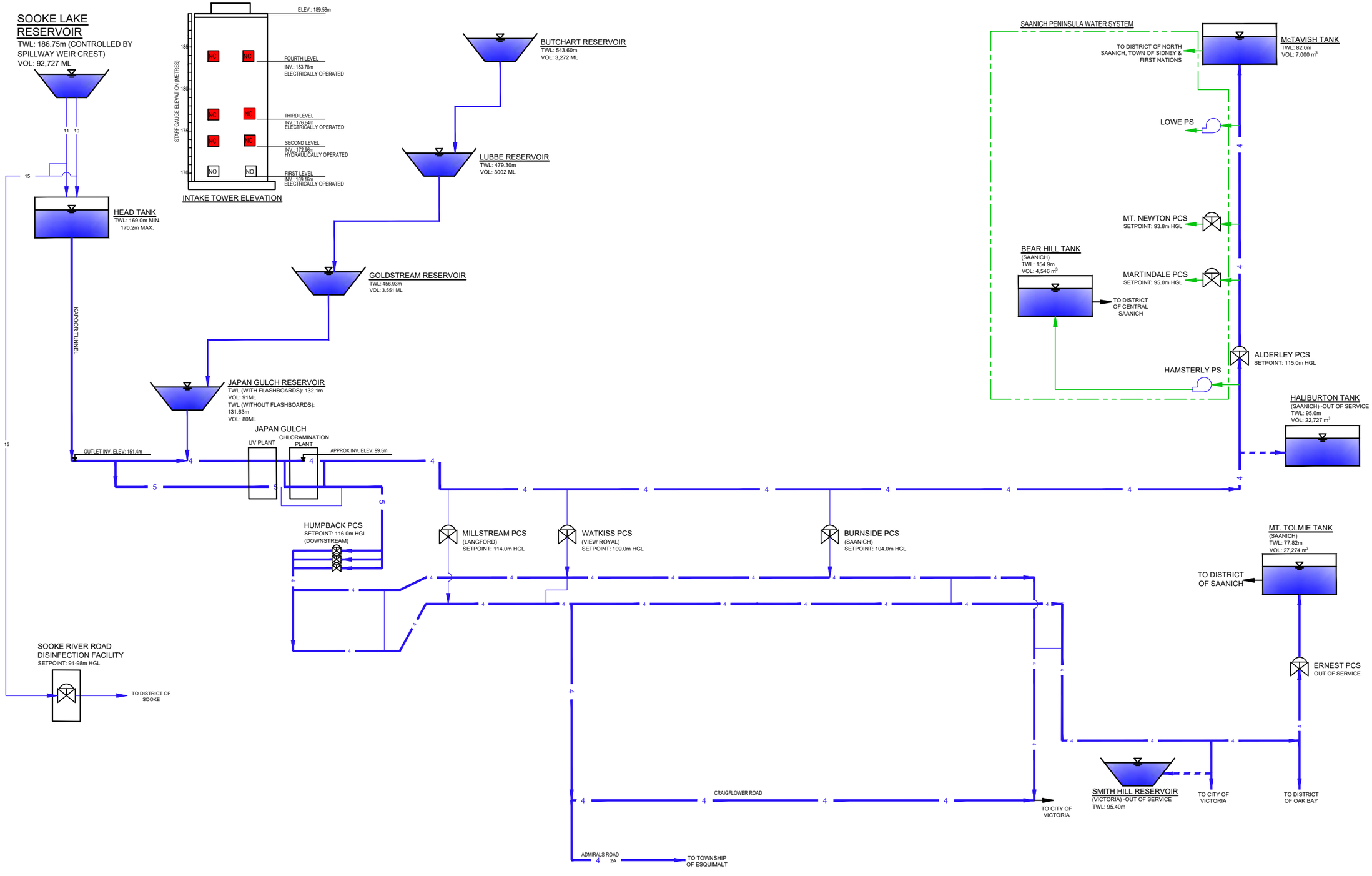


Figure 2.5: RWS Transmission System Hydraulic Schematic

2.1.6 Transmission System Storage Tanks

The RWS transmission system does not contain a significant volume of tank storage. The RWS system was developed as a gravity fed, on-demand system where instantaneous peak flows, peak hour flows and emergency fire flows are supplied from Sooke Lake Reservoir via the RWS transmission system. This approach requires the transmission system to have sufficient hydraulic capacity to convey the peak and fire flows and consumes residual hydraulic capacity which should be reserved for population and demand growth. This will become a significantly greater issue once a water filtration plant is constructed. Ideally, peak balancing storage should be constructed within the transmission system and the municipal distribution systems should provide fire and emergency storage for so that the hydraulic capacity of the RWS system is not stressed from requirement to provide instantaneous peak, peak hour, and fire flows. One location that has been identified as a potential site for balancing storage tank for the transmission system is the former Smith Hill Reservoir site which has been decommissioned. This site is ideally situated as it is located on a higher ground elevation on Smith Hill, land is owned by the CRD, and transmission mains are easily accessed. A pump station will be required to boost the HGL in the service area served by a proposed Smith Hill Tank.

The RWS does have in service and out of service storage tanks in their transmission system and these are summarized below in **Table 2.4**.

Table 2.4: Storage Tanks

Storage Tanks	
In Service	
Head Tank	TWL 170.2 m, LWL 169 m (raw water)
McTavish Tank	TWL 82.0 m – Volume 7,000 m^3
Mount Tolmie Tank	TWL 77.82 m – Volume 27,274 m^3
Out of Service	
Haliburton Tank	TWL 95.0 m – Volume 22,727 m^3
Smith Hill Reservoir	TWL 95.4 m – open decommissioned reservoir

2.1.7 Water System Governance, History and Background

This 2022 Master Plan is meant to be a technical and operational themed plan and it is important to consider the legislative framework and context as it guides and influences the mandate of the utility. This section identifies the authority of the Capital Regional District and the Regional Water Supply Commission and the mandate for the delivery of water to the regional as well as providing a brief history of the water system and related planning of the utility.

The history of the Regional Water Supply Service is well documented but for the context of the Master Plan it is important to identify some key milestones in the history related to the water system's ownership, performance, and planning. These historical milestones influenced the governance, ownership, improvements, and performance of the water system of today. These milestones include:

1. The Greater Victoria Water District (GVWD) was a statutory body created in 1948 by provincial legislation (Greater Victoria Water District Act) originally servicing Victoria, Saanich, Esquimalt, and Oak Bay.

2. By the late 1980's there were significant issues related to water quality and security of water supply which resulted in great controversy in the communities being serviced by the GVWD.

3. By 1994 the Greater Victoria Water District Long Term Water Supply Plan was completed which recommended comprehensive water system improvements.

4. By 1996 the Province of BC established a Special Commission to review the Conservation and Protection of the Greater Victoria Water Supply which addressed a broad range of issues (refer to Section 2.1.13).

5. By 1997 the Capital Region Water Supply and Sooke Hills Protection Act was adopted and in essence resulted in the conversion of ownership of the water system from the GVWD to the Capital Regional District and created the Regional Water Supply Commission (refer to Section 2.1.14).

6. By 1998 the Review of Capital Regional District Water Supply was prepared to address operations, financial expenditures and revenue and historical issues.

7. By 1999 the Strategic Plan for Water Management report, Volumes 1, 2, 3 and 4, by Reid Crowther, Aqualta, and Context, March 1999, was completed.

8. By 2004 the Review of the Strategic Plan for Water Management, by the CRD, November 2004, was completed.

9. By 2012 the CRD had completed the 2012 Strategic Plan for the Greater Victoria Water Supply System.

10. In 2017, the Regional Water Supply 2017 Strategic Plan was issued and approved. By 2020, the RWSC was updated on process (refer to Staff Report of October 21, 2020).

In addition, the progression and development of the water system is well documented in a variety of sources, including The Greater Victoria Water District - Water Supply Area Background Information Report, the CRD's library of studies and reports, Capital Expenditure Plans, Staff Reports for the GVWD and CRD, public archives and other sources.

2.1.8 Local Government Act of British Columbia and the Capital Regional District

The Local Government Act (LGA) of British Columbia provides the legislative framework for local governments including Regional Districts. The Capital Regional District is subject to the LGA and has established local service areas whereby a service is defined including the area or participants for the service (refer to Figure 1.1, Section 1.1).

With the conversion of the water system ownership from the GVWD to the CRD in 1997 pursuant to the *Capital Region Water Supply and Sooke Hills Protection Act,* several bylaws were created and since updated (refer to Section 2.1.10).

2.1.9 Capital Region Water Supply and Sooke Hills Protection Act

In 1997 the *Capital Region Water Supply and Sooke Hills Protection Act* was adopted by the Province of BC. This Act required the conversion of the Greater Victoria Water District to the Capital Regional District and stipulated the governance and mandate of the water service.

In summary the Act included:

- The establishment of a "water supply local service area" of the Regional District and identified participating areas (municipalities and an electoral area)
- The Act also established the "water distribution local service", otherwise known as the Juan de Fuca Water Distribution Service
- Establishment of the Regional Water Supply Commission
- Establishment of the Sooke Hills Wilderness Regional Park
- Power to make regulations
- Transfer of assets, liabilities, and authority to the CRD and transfer of bylaws

2.1.10 Water Service Related Bylaws of the Capital Regional District and Regional Water Supply Service

Pursuant to the authority of the Capital Regional District by the *Capital Region Water Supply and Sooke Hills Protection Act*, several bylaws have been created related to service establishment, commission representation, water advisory committee, establishment of a regional park, power to make regulation and transfer of assets. A summary of the more relevant bylaws is as follows:

- **Bylaw 2539/3371** – *A Bylaw for the Establishment and Operation of a Regional Water Supply Commission* defines the water supply local service participating areas, establishes the Regional Water Supply Commission and general business, identifies obligations for ongoing strategic planning, encourages conservation and water demand management practices, and annual operating and capital budgeting requirements.
- **Bylaw 2541** – *Water Advisory Committee Bylaw No. 1, 1997,* (A Bylaw for the Establishment and Operation of a Regional Water Supply Protection and Conservation Advisory Committee) and to directly quote the Bylaw, the role of the Committee is "to provide advice to the RWSC on water supply, water quality, the stewardship of the lands held by the Regional District for water supply purposes and water conservation purposes".
- **Bylaw 3061** – *Capital Regional District Water Conservation Bylaw No. 1, 2003,* which was a result of the service establishment bylaw that addressed water demand and conservation issues.

- **Bylaw 3516** – *Capital Regional District Cross Connection Control Bylaw No. 1, 2008* (as amended by Bylaw 4037). This Bylaw resulted from an Order by the Chief Medical Health Officer for Vancouver Island Health Authority pursuant to the Drinking Water Protection Act since it was determined that a significant risk existed to the drinking water in the absence of devices to control contamination.
- **Bylaw 2804/4050** – *Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 1, 2016*, which restricts access to the water supply area and regulates activities within the watershed.
- **Bylaw 2739** – *Capital Regional District Water Management Strategic Plan Bylaw No. 1, 1999*, this resulted in the obligation of the service establishment bylaw and in essence adopted the Strategic Plan for Water Management as prepared by Reid Crowther, Aqualta and Context in March of 1999.

Many additional bylaws exist that specifically related to financial and loan authorization.

2.1.11 Summary of Prior Reports, Studies, Inquiries, and Reviews

There have been many studies and reports commissioned for a variety of scopes and reasons over the decades of operation of the Regional Water Supply Service. The following Sections 2.12 to 2.17 are a summary of the more significant long term or master planning, strategic planning, special and other studies of note that have influence on this 2022 Master Plan.

2.1.12 Greater Victoria Water District, Long Term Water Supply Plan, Montgomery Watson/Dayton & Knight Ltd., 1994

In 1992 the GVWD initiated a planning process and hired a consultant to assess the water service and provide recommendations for improvements. By 1994 the *Greater Victoria Water District Long Term Water Supply Plan (Montgomery Watson and Dayton and Knight Ltd.).* was completed which recommended comprehensive water system improvements and included a schedule with a significant capital expenditure plan.

At the time, the context of the recommended improvements was all encompassing, including renewal and rehabilitation of existing assets, new assets to address a higher level-of-service and to address future water demand. Some of the improvements included dam rehabilitation, water treatment study and enhancement, raising of Sooke Lake Dam, replacement of Main No. 1, and a Deep Northern Intake from Sooke Lake Reservoir. Many of the recommended improvements have been completed, some were revised in scope and detail, and some were deemed no longer necessary. A summary of the recommendations and status is provided in Section 1.1. This plan and other subsequent studies formed the basis of the current 2022 Master Plan.

2.1.13 Special Commission on the Conservation and Protection of the Greater Victoria Water Supply

Subsequent to the delivery of the 1994 Plan there was great concern arising from the customers which resulted in the Province of BC establishing in 1996 a “Special Commission on the Conservation and Protection of the Greater Victoria Water Supply” which addressed a broad range of issues including governance, operation, public participation, retail water systems, land

use, water conservation and ownership transition. The commission was led by Mr. David Perry and the recommendations resulted in the conversion of the water system from the GVWD to the CRD (*Capital Region Water Supply and Sooke Hills Protection Act*). The recommendations are summarized by number and title only for general context as follows:

- Recommendation #1 Compensation
- Recommendation #2 Governance Model
- Recommendation #3 Public Participation Group on Regional Water Issues
- Recommendation #4 Retail Water System
- Recommendation #5 Kapoor Land Limited Exchange
- Recommendation #6 Disposition of Crown Land Lot #87
- Recommendation #7 No Status Quo for Council Creek Basin
- Recommendation #8 No Land Exchange for Council Creek Basin
- Recommendation #9 Purchase of Council Creek Basin
- Recommendation #10 Cease the Council Creek Diversion
- Recommendation #11 Highway 117 Closure
- Recommendation #12 Alternate Galloping Goose Right-of-Way
- Recommendation #13 Land Use in Non-Catchment Areas
- Recommendation #14 Tenure and Management of Non-Catchment Lands
- Recommendation #15 Supply-Side and Demand-Side Water Management
- Recommendation #16 Regional Demand-Side Management Measures
- Recommendation #17 Provisional Demand-Side Management Measures

2.1.14 Review of Capital Regional District Water Supply, D.L. Mackay, P.Eng., April 1998

Subsequent to the Special Commission of 1996, the *Capital Region Water Supply and Sooke Hills Protection Act* was adopted in 1997 and by 1998 another review was commissioned, *Review of Capital Regional Water Supply*, by D.L. Mackay, P.Eng., April 1998. This review addressed operating and infrastructure, cost sharing development cost charges, historical issues that were technical and operational in nature, operational and organizational issues, and other issues. There were five general recommendations, and they are summarized by number and title only for general context as follows:

- Recommendation #1 - Identification of the Regional Water Supply System
- Recommendation #2 - Operating and Maintenance Costs
- Recommendation #3 - Existing Debt
- Recommendation #4 - Future Debt
- Recommendation #5 - Review of the Water Quality Testing and Reporting

2.1.15 Strategic Pan for Water Management, 1999

In 1997 the Province of BC enacted a regulation requiring the CRD to prepare a Strategic Plan looking forward 20 years and addressing the water supply, water conservation and the management of the catchment lands and the regulation included a requirement that the plan be regularly updated. In 1998 the CRD hired a consulting consortium to prepare the Strategic Plan for Water Management, March 1999. The plan was comprehensive and included public consultation, water quality issues, demand and reliability, demand-side management, supply-side management, water management options and included a decision process and results. Generally, the conclusions and recommendations were adopted, and they set the goals for the CRD for the next period.

2.1.16 2012 Strategic Plan

The *2012 Strategic Plan for the Greater Victoria Water Supply System* was prepared by the CRD, and it was another comprehensive plan that identified strengths, challenges, and opportunities. The plan resulted in numerous strategies and actions as well as key recommendations: adapting to climate change, addressing changing trends in water use, and workforce planning. Further recommendations included:

1. Increase the minimum usable storage volume for Sooke Lake Reservoir used to calculate water system reliability to better highlight the importance of maintaining source water quality,
2. Continue to adapt demand management initiatives to match changing trends in water use with an ongoing target of deferring expansion of the water supply system for 50 years,
3. Incorporate climate change projects and a broader range of water use projections in the next analysis to determine when an expansion of water supply will be required,
4. Update the hydraulic model to the water transmission system,
5. Develop level of service policy and formal agreements with bulk water customers to clarify the requirements for the supply of bulk water to distribution systems,
6. Assess the value of non-owned catchment and buffer lands for the protection of the Greater Victoria Water Supply Area and work with other CRD departments to develop a coordinated corporate strategy and process for land purchases and exchanges,
7. Review and update the Capital Regional District Water Supply Area Regulations Bylaw to incorporate the security requirements of the Leech Water Supply Area,
8. Update the watershed assessment and risk assessment framework to the Greater Victoria Water Supply Area to include the Leech Water Supply Area, and
9. Develop a State of the Water Supply Area report prior to the next review of the Strategic Plan.

It is not the intent of the 2022 Master Plan to review and evaluate each of the foregoing. The recommendations have been provided for context and linkage to the current Master Plan.

2.1.17 Regional Water Supply 2017 Strategic Plan

In 2017, the CRD had prepared another Strategic Plan that was adopted by the Regional Water Supply Commission and the CRD Board of Directors. This Strategic Plan included the following statement:

> *"This Strategic Plan for Regional Water Supply sets Commitments and identifies Strategic Priorities and Action, with a planning horizon to the year 2050, that will guide the future direction for the Regional Water Supply Service. The Strategic Plan will also support CRD Board priorities, provide context for water serving policy, and align with other CRD strategies and plans."*

The Strategic Plan is broadly based on three Commitments and six Areas of Focus, summarized as follows:

Commitments

1. Provide high quality, safe drinking water
2. Provide an adequate, long-term supply of drinking water
3. Provide a reliable and efficient drinking water transmission system

Areas of Focus

1. CRD Board Priorities – Sustainable and Livable Region
2. Climate Change Impacts – Mitigation and Adaptation
3. Preparing for Emergencies and Post-Disaster Water Supply
4. Supply System Infrastructure Investment – Renewing Existing and Preparing for New Infrastructure
5. Planning for the Future Use of the Leech Water Supply Area
6. Demand Management – Addressing Changing Trends in Water Demand

This strategic direction is important for the Master Plan as it sets the framework and criteria for which to evaluate the existing system to determine gaps or deficiencies in the existing assets, management of the service to meet anticipated future demands, adapt to potential changes, and prepare and mitigate emergencies.

As noted in Section 2.1.7, a Master Plan is one of many plans that are scope and objective focused such as Business Continuity Plans, Asset Management Plans, Emergency Plans, Financial Plan, Strategic Plan, etc. [refer to AWWA definition] and ultimately the suite of plans is aligned and complementary.

2.1.18 Planning by Participating Areas / Municipal Customers

Beyond the internal planning conducted by the CRD, it is imperative that the various plans of each of the participating areas or municipalities (see Section 2.1.7) be integrated. Ultimately the Master Plan addresses the expectations of the municipal distribution services, but more detailed coordination of water system performance is achieved via a variety of other aspects including coordination of Official Community Plans, Development Cost Charge programs, asset

management planning, Level-of-Service agreements (existing and pending), and asset ownership agreements.

2.2 Historical Supply Reliability

The reliability of the CRD water system has historically been good and the raising of the Sooke Lake Dam in 2002 provided additional resiliency. The RWS has provided an acceptable level of service for the major municipal customer base. Reliability on the supply, transmission, and treatment side has been good; there has been no loss of service or significant complaints from the customer base. Taste and odour complaints have occasionally occurred from the customer base as a result of algae in Sooke Lake Reservoir, but normally algae concentrations are not high enough to cause major issues with water quality.

Section 5.0 of this report discusses the historical water quality data from Sooke Lake Reservoir. The raw water quality from this primary source is considered very good and meets provincial and federal guidelines without filtration. Turbidity levels have typically been below 0.4 NTU on average with other parameters also falling within current Health Canada Guidelines for Canadian Drinking Water Quality.

The Goldstream reservoirs have been used as a secondary water supply during inspections of Kapoor Tunnel. The Goldstream reservoirs water quality is generally a good quality source but is sometimes impacted by landslides along the Goldstream River canyon which conveys water to Japan Gulch Reservoir. These slides have typically occurred during wet weather high flow periods.

The CRD has recently completed the *Leech River Watershed Water Quality Analysis Report* (October 2021) to obtain additional information related to Leech River water quality. In general, the water quality is quite good with a mean turbidity of 1.3 NTU but with peak turbidity up to 157 NTU. Of significance from a water quality perspective is elevated levels of colour exceeding the BC Safe Drinking Objective of 15 TCU for more than 58% of samples. High turbidity events were associated with wet weather during first flush rainfall events. The high turbidity combined with elevated colour would require use of a conventional treatment process for treatment. The Leech River water has low pH and alkalinity, similar to Sooke Lake Reservoir.

The Deception Gulch Reservoir is adjacent to Sooke Lake Reservoir. This reservoir has a volume of 1.5 Mm^3 due to its shallow depth. The reservoir primarily serves as a source for downstream fisheries flow release. It could also serve as a receiving reservoir for flows from Leech Watershed and eventual transfer into Sooke Lake Reservoir via a control structure in Sooke Lake Saddle Dam. Further water quality testing of this reservoir is warranted.

2.3 Historical Water Quantity

In 2020 the CRD used 48 Mm^3 of water from the Sooke Lake Reservoir. In an average year, the Sooke Watershed has been able to supply water demands and Sooke Lake Reservoir is replenished by precipitation to full supply level over the winter months. In 1987, prior to raising of the Sooke Lake Dam in 2002, the CRD did experience water shortages from the Sooke watershed due to high water use and limited storage. In conjunction with raising of the Sooke Lake Dam, the CRD implemented a water conservation program and has been able to reduce their demands significantly, and water shortages have not been an issue even during dry years. In 2009, the

CRD experienced an approximate 1:50 year drought condition and due to hot weather and lack of precipitation, the Sooke Lake Reservoir did not fill until the 2010 winter season. Since the raising of the dam in 2002, the 2009 drought year (an approximate 1:50 year event) has been the only year that Sooke Lake Reservoir did not fill. A hydrological assessment of the Sooke watershed has been completed as part of this study and is discussed in Section 4.2 of this report.

2.4 Water Supply System Redundancy

The RWS has several infrastructure components where redundancy is a concern. The main concerns include the lack of redundancy for the Kapoor Tunnel, a single Main No. 15 serving the Sooke River Road Disinfection Facility, single pipes for Main No 3 and Main No.4 serving the Saanich Peninsula and a single intake tower in Sooke Lake Reservoir. Failure of any of these components during a seismic event could result in termination of water service to all or parts of the RWS service area. In addition, Main No. 4 and Main No. 15 have sections with bridge crossings of waterways which could be vulnerable during seismic events. RWS dams are also a concern and the CRD has been upgrading the dams in the past 20 years to meet Provincial Dam safety requirements.

A *Supply System Risk and Resiliency Study – Phase 1* (Stantec 2021) and a S*eismic Assessment of Critical Facilities Study* (Stantec 2021) provided an assessment of critical facilities and a plan for future upgrades to reduce the overall vulnerability of critical components of the RWS. The *Deep Northern Intake, Treatment and Transmission Study* (Stantec 2021) provides alternatives for a second intake and redundancy options for the Kapoor Tunnel.

2.5 Level of Service

Level of Service (LoS) is a commonly used concept to define the expected or required performance criteria of a system or asset. In the context of this Master Plan, the LoS concept was considered throughout its preparation and development. Several cited LoS definitions include the following:

> *"The defined service quality for a particular activity (i.e., roadways) or service area (i.e., street lighting) against which service performance may be measured. Service levels usually relate to quality, quantity, reliability, responsiveness, environmental acceptability and cost."* (International Infrastructure Management Manual V.3.0)

and

> *"Level of Service should form the basis for determining appropriate practices, approaches and funding for capital renewal and maintenance activities. Utility managers must know what levels of service are required by regulations, what LoS customers desire and the related costs" and "Getting value from assets is about making sure they perform as desired at the right cost."* (Water Utility Management, Manual of Water Supply Practices M5, 3rd Ed., AWWA)

The LoS is important for many reasons as it establishes the performance expectations of assets such as those related to a water system. During the preparation of this Master Plan, it was recognized that the LoS concept should be applied in anticipation of the comprehensive conclusions and recommendations that would result in significant expenditures. Therefore, consideration will be given to a variety of LoS's for the proposed improvements. Defining the LoS

for an existing and operational utility is an iterative process whereby the system is constantly being assessed for a variety of performance criteria.

For the context of the Master Plan, two general categories of LoS were considered and are discussed as follows:

- **Non-Discretionary LoS** – Non-Discretionary LoS refers to the absolute requirements for service such as legislated obligations. For this Master Plan the primary LoS obligations are set out in the BC Provincial Drinking Water Protection Act, Water Sustainability Act and Dam Safety Regulation. Although there are numerous other legislated obligations (e.g., worker safety) for the management of a water utility, they will be identified and addressed in future detailed plans where appropriate (e.g., preliminary, and detailed design).
- **Discretionary LoS** – Discretionary LoS refers to the LoS that may be decided by the utility owner and customers. Financial sustainability and affordability may be influencing factors in determining the performance of a system or assets. Quite often perceptions of LoS influence conclusions which may be unaffordable in both capital costs and life-cycle costs. It is premature at the Master Planning phase, but the process of value engineering can be applied in subsequent phases of project development to ensure good return on investments.

Specific examples of applying the LoS concept to various asset categories include the following:

- **Water Treatment** – Current drinking water legislation is outcome based with the expectation of meeting potability standards or guidelines (e.g., GCDWQ, USEPA, etc.) and the legislation does not prescribe particular types of treatment processes. The LoS concept can be applied when detailing a water treatment plant design criteria (e.g., materials selection, redundancy of process, power supply, etc.).
- **Water Conveyance Mains** – There is no specific legislation to define the LoS for conveyance mains. The utility has discretion in the selection of materials, means of construction, and capacity, etc. The LoS may be influenced by proven and routinely available materials and potentially the insurance sector (e.g., Seismic Guidelines for Water Pipelines, American Lifelines Alliance). For example, a main for the intent of providing redundancy to an existing main may be sized to replicate full capacity, partial capacity, or a limited capacity for emergencies.

Some general opportunities for applying the LoS concept include the following, but the implications of each should be carefully identified and assessed:

- Redundancy
- Materials selection and life expectancy
- Seismic performance
- Loss of service (planned maintenance or unplanned failure)
- Coupling policy with assets, such as Water Conservation Bylaw or use restrictions during loss of service
- Functionality or operational performance

The CRD has a process of determining the existing or available LoS through the Master Planning process, Asset Management Program, and consultation/coordination with municipal or bulk customers to determine expectations. Further, the CRD plans to prepare and establish formal Level of Service Agreements with each of the customers (existing Capital Project). Such agreements could include LoS related terms such as:

- General terms of water purchase, governance, and administration
- Quality of delivered water and responsibility for surveillance/monitoring
- Allocation and water supply
- Defined ranges of demands (e.g., peak, daily, maximum day, annual, etc.), hydraulic grade line limits and service areas
- Water conservation commitments
- Asset ownership and transfer points
- Define comprehensive transmission/supply and distribution systems criteria and collaborative systems development
- Asset management and risk mitigation investments and,
- Acceptable duration for interruptions to service, including major emergencies.

It is important to define these LoS issues as they set the criteria and framework for RWS utility planning. The existing RWS system has been well managed and has benefitted from capital and other investments in the system that resulted in many years of reliable and cost-effective service (e.g., raising of Sooke Lake Dam and Reservoir, replacement of Main No. 1, etc.). The CRD will need to continue to identify system limitations and improvement measures as water demand increases and the ultimate capacity thresholds are approached and surpassed.

3.0 WATER DEMANDS

Planning of the water supply requires the prediction of future water use, or demand forecasting, in order to anticipate and address limitations in capacity and plan for new infrastructure at the optimal time. Forecasting demands involves uncertainty due to the limited precision with which population growth rates can be predicted and inherent uncertainty of future water use patterns. Historical information provides a sound basis for prediction of demands, provided the future growth patterns and water use remain similar to what has been previously experienced. For this study the CRD has provided good historical consumption data which provides a basis for establishing trends in demands and historical water use patterns. However, any forecast results require regular periodic review and evaluation with corrections applied to future demands as new information becomes available and policies change. Subsequent long-term planning iterations may then adjust the schedule and sequence of required capacity related improvements accordingly. Demand forecasts will be developed to include several planning horizons. The planning horizon of 2050 has been established as requested by the CRD for treatment and transmission evaluations. A longer term planning horizon of 2100 for a deep intake on Sooke Lake Reservoir and associated conveyance of raw water is considered appropriate because the service life of these major assets is typically 75 years or more and future staged expansion of these facilities is difficult and costly.

The RWS customer demand is primarily residential (64%), other sector uses include: ICI (22%), agricultural (3%) and non-revenue water (approximately 11%). CRD demand management efforts have focused primarily on residential demands and to a lesser extent ICI and agricultural. The ICI component is a significant demand worth considering for future demand management initiatives.

3.1 Historical Population Growth

Key considerations in demand forecasting include historical patterns of population growth and associated water demand. Statistics Canada uses a Victoria metropolitan census area that corresponds closely with the Regional Water Supply Service Area boundaries. The CRD has developed historical population estimates for the Regional Water Supply service area for non-census years and corrections for the population not connected to the Regional Water Supply Service area. Estimates for the years 1995 to 2019 are outlined in **Table 3.1** with the corresponding annual growth rate. The average population growth rate from 1995 to 2019 was 1.1%. The average for 2010 to 2019 was 1.5%. As is common in British Columbia, many communities have seen periods of several years where growth has been above average but historically the growth rates in the CRD have been approximately 1.1% when a longer horizon is reviewed.

Table 3.1: Historical Population and Annual Growth Rates for the Regional Water Supply Service Area (1995 - 2019)

Year	Population	Growth Rate (%)
1995	300,400	-
1996	302,400	0.7
1997	306,400	1.3
1998	307,700	0.4
1999	308,900	0.4
2000	309,600	0.2
2001	310,400	0.3
2002	312,700	0.7
2003	315,400	0.9
2004	317,800	0.8
2005	322,400	1.4
2006	325,400	0.9
2007	327,500	0.6
2008	331,100	1.1
2009	334,100	0.9
2010	337,400	1.0
2011	339,227	0.5
2012	344,450	1.5
2013	349,638	1.5
2014	356,299	1.9
2015	365,112	2.5
2016	372,975	2.5
2017	377,865	1.3
2018	382,625	1.3
2019	387,400	1.2

The 1994 Plan predicted populations of 389,000 in 2012 compared to actual of 344,450 and 667,000 in 2044. Based on historical census data these estimates have been overly conservative. For this reason, it is appropriate to look at sensitivity of population impacts from different growth scenarios. Section 3.2 presents a sensitivity analysis of three different growth scenarios and provides recommendations for future population projections.

3.2 Projected Population Growth

The regional population growth has varied depending on factors such as birth rate, life expectancy, employment, and migration. Projections of future population are difficult to predict and net migration to the CRD area is anticipated to be the most significant factor (BC Stats 2019). Population projections developed by BC Stats for the CRD used an average annual population growth rate of just under 1% and predict a decrease in growth starting mid-century. A more conservative approach is justified for population projections and associated water demand forecasts used for long-term planning of high cost and long-life infrastructure. Three annual population growth scenarios were considered for projections: 1.0%, 1.25%, and 1.5%. While these population projections will be used to forecast future demands for planning purposes, it is important that they be reviewed and reassessed periodically at intervals of ten years or less or when CRD planning and Statistics Canada Census information is updated. The population projections for the three scenarios are displayed in **Table 3.2** for the planning horizons corresponding to years 2030, 2050, and 2100. The historical and projected population scenarios are plotted together in **Figure 3.1**.

Table 3.2: Projected Population of Service Area for Three Population Growth Scenarios

Year	Low (1.00% Annual Growth)	Med (1.25% Annual Growth)	High (1.50% Annual Growth)
2030	432,000	444,000	456,000
2050	527,000	569,000	615,000
2100	867,000	1,060,000	1,294,000

The choice of year as a planning horizon depends on the nature of the water supply facilities to be constructed. For medium range planning purposes, the year 2050 is appropriate and would include the potential staging of additional treatment works and related infrastructure. For the purposes of designing assets, such as deep intake structures drawing from the northern basin of the Sooke Lake Reservoir and any associated tunnels used for raw water conveyance, an extended planning horizon to 2100 is justified.

The intermediate growth rate scenario of 1.25% corresponding to a projected population of 569,000 for year 2050 is recommended for actual planning level use, with the high and low scenarios providing an indication of the magnitude of probable range of estimates expected.

It is important to note that when developing water demand forecasts based on a per-capita demand model, the projected population introduces the greatest source of uncertainty in the results compared to uncertainties in the actual demand assumptions (AWWA 2017). Furthermore, the uncertainty increases considerably with time. The impact of uncertainty in forecasted demands must be considered in planning and design efforts. Equally important is keeping good records of actual water use, which the CRD has done for many years.

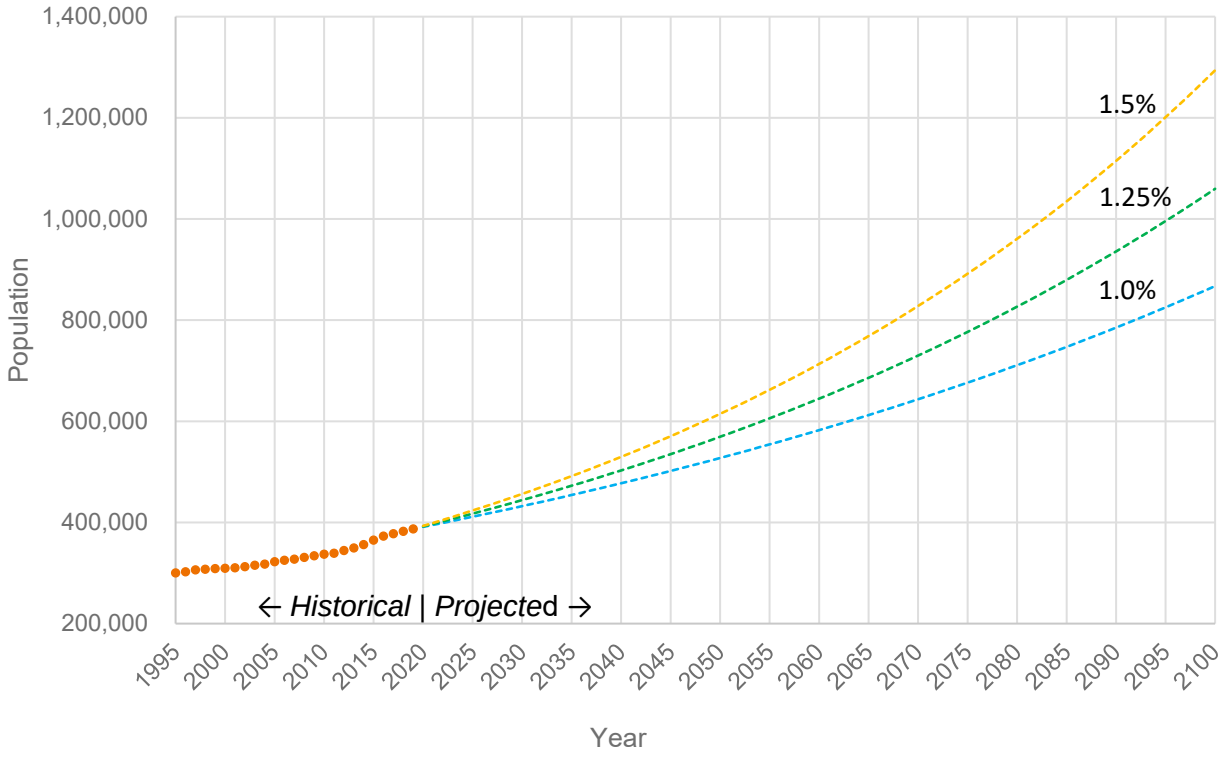


Figure 3.1: Population Projections to 2100 for Low (1.0%), Medium (1.25%), and High (1.5%) Annual Growth Scenarios

3.3 Water Use and Demand Projections

3.3.1 Historical Demand

Demand projections involve the prediction of future water demands based on historical water use. Key demand parameters will be defined and their historical trends considered. Demand data is based on production records and is not disaggregated by end-use, customer type, or municipality. There is an assumption that water use segregation between residential, ICI and agricultural consumption will remain consistent with population growth.

Average Day Demand (ADD)

The Average Day Demand (ADD) is the total volume of water delivered to the water system in one year divided by days in a year. The units are either million litres per day (MLD) for the system total demand or litres per capital per day(L/c/d)with normalizing by the population estimate. The ADD has generally decreased over the past two decades due to CRD water conservation efforts and use of low flow fixtures and appliances, from a peak of 172 MLD in 1998 to a low of 132 MLD in 2019. The average per capital day demand from 1998 to 2019 was 450 L/c/d. The average ADD from 2010 to 2019 was also 132 M. The per-capita ADD has also declined steadily over that period from 546 L/c/d in 1995 to 254 L/c/d in 2019. The per-capita ADD average has flattened out for the last 10 years so the average from 2010 to 2019 of 366 L/c/d was used to project future demands. These observations are consistent with the experience of water utilities across North America and partly due to improved appliance and plumbing fixture efficiency and conservation efforts.

Winter Day Demand (WDD)

The Winter Day Demand (WDD) is the average daily demand observed during the winter or off-peak period for a given year starting from the first day in November of that year and ending the last day of February of the following year (4 months). As with ADD, the units of WDD are either MLD or L/c/d for system total and per-capita demands, respectively. The WDD is assumed to strongly correlate with the year-round indoor residential demand and population served because there are negligible irrigation and tourism demands in the winter season.

During the winter, the daily demand fluctuates minimally within a given year as demands are largely based on indoor uses and are assumed to directly relate to population served. A slight downward trend corresponds to steady adoption and spread of high efficiency fixtures and appliances used within homes and businesses, such as low flow toilets, shower heads, dishwashers, and washing machines. For example, until the mid-1980s toilets used 20 L per flush. Building codes now require residential toilets that flush 4.8 L or less, and older existing toilets are slowly being replaced. Similar trends have occurred with washing machines and dishwashers. An increasing awareness among the public of the importance of water conservation has likely contributed to the trend.

Using the period of November 1st of a given year to the end of February of the following year, the average WDD has decreased from a peak of 129 MLD in 1998 to 98 MLD in 2019. The average WDD from 2010 to 2019 was 99 MLD. The per-capita WDD has decreased from 424 L/c/d in 1996 to 254 L/c/d in 2019. The average per-capita WDD over 2010 to 2019 was 274 L/c/d.

Table 3.3: Average Daily Demands for 2010-2019 for RWS (GDF and SRRDF)

Demand Parameter	Demand (MLD)	Demand (L/c/d)
ADD	132	336
WDD	99	274
MDD	242	-
M3DD	226	-
M5DD	218	-
PHD*	321	-

*2016-2020

Maximum Day and Peak Hour Demand (MDD and PHD)

The Maximum Day Demand (MDD) is the largest volume of water delivered to the system in a single day for a given year. The Peak Hour Demand (PHD) is the maximum volume delivered in one hour on the maximum demand day. Peak hour demands occur in any 24-hour period throughout the year, but the highest PHD usually occur in the summer months when irrigation demands are the greatest. Both MDD and PHD are expressed in units of mega litres per day (MLD). The water supply assets collectively must be capable of providing the MDD. The PHD is typically used for sizing of storage, pumping, and distribution facilities.

The RWS maximum day demand (MDD), usually occurring in July or August, has significantly decreased over the past three decades, consistent with North America-wide trends. The decrease

is generally due to ongoing conservation efforts, greater efficiency, enforcement of watering restrictions, public education, as well as metering and billing based on volumetric usage.

The MDD has declined to 224 MLD in 2019 from a high value of 369 MLD in 1985. During the extreme hot heat dome in June and July 2021, a single day demand of 274 MLD was experienced. This was the highest maximum day demand since the 2009 drought when a demand of 293 MLD was experienced. The average MDD during 2010 to 2019 period was 242 MLD. The per-capita MDD has declined from approximately 1100 L/c/d in 1995 to 578 L/c/d in 2019. The average per-capita MDD over 2010 to 2019 was 673 L/c/d. The MDD is largely a function of outdoor irrigation and agriculture. Further decreases may occur due to increased densification and the greater proportion of multi-family over single-family dwellings. Changes to landscaping practices, plumbing fixtures and washers that require less water may also decrease MDD. However, increased agricultural activity within the service area or relaxation of bylaw watering restrictions could have the opposite effect and continued diligence on water conservation measures is important.

The PHD observed on the maximum day has been evaluated based on CRD combined flow data for water supplied from both the Goldstream and Sooke River Road disinfection facilities over the years 2016 to 2020. The PHD for the full system has ranged from 311 to 339 MLD, with an average of 321 MLD. This represents a PHD to MDD peak factor of 1.36 on average over this time.

The ratio of MDD:WDD has been relatively stable over both the 1995-2019 and 2010-2019 periods, averaging in both cases to 2.46. This supports the assumption that declines in both indoor and outdoor demands have been comparable and that the aggregate mixture of customer types has been similar. This assumption should be confirmed in future reviews of demands.

Maximum 3-Day and 5-Day Demand (M3DD / M5DD)

Additional parameters of potential importance are the maximum 3-day demand (M3DD) and maximum 5-day demand (M5DD), which averages the daily demands spanning one or two days on either side of the maximum day, respectively. These values both declined similarly to the MDD, from 369 and 338 MLD in 1985 to averages of 226 and 218 MLD over the period of 2010 to 2019, respectively. Interestingly, the ratios of MDD to both M3DD and M5DD have remained relatively constant over the past 10 and 25 years at 1.07 and 1.11, respectively. These multi-day demand parameters are valuable when considering capacity trade-offs in finished water production at the existing disinfection facilities and future filtration plant, clearwell and system storage. Increases in system storage capacity for peak demand flow balancing allow a smaller treatment plant and cost savings.

For the period of 2010 to 2019, the average total and per capita demands are summarized in **Table 3.3** and the average demand ratios are summarized in **Table 3.4.**

Table 3.4: Average Demand Ratios for 2010-2019 for Regional System (GDF and SRRDF)

Demand Parameter	Ratio
ADD:WDD	1.34
MDD:WDD	2.46
MDD:M3DD	1.07
MDD:M5DD	1.11
PHD:MDD*	1.36

*2016-2020

Long-term planning requires consideration of the total volume of water used by the regional system each year to assess aspects such as water license allowance and reliability of source yield. Total annual demand and total summer demand are two demand parameters are commonly used for long-term planning.

Total Annual Demand (TAD)

The total annual demand (TAD) represents the total volume of water used by the system in a year expressed in millions of cubic meters (Mm^3). The TAD for the Regional Water Supply Service, increased steadily since the 1940s to surpass 30 Mm^3 around 1970. The early 1980s saw a rapid increase, exceeding 40 Mm^3 around 1980. Between 1985 and 2010, TAD fluctuated between approximately 50 and 60 Mm^3, remaining below 50 Mm^3 from 2011 to the present. The average TAD from 2010 to 2019 has been 48 Mm^3 (excluding conservation demands) comparable to levels seen in the early 1980s when the population was approximately half of what it is today. Note that all demand values discussed in this report represent the total water supplied to the entire regional water system, including residential, industrial, commercial, institutional, and agricultural customers, as well as non-revenue water. The total annual demand is useful when assessing the adequacy of lake reservoir storage and the seasonal impacts on water levels in Sooke Lake Reservoir.

Total Summer Demand (TSD)

Of particular importance in managing Sooke Lake Reservoir levels is the portion of the annual demand occurring during the dry summer months and high demands due to outdoor use, particularly irrigation by residential, commercial, and agricultural customers. Daily demands fluctuate depending on temperature, precipitation, and regulated irrigation watering days. The Total Summer Demand (TSD) represents the total volume of water used by the system in a year between May 1st and October 1st (five months) expressed in Mm^3. During this period stream inflows to Sooke Lake Reservoir effectively cease and the level of the reservoir generally declines until the resumption of significant precipitation and cooler weather, typically in October. Water system demand fluctuates the greatest during the summer, depending on the daily temperature and precipitation. Over the past 25 years, the TSD has averaged 29 Mm^3, with a peak of 34 Mm^3 in 1998, followed shortly by the minimum of 22 Mm^3 during a drought in 2001 (involving Stage 3 watering restrictions). The average over the period of 2010 to 2019 was 27 Mm^3. The ratio of the TSD to TAD over the periods of 1995-2019 and 2010-2019 has been 0.55 in both cases.

Table 3.5: Average Annual Demand Volumes for 2010-2019 for RWS (GDF and SRRDF)

Parameter	Value
TAD	48 Mm^3
TSD (5 months)	27 Mm^3
TSD/TAD	0.56

3.3.2 Future Demand Forecasts

The development of future demand forecasts for the Regional Water Supply involves the following approach and assumptions:

1. Use a conservative approach to project from current per capita demand levels and assume no further decline in demand due to improved conservation and efficiency. This assumption should be reviewed every 5 years and particularly after new water conservation measures are implemented and their effectiveness analyzed. The impacts on summer demand of future climate change should also be considered and if necessary, a climate change factor should be included in future projections. The 2021 Heat Dome is a good example of how extreme hot weather due to climate change can impact MDD. Future adjustments to projections can be made if necessary.

2. Assume constant per-capita WDD, MDD:WDD, ADD:WDD, and TSD:TAD remain at average values for 2010 to 2019 until the year 2100.

3. Assume constant PHD:MDD at average value of 2016-2019 until 2100.

4. Calculate WDD for future years by the product of per-capita WDD and projected population.

5. Calculate ADD and MDD for future years as the product of WDD of future years and the constant ratios ADD:WDD and MDD:WDD, respectively.

6. Calculate PHD for future year by the product of MDD of that year and the constant ratio PHD:MDD.

7. Calculate the TAD of future years as the forecasted ADD of that year multiplied by number of days in that year.

8. Calculate the TSD of future years as the product of TAD of that year multiplied by the constant ratio TSD:TAD.

9. Conservations flows for ecology or fisheries will be in addition to domestic drinking water demands so these should be considered when assessing the yield capability of the source to supply total water demands.

This approach and its assumptions imply that the mixture of demand types and proportions remain effectively the same in aggregate into the future. Such assumptions require regular re-evaluation, assessment, and correction to the forecasted demands but are suitable for Master Planning level evaluations and planning when capacity expansion to RWS facilities is required.

The declining historical and future constant per-capita WDD are illustrated in **Figure 3.2**.

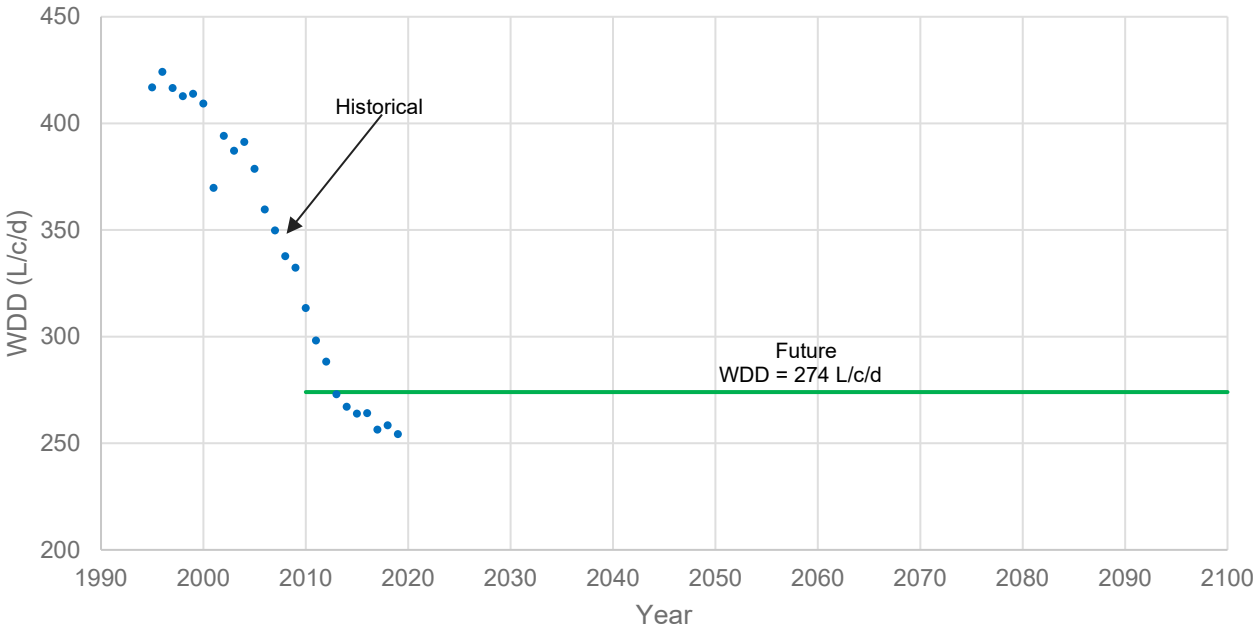


Figure 3.2: Historical and Future Per-Capita WDD

By applying the three population growth scenarios (1.0%, 1.25%, 1.5%), a constant per-capita WDD of 274 L/c/d based on the average over the past decade and applying the average MDD:WDD ratio corresponding to the same period, the following demand forecast is produced as shown in **Figure 3.3.**

These projections predict a flattening or reversal of the declines in demand observed over the past 15 years, returning to system demand levels of the early 1990s. Consequently, capital improvements for transmission system are anticipated to focus primarily on addressing existing deficiencies, improvements in resiliency, and needed rehabilitation and replacement efforts as well as population growth.

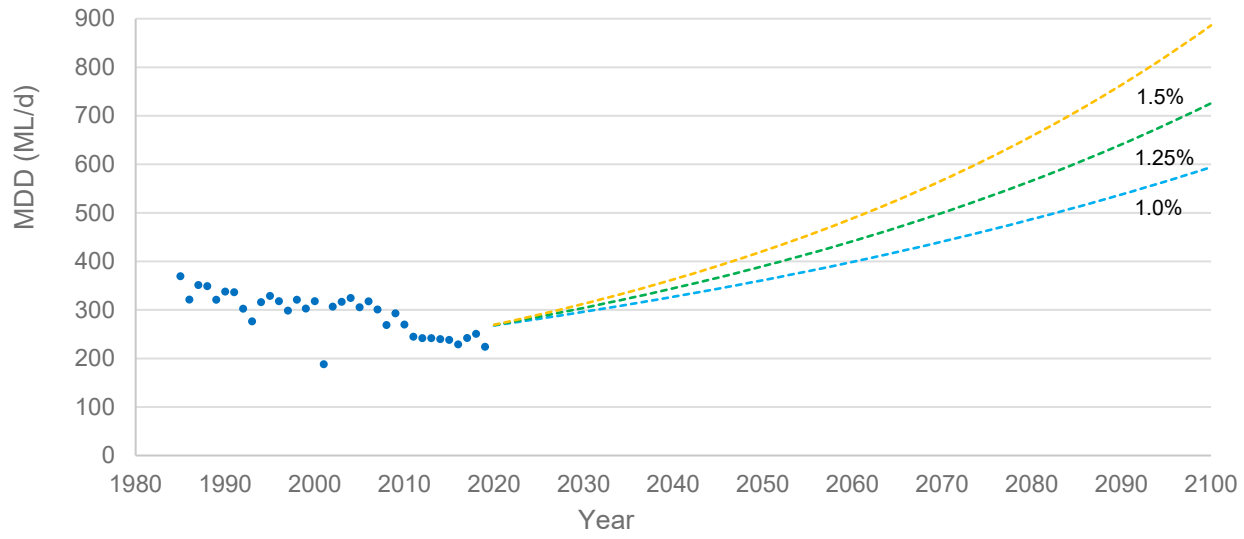


Figure 3.3: MDD Forecast for 2020 to 2100 for Annual Population Growth Scenarios

At the 2050 planning horizon, the MDD is expected to attain the peak levels seen in the mid-1980s mainly due to population growth. Subsequent growth beyond 2045 will require additional source development such as diversion of Leech River, new infrastructure, and increased capacity for the system, in addition to any ongoing replacement and rehabilitation. For the purposes of planning the proposed Deep Northern Intake and raw water conveyance investments from Sooke Lake Reservoir, the planning horizon of 2100 is considered assuming full redundancy, though the uncertainties in forecasted demands are greatest at this distant horizon. Numeric values for the various demand parameters are tabulated in **Table 3.6.**

Table 3.6: Forecasted Daily Demands (MLD)

Planning Horizon	Demand Type	Low (1.0%)	Med (1.25%)	High (1.5%)
2050	WDD	145	156	168
	ADD	188	203	219
	MDD	361	390	421
	M3DD	337	364	393
	M5DD	325	350	378
	PHD	491	530	572
2100	WDD	238	290	355
	ADD	309	377	461
	MDD	594	726	886
	M3DD	555	678	828
	M5DD	534	652	796
	PHD	807	986	1204

The TAD and TSD projections to 2100 are shown in the **Figure 3.4** for the three growth scenarios and summarized in **Table 3.7**. These forecasted demands should be considered when evaluating the adequacy of existing water licenses, the safe yield of current sources, and planning the possible development of other sources such as the Leech watershed. The projected range of TAD agree with estimates produced by CRD Environmental Services, using the same initial condition and similar growth scenarios.

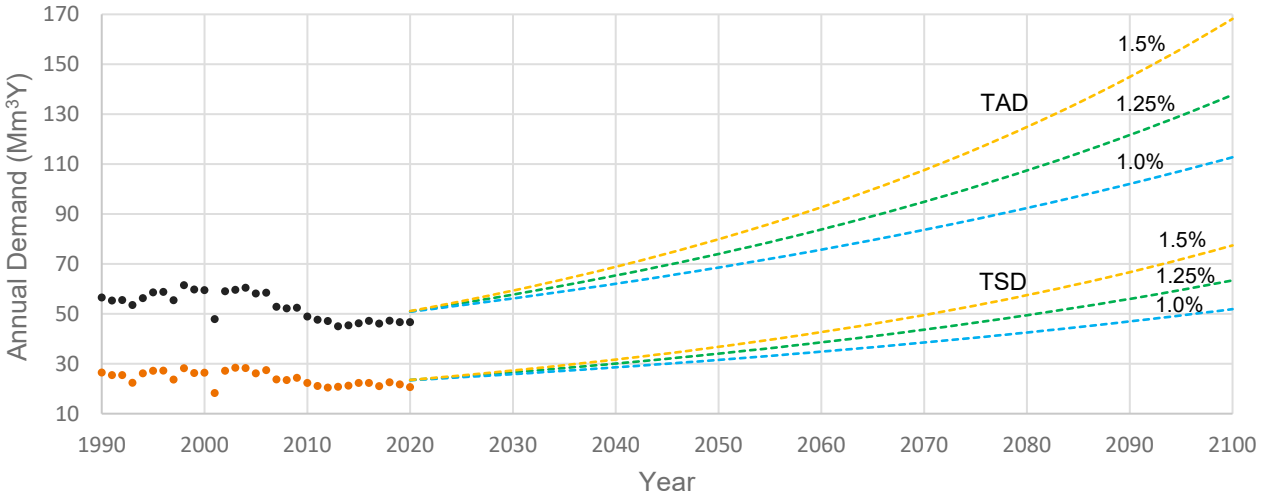


Figure 3.4: Total Annual and Summer Demands – 2020 to 2100 (growth rates indicated)

Table 3.7: Forecasted Total Annual and Total Summer Demand (Mm^3)

Planning Horizon	Demand	Low (1.0%)	Med (1.25%)	High (1.5%)
2050	TAD	69	74	80
	TSD	38	41	45
2100	TAD	113	138	168
	TSD	63	77	94

From the above analysis, the medium growth scenarios results are suggested for planning purposes, with the high and low scenario results providing an estimate of uncertainty. As the peak demand parameters are of greatest importance in system planning and design, the recommended values are summarized in **Table 3.8** using the medium growth (1.25%) scenario and rounded to the nearest 10 MLD. The corresponding projected values for the year 2030 are provided to guide subsequent revaluation and corrections, as the shorter-term predictions are anticipated to involve the least uncertainty. The current demand values, expressed by the average values observed over the period of 2010 to 2019. The historical peak values for these parameters are also included. In the case of daily demands, a peak was observed in 1985 at comparable levels to those forecast for 2050 in the medium growth scenario.

Table 3.8: Summary of Historical, Current, and Forecasted Maximum Day and Peak Hour Demands (MLD)

Demand	Past Peak	Current	Planning Horizons		
	1985	2010-2019	2030	2050	2100
MDD	370	240	300	390	730
M3DD	350	230	280	360	680
M5DD	340	220	270	350	650
PHD	530[a]	320[b]	410	530	990

a. 1994 - GVWD Long Term Water Supply Plan
b. 2016-2020 Average
c. Projections are rounded.

The TAD and TSD values are summarized in **Table 3.9**. In this case, TAD and TSD peaks occurred in 1998, coinciding with levels forecast to occur regularly between 2030 and 2050.

Table 3.9: Summary of Historical, Current, and Forecasted Total Demands (Mm^3)

Demand	Past Peak	Current	Planning Horizons		
	1998	2010-2019	2030	2050	2100
TAD	63	48	58	74	138
TSD	35	27	32	41	77

Several key observations can be made from the above analysis. Firstly, the next two decades provide an opportunity to address needed improvements to the reliability and resiliency of the existing system while simultaneously developing new source capacity before it is needed. Secondly, the total draws on the source are predicted to exceed their historical peaks during the period of 2030 to 2050 (approximate 2045) assuming no further reductions in demand due to additional efficiency and conservation measures. It is also noted that the total demands outlined in the tables above do not include the environmental flow needs flows which are constant at 5.4 Mm^3Y and are used to assess the adequacy of the water sources.

3.4 Demand Management

As the population served by the Regional Water Supply Services continues to grow, eventually a point will be reached when the demand will exceed the reliable safe yield of the source water, incurring a deficit and requiring capital expenditures to develop additional source capacity. The demand forecasts developed involve the conservative assumption that no further reductions in total per-capita demand are expected in the future below the average observed over the period of 2010 to 2019. However, for the past three decades a significant decline in demands has been observed consistent with trends experienced across North America. Not only have total per-capita demands decreased, total annual, average daily, and maximum daily demands have also declined despite population increases. Such declines are due to greater conservation, efficiency in plumbing fixtures and appliances and successful demand management initiatives by the CRD. The CRD should continue with their conservation and public education program for residential, agricultural and ICI users.

Future demands will depend on actual population growth, housing density, landscaping practices, weather, lifestyle changes, industrial and agricultural activity, legislative changes, technology enhancements, water pricing and other factors. In addressing the questions of future source capacity and reliability, it is rational to consider what additional impacts the current and future demand management activities may have on future demands and further deferral of capacity increases.

The AWWA defines demand management as "*the practice of systematically reducing water use for a broad spectrum of utility customers through efficiency measures and conservation, often as an alternative to purchasing new water or expanding water treatment facilities*." (M52 – Water Conservation: A Planning Manual).

3.4.1 Brief History of Key Demand Management Efforts in Greater Victoria

The overall demand management philosophy has been to continue deferral of supply expansion by achieving cost-effective and long-lasting reductions in water use using an adaptive approach that allocates resources based on trends relative to program goals. CRD's approach to demand management has been quite successful and should continue to optimize use of the water resources with the WSA.

A brief history of some of the key elements in the demand management efforts of the CRD and its predecessor is described below. Public outreach and education have been a major element and has assisted in fostering a cultural shift in consumers.

1993 Public education efforts regarding water conservation and encouragement of voluntary outdoor water use restrictions began following a dry period experienced across most of North America during the late 1980s and early 1990s.

1994 Development of a regional Demand Management Program a key recommendation of the 1994 *Long Term Water Supply Plan,* with focus to be directed at the residential sector comprising approximately 70% of total water use. First initiative was a rebate program to encourage adoption of low flush toilets.

1997 Enactment of the *Capital Regional Water Supply and Sooke Hills Protection Act* and Regulation established CRD authority over a Regional Water Supply, including the requirement to "encourage effective conservation of the water supply".

1999 The Strategic Plan for Water Management, Volume 1 – Supply Management and Demand Management was prepared for the CRD and included a reexamination of the recommendations of the *1994 Long Term Water Supply Plan*. Demand Management program options were developed for moderate and aggressive efforts, with a moderate level of effort selected.

2001 In 2001 the CRD experienced a drought condition and low Sooke Lake Reservoir water levels. In February of 2001 the CRD adopted the Water Conservation Bylaw 3061 establishing mandatory outdoor water use restrictions to be scheduled between June 1st and September 30th and enforceable throughout the service area to reduce peak day demand and manage water supply. Initial Stage 1 restrictions allowed watering of lawns twice per week, Stage 2 once per week, and Stage 3 no

lawn watering permitted. Advancement to Stages 2 or 3 are determined by the CRD based on multiple considerations, particularly Sooke Lake Reservoir level. Stage 3 restrictions (no lawn watering) were imposed from April 2 to December 18, 2001, relaxing to Stage 2 until January 8, 2002.

2002 Rebate program extended to high efficiency front-loading washing machines.

2003 Water Conservation Bylaw amended to advance Stage 1 seasonal water restriction schedule starting May 1st to further reduce outdoor water use.

2004 Demand Management program expansion into the industrial, commercial, institutional (ICI) sector, to include water use audits, industry education, and infrastructure grants and rebates to promote and improve water efficiency. Rebates included encouraging replacement of 'once through' cooling systems using large amounts of water.

2005 Changes to the plumbing code result from the Water Conservation Plumbing Regulation under the Local Government Act. New toilets must be low flush type with a maximum flush volume of 6 L per flush, a significant reduction from older toilets with flush volumes from 13 L to more than 20 L per flush.

2017 Water system audit completed for the RWS and JDFWDS, SPW service areas using the AWWA M36 methodology for treated water from source meters to connection points with retail municipalities, regional subsystems, and westshore communities. Non-revenue water components estimated, including real and apparent losses for key locations or customer connections and associated lost value.

2021 The Regional Water Supply Commission approves the administration of a once-through cooling equipment replacement rebate program in the 2022-2026 budgets to continue promoting water efficiency in the industrial, commercial, institutional (ICI) sector.

3.4.2 Current CRD Demand Management Program

Ongoing demand management activities are described in a report submitted by the CRD's Environmental Protection as an update to the Regional Water Supply Commission on February 17, 2021. Key priorities and deliverables involve public outreach and education, research, and technical assistance to improve efficiency. Current demand management activities are described as follows:

- Research and Planning
  - Long-range water demand forecasting tool
  - Seasonal Demand Analysis
  - Agricultural Trend Analysis
  - Local Government Supply and Demand Analysis

- Residential Water Conservation
  - Go Golden Campaign promotes the reduction of non-essential outdoor watering of residential lawns
  - Strive for Five Campaign promotes behavioural change to reduce shower time among the young adult demographic for the second largest contribution to indoor water use
  - Development of educational water videos covering outdoor water use tips, irrigation system best practice, and the benefits of conservation
  - Irrigation Management involves promotion of irrigation best practices to reduce waste, promote healthier plants and encourage use of native plant species
  - Fix a Leak Program promotes awareness and proactive leak detection habits by homeowners to reduce an estimated 14% of residential indoor water use lost to leaks
- Industrial/Commercial/Institutional (ICI) Water Conservation
  - Water Use Assessments target high water users in the retail sector for voluntary participation in audit and promotion of water efficiency practices
  - Targeted Building Owner Outreach to address water efficiency practices by businesses that share a water bill based on square footage rather than usage
  - Landscape Water Calculator is a map-based tool to be customized for the Greater Victoria region to calculate the water budget of for a given property
  - Aerator Replacement Program to improve water efficiency of faucets at commercial facilities
  - Once-Through Cooling (OTC) videos being developed to continue educational approach of discouraging use of OTC equipment and promote replacement with alternative cooling systems

3.4.3 Potential for Further Demand Reductions

Forecasted demands have been projected from current day demands based on evaluation of historical consumption records. It is reasonable to expect improvements in conservation and efficiency to continue up to a certain limit. To what extent such improvements will have a meaningful impact on water demands is less certain. Any significant reductions will effectively offset anticipated demand increases and further defer source development and infrastructure capacity expansion requirements. Changes in local regional policy such as watering restrictions, move to xeriscape landscaping, rate structures and other initiatives have the potential to further reduce water demands.

The total (all in) per-capita demand can be calculated by taking the sum of all water uses including residential, ICI, agricultural and nonrevenue water and dividing by the population estimates for the given year. This allows comparison with other relevant jurisdictions and industry averages. The total per-capita demand of the Regional Water Supply has declined significantly from 546 L/c/d in 1995 to 337 L/c/d in 2020. The ten-year average over 2010 to 2019 was 366 L/c/d. The CRD estimates that the total demand may currently be disaggregated by sector as follows:

residential (64%), ICI (22%), agriculture (3%), and non-revenue water (11%). This implies that the residential only per-capita demand for 2020 was approximately 240 L/c/d. A 2016 study by the Water Research Foundation on residential end-uses of water reported a North America average of 220 L/c/d for residential per-capita demand. Using the USEPA WaterSense New Home Specification as the definition of a “high efficiency” home, it was also estimated that residential per-capita demand in high efficiency homes would be approximately 140 L/c/d. The most significant criteria for high efficiency homes are toilets that use less than 7.6 L per flush and clothes washers that use less than 114 L per load. Appliances that meet or exceed these specifications are currently common and many homes in the RWS have already converted to these appliances. Eventually, as older fixtures and appliances are replaced, the high efficiency home of today may be the standard home in the future.

Outdoor water use can be estimated from the ratio of ADD to WDD and has historically fluctuated between 30% and 40% of total water demand, with a minimum occurring at 17% for the year 2001 when Stage 3 restrictions were applied from April to December. The ratio of MDD to WDD has remained relatively constant around 2.5. Reductions in outdoor demand may result if the proportion of high-density housing grows and landscaping and behavioural practices favour increased conservation. Reducing irrigation water consumption during the summer months is of paramount importance because of little to no yield from any of the watersheds in the summer months.

The intermediate population growth scenario estimates for the 2050 MDD (used for sizing of filtration facilities) will be reduced from 390 MLD to 316 MLD and the TAD will decrease from 74 Mm^3 to 67 Mm^3 (the 1:50 year drought safe yield) if a modest 10% reduction in both the WDD and the peak factor MDD: WDD are applied to the demand forecast methodology. The universal spread of high efficiency fixtures and appliances and additional technological improvements could promote the continued trend in declining demand despite population increases.

Figure 3.5 shows the sensitivity and impact on the conservation of water in the Sooke Lake Reservoir for various demand management scenarios ranging from 200 to 300 L/c/d. As an example, reducing demand to 300 L/c/d results in extending the Sooke supply to 2060 while a target of 250 L/c/d could extend the source to 2070. The Sooke supply capability will reach its limit around 2045 with the current demand levels and an annual population growth of 1.25%. The red dashed line on Figure 3.5 shows the safe 1:50 year annual yield of the Sooke Lake Reservoir at 67 Mm^3. Using this graph, it is possible to project the life of the SLR using various demand scenarios. Modest and achievable reductions in demand, (e.g., 300 L/c/d from the current demand of 337 L/c/d) will go a long way to extending the life of the Sooke Lake Reservoir beyond the 2050 planning horizon.

Other areas for future demand management include outreach to ICI and agricultural water users and establishment of programs to conserve water for these users.

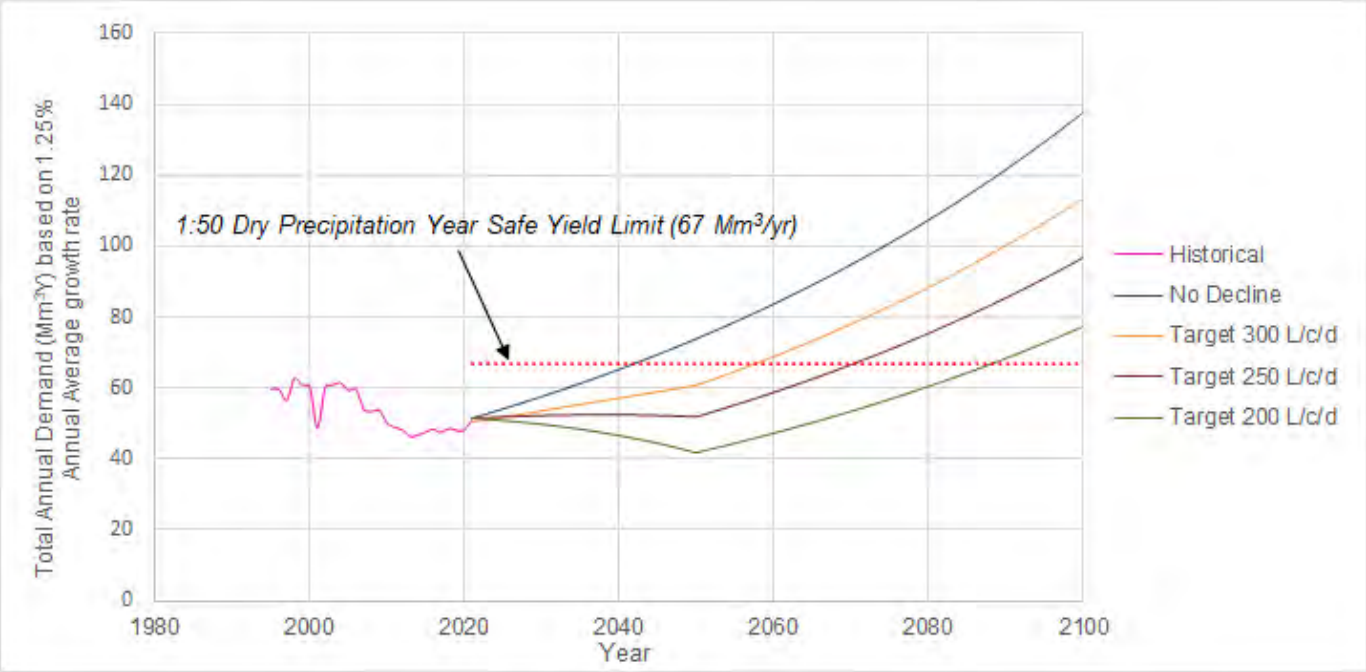


Figure 3.5: Total Annual Demand for Various Water Conservation Target Reductions

4.0 WATER SOURCES

4.1 Existing Sources of Water

The Regional Water Service has a number of surface water sources that are used for water supply. A description of the existing sources of water is provided below in **Table 4.1**.

Table 4.1: Watershed Information

Watershed	Catchment Area (ha)	Reservoir	Available Storage Volume (Mm^3)	Comment	
				Quality	Quantity
Sooke	8,682	Sooke Lake	92.7	High quality, especially in hypolimnion. Extensively monitored.	Accessible volume limited by existing intake elevation and finite watershed basin yield.
Goldstream	2,300	Butchart Lake	3.3	High quality. Monitored monthly (Goldstream) and quarterly (Butchart).	Can supply sufficient water during maintenance of Kapoor Tunnel, but storage is limited. Has up to 10 Mm^3 available for use. Not currently available for use in JDFWD Service and District of Sooke.
		Lubbe Lake	3.0		
		Goldstream Lake	3.6		
		Japan Gulch	0.08	High quality except if slides encountered on Goldstream River or algae due to shallow reservoir depth.	Minimal storage in Japan Gulch but storage reservoir is supplied from Goldstream River and releases from higher level Goldstream dams. Japan Gulch Reservoir HGL 132 m provides driving head to RWS when Head Tank HGL 169 m out of service.
Leech (Future)	9,600	Possible future reservoir or direct diversion from Leech River via Leech Tunnel	None	Generally good quality but has higher colour levels. Long-term watershed restoration and rehabilitation in progress.	Use of this source during summer requires development of a new impoundment dam and reservoir. Transferable flows to Sooke Lake Reservoir are possible by direct diversion during higher flow seasons. Potential to divert to Deception Gulch Reservoir and then SLR.
Council Creek	1,068	Council Lake (No dam)	No firm reservoir volume available	High quality	Has been used as a Sooke Lake Reservoir augmentation supply via Council Creek diversion structure and pipe (Main No. 12). The watershed

Watershed	Catchment Area (ha)	Reservoir	Available Storage Volume (Mm^3)	Comment	
				Quality	Quantity
					area of 1068 hectares is included in the Sooke Lake Reservoir total catchment area. Potential for reservoir storage development to be investigated.
Deception	650	Deception Gulch	4.0 Mm^3 to 6 Mm^3 at full supply level of 186.75 m	Currently not tested	Can be used to transfer future Leech River water to SLR.

The RWS previously included numerous smaller off catchment upland lakes including Mavis Lake and Jack Lake, Cabin Pond, Charters River, and Humpback Reservoir. These sources were decommissioned due to water quality concerns and a suspected cryptosporidium outbreak. Future use of these sources could be considered once a filtration plant is constructed or if required for additional water supply.

4.1.1 Sooke Watershed

The Sooke Lake Watershed consists of approximately 8,862 hectares net catchment area and is the primary source of water for the CRD's regional water supply. The Sooke Lake Reservoir created by the construction of the Sooke Lake Dam at the south end of the watershed enables impoundment of 92.7 Mm^3 of usable storage with the existing intake facilities. Approximately 98% of the watershed is owned and managed by the CRD. Sooke Lake Reservoir was initially impounded in 1915, with the original dam replaced by larger ones, first in 1970 and a second time in 2002. Two long ridges on either side of the reservoir define the watershed. The main tributary to the Sooke Lake Reservoir is Rithet Creek. It supplies about 25% of the water entering the reservoir from a drainage area of about 1,740 hectares. Water from approximately 546 hectares of the Council Lake watershed can be diverted into the reservoir through Main No. 12 and a channel.

Sooke Lake Reservoir tributary creeks cease significant inflow during the dry season from late spring until substantial rains return in late fall. Consequently, during the period from approximately May to October, the level of Sooke Lake Reservoir typically experiences a net decrease due to water demand, water released for downstream fisheries conservation and evaporative loss. Replenishment of this volume depends on the resumption of winter rains.

Sooke Lake Dam was raised in 2002 to create more storage. The full supply operating level is 186.75 m (spillway crest) and at this elevation there is 92.7 Mm^3 of storage available for use with the existing Sooke intake tower. Access to the intake tower and screen is via a bridge. Water is extracted from SLR using a multi-level intake port system which includes a fine 0.5 mm mesh travelling screen. Water can be extracted from SLR using a multi gate system at four different intake port elevations to enable extraction of water at lower levels as the reservoir level drops. The intake tower can draw water down to 170.4 m and provides head above the 169.16 m invert

of the lowest intake tower port. During normal operations in non-drought periods, the CRD does not draw the SLR down to low levels to protect water quality. For much of the winter the reservoir level exceeds the spillway crest elevation of 186.75 m.

A *Deep Northern Intake, Treatment and Transmission Study (Stantec 2021)* was completed to investigate the feasibility of installing a deeper intake to access water in the deep northern basin of the SLR. A review of lake bathymetry was undertaken to determine stage storage elevations for the reservoir. With the proposed Deep Northern Intake located at elevation 150.0 m the available lake volume that can be accessed with a lower intake is 137.8 Mm^3. This would allow the CRD to access cooler and better quality deeper northern basin water and from a lower level than is currently available from the Sooke Lake Dam intake tower. It is noted that to ensure replenishment of supply on an annual basis in the future once the safe drought yield of 67.3 Mm^3 /YR (see Section 4.2) is reached, the Sooke Lake Reservoir should not be drawn down below 177 m. Drawing the SLR below 177 m once the annual demand reaches 67.3Mm^3Y could also lead to water quality issues from low water levels in some areas of the reservoir and siltation associated with shore erosion. Stage volume data for the SLR is provided **Table 4.2**. As part of RWS normal operations the SLR is not typically drawn down below 175m due to concerns regarding water quality. The SLR water level operating range is illustrated in Table 4.2 in green font. The deeper intake would not provide any additional water supply by lowering the intake without the future diversion of the Leech River into the Sooke Lake Reservoir. Table 4.2 clearly illustrates that there is not significant advantage to lowering the intake below elevation 150 m due to the steep lake bottom bathymetry.

Table 4.2: Existing Bathymetry of Sooke Lake Reservoir

Elevation (m)	Lake Volume (Mm^3)	Percentage of Lake Volume (%)
186.75	160.3	100
185	147.5	92.0
180	115.3	71.9
175	88.1	54.9
170	67.6	42.2
165	52.3	32.6
160	40.2	25.1
155	30.5	19.0
150	22.5	14.0
145	15.9	9.9
140	10.7	6.7
135	6.8	4.2
130	3.8	2.3
125	1.7	1.1
120	0.6	0.4
115	0.02	0.01
113.6	0	0

The Stantec study concluded that the proposed deep northern intake would provide redundancy for the existing intake tower, improve supply resiliency during drought conditions and can be used during normal operations to enable access to cooler high-quality water. However, hydrological investigation indicates that the reservoir would have difficulty filling during a 1:50 year drought if water levels were drawn below 177 m for future increased annual demands up to 40% greater than current demands. While the second intake does provide redundancy and access to high water quality in deeper sections of the reservoir, it will not provide additional water supply as the Sooke watershed has a finite safe yield which is limited to an increase of 40% over existing annual demands in a 1:50 year drought. Extraction of demands greater than 40% over current levels will make it difficult for the reservoir to fill following a 1:50 year drought condition without Leech River flows. Other issues such as environmental impacts and reduction of water quality from significant reservoir level drawdowns would have to be assessed prior to lowering the reservoir below historical low operating levels for an extended period of time.

The primary benefits of constructing a deep intake are access to more storage and stable water temperature, high quality raw water not subject to algae blooms, redundancy from a second intake, and increased resiliency in the event the water level must be drawn down below typical drawdowns in a severe drought condition. The City of Las Vegas recently installed a second intake into Lake Mead to access lower portions of the reservoir. The severe droughts in the US Southwest in 2021 required the Lake Mead reservoir to be drawn down significantly below normal operating levels. The advantage of having the deeper second intake significantly improved the resiliency of the water supply during an emergency extended multi year drought condition. Without a deep intake, the City of Las Vegas would have had difficulty meeting their water supply demands in the summer of 2021.

4.1.2 Deception Gulch Reservoir

Deception Gulch Reservoir (DGR) is a shallow reservoir located adjacent to Sooke Lake Reservoir. The reservoir has a catchment area of 6.5 km^2 and a volume of 1.5 Mm^3. The reservoir is shallow and is not used as part of the drinking water system. Limited water quality information is available for this reservoir so further water quality sampling is required to confirm the viability for use as a drinking water source. This reservoir does warrant further investigation as a potential receiving reservoir for diverted Leech River water. Improvements to the Deception Gulch Dam and spillway and Sook Lake Saddle Dam would be required. The Deception Gulch Reservoir could serve as a receiving reservoir for water diverted from Leech, which could then be transferred to Sooke Lake Reservoir. The existing gate system would have to be rebuilt and the hydraulics of transfers from Deception Gulch Reservoir to Sooke Lake Reservoir will have to be confirmed. Upgrading of the Sooke Lake Saddle Dam would be required to facilitate the water transfer to SLR.

4.1.3 Council Creek Watershed

Council Creek is a small watershed which has been used as an augmentation supply for Sooke Lake Reservoir. The catchment is relatively small, at 1068 hectares and there is no storage in this catchment but there is a small lake (Council Lake). It may be possible to construct a dam in this watershed to provide additional reservoir storage. Further investigation on the potential for storage development on this source may be warranted. Water is diverted to SLR via Main No. 12 and a channel.

4.1.4 Goldstream Watershed

The Goldstream Watershed is approximately 2,300 hectares in size and is used as a secondary or emergency source of water when the Sooke Lake Reservoir watershed is offline for the Kapoor Tunnel inspection and maintenance. A series of four reservoir impoundments store water from the Goldstream Watershed, consisting of the Butchart, Lubbe, Goldstream and Japan Gulch Reservoirs. The Goldstream reservoirs store about 10 Mm^3 of water. Approximately 98% of the watershed is owned and managed by the CRD. An intake facility from the Goldstream River to Japan Gulch Reservoir supplies screened water to the Goldstream Disinfection Facility when activated. One of the issues with this source is that it can be subject to turbidity fluctuations during high rainfall due to slides which occur in the Goldstream River Canyon upstream of Japan Gulch Reservoir. The Goldstream watershed serves a valuable function as a secondary or emergency supply and can supply water for 2 to 4 weeks depending on demand and water quality conditions.

Connecting the Goldstream source directly to the transmission system via a pipeline would improve the overall resiliency of supply as high-quality water could be extracted directly from Goldstream Lake rather than the Goldstream River which is prone to turbidity excursions during wet weather. A screened intake would be required in Goldstream Lake Reservoir for the piped transmission system and Japan Gulch would be removed from service.

4.1.5 Leech Watershed as a Potential Future Source

An area of nearly 9600 hectares within the Leech watershed was purchased in 2007 and 2010 from private forest land holders for use as a future source of water for the CRD's regional water supply. As the area was harvested starting in the 1960s and continued to 2007. Much of the area has been replanted and a long-term rehabilitation program is in progress to prepare the watershed for future use. Such activities include the reforestation, slope stability and soil erosion control, wildfire protection and forest fuel management, road deactivation, and fencing to reduce unauthorized access.

The quality of water available from the Leech watershed is suitable for use as a drinking water source with treatment of elevated colour levels and turbidity. Both of these water quality parameters could easily be removed with a filtration plant. The northern portion of the watershed consists of a high elevation plateau with three small lakes and numerous wetlands. The lower canyons have steep slopes and the West Leech and Leech Rivers, and Cragg Creek can have sediment issues during slope failures and major flow events. Efforts to restore the watershed ecology are ongoing but these efforts will not reduce the potential threat to water quality from slope failures in these canyons.

The potential yield of the Leech watershed is estimated to be greater than that of the Sooke and Goldstream watersheds combined, seasonal flows require the development of storage impoundment dams for which options are limited and would involve significant capital investment for construction of a new high dam in the Leech watershed. The cost for construction of new or multiple dams on Leech River will be significant and require further evaluation, geotechnical and hydrological study to confirm feasibility. Another option for consideration is construction of an intake on the Leech River and diversion to DGR via Leech Tunnel. This option would involve diverting water to DGR and then to SLR. Further hydrology and a reservoir operating model are required to confirm the feasibility of concurrent Leech River / Sooke Lake Reservoir operations.

The 1994 Plan considered several storage options. A 12 m high dam at the inlet of the Leech tunnel would provide an estimated 1 Mm^3 of storage, as well as provide adequate surcharge of the tunnel to increase the capacity of the tunnel to convey water to Sooke Lake Reservoir. A 50 m dam at the same location was estimated to provide 7 Mm^3 of additional storage. Also considered was the impoundment of Weeks Lake in the upper portion of the Leech Watershed using a drawdown channel and dam combination to provide an additional 10 Mm^3 of storage. The cost for construction of new or multiple dams on Leech River will be significant and require further evaluation, geotechnical and hydrological study to confirm feasibility.

As part of this 2022 Master Plan, Stantec investigated construction of a dam at a conceptual level to determine the viability of increased water supply from the Leech watershed. Preliminary modeling indicates it would be feasible to develop an additional 13 Mm^3 from Leech watershed with a high dam. The requirement to meet downstream fisheries conservation allocations may limit the amount of water that can be developed for drinking water in this source, but the CRD already has an existing water license on this source so discussions should be held with the province to ensure that CRD will have access to full licensed annual withdrawal of 30.8 Mm^3. Another option is direct diversion from the Leech River via a weir and intake which would discharge directly to the Leech Tunnel. This type of a system could be easily implemented at low cost but would likely only be useful in the shoulder seasons as inflows into Leech watershed are limited during the summer months, like the Sooke watershed.

The alternative options developed by the 1994 Plan for system expansion and upgrading include augmenting the Sooke Lake Reservoir with water transferred from the Leech Watershed and involve bypassing of the Deception Gulch Reservoir due to perceived water quality concerns. The water quality in Deception Gulch Reservoir requires further assessment through a detailed water quality sampling program. Diverting water to SLR via DGR would be more cost effective than construction of a pipeline or diversion channel to SLR. The mixing of Leech and Sooke source waters would accelerate the replenishment of the Sooke Lake Reservoir upon resumption of winter rains, thus alleviating the duration of the critical dry period to some extent and mitigating against back-to-back drought years. However, transfer of Leech River water to the Sooke Lake Reservoir will likely increase the need and/or level of treatment and increase the risk of algal blooms, depending on the resulting blend and nutrient levels. Ideally this option would also require the development of storage in the Leech watershed to provide a source of water for use during the summer high demand period. Alternatively, a direct intake into the Leech River could be considered to divert water to Deception Gulch Reservoir and then Sooke Lake Reservoir during the shoulder seasons when water is available from the Leech River.

In October 2021, the CRD completed the *Leech River Watershed Water Quality Analysis Report*. This report indicated that Leech River water quality was generally good but did have elevated levels of colour exceeding the 15 TCU threshold objective. Turbidity levels are slightly higher than Sooke Lake Reservoir with a mean value of 1.3 NTU. Colour and turbidity could be removed with a conventional filtration process to meet Provincial and Federal drinking water guidelines.

At a mid-range demand growth of 1.25% annually it is projected that the Leech water supply would have to be in service by the year 2045. This is the approximate year when the safe 1:50 drought yield of the Sooke watershed will be reached. Planning for diversion of the Leech River should commence by 2032 as it can take some time to conduct the required planning, environmental studies, design, and construction of works necessary to develop this source.

4.1.6 Reservoir Operating Balance Procedures

The CRD recognizes the importance of the reservoir operating procedures to reduce the risk associated with operating reservoirs at high water levels in the winter and to optimize the capture and use of water in each of their watersheds. The CRD is planning preparation of a hydrological model and reservoir water budget and operating rules model to optimize use of the Sooke Lake Reservoir, Council Lake, and the Goldstream reservoirs. Such a model would enable the CRD to optimize water use for domestic and downstream environmental flow needs. This model could also be used to optimize Leech River diversions to Sooke Lake Reservoir as well as being used to optimize reservoir storage development on the Leech River.

4.1.7 Other Surface Water Sources

It is prudent to first confirm the feasibility of storage or diversion from the Leech River watershed and then explore other opportunities beyond the Leech supply if necessary.

The 1994 Plan investigated other potential sources outside of the existing WSAs. These included the Upper Jordan Watershed / Bear Creek Reservoir operated by BC Hydro and Koksilah River Watershed. Both of these watersheds are remote from the transmission system and would involve significant capital investment to develop. The Upper Jordan Watershed is currently operated by BC Hydro for power generation so the likelihood of developing this source for drinking water supply would be remote.

The likelihood of developing additional water sources which are not currently under the control or jurisdiction of the CRD is remote. For this reason, optimization of existing sources in the WSA is the preferred strategy for providing additional water during the planning horizon for this 2022 Master Plan. Once filtration is in place, previously used and now decommissioned off catchment sources such as Jack Lake, Mavis Lake and Cabin Pond could also be explored as possible additional sources. Furthermore, the development of the Leech River supply has significant potential to yield additional water supply beyond the 2050 planning horizon.

4.1.8 Groundwater

The 1994 Plan reviewed the potential for groundwater development within the CRD. Current wells within the CRD have limited capacity with yields that are considered to be too low for a large regional water supply system. Groundwater quality is unlikely to be as good as surface water sources in the CRD. Groundwater development is not considered a long-term viable water source within the CRD.

4.1.9 Desalination of Sea Water

Desalination is becoming more popular due to advancements in technology. In California several large facilities have been constructed and at least six (6) are in the planning or design phase. The main disadvantage of desalination is that the operational and maintenance costs are significantly higher than conventional treatment processes treating better quality surface waters. Brine disposal is also a concern with this technology. This technology would only be explored as a last resort once all other surface water sources are fully explored and used to their safe yield limit.

4.2 Source Watershed Hydrology

4.2.1 Hydrologic Climatic Conditions

The Leech, Sooke and Goldstream Watersheds are each designated as individual Water Supply Areas (WSAs). Cumulative assessments of the historical climate and hydrologic data available within the WSAs have not yet been completed; therefore, regional assessments and estimates have been used in the following sections to characterize existing climate and hydrologic conditions. The WSA watersheds are shown in **Figure 4.1**.

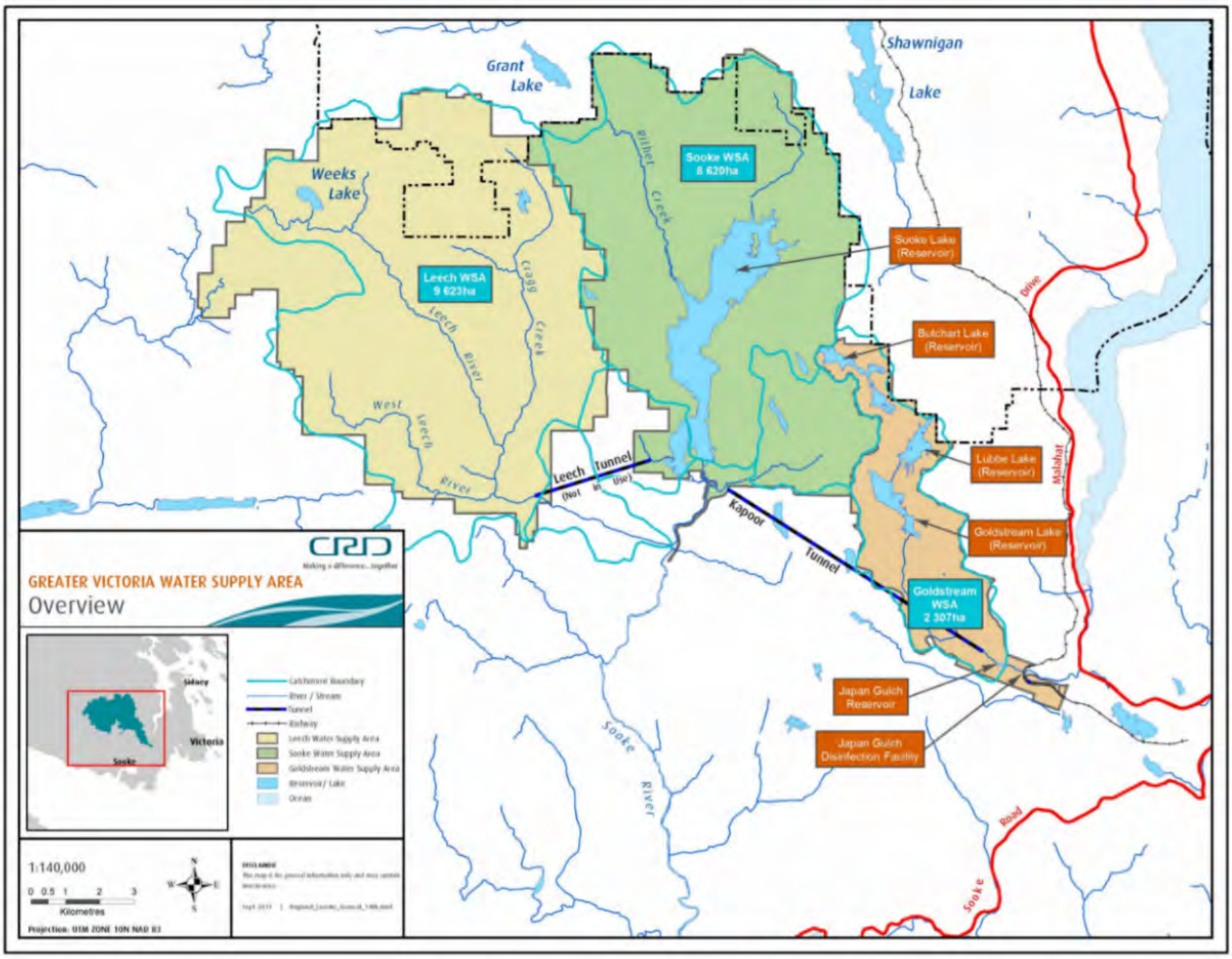


Figure 4.1: Existing Watersheds Water Supply Areas

4.2.1.1 Climate

The WSAs are located within the Eastern Vancouver Island Georgian Depression Ecoprovince Ecoregion of BC, bounded by the Vancouver Island Mountains and Olympic Mountains to the south, the southern Coast Mountains, and northern Cascade Ranges to the east (Demarchi 2011). The climate is characterized by moderate temperatures and heavy precipitation in the fall and winter seasons. Snowfall is not frequent and when it does occur, it typically accumulates at higher elevations only.

Climate parameters have been measured at several climate stations within the WSAs beginning as early as 1895. Climate stations currently in operation as well as historical stations that are no longer active are shown in **Table 4.3**.

Table 4.3: Historical Climate Stations within the Water Supply Areas

Station	Station ID	Elevation (m)	Period of Record
Leech River Watershed			
Chris Creek FWx[2]	FW009	561	2015 to present
Martin's Gulch FWx[2]	FW007	512	2009 to present
Survey Mountain FWx[2,3]	unknown	unknown	2019 to present
Sooke River Watershed			
4RW6 FWx[2,3]	FW004	675	1996 to present
North Basin FWx[1]	FW008	280	2013 to present
Judge Creek	unknown	200	1994 to present
Rithet Creek FWx[1]	unknown	223	1994 to present
Sooke Lake Dam FWx	FW006	180	1995 to present
Sooke Lake[2]	1017560	173	1903 to 1966
Sooke Lake North[2]	1017563	231	1966 to 2011
Goldstream River Watershed			
14G FWx (Goldstream Dam) [2]	FW001	493	1998 to present
31N FWx[1] (Butchart Reservoir)	FW003	606	1996 to present
Mt McDonald FWx[1]	FW005	436	1996 to present
Goldstream Lake Reservoir	1013240	459	1894 to 1953
Japan Gulch[1]	unknown	142	1999 to present

Notes:

[1] Precipitation not measured at this station

[2] Snow measured at this station

[3] Snow water equivalency measured at this station

FWx: Fire Weather Station

Source: station details were either provided by CRD or obtained from Environment and Climate Change Canada (ECCC) historical data (Canada 2021a)

Temperature

Temperature climate normals are available for two regional climate stations that are located within 14 km of the WSAs for the most recent period available (1981-2010). Shawnigan Lake (El. 159 m; ID 1017230) and Duncan Kelvin Creek (El. 103 m; ID 1012573) are located at elevations that are lower than the majority of the WSA watersheds (which range from approximately 135 m to 951 m). To generate temperature climate normals within the WSA watersheds and at a range of elevations more representative of the WSA watersheds, ClimateBC was used. ClimateBC provides point climate parameter estimates for historical and future data on a monthly or annual

basis (Wang et al. 2016). Using ClimateBC, monthly temperatures were generated for the 1981-2010 climate normals period and are also shown in **Figure 4.2.** Survey Mountain (El. 951 m) and Japan Gulch Dam (135 m) were selected to represent the range of temperature climate normals. In comparison to the regional lower elevation climate normals, the ClimateBC generated estimates for the 1981-2010 period estimated lower average temperatures in May through September at all elevations and higher winter temperatures at lower elevations (December through February). Comparison of the two ClimateBC locations, highlights the strong effect that elevation has on temperature.

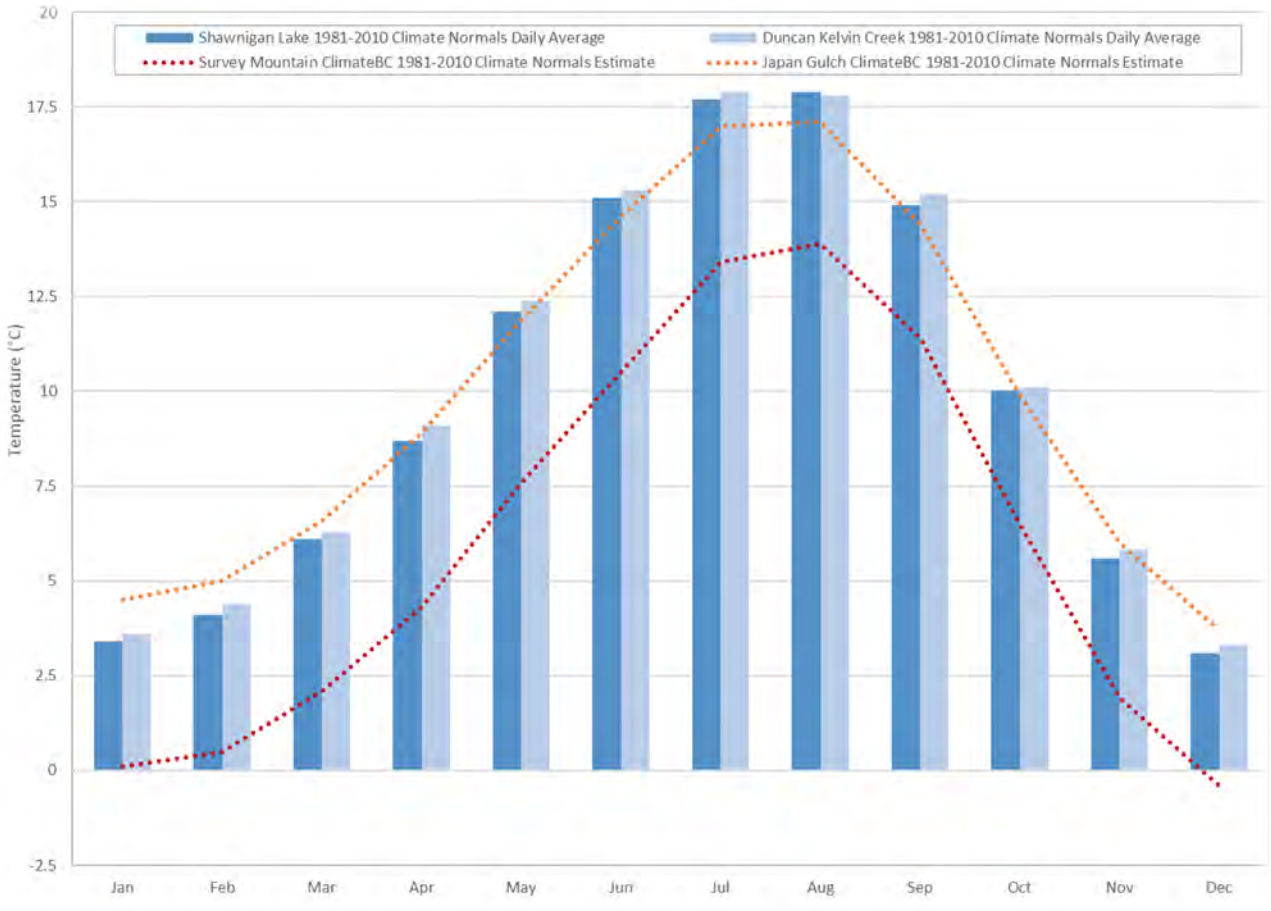


Figure 4.2: Regional 1981-2010 Temperature Climate Normals (ECCC) and ClimateBC Generated Estimates

Precipitation

Precipitation within the WSAs is relatively higher in the late fall, winter, and early spring, and low in summer months **(Table 4.4)**. Precipitation is highest in the Leech River Watershed (CRD 2021) which contains higher elevations than the Sooke and Goldstream watersheds. Orographic effects on precipitation have been estimated to be approximately 2 mm per 100 m of elevation gain (CRD 2018) and records indicate a general trend of increase from southeast to northwest in the Goldstream and Sooke Watersheds (Niemann 1993).

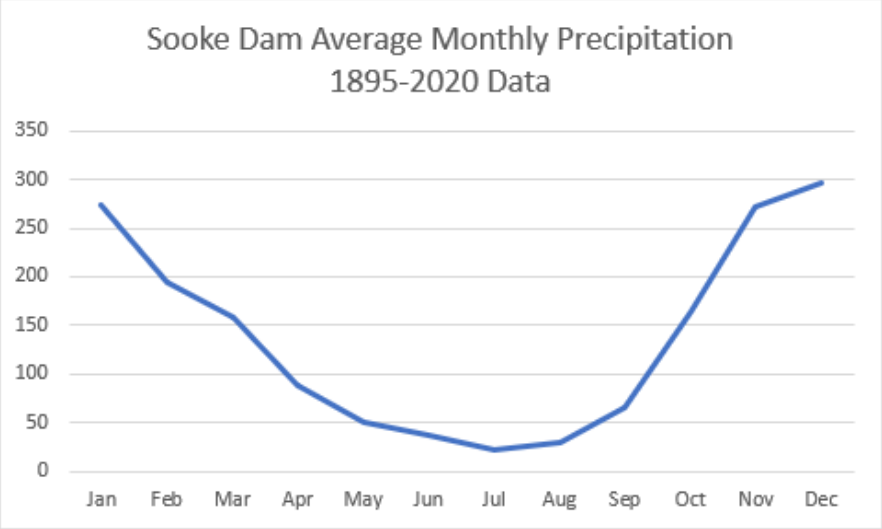
Snow accumulations within the WSAs are variable year to year with snow typically being melted by April (CRD 2017). Snowpack is measured at a few stations within the WSA (FRW6 FWx, Chris Creek and Martin's Gulch FWx; **Table 4.3**). However, snow water equivalent within the WSAs is

not measured (CRD 2018). Regional snow survey stations collect data at elevations above (Jump Creek 3B23P at El. 1,160 m and Heather Mountain Upper 3B24P at El. 1,190 m) or below (North Rd Lab 3B25P at El. 48 m in Victoria) the elevation ranges most common within the WSAs (from El. 951 m at Survey Mountain to El. 135 m at Japan Gulch). ClimateBC 1981-2010 climate normal estimates within each of the WSAs estimated snow to be 3% to 5% of annual precipitation at elevations between 135 m and 211 m, 7% to 8% at elevations between 400 m and 460 m and 9% to 20% at elevations from 460 m to 951 m.

A local long-term daily precipitation record was estimated (Acres 1999) by combining station data collected from the Goldstream Lake, Sooke Lake, Sooke Lake North, and Sooke Lake Dam FWx climate stations (stations listed in **Table 4.3**). Average monthly and annual precipitation depths from this estimated dataset extended with recent Sooke Lake Dam FWx data are provided in **Table 4.4.** Annual wet and dry return periods were estimated using this combined data set and are provided in **Figure 4.3**. The two driest precipitation years in the last twenty years are estimated to have return periods of 32 years (2008) and 42 years (2000) based on this combined dataset.

Table 4.4: Estimated Sooke Lake Dam Average Monthly and Annual Precipitation (1895 to 2020 Data Provided by CRD)

Average Precipitation (mm)												
Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual**
273.2	194.3	159.1	88.1	49.6	36.2	22.6	29.1	65.7	163.2	272.6	296.0	1,649.7



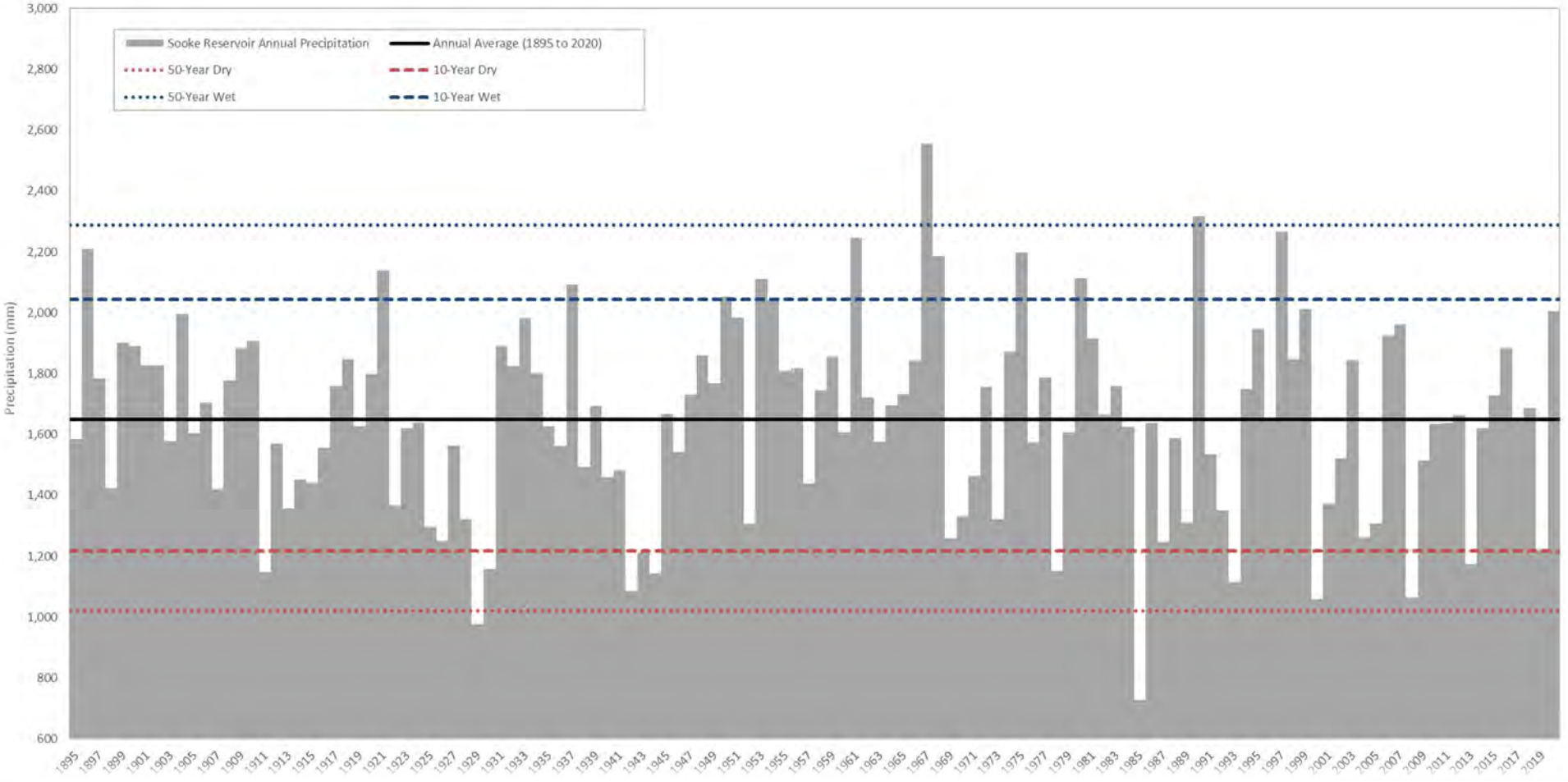


Figure 4.3: Estimated Historical Sooke Lake Dam Annual Precipitation (Data Provided by CRD) and Estimated Annual Return Periods

Evaporation and Evapotranspiration

Evaporation is the process of water changing phase from a liquid to a vapour causing it to be lost to the atmosphere (e.g., over a body of water). Evapotranspiration is the process where water vaporizes from plant tissue (transpiration) along with evaporation from liquid water forms (e.g., water losses from vegetation and soil to the atmosphere). Neither evaporation nor evapotranspiration are directly measured within the WSAs, however several regional and local estimates are available. The average annual historical evaporation from the Sooke Lake Reservoir was modelled to be 762 mm between 1996 and 2005 (Werner et al. 2015). The lowest modelled annual evaporation during this period was 679 mm in the 1996/1997 water year and the highest was 836 mm in 1997/1998 (Werner et al. 2015). The highest evaporation rate in 1998 also corresponded with the highest average annual air temperature between 1971 and 2000 (Werner et al. 2015). The mean annual Sooke Lake Reservoir evaporation is estimated to be in the range of 600 to 800 mm (Canada 1975). Evapotranspiration and groundwater losses combined have been estimated to be 480 mm (Acres International 1999). Annual Hargreaves reference evaporation estimates from ClimateBC ranged from 672 mm near the Sooke Lake Dam (El. 187 m) to 578 mm on Survey Mountain (El. 951 m) and monthly estimates were highest in July and lowest November through February (**Table 4.5**). Approximately 5 Mm^3 evaporates from the surface of Sooke Lake Reservoir on an annual basis.

Table 4.5: ClimateBC Estimated 1981-2010 Hargreaves Reference Evaporation Climate Normals (mm)

El. (m)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
187	12	20	39	61	91	106	118	102	66	33	15	10	672
951	11	18	34	53	78	91	104	91	57	29	13	0	578

4.2.1.2 Hydrology

The Leech, Sooke and Goldstream Watersheds are located within the West Coast Region of the Natural Resource Operation Regions for BC within Hydrologic Zone 28 (Eastern Vancouver Island; Ahmed 2017) and within the Coastal Western Hemlock Zone of the BC Biogeoclimatic Zones (FLNRORD 2018). The Leech watershed is the largest by area and has the highest elevation of the three watersheds. Runoff relationships in each of the watersheds vary due to the differences in tree cover, topography, elevation, and soil (CRD 2018).

Leech Watershed

The Leech Watershed drains generally northwest to southeast. The watershed contains several lakes, with Weeks Lake wetland and Jarvis Lake being the largest two (**Table 4.6).** Jarvis Lake flows into Cragg Creek which flows into the Leech River in the southeast portion of the catchment. Weeks Lake flows into the main arm of the Leech River. The West Leech River in the southwest portion of the watershed flows into the Leech River downstream of its confluence with Cragg Creek. The Leech Tunnel (currently not in use) diverts water from the Leech River downstream of the confluence with the West Leech River before it flows into the Sooke River and into Sooke Inlet.

Table 4.6: Surface Areas of Major Waterbodies within the Leech Watershed

Waterbody	Surface Area (ha)
Jarvis Lake	14.2
Worley Lake	3.5
Weeks Lake	27.6
Source: CRD 2015, Acres 1999	

The northern and eastern parts of the Leech Watershed are dominated by bed rock outcrops (CRD 2015). Elevations within the watershed range from approximately 950 m at Survey Mountain to 140 m at the mouth of the Leech River (CRD 2018). The Coastal Western Hemlock biogeoclimatic subzones located within the watershed are Submontane Moist Maritime (CWHmm1), Montane Moist Maritime (CWHmm2) and Western Very Dry Maritime (CWHxm2; FLNRORD 2018). Approximately 95% of the area within the Leech Water Supply Area (which covers a similar percentage of the watershed area footprint) has been harvested and 400 km of roads have been constructed (CRD 2021). A watershed restoration program has been funded since 2009 to facilitate forest recovery.

The hydrologic response time within the Leech watershed to precipitation events is short (peaks occur within hours and days, estimated Leech River lag times have ranged from 2 to 6 hours; CRD 2015) due to the in-progress forest restoration, extensive road network, shallow soil depths and steep gradient streams in the upper Leech River Watershed (CRD 2015).

Hydrometric stations where historical flow data has been collected within the Leech River Watershed are summarized in **Table 4.9**. Hydrometric data collected at the Leech River hydrology station (located downstream of the Leech Tunnel) provided by CRD are shown in **Figure 4.4** (note this data has not been reviewed for quality assurance and quality control). These records indicate the mean annual discharge at the station is approximately 5.75 m^3/s.

Data from **Figure 4.4** indicates that the Leech Watershed produces little flow from mid June to mid August when consumptive water demands are high. Impoundment would be required if the Leech River is to be used in the future for CRD water supply.

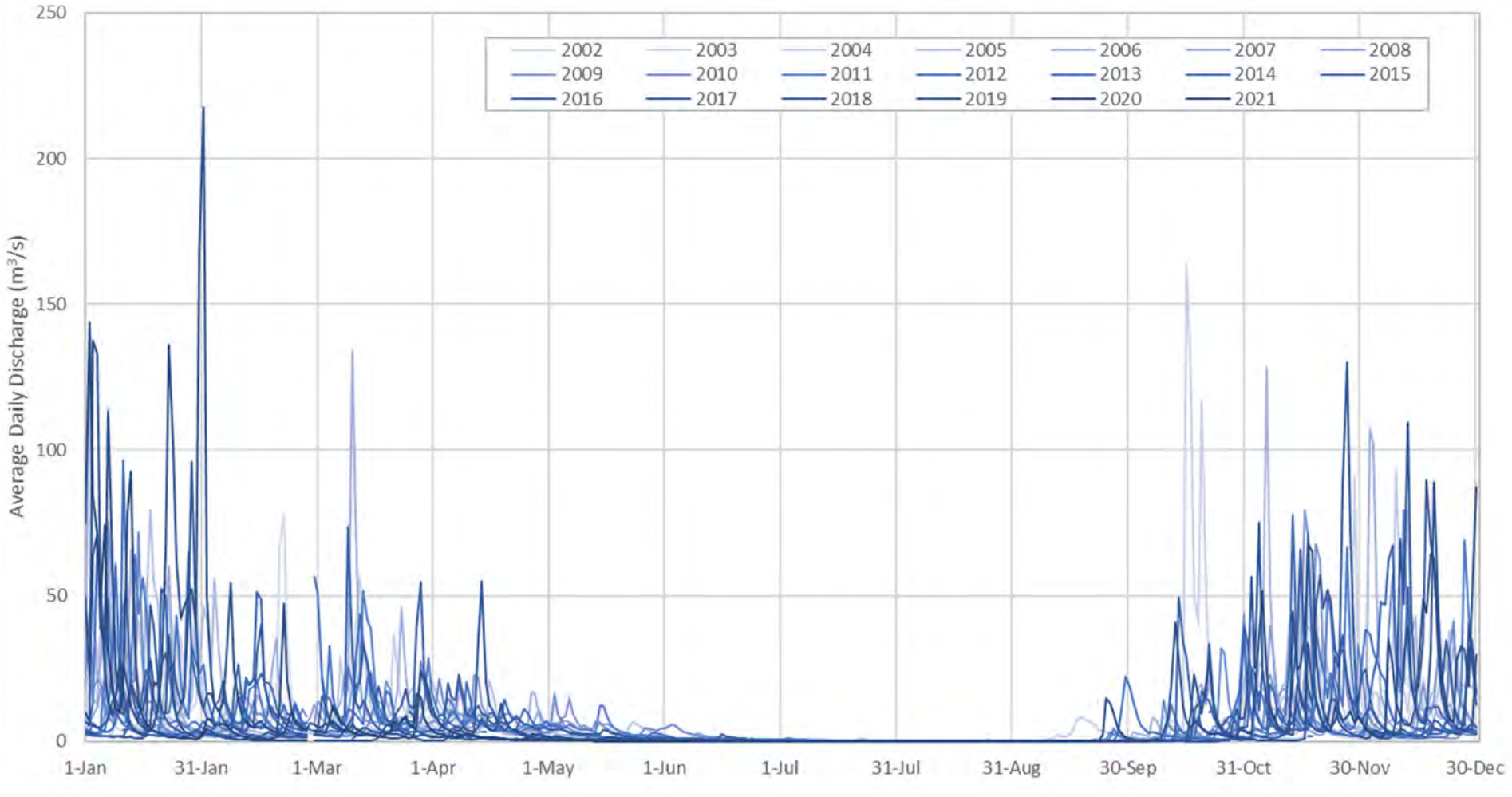


Figure 4.4: Leech River Daily Average Discharge (January 2002 to June 2021, Data Provided by CRD)

Sooke River Watershed

The Sooke Watershed generally drains north to south. Judge Creek flows into Sooke Lake Reservoir from the north. The main tributary, Rithet Creek, flows into the reservoir from the west and contributes approximately 25% of the reservoir inflows. The watershed contains several lakes, in addition to the Sooke Lake Reservoir which is the largest waterbody within the watershed (**Table 4.7**). Water from the Council Lake watershed (located east of the Sooke Lake Reservoir) is routinely diverted to the SLR through Main No.12 and a channel. Water from the Sooke Lake Reservoir intake tower is conveyed to the Head Tank. The Head Tank pressurized Kapoor Tunnel which conveys water to the Goldstream Disinfection Facility. The Coastal Western Hemlock bio-geoclimatic subzones located within the watershed are Eastern Very Dry Maritime (CWHxm1) and Western Very Dry Maritime (CWHxm2; FLNRORD 2018).

Hydrometric stations where historical flow data has been collected within the Sooke River Watershed are summarized in **Table 4.9**. Hydrometric data collected at the Rithet Creek hydrology station (located upstream of the confluence with the Sooke Lake Reservoir) provided by CRD are shown in **Figure 4.5** (note this data has not been reviewed for quality assurance and quality control). These records indicate the mean annual discharge at the station is approximately 0.70 m^3/s and mean annual runoff is 1,266 mm (based on a watershed area of 17.4 km^2; CRD 2021b). Runoff in the Rithet Creek catchment is estimated to be between 71% to 82% (KWL 2016) of recorded precipitation (at Sooke Lake Dam).

Table 4.7: Surface Areas of Major Waterbodies within the Sooke Watershed

Waterbody	Surface Area (ha)
Council Lake	14.2
Horton Lake	5.5
Jones Lake	8.0
Sooke Lake Reservoir	610[1]
Source: Acres 1999 [1] At high water mark elevation 186.75m	

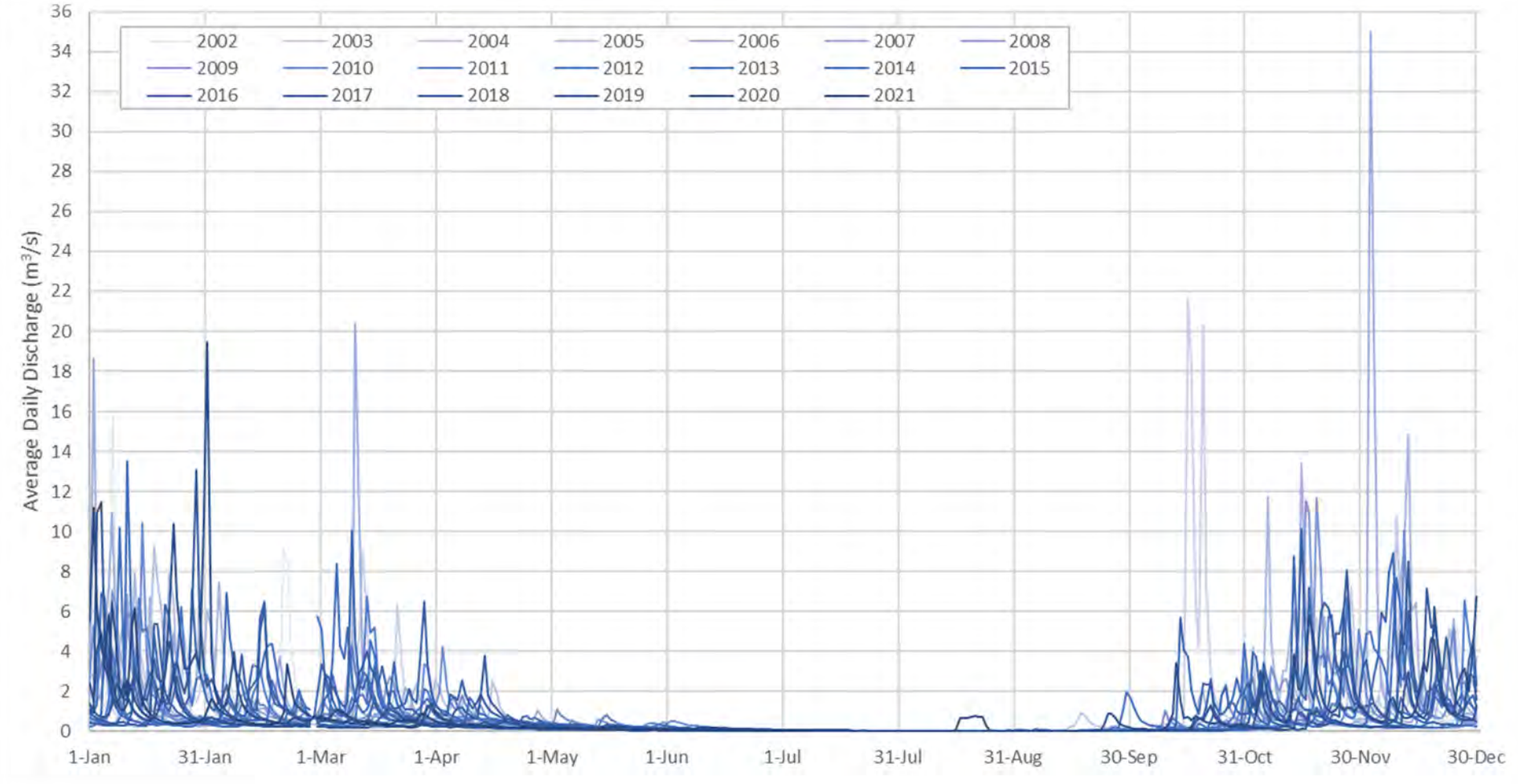


Figure 4.5: Rithet Creek Daily Average Discharge (January 2002 to June 2021, Data Provided by CRD)

Goldstream Watershed

The Goldstream Watershed is located east of the Sooke Watershed. There are eleven dams located within the Goldstream Watershed and four different reservoirs (Butchart Lake Reservoir, Lubbe Lake Reservoir, Goldstream Lake Reservoir and Japan Gulch Reservoir, See **Figure 4.1**). Butchart Lake Reservoir is located at the north end of the catchment and flows via a constructed surface channel into Lubbe Lake Reservoir before flowing through another surface channel to Goldstream Lake Reservoir (CRD 2021c). Goldstream Reservoir flows southeast into the Goldstream River. An intake from the Goldstream River diverts water into Japan Gulch Reservoir. Water from Japan Gulch Reservoir is screened before it flows into the transmission system upstream of the Goldstream Disinfection Facility. Downstream of Japan Gulch Reservoir intake, the Goldstream River takes a sharp turn as it enters Goldstream Provincial Park and flows north into Finlayson Arm in Saanich Inlet. Water from the Goldstream water supply area is currently used a secondary source and typically used during inspection and maintenance of the Kapoor Tunnel. Minimum environmental conservation flow requirements exist on the Goldstream River which contains salmon and the Howard English Fish Hatchery. On average 4.5 Mm^3Y of water is released (CRD 2021c).

Elevations within the watershed range from approximately 650 m at highest elevation portion of the catchment near Butchart Lake to below 135 m at the Japan Gulch Dam. The Coastal Western Hemlock biogeoclimatic subzones located within the watershed are Eastern Very Dry Maritime (CWHxm1) and Western Very Dry Maritime (CWHxm2; FNLRORD 2018).

Table 4.8: Surface Areas of Major Waterbodies within the Goldstream Watershed

Waterbody	Surface Area (ha)[1]
Butchart	70.9
Goldstream	76.2
Lubbe	53.8
Japan Gulch	2.2

Source: Acres 1999

[1] At high water mark elevation

Hydrometric stations where historical flow data has been collected within the Goldstream Watershed are summarized in **Table 4.9**. Reservoir elevations have been monitored within the Butchart, Lubbe and Goldstream Reservoirs beginning in either 2011 or 2012 (KWL 2017). Outflows from the Goldstream Lake Reservoir have been recorded since 2011 (KWL 2017). Runoff in the Goldstream Watershed is estimated to be 72% of precipitation in the catchment (between 2011 and 2016; KWL 2017).

Table 4.9: Historical Hydrometric Stations within the Leech, Sooke and Goldstream River Watersheds

Station Description	Station ID	Operator/Data Contributed by	Drainage Area (km^2)	Period of Record
Leech River Watershed				
Leech River at the Mouth	08HA017	n/a[3]	104[3]	1963 to 1966[3]
Jordan Meadows Tributary at WJ650	HY027	CRD	n/a	n/a
Leech River at Weeks Main (L504)	HY022	CRD	n/a	n/a
Chris Creek at Chris Creek Road	HY026	CRD	n/a	n/a
East Survey Mountain Creek	HY024	CRD	n/a	n/a
West Leech River vs West Leech Falls	HY029	CRD	n/a	n/a
Leech River at Intake Tunnel	HY017	CRD	n/a	n/a
Leech Water Level Sensor	HY007	CRD	n/a	n/a
Sooke River Watershed				
Judge Creek Hydromet Station	HY002	CRD	n/a	n/a
Rithet Creek Hydrology Station	HY001	CRD	n/a	2002 to 2021
Deception Creek Hydrology Station	HY008	CRD	n/a	n/a
Deception Dam	HY014	CRD	n/a	n/a
Sooke River (Victoria Water Supply)	08HA006	City of Victoria[3]	66.9[3]	1916 to 1966[3]
Sooke Lake Dam	HY010	CRD	7.08[2]	n/a
Council Creek Hydrology Station	HY003	CRD	n/a	n/a
Sooke River Hydrology Station	HY009	CRD	n/a	n/a
Sooke River near Sook Lake	08HA005	City of Victoria[3]	77.7[3]	1916 to 1966[3]
Sooke River above Todd Creek	08HA018	n/a[3]	n/a[3]	1963 to 1965[3]
Sooke River above Charters River	08HA059	n/a[3]	262[3]	1989 to 1997[3]
Goldstream River Watershed				
Butchart Dam	HY013	CRD	n/a	2011 or 2012[1] to present

Station Description	Station ID	Operator/Data Contributed by	Drainage Area (km^2)	Period of Record
Lubbe Dam 1	HY011	CRD	n/a	2011 or 2012[1] to present
Goldstream Dam	HY015	CRD	n/a	2011[1] to present
Goldstream River Hydrology Station	HY004	CRD	n/a	1998[1] to unknown
Goldstream River Turbidity	HY016	CRD	n/a	n/a
Japan Gulch Reservoir	HY005	CRD	22.4[2]	n/a
Lubbe Dam 4	HY012	CRD	n/a	n/a
Goldstream River in Goldstream Provincial Park	08HA039	BC MoE[3]	n/a[3]	1976 to 1978[3]

Notes:
BC MoE: British Columbia Ministry of Environment
n/a: data unavailable
[1] KWL 2017
[2] CRD 2014
[3] Water Survey of Canada (Environment and Climate Change Canada) Historical Database (Canada 2021b)

4.2.2 Climate Change Impacts on Source Water Quantity

Regional projections of potential climate change (PCIC 2021) relevant to water quantity within the WSAs are summarized in **Table 4.10**. Potential impacts specific to the projected climate change are shown in **Table 4.11.**

Future temperatures within the Capital Regional District are projected to increase, under a high emissions scenario relative concentration pathway (RCP) 8.5, in every season and throughout the 21st century (Table 4.3; PCIC 2021). RCP 8.5 is the radiative forcing scenario consistent with current greenhouse gas emissions trends and is generally considered the most relevant for design and assessment (EGBC 2020). The greatest temperature increases are expected during summer months (June through August). Predicted changes in total annual precipitation within the Capital Regional District range from minor increases in the 2020s to increases of 2.3% in the 2050s and 8.0% in the 2080s (Table 4.3; PCIC 2021). Annual total precipitation is expected to increase overall. However, seasonal distributions are projected to change with decreasing precipitation during summer months and increasing precipitation in winter months (Table 4.3; PCIC 2021).

Table 4.10: Projected 50th Percentile Increase from 1961-1990 Baseline (PCIC 2021)

Period	Temperature (°C)			Precipitation (%)		
	2020s	2050s	2080s	2020s	2050s	2080s
Dec to Feb	+1.5	+2.6	+4.7	+2.5	+2.3	+10
Mar to May	+1.6	+2.5	+4.1	-0.63	+3.7	+1.2
Jun to Aug	+1.7	+3.1	+4.7	-7.3	-11	-19
Sep to Nov	+1.5	+2.6	+4.1	-1.8	+5.6	+11
Annual	+1.5	+2.7	+4.3	+0.54	+2.3	+8.0
Source: PCIC 2021, 12 ensemble projection using RCP 8.5 (high emissions) greenhouse gas scenario						

Table 4.11: Potential Climate Change Impacts on Water Quantity

Projected Climate Change	Hydrologic Response	Potential Impact
Increased Precipitation	• Increased runoff / flooding • Wetter storm events • Possible increase in saturated soil • Increased erosion	• Flooding frequency/magnitude may increase • Seasonal water quality may be reduced • Stream bank erosion may increase • Increased sediment accumulation in stream and riverbeds may occur • Increase in turbidity, organics and colour in raw water • Erosion may increase, possible impacts on fish habitat • Water quality may be negatively affected by nutrient and input runoff • Excess water may require new storm water management infrastructure/diversion • Steep slopes may be destabilized
Increased Temperatures	• Earlier freshet • Extended dry season • Drier droughts • Increased evaporation and evapotranspiration	• Water supply may be reduced, increased evaporation • Storage reservoir demand may be increased • Water use restrictions may need to be tightened • Increased risk of wildfires which could alter hydrologic regime • Algae growth more prominent
Sources: PCIC 2021, CRD 2017 and CRD 2018, Stantec		

4.2.3 Sooke Watershed Drought Safe Water Supply Yield

The Sooke Lake Reservoir water balance was developed and simulated with daily timesteps using GoldSim software (a dynamic simulation software package) to confirm that the Sooke Lake Reservoir has sufficient water yield to supply its existing demands under drought conditions.

CRD (2021d) monitors inflows and calculates timeseries of daily atmospheric inflows into the Sooke Lake Reservoir (i.e., equivalent of influent runoff plus direct precipitation minus evaporation) during 2002 through 2020 based on daily monitored outflows and water levels. Monthly summary statistics of these back calculated atmospheric inflows are shown in **Table 4.12** and graphs of these daily inflows are shown in **Figure 4.6**.

Table 4.12: Sooke Lake Reservoir Daily Atmospheric Inflow by Month (2002 to 2020 Data Provided by CRD) (Mm^3)

Month	Average	Minimum	Maximum
Jan	22.9	11.7	38.8
Feb	11.1	4.0	26.6
Mar	12.6	3.8	23.3
Apr	5.7	1.5	11.1
May	1.6	-0.01	4.3
Jun	0.24	-0.51	1.73
Jul	-0.40	-0.74	0.01
Aug	-0.47	-0.96	0.05
Sep	0.26	-0.45	1.57
Oct	4.2	0.12	26.3
Nov	14.4	3.6	34.9
Dec	17.5	3.0	31.2
Annual	**89.7**	**50.5**	**122.2**
Source: CRD 2021			

The historical (2010-2020) average annual demands from the Sooke Lake Reservoir include 46.6 Mm^3Y to the Head Tank, 1.5 Mm^3Y for the District of Sooke supply via Main No.15 , and 5.4 Mm^3Y fish release for environmental conservation flow needs (**Table 4.13**). Monthly distribution of these demands is shown in Table 4.13.

Table 4.13: Existing Demands from Sooke Lake Reservoir (Mm^3)

Month	Head Tank[1]	Sooke Supply[1]	Conservation Release[2]	Total
Jan	2.8	0.10	0.72	3.62
Feb	2.7	0.09	0.83	3.62
Mar	3.0	0.10	0.83	3.93
Apr	3.2	0.11	0.83	4.14
May	4.3	0.14	0.73	5.17
Jun	5.1	0.16	0.25	5.51
Jul	6.1	0.18	0.10	6.38
Aug	5.8	0.18	0.10	6.08
Sep	4.3	0.13	0.12	4.55
Oct	3.4	0.11	0.17	3.68
Nov	3.0	0.10	0.22	3.32
Dec	3.0	0.10	0.52	3.62
Annual	**46.7**	**1.5**	**5.4**	**53.6**

Note:

[1] Average of 2010-2020 values taken from CRD 2021d

[2] Taken from Appendix 2 of CRD 2019

Daily simulation of the Sooke Lake Reservoir water balance with 19 years of atmospheric inflow data (**Figure 4.6**) and existing demands (Table 4.6) shows that the lowest Sooke Lake Reservoir water levels occur in fall (between late September and early November). The reservoir starts filling with winter precipitation and completely fills 18 of the 19 simulation years (i.e., 95% of years), except 2009 which followed 2008 (an approximate 1-in-50-year dry annual precipitation year; **Figure 4.7**). With normal climate inflows in 2009, the reservoir fills again in 2010 (see Figure 4.7). Every year, including 2009 when the reservoir does not fill, all existing demands in Table 4.6 can be supplied by the reservoir (i.e., no supply deficits). Therefore, the Sooke Lake Reservoir has sufficient water yield to supply its current demands under drought conditions.

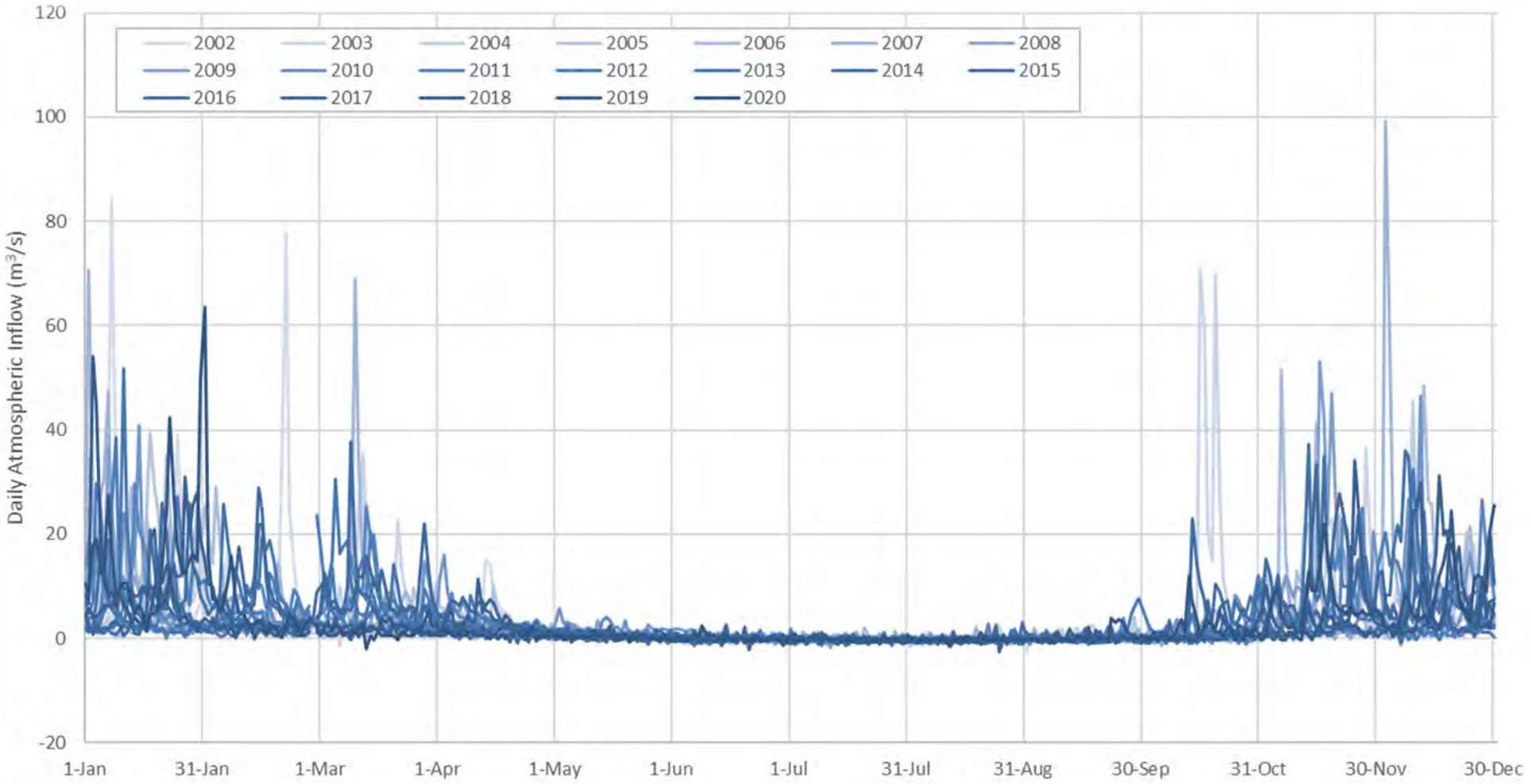


Figure 4.6: Sooke Lake Reservoir Daily Atmospheric Inflow during 2002 to 2020 (CRD 2021)

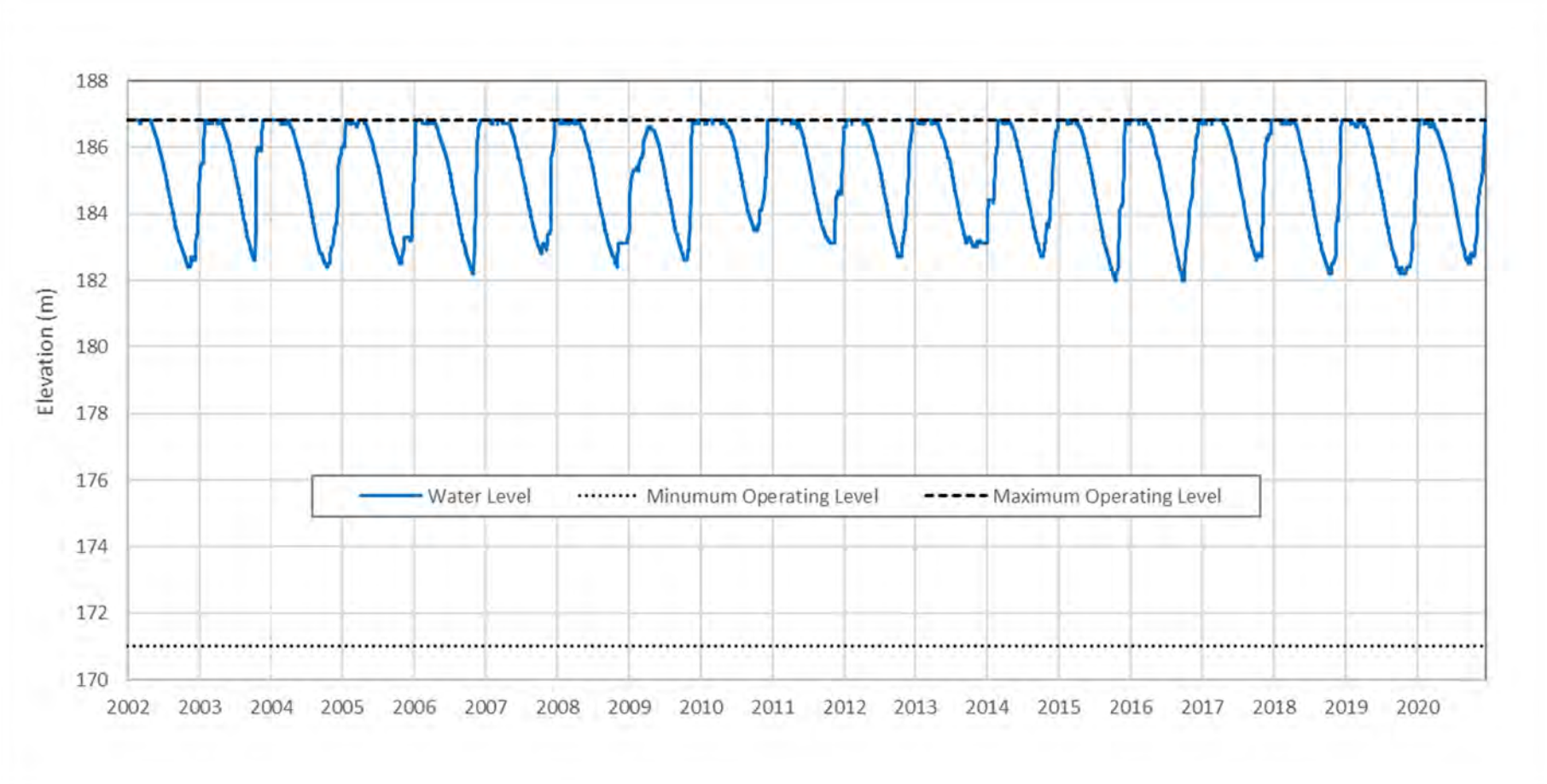


Figure 4.7: Simulated Water Level in Sooke Lake Reservoir with Existing Water Demands and 2002-2020 Atmospheric Inflow

4.2.4 Adequacy of Sources to Meet Future Demands

4.2.4.1 Sooke Watershed

The Sooke Lake Reservoir water balance model (Section 4.2.3) was run under the existing demand scenario as well as five increased demand scenarios where the Head Tank and JDFWD supply demands were increased (ranging from 10% to 50% increase, **Table 4.14**) to assess the adequacy of Sooke Lake Reservoir to meet future increased demands. In all scenarios, the conservation flow release demand was assumed to be constant per existing releases (as shown in Table 4.14).

Table 4.14: Simulated Water Level in Sooke Lake Reservoir with Existing Water Demands and 2002-2020 Atmospheric Inflow

Scenario	RWS Head Tank Demand Mm^3	RWS JDFWD Supply Demand Mm^3	Total
Existing Demand	46.6	1.5	48.1
10% increased Demand	51.3	1.7	53.0
20% increased Demand	55.9	1.8	57.7
30% increased Demand	60.6	2.0	62.6
40% increased Demand	65.2	2.1	67.3
50% increased Demand	69.9	2.3	72.2
Note: Conservation release demand is 5.4 Mm^3Y (Table 4.6) for all scenarios			

As noted in Section 3.0, the projected 2050 demand assuming a 1.25% population increase is 74 Mm^3Y (see Figure 3.4). This is more than the estimated 40% yield capacity of 67.3 Mm^3Y recommended as the maximum additional withdrawal from Sooke Lake Reservoir. Additional water sources such as augmentation with flows from Leech watershed, further demand reduction or other potential sources should be planned for development within the next 25 years to ensure that future demands can be met. Continued water conservation efforts and achieving a modest demand reduction to 300 L/c/d would allow the Sooke watershed supply to be adequate until the year 2060.

Table 4.15: Preliminary Estimates of Monthly Change in Sooke Lake Reservoir Inflow due to Climate Change by 2080s

Month	Reservoir Inflow Change (m^3/s)
Jan	0.745
Feb	0.374
Mar	0.041
Apr	-0.011
May	-0.070
Jun	-0.300
Jul	-0.270
Aug	-0.376
Sep	0.081
Oct	0.438
Nov	0.801
Dec	0.612
Annual	**0.172**

Note:

Flow changes were calculated by applying projected percent changes to monthly precipitation and evaporation estimates, averaged over the 2002 to 2020 period.

The Sooke Lake Reservoir fills 17 of the 19 simulation years (i.e., 90% of years) under the 30% and 40% increased demand scenarios, and 12 of the 19 simulation years (i.e., 63% of years) under the 50% increased demand scenario (**Table 4.16**).

Figure 4.8 shows simulated water levels in the reservoir for a 1:50 year dry annual precipitation year (2008) followed by a normal precipitation year (2009) under different demand scenarios. It is seen that in all scenarios with up to 40% increased demand, a normal year after a 1:50 dry year can fill the reservoir (i.e., effects of the 1:50 year dry year on water levels will be mitigated after one year). Therefore, it is anticipated that the Sooke Lake Reservoir has sufficient water yield to supply a demand up to 40% higher than existing demand. This estimate accounts for climate change and is for a 1:50 year drought condition which is considered suitable for assessing adequacy of water sources at the master planning level. This assessment should be considered as being preliminary and further analysis is recommended (e.g., detailed hydrologic modelling-based water balance and detailed environmental effects assessment). It is noted that CRD does not operate the SLR below 175 m as a precautionary measure for potential water quality reasons. Low water levels below 175 m may have a greater potential to promote algae growth in shallower sections of the reservoir.

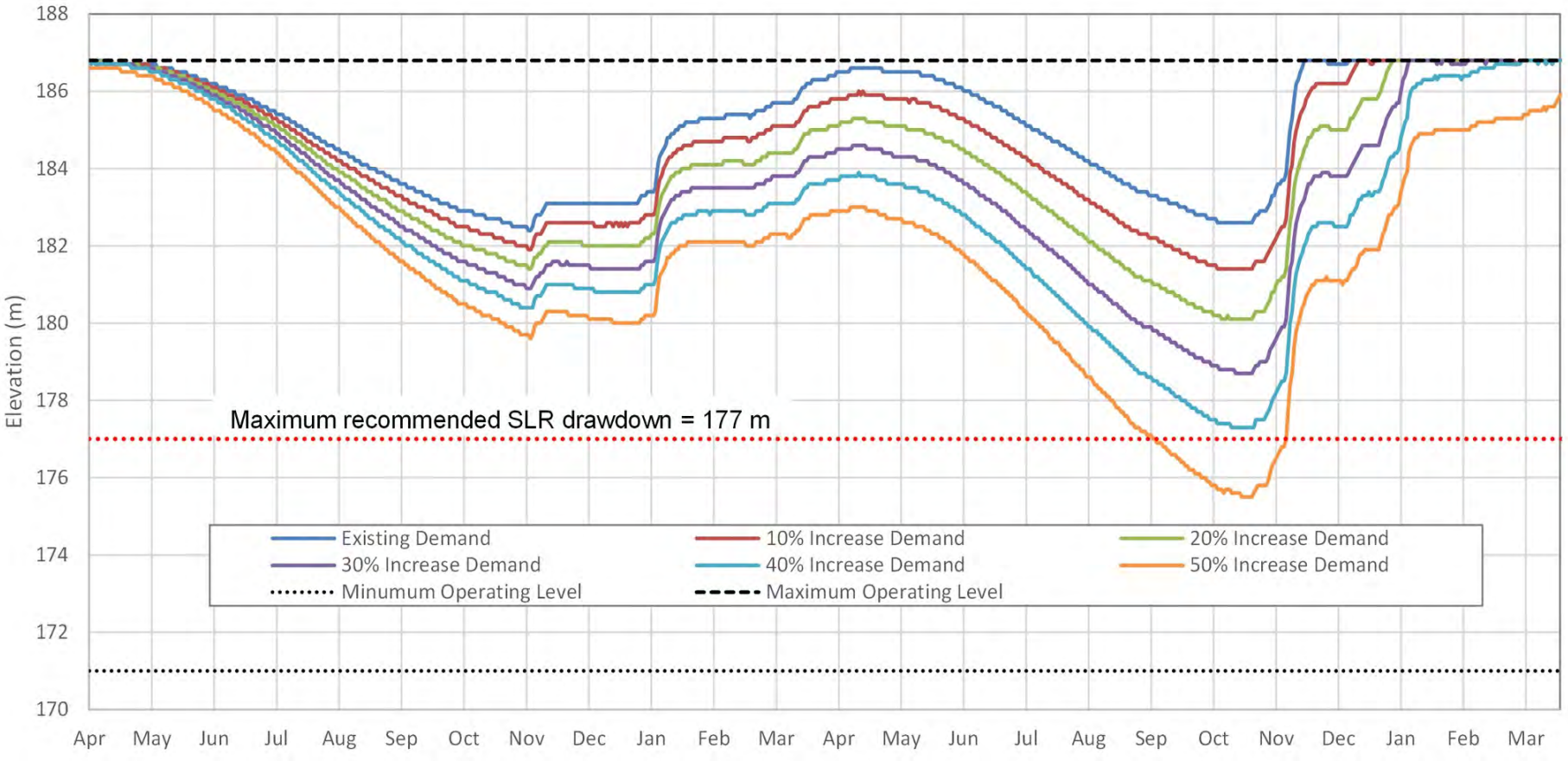


Figure 4.8: Simulated Water Level in Sooke Lake Reservoir for a 1:50 Dry Precipitation Year Followed by an Average Precipitation Year with different Demand Scenarios

Table 4.16: Number of Years (within the 19 Simulation Years) that the Reservoir Does Not Fill (Does not Reach the Maximum Operating Level of 186.75 m)

Scenario	No. of Not Filled Years[1]
Existing Demand	1 (5%)
10% increased Demand	1 (5%)
20% increased Demand	1 (5%)
30% increased Demand	2 (10%)
40% increased Demand	2 (10%)
50% increased Demand	7 (37%)

Notes:

[1] Number of not filled years are also shown in the form of percent in parentheses (% of simulation years when the reservoir does not fill).

A preliminary analysis was conducted to estimate the implications of climate change for the adequacy of Sooke Lake Reservoir to meet future (increased) demands Table 4.3 shows that by the 2080s, precipitation is expected to increase by 11% in fall, 10% in winter, and 1% in spring, and decrease by 19% in summer (annual precipitation is expected to increase by 8%). In addition, ClimateBC estimates (Wang et al. 2016) show that by the 2080s, evaporation in this region can increase by up to 10%. With these projections, it is expected that the fall and winter high flows increase, and summer low flows decrease by the 2080s.

As mentioned in Section 4.2.3, the Sooke Lake Reservoir water balance is based on back-calculated reservoir net inflows, not on a hydrologic model with direct precipitation and evaporation inputs. To assess climate change effects on the water balance, the percent changes previously mentioned (of precipitation and evaporation) were applied to monthly estimates of precipitation and evaporation (averaged over the 2002-2020 simulation period). These monthly average flow change estimates **(Figure 4.9)** were applied to all of the 19 water balance simulation years to estimate the preliminary effects of climate change on the Sooke Lake Reservoir water balance.

Figure 4.9 shows simulated water levels in the reservoir for a 1-in-50-year dry annual precipitation year (2008) followed by a normal precipitation year (2009) under the 40% increased demand scenarios, with and without climate change effects. In the summer of first year (1-in-50-year dry annual precipitation year, under the existing climate conditions), water levels of the climate change scenario are lower than those of the scenario without climate change. This is expected because under the climate change scenario summers are expected to experience lower precipitation and higher evaporation. However, because the climate change scenario also expects higher fall and winter flows, water levels under the climate change scenario become higher by the end of the winter than those without the climate change scenario. By the end of the second year (a normal climate year, under the existing climate condition), the reservoir fills under both scenarios (with and without climate change). Therefore, it is anticipated that effects related to

climate change will not significantly impact the adequacy of Sooke Lake Reservoir to meet future demands. This is a preliminary assessment that requires further analysis (e.g., hydrologic modelling-based water balance with direct climate change parameters). The analysis assumes that normal precipitation periods occur following a 1:50 year dry annual precipitation year. It does not consider extended extreme events which extend over a period of several years as experience to date has shown that this type of scenario has not occurred.

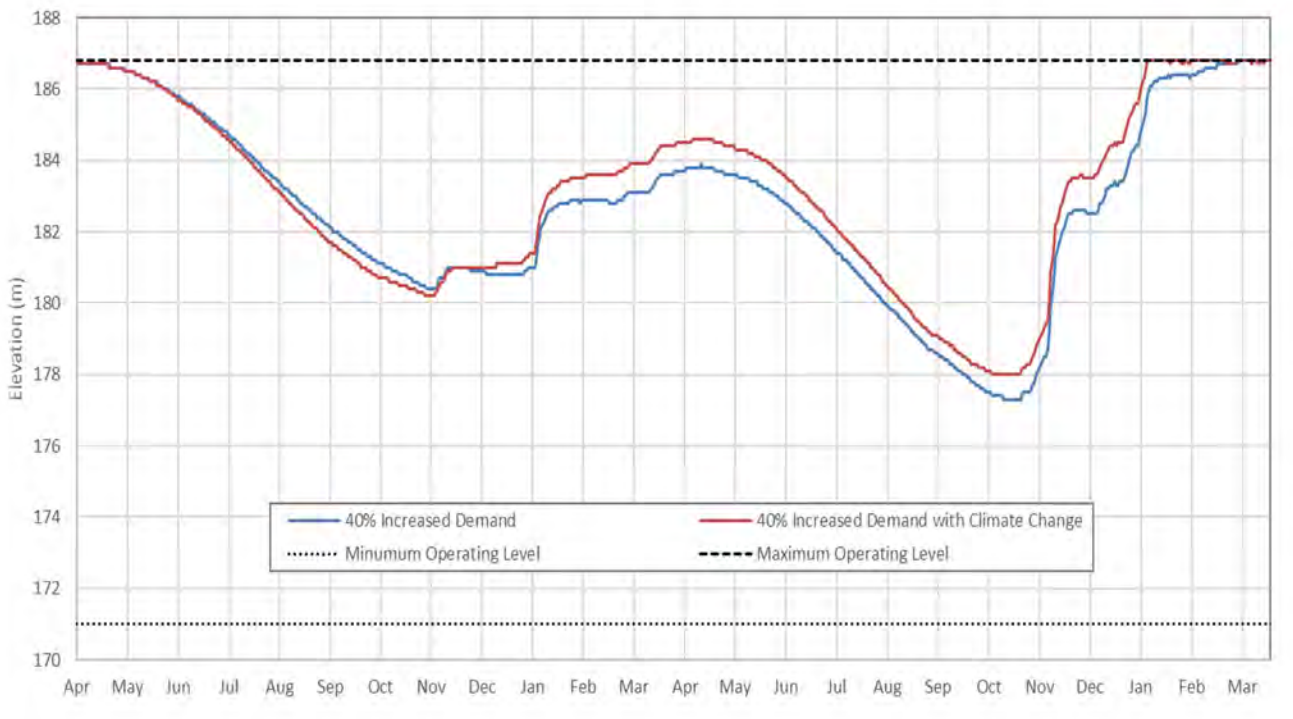


Figure 4.9: Simulated Water Level in Sooke Lake Reservoir for a 1:50 Dry Precipitation Year Followed by an Average Precipitation Year with 40% Increased Demand, With and Without 2080s Climate Change Scenarios

4.2.4.2 Leech Watershed

The hypothetical (assuming a dam is constructed in the future) Leech River Reservoir water balance was simulated with daily timesteps using GoldSim software to assess the potential for supplying water demands from the Leech watershed. The water balance model estimates the annual demand (with monthly distributions similar to those of the RWS Head Tank Demand in Table 4.6) that can be supplied by a hypothetical reservoir on Leech River. Analysis of the geotechnical, slope stability or other dam considerations are not part of this study and may impact the feasibility of dam construction on the Leech River. These issues would be investigated in preliminary design to assess the feasibility of dam construction on Leech River.

A time series of daily streamflows from the Leech River hydrology station (located downstream of the Leech Tunnel) during 2002 to 2021 provided by CRD are available (**Figure 4.4**). From this time series, 17 years (2002-2013 and 2016-2020) have complete daily streamflow data and were used for water balance modelling.

Conservation flow needs (i.e., fish release flows) that should be released from the hypothetical reservoir were calculated based on the British Columbia Environmental Flow Needs (EFN) Policy (BC FLNRO & BC MOE 2016). Based on the lowest risk level of the EFN Policy, if the inflow to the hypothetical reservoir is less than 20% of the mean annual discharge, the fish release should be 100% of the inflow. If the inflow to the hypothetical reservoir is greater than 20% of the mean annual discharge, the fish release should be 85% of the inflow (i.e., 15% of the inflow can be stored in the reservoir to supply the demand). Since CRD already has a licenced allocation of 30.8 Mm^3 for this source, the CRD should initiate discussions with the Province regarding this allocation when completing further future assessments on the development of the Leech River watershed as a long term water source for drinking water. The CRD should confirm with the Province that the allocated water license extraction from Leech River will be available given the Water Sustainability Act which has been implemented since completion of the 1994 Plan.

Daily simulation of the hypothetical Leech River Reservoir water balance with 17 years of inflow data (**Figure 4.4)** and different reservoir storage volumes shows that by increasing the active storage volume of the hypothetical Leech River Reservoir to 13 Mm^3, the reservoir can supply up to 15 Mm^3Y of demand. Increasing the active storage volume beyond 13 Mm^3 does not increase the annual demand that can be supplied (15 Mm^3/Y; **Figure 4.10**). Therefore, developing a reservoir with an active storage volume of greater than 13 Mm^3 is not expected to result in more water supply yield. Preliminary assessment of the topography suggests that a 60m to 100m dam is required to develop the 13 Mm^3 active storage. Further detailed studies are required to determine the volume of the reservoir, as well as height of the dam, required to supply the 15 Mm^3Y demands. Pending the outcome of discussions with the Province regarding the EFN Policy it may be possible to increase the withdrawal to the licensed amount of 30.8Mm^3Y as community drinking water supply is a typically a high priority use.

The hypothetical Leech River Reservoir with an active storage volume of 13 Mm^3 (or greater) fills 16 of the 17 simulation years (i.e., 94% of years) when the annual demand is 15 Mm^3 Y (**Table 4.17; Figure 4.11**). An arbitrary maximum volume of 300 Mm^3 (greater than the minimum required 13 Mm^3) was used in Figure 4.11 just for illustration purpose. The number of years that the reservoir does not fill increases if the annual demand increases beyond 15 Mm^3 (Table 4.17). For

example, with an annual demand of 20 Mm^3, the reservoir would fill 7 of the 17 simulation years (i.e., 47% of years; Table 4.17; Figure 4.10).

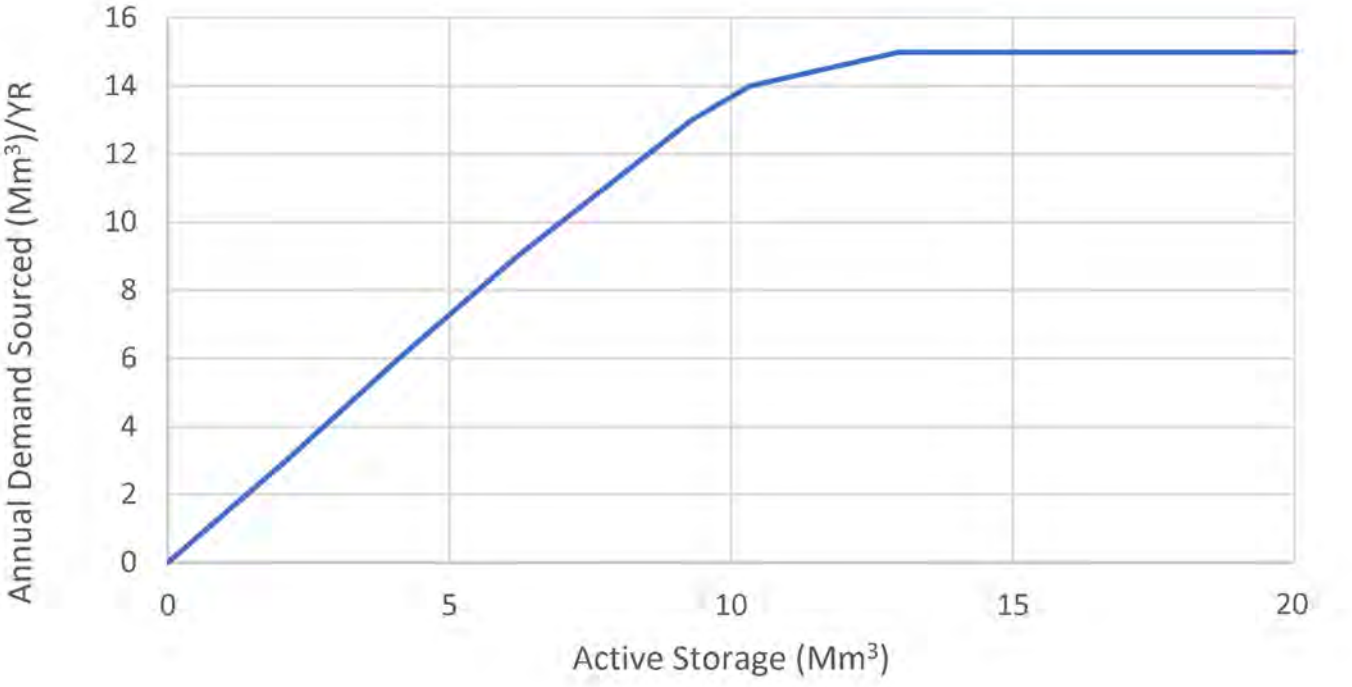


Figure 4.10: Potential Annual Demand Sourced by Leech River for Different Active Storage Scenarios

Table 4.17: Number of Years (within the 17 Simulation Years) that the Reservoir with Active Storage Volume

Annual Demand (Mm^3/yr.)	No. of Years (Percent of all Simulated Years)
12	0 (0%)
15	1 (6%)
17	2 (12%)
20	9 (53%)

Like the method described for the Sooke Lake Reservoir (Section 4.2.4.1), a preliminary analysis was conducted to estimate the implications of climate change for the adequacy of a hypothetical Leech River Reservoir to meet the 15 Mm^3Y demand.

With this method, the monthly average flow change estimates (due to climate change impacts by the 2080s) for the hypothetical Leech River Reservoir are shown in **Table 4.18.** These monthly changes were applied into all 17 water balance simulation years to estimate preliminary effects of climate change on the hypothetical Leech River Reservoir water balance.

Figure 4.12 shows simulated water levels in the reservoir during the 17 years of simulation with and without climate change. Minimum reservoir levels under the climate change scenarios are lower than those of the without climate change scenario because the climate change scenario

has lower precipitation and higher evaporation in the summer. However, because of the higher fall and winter flows, the maximum water levels in the climate change scenario are the same as (or higher than) those of the without climate change scenario. Based on Figure 4.12, two differences between the scenarios with and without the climate change are as follows:

1. The climate change scenario requires 15 Mm^3 of active storage (compared to 13 M^3 active storage required for the scenario without climate change) to supply a 15 Mm^3Y demand.
2. Under climate change scenario, the reservoir fills every year (compared to the without climate change scenario, which does not fill in one year). The difference is the result of higher fall and winter flows predicted under the climate change scenario.

Like the Sooke Lake Reservoir analysis, this is a preliminary assessment that requires further analysis (e.g., hydrologic modelling-based water balance with direct climate change parameters).

Table 4.18: Preliminary Estimates of Monthly Change in Hypothetical Leech River Reservoir Inflow

Month	Reservoir Inflow Change (m^3/s)
Jan	0.979
Feb	0.494
Mar	0.056
Apr	-0.007
May	-0.076
Jun	-0.364
Jul	-0.318
Aug	-0.451
Sep	0.134
Oct	0.591
Nov	1.057
Dec	0.807
Annual	0.242

Note:

Flow changes were calculated by applying projected percent changes to monthly precipitation and evaporation estimates, averaged over the 2002 to 2020 period.

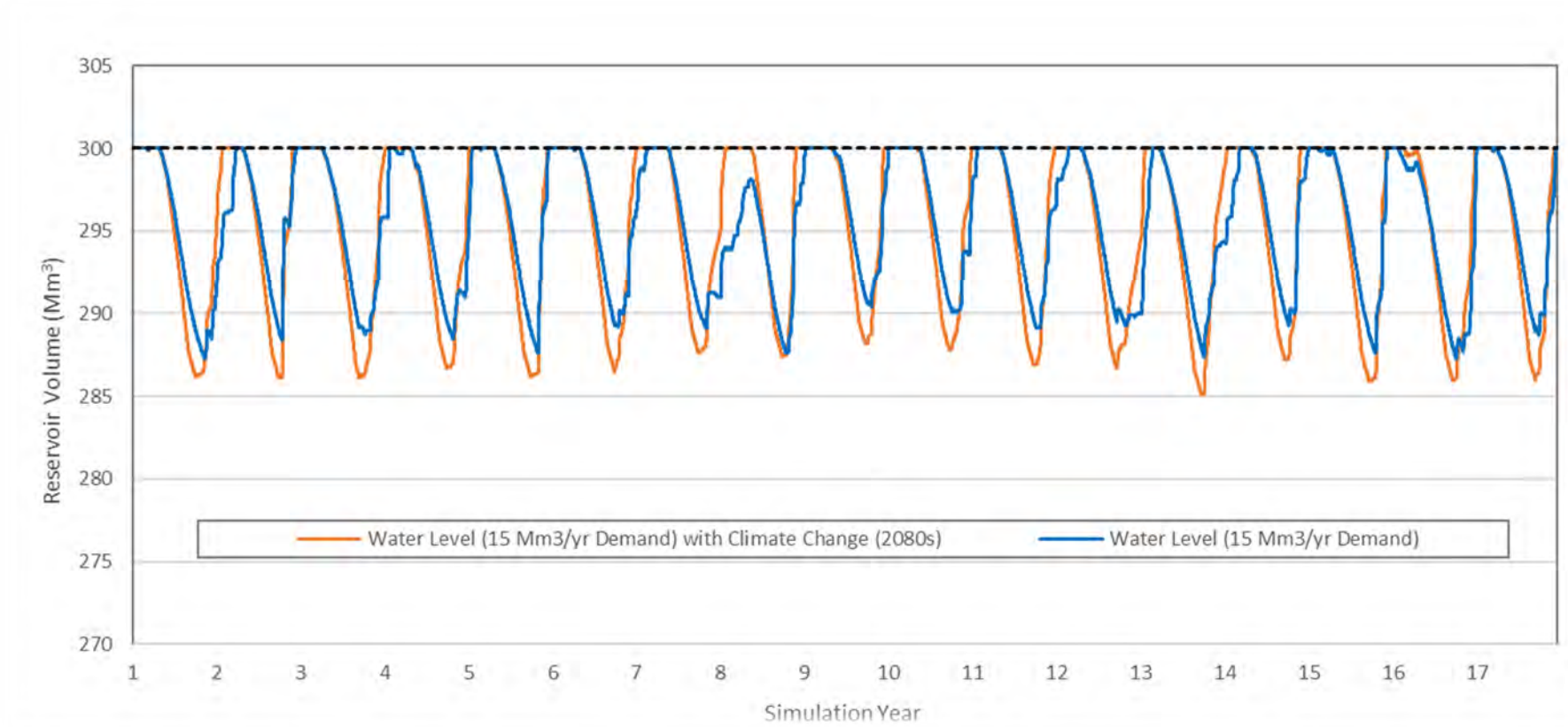


Figure 4.11: Simulated Water Level in a Hypothetical Leech River Reservoir with an Arbitrary Maximum Volume of 300 Mm^3 under the 15 Mm^3Y and 20 Mm^3/yr Demand Scenarios. The arbitrary maximum volume of 300 Mm^3 (greater than the minimum required 13 Mm^3) was used for illustration purposes only.

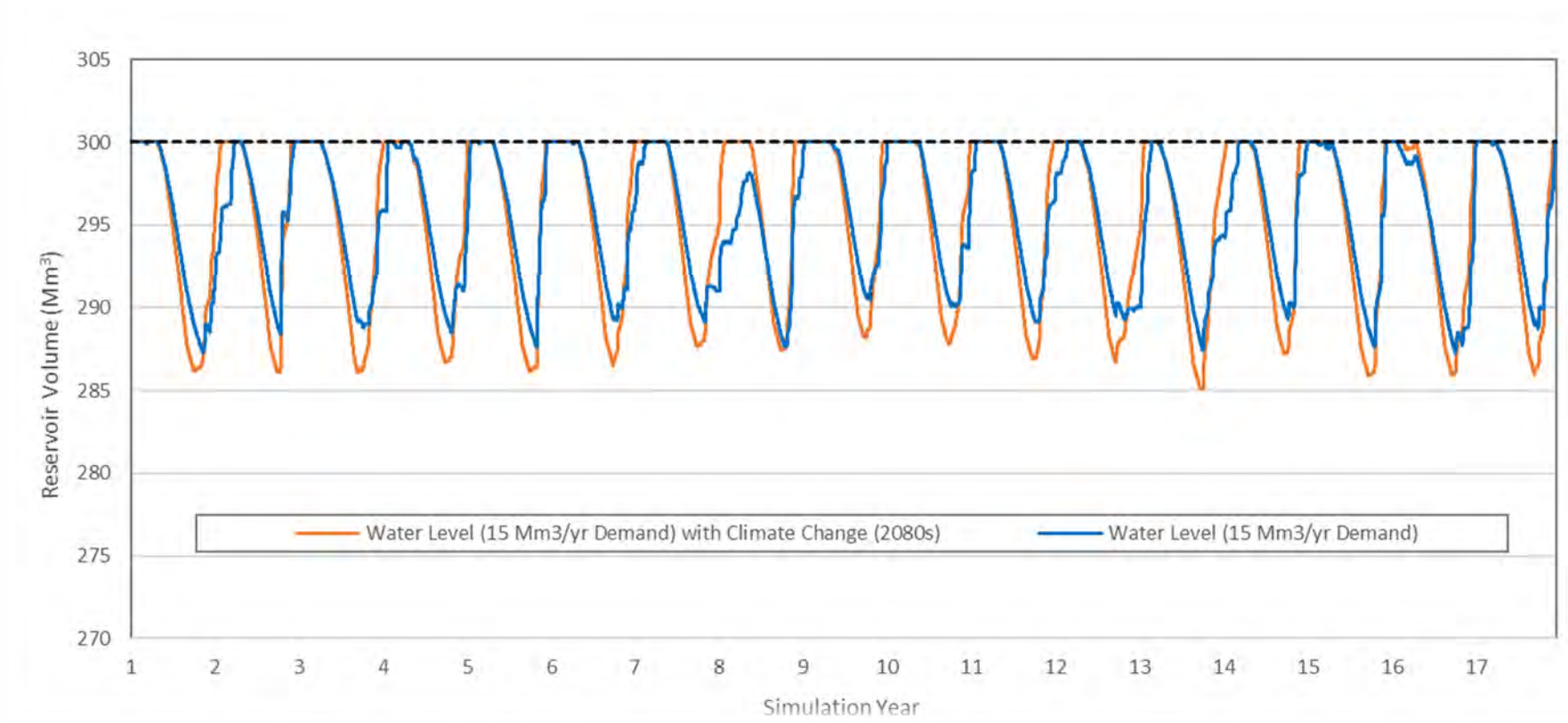


Figure 4.12: Simulated Water Level in a Hypothetical Leech River Reservoir with 300 Mm^3 under the 15 Mm^3Y Demand, with and without 2080s Climate Change Scenarios

4.2.4.3 Considerations for Concurrent Use of Sooke and Leech Watersheds

Sections 4.2.4.1 and 4.2.4.2 provide preliminary assessment for the adequacy of Sooke and Leech watersheds to meet future water demands. Conclusions provided in those sections assumed that the Sooke Lake Reservoir and hypothetical Leech River Reservoir would be operated independently to meet the water demands.

There is potential to increase the total water supply yield from the Sooke and Leech watersheds, and/or improve the reliability of water supply yield by concurrent use of these reservoirs in tandem or parallel configurations. This potential can be further investigated by an operational water balance model that considers different options and operating rule curves for concurrent operation of these reservoirs or direct diversion of Leech River water to SLR. The operational water balance model would be more accurate and reliable if it is developed based on a detailed hydrologic model and hydroclimatic data from each watershed.

We understand CRD does have a qualified hydrologist on staff who can provide guidance on stream monitoring and interpretation of available data collected in each watershed. It is recommended that all hydroclimatic data collected in the WSAs during the recent years (20 years if possible) be reviewed by CRD's qualified professional considering the data collection standards (e.g., RISC 2018). Hydroclimatic data that passes such a quality review should be compiled into summary reports that can be used for multiple purposes, including hydrologic and water balance modelling. We are advised by CRD that data collection and analysis for all hydroclimatic stations in the WSAs is compliant with the provincial standards (e.g., RISC 2018). This data should be consolidated in monthly and annual reports for future use and reference. Any future stations installed in the watershed should also meet provincial standards.

4.3 Water Licences

CRD has numerous water licences from a variety of sources with largest being Sooke, Goldstream River and Waugh Creek, Goldstream Dams and Lakes and Leech River. The CRD has water licences on all of its major water sources which outline the allowable waterworks drafts from each source. CRD has provided a listing of existing licences currently used as well as those that are not currently used, as shown in **Table 4.19**.

Table 4.19: CRD Water Licences

Related Dam	Stream Name	Water Licence	Cubic Metres per Year	Water Use
Licenses Currently Utilized for Drinking Water				
Sooke Lake Dam	Sooke Lake	C117626	5,554,360	Conservation
Sooke Lake Saddle Dam	Sooke Lake	C117626	89,862,718	Storage – Non Power
	Sooke Lake	C117626	60,790,315	Waterworks
	Council Creek	F021627	4,977,969	Waterworks
	Council Creek	C041347	175,154	Conservation
	Council Creek	C041347	2,644,006	Waterworks
	Council Creek	C041348	2,837,004	Storage – Non Power
Deception Gulch Dam	Deception Gulch	C117628	4,101,321	Conservation Storage
Goldstream Lake Dam	Goldstream River	C130779	6,660,802	Storage
Lubbe Dam #1	Waugh Creek	C130779	3,207,053	Storage – Non Power
Butchart Dam #1	Goldstream River	C130779	4,193,838	Storage – Non Power
Japan Gulch Dam	Goldstream River	C130779	117,181	Storage – Non Power
Licenses Not Currently Utilized for Drinking Water				
Jack Lake Dam	Waugh Creek	C130779	42,616	Storage – Non Power
Humpback Dam	Waugh Creek	C130779	616,741	Storage – Non Power
Cabin Pond Dam	Goldstream River	C130779	67,842	Storage – Non Power
	Goldstream River and Waugh Creek	F021630	15,911,315	Waterworks
Charters River Dam	Charters River	C043293	829,661	Waterworks
	Charters River	C043294	74,009	Storage – Non Power
Other	Leech River	C052452	30,837,000	Storage Waterworks - 2005
	Leech River	C052452	30,853,449	Waterworks

The CRD has licensed water supply rights for Leech River and lakes within the Leech watershed. These are not currently used for drinking water supply but may be incorporated into the RWS system in the future once the Leech watershed supply is developed. The BC Water Sustainability Act and BC Environmental Flow Needs Policy may limit the water extraction from Leech even though the CRD has a water license of 30.8 Mm^3Y from this source. Discussions should be held with the Province to confirm that the Leech River water license volume will be available for use by RWS in consideration of new regulations that were introduced after the license was issued.

4.4 Water Supply Dams

4.4.1 Introduction

The Integrated Water Services Department (IWS) of the Capital Regional District (CRD) manages 22 dams, 15 of which are directly related to the Regional Water Supply (RWS) system for the purpose of creating water storage to meet the annual and seasonal water demands of the customers. The history of many of these dams date back well over a century and **Table 4.20** provides some detail of the existing RWS dams including the Dam Failure Consequence Classification, year(s) of construction and other details. **Figure 4.13** illustrates the location of each of the dams.

There are three (3) dams within the Sooke Lake Watershed that impound the Sooke Lake and Deception Gulch Reservoirs. There are eleven (11) dams in the Goldstream Watershed that create Butchart Lake, Lubbe Lake and Goldstream Lake Reservoirs. Japan Gulch Dam and Reservoir are located downstream of the Goldstream Lake Reservoir. In addition, there are several dams that have been retired from service or have been decommissioned including Charters River Dam. Additional details are contained in two recent RWSC staff reports of 2017[1] and 2019[2]. No dams exist within the Leech watershed although proposed dams were considered in the 1994 Plan.

Table 4.20: Summary of Regional Water Supply Dams

Name		Consequence Rating	Year Constructed - Original / Upgraded	Dam Crest Width	Dam Crest Length	Dam Crest Elev. / Height
1	Sooke Lake Dam	Extreme	1970 / 2002	7.3m to 10m	533m (includes 63m spillway)	El. 190.75m / 24.75m
2	Sooke Lake Saddle Dam	Very High	2002	5m to 14m	1080m	El. 190.75m / varies up to 16m
3	Deception Gulch Dam	Very High	1979 / 1981 / 2002	7m	460m	El. 189.50m / 24m
4	Japan Gulch Dam	Significant	1900 / 1995	6.1m	97.5m	El. 134.6m / 12.5m
5	Charters River Dam	High	1976	0.91m	30.48m (includes spillway)	El. 83.23m / 16.76m
6	Goldstream Lake Dam & Spillway	High	1892 / 1995	5m	302m	El. 459.96m / 12.0m
7	Lubbe Lake Dam 1	High	1900 / 1995	5m	63m	El. 482.34m / 12.2m
8	Lubbe Lake Dam 2	Significant	1900 / 1995	4m	28m	El. 481.1m / 3.0m
9	Lubbe Lake Dam 3	Significant	1900 / 1995	4m	29.5m	El. 481.1m / 3.0m
10	Lubbe Lake Dam 4	Significant	2019*	5m	48m	El. 481.3m / 10m
11	Butchart Lake Dam 1	High	1900 / 1995	5m	60m	El. 546.6m / 11m
12	Butchart Lake Dam 2	High	1900 / 1995	5m	40.2m	El. 546.6m / 14.6m
13	Butchart Lake Dam 3	Low	1900	3.5m	17.4m	El. 545.1m / 1.8m
14	Butchart Lake Dam 4	Significant	1900	5m	48.5m	El. 545.2m / 7.3m
15	Butchart Lake Dam 5	Significant	1900 / 1995 / 2021	4.5m	157m	El. 545.4m / 7.3m

*Original dam was removed and replaced in 2019

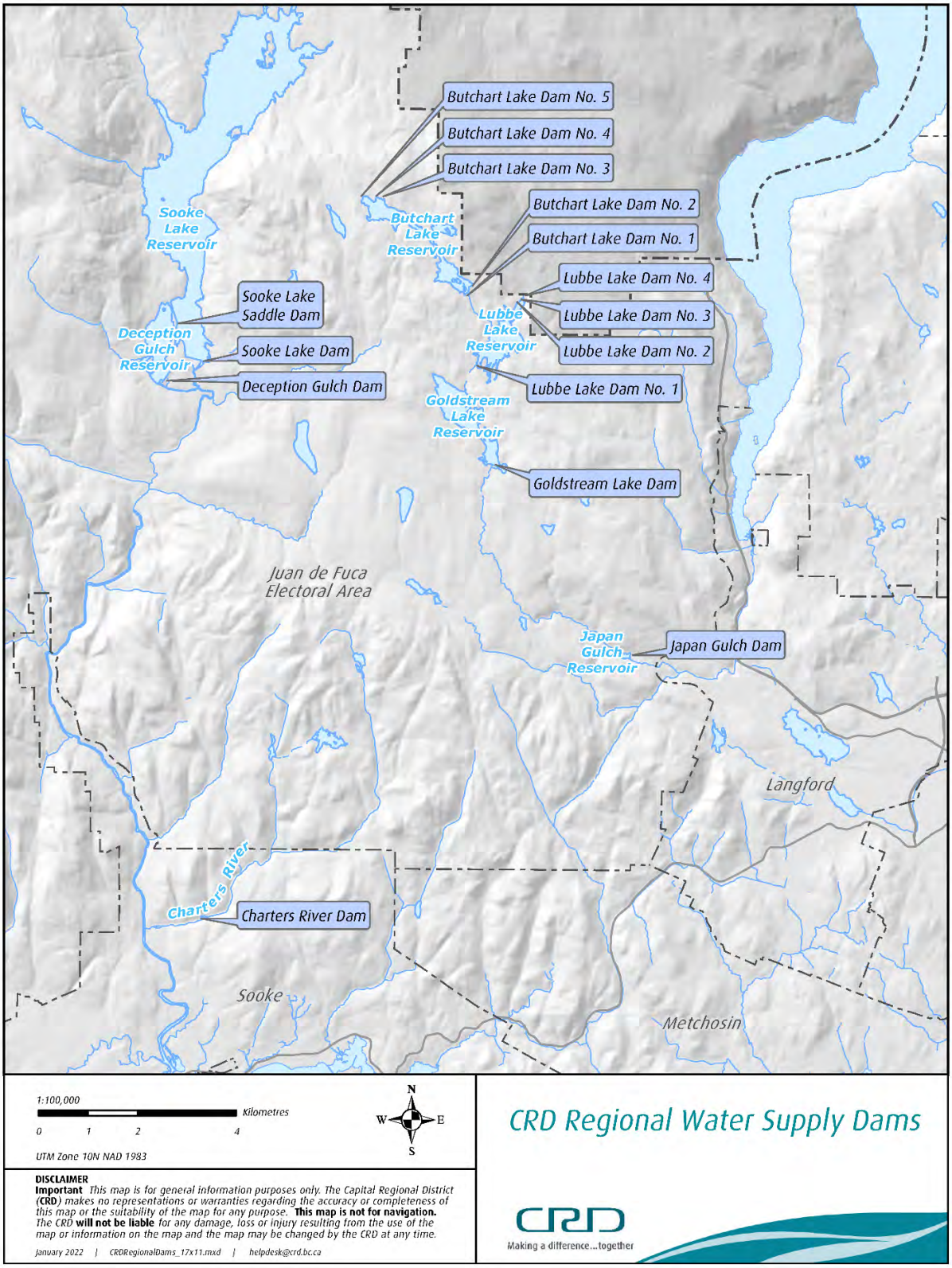


Figure 4.13: CRD Regional Water Supply Dams Locations

In general, dams may have one or more intended purposes including creating water storage for domestic and agricultural water supply, flood control, irrigation, downstream conservation (fisheries) flows and hydro-electric power generation. The purpose of the RWS service dams is primarily for domestic or drinking water supply and they provide a lesser amount of water for domestic irrigation and agricultural use. A historical exception was the hydro-electric works that predate the CRD ownership and have long since been decommissioned or abandoned (i.e., Cabin Pond head pond, penstock, and power station at Japan Gulch Reservoir).

4.4.2 Dam Safety Legislative and Regulatory Framework

Dams in the Province of British Columbia are legislated and regulated under the Water Sustainability Act (WSA) and its related Dam Safety Regulation (DSR). The WSA and DSR are enforced by Provincial Dam Safety Officers (DSO) within the Ministry of Forests, Lands, Natural Resource Operations and Rural Development. The WSA allows for the issuance of water rights licenses to water suppliers by the Province for three general purposes including use, storage, and diversion of surface water and hence the linkage to dams and storage reservoirs. A fourth type of applicable water license is for conservation normally reserved to provide downstream flows for fisheries and ecology. The existing water licenses issued to the CRD by the Province are discussed in greater detail in Section 4.3 and outlined in Table 4.20.

The DSR identifies specific obligations for dam owners including:

- Determination of the Dam Failure Consequence Classification defined by:
    1. Loss of Life
    2. Environmental
    3. Cultural Values, Infrastructure and Economics
- Responsibilities for dam condition and safety
- Preparation and updating of an Operation, Maintenance and Surveillance manual
- Preparation and updating of a Dam Emergency Plan
- Site surveillance and formal inspections
- Dam Safety Reviews and reporting
- Maintenance of dam safety records

The CRD staff consider the DSO to be important stakeholders in the management of the dams and CRD staff provide information to the DSO as required by the DSR. Regular activities undertaken by CRD staff to meet regulatory requirements for active and retired dams where necessary include:

- Routine inspections of dams and spillways
- Surveillance and reporting
- Preventative maintenance
- Exercising of valves and appurtenances
- Seasonal adjustments to flow releases

- Corrective action and capital improvements as required
- Internal (CRD) dam safety auditing

Beyond the legislative and regulatory obligations, the dams are assessed against technical performance standards of the Canadian Dam Association (CDA), the International Commission on Large Dams (ICOLD), and Engineers and Geoscientists of British Columbia (EGBC).

4.4.3 Dam Safety Investments and Related Strategic Plan Objectives

As a result of the seasonal variation of the annual hydrological cycle, water storage created by dams is required to meet the current and future water demands as discussed in greater detail in Section 4.1. Impounding of raw water has some positive effect on raw water quality in terms of reducing the velocity of the flow and allowing the opportunity for suspended particulate matter in the water column to settle-out. The dams and related storage reservoirs provide for a level-of-security and redundancy of water supply. Prior to the 2002 commissioning of the raised Sooke Lake Dam, the water service was in a situation whereby the water demand was approaching the Sooke watershed's available water yield and additional storage was required to capture additional water in the winter precipitation season. After raising of Sooke Lake Dam, the CRD has benefited from two decades of relief from drought and water demands.

The Goldstream Watershed dams were deemed to be at risk of failure due to seismic forces and failure modes and in the 1990's the Province ordered the draining of the Goldstream reservoirs. Negotiation between the CRD and the Province resulted in the reservoirs being maintained at a reduced volume until such time that investments were made to improve the seismic performance of these dams. By the mid-1990's most of the Goldstream Watershed dams were upgraded by raising the height to achieve greater freeboard and buttressing was constructed to increase the performance and reliability of the back-up water supply to Sooke Lake Reservoir.

Significant dam related capital investments in the recent decades include the following:

1. Seismic and mechanical improvements of the Goldstream Dams (mid-1990's – 1994 Plan Alternative A, Project "a")
2. Raising of Sooke Lake Dam and Sooke Lake Saddle Dam (2002- 1994 Plan Alternative A, Project "e")
3. Replacement of Lubbe Dam #4 (2019)
4. Foundation Grouting/Rehabilitation of Butchart Dam #5 (2021)

In addition to physical improvements, many studies, assessments, and reports have been commissioned to analyze the dams for failure modes and performance relative to dam safety standards. A summary of completed studies follows:

1. Updated Dam Safety Reviews for all RWS dams in the past decade
2. Probabilistic Seismic Hazard Assessment (PSHA) for Sooke Lake Dam, Sooke Lake Saddle Dam and Deception Gulch Dam (2017)
3. Probable Maximum Precipitation (PMP) and Probably Maximum Flood (PMF) hydrological studies and spillway discharge capacity assessments (2016 and 2017)

4. Dam Breach and Inundation Zone Mapping studies for the Sooke Watershed and the Goldstream Watershed. These studies as well as Dam Safety Reviews confirm the Dam Failure Consequence Classification
5. Dam surveillance instrumentation improvements for real-time dam performance information
6. Improvements to Dam Emergency Plans, Operation, Maintenance and Surveillance Manuals, updating of Standard Operating Procedures, etc.

4.4.4 Dam Safety Risk Management and Mitigation

The CRD has considered the potential implications should one or more dams fail, but in context of the function of the dams and with limited redundancy, the CRD should continue to diligently operate, maintain, and conduct surveillance of the dams. Further to the obligation to have a Dam Emergency Plan should a dam failure occur, the CRD has Business Continuity Plans and Emergency Management Plans. Identified dam safety risks are managed and use the approach to “reduce risk as low as reasonably practicable” (ALARP). The CRD staff continue to develop a dam safety management system and risk-informed decision-making process to prioritize and resolve dam safety issues. The comprehensive Dam Safety Program and obligations of the Regulation require the dams to continuously be assessed for risks through routine surveillance and Dam Safety Reviews. In addition, the AWWA J100 assessment recently conducted by the CRD included dam safety risks and means to mitigate risk.

The CRD should consider the short-term and long-term effect should one or more of the dams fail or be taken-out-of-service. Under the current operating procedures, Sooke Lake Reservoir is the primary water source. Should Sooke Lake Dam or Sooke Lake Saddle Dam fail, current opportunities for secondary water supply include the use of the Goldstream supply which has limitations and is unable to convey water to the JDFWD. Customer demand for water and stored volume will determine the duration for which water is available. The CRD has ability to impose consumption restrictions during an emergency. The 1994 Plan included an option for obtaining water from the north basin of Sooke Lake Reservoir and this option is discussed in Section 4.5 of this report. In the extreme event that Sooke Lake Dam and/or Saddle Dam breaches and the stored water is released or unavailable, the natural north basin could be a source of interim water until infrastructure is re-established.

Fully respecting the loss of life and environmental consequences, the more significant implications of dam failure for the Region include the loss of drinking water supply, fire protection by municipal distribution systems, and supply of water for commercial and institutional use.

The benefit of the Goldstream water supply and dams has been raised in relation to the life-cycle costs and it has been concluded that the Goldstream supply is required and hence management of the Goldstream dams should carry on.

4.4.5 The Future of Water Supply and Dams

This section discusses the past, present and future water supply. There are several phases post raising of Sooke Lake Dam (2002). Phase 1 – 2002 to present day – under the current operating modes, Sooke Lake Reservoir is used as the primary water supply with the Goldstream system as secondary. The Leech Watershed is not currently used (intentionally). In Phase 2, SLR can

supply the annual demand until the demand scenario increases by 40% which is expected to occur by 2045 at current per capita demand rates. In the Phase 2 scenario whereby the water demand increases, Sooke Lake Reservoir will reach a threshold whereby the available /sustainable yield of Sooke Watershed will be exceeded. In the distant future, Phase 3 will require additional storage in the watersheds, just like what was experienced leading up to the raising of SLD in 2002. Phase 3 would likely include the incorporation of the Leech WSA into the RWS.

The 1994 Plan proposed accessing water from the north basin of Sooke Lake Reservoir and since then, Sooke Lake Dam was raised, and the primary water supply, SLR, has been able to satisfy the demand. The concept of accessing water from the north basin is explored in Section 4.5. The reasons for accessing this water are aligned with the 2017 Strategic Plan, but it should be noted that the north basin should not be relied upon for additional water supply (quantity above safe drought yield) without augmentation with Leech River flows as the yield and sustainable volume is finite from the watershed areas draining into SLR. It should be noted that there is an opportunity to supplement water supply from the Leech Watershed to the Sooke Lake Reservoir via the existing Leech Tunnel, but water supply is limited in summer high demand months due to the seasonal hydrological cycle and lack of storage and potential water licensing policy.

It is recommended that a water balance or optimization study be completed to explore how to operate to the full benefit of the three existing watersheds. Reservoir Operating Rules (Standard Operating Procedures) should be established to manage the current water balance and to prepare for the future. It is also recommended that opportunities for additional storage be explored to take full advantage of available water yield in the future. More specifically, it is recommended that a study be commissioned to identify storage opportunities within each of the three existing watersheds.

Options to create additional storage include:

1. Deception Gulch Reservoir - rehabilitation and recommissioning of Deception Gulch Dam (including dredging),
2. Sooke Lake Dam (and Sooke Lake Saddle Dam) - raising of Sooke Lake Dam and its Sooke Lake Saddle Dam. It should be noted that the option of raising Sooke Lake Dam and Sooke Lake Saddle Dam was explored in 2016 and limitations and implications of additional raising of Sooke Lake Dam were identified. See report of March 16, 2016.
3. 1994 Plan options – complete except for Leech Watershed dam/storage options which require detailed study including hydrological water balance models and geotechnical assessments.
4. Numerous additional small dams, all watersheds (e.g., Council Lake, etc.)
5. Leech Watershed – the topography and geology provide for challenging conditions to create storage with dam structures. Unlike the topography of the Sooke Lake basin, the topography in the Leech Watershed is steep and incised and therefore the resulting volume of storage for height of dam (and volume) is not as efficient as Sooke Lake Reservoir. The geology has been described as unconducive to founding dam structures and slopes are unstable which could result in realizing various dam failure modes and geoscientists continue to map-out and characterize the Leech River Fault. Further

detailed assessment by geotechnical engineers and dam specialists is required to determine the feasibility of dam construction.

6. Integration of "off-catchment" water and reestablishment of decommissioned dams and reservoirs (e.g., Jack Lake, etc.). Many old dams and reservoirs were decommissioned or removed from service for good reason related to water quality and that the land ownership was not fully the CRD's. Taking advantage of current off-catchment watershed may be an opportunity in the distant future and these sources may become more viable post commissioning of future water filtration.

4.4.6 Climate Change

Climate change implications were discussed in Section 4.2, and from a dam perspective PMP and PMF studies are routinely conducted. It is recommended that the review of PMP and PFM and the effect on existing works (e.g., spillway capacity) and operating rules (e.g., Reservoir Operating Rules) be conducted to adapt to the potential implications of climate change relative to dam safety.

4.5 Water Source Development Requirements

4.5.1 Sooke Lake Reservoir Deep Northern Intake

A 2021 study by Stantec concluded that a proposed deep northern intake into Sooke Lake Reservoir would provide significant benefits in terms of emergency water supply, redundancy, short term emergency supply during drought conditions and improvements in water quality.

The criteria for sizing of the intake is design consideration. From a sizing perspective, it would be desirable to size the intake pipe to provide full redundancy of the intake capacity for 2100 MDD. The intake could then be used to supply directly to the Head Tank or a second redundant connection to the transmission system. Sizing of tunneled intakes should consider a longer supply horizon as the mobilization and capital costs for MTBM mobilization and shaft construction are significant. It is recommended that the tunnel be sized for a year 2100 MDD flow of 730 MLD. This flow would require an intake diameter of 2.4 metres based on acceptable design velocities.

If the intake is to be used for emergency water supply purposes only, in the event that the intake tower or Kapoor Tunnel are out of service, then possibly a smaller diameter intake and lower Level of Service could be considered such as supply of 2100 ADD, provided CRD is willing to have policies in place for demand management during emergency situations. Since the length of the intake pipe is not significant and most of the cost is associated with construction of the intake shaft and MTBM mobilization, a conservative sizing approach is warranted on the intake to provide future flexibility for additional water supply extraction from Sooke Lake Reservoir once Leech River flows are diverted to SLR in the future. A decision on providing a lower level of service and appropriate sizing for a smaller redundant transmission system can be made during preliminary design but it would be preferable to make the intake no smaller than 1.8 m diameter. This size would be adequate to convey the 2100 ADD of 377 MLD from the intake, enough to provide a resilient source of supply.

Stantec investigated a potential site for a deep northern intake. The site is located approximately 2 km north of the CRD boat launch facility on the east side of Sooke Lake Reservoir as shown in **Figure 4.1.4.** A feasible configuration of the tunnel is to have the MTBM launching shaft at the small landform on the east side of Sooke Lake Reservoir. This site has good access for construction and laydown. A hard rock MTBM would be launched from the land side towards the lake to excavate the tunnel. The length of tunnel is estimated to be approximately 300 m. As the slope of the lakebed appears to be relatively gentle per the bathymetry shown, a receiving trench/pit in the lake may be needed to provide a nearly vertical or steeply sloped face that would be appropriate for the MTBM to exit into the lake. Given our understanding about the local geology, rock excavation is anticipated for the receiving trench excavation. As the elevation of water intake is set at approximately elevation 150m, the tunnel invert elevation would be at about 147.6m to provide for the 2.4m diameter steel pipe. The intake level may be adjusted slightly to accommodate design configuration for the intake screens. Final elevation of intake would be selected following detailed water quality studies.

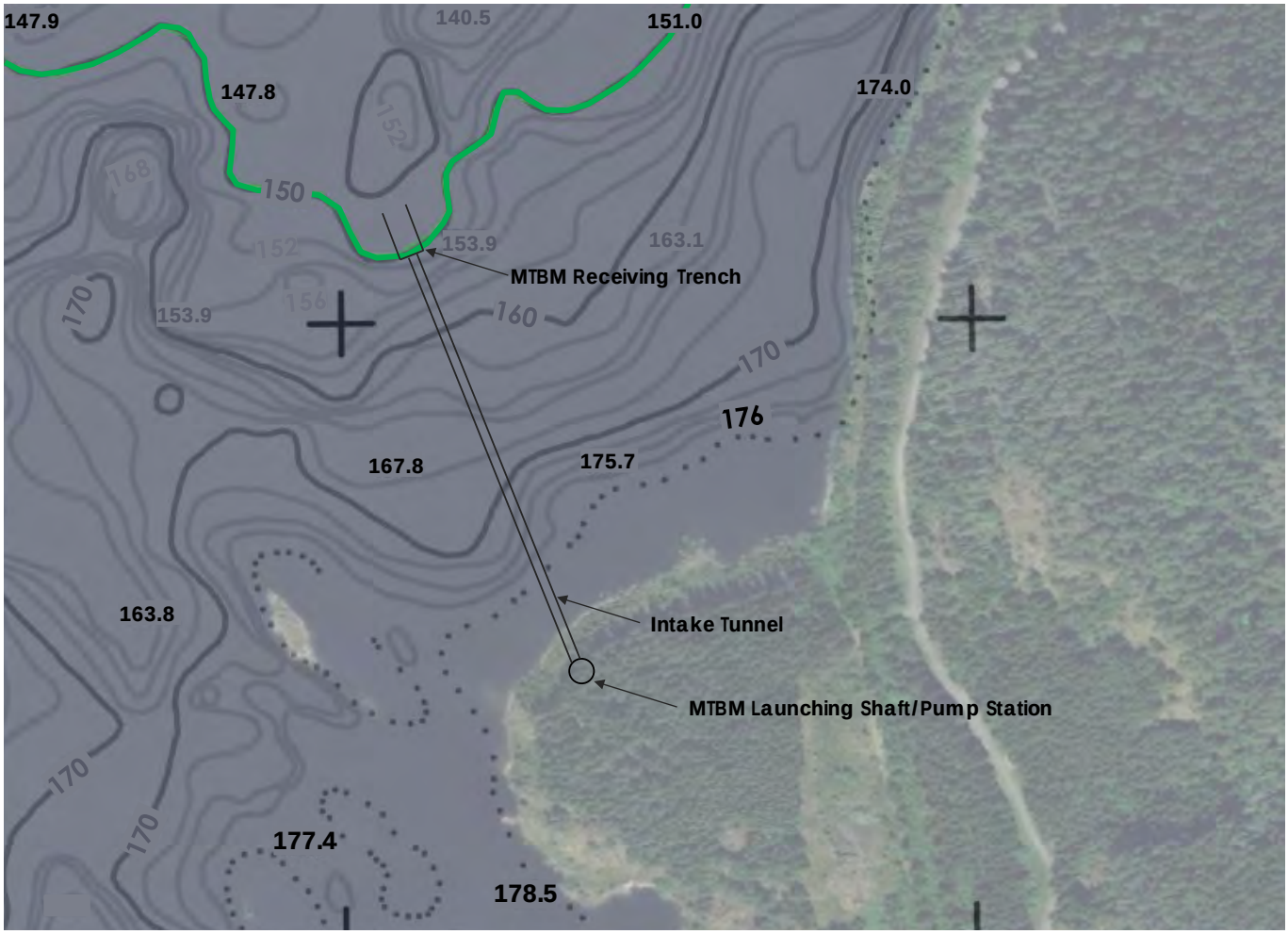


Figure 4.14: Conceptual Intake Tunnel Configuration

The CRD has advised that the suggested location is across from Rithet Creek and concern has been expressed regarding the impacts on water quality. Rithet is still a significant distance from the proposed intake, but it would be prudent to determine if there are any water quality impacts in future investigations at the proposed intake site.

Seasonal water quality sampling at the location of the proposed second intake is warranted and recommended. The sampling should be completed during wet weather conditions to determine if there are any seasonal influences on water quality from watershed creeks draining into the SLR.

The geological conditions along the intake tunnel are anticipated to be in hard rock and well below the water table. Microtunnelling is expected to be the most feasible construction method. Should a longer intake be required, or if the intake is integrated within part of a larger tunneled conveyance project, large diameter TBM tunneling methods may also be used. For a short intake, large diameter TBM tunneling is expected to be prohibitively expensive. Recent experience at Comox and Campbell River has shown microtunnelling to be a cost-effective construction method for shorter intakes.

Another potential viable option for an intake to access deeper sections of Sooke Lake Reservoir is the installation of a HDPE float and sink marine intake pipe. The intake pipe would be sunk to the bottom of the lake and would be cost effective to install in comparison to tunneling. This intake pipe would extend to deep water in the northern basin of Sooke Lake reservoir, and it could be connected to the existing intake tower or the Head Tank. The final location for a second intake will involve further study including water quality assessments, geotechnical assessments, constructability evaluations and cost comparisons.

The 1994 Plan investigated the option of installing a floating intake for emergency water supply from the deeper northern portion of the SLR. This type of intake is currently used for emergency water supply by the Seattle Public Utilities Commission on their Chester Morse Lake source. Such a facility is typically constructed on a barge and equipped with flexible or hinged pipe connections such that the pump station can be operated over variable water levels. The intake would still be equipped with fish screens using an air burst wedge wire type screen. With this option there is also the possibility of using a floating, flexible HDPE discharge pipe which would eliminate the requirement for trenching or a float and sink marine pipeline. The discharge pipe could be connected to the existing SLR intake tower or the Head Tank. **Figure 4.15** shows a floating pumping station installed on a barge. For the SLR, intake screening would be located below the barge and the pump station would be located offshore in deeper sections of the reservoir.

Figure 4.15: Floating Pump Station

4.5.2 Goldstream Reservoirs

Water supply from the Goldstream Reservoirs discharges to Goldstream River and flows into Japan Gulch Reservoir. A screen is located adjacent to Japan Gulch Dam and following screening the water is discharged to the transmission system upstream of the Goldstream Disinfection Facility. The Goldstream Reservoirs serve as a valuable secondary source and this system used when Kapoor Tunnel is taken out of service for inspection or maintenance. The RWS must be operated at a lower HGL of 132m when the Goldstream system is used as Japan Gulch Reservoir provides the driving head for the system when Kapoor Tunnel and the Head Tank are taken off line. These reservoirs can supply demand for several weeks depending on water demands in the system. The combination of the three Goldstream reservoirs provides 10 Mm^3 of additional storage for the RWS. The storage is not sufficient to meet summer demands, but it is adequate as a secondary or emergency supply for a short duration. The source is not used during high flow periods when Goldstream River Canyon is prone to slides which impact water turbidity. The installation of a proposed transmission main directly from Goldstream Lake Reservoir to Japan Gulch as suggested in the 1994 Plan would eliminate this issue and make it a more reliable source. An intake into Goldstream Lake and a screening system would also be required.

4.5.3 Leech River Watershed

As noted in Section 4.2.4.2 the Leech River watershed has a significant catchment area that could serve as a potential future drinking water source. In the summer months there is little inflow into the watershed; thus, storage is required to maximize use of this source. There are reported slope stability issues within some sections of the watershed and the slopes are steep making

development of storage more difficult and costly because a high dam would be required to achieve any appreciable storage (see Section 4.1.5).

The hydrological modeling completed as part of this study indicates that the potential yield from this watershed is 15 Mm^3Y if it can be captured, stored, and transferred to the Sooke Lake Reservoir via Leech Tunnel. Since inflows into the watershed cease in the summer months, a high dam could be constructed to maximize the potential for development of this source or water could be diverted using a direct intake in Leech River when water is available during the months of October to April. Geotechnical and stability assessments will be required to further assess the feasibility of dam construction at the Leech watershed. Other considerations, such as the Water Sustainability Act and the requirement to meet environmental flow needs may impact the quantity of water that can be extracted from this source for drinking water use. Further study and discussions with the Province are required to confirm the options to be studied can be permitted under the Water Sustainability Act.

Another option for use of Leech water would be seasonal diversion of water supply to Sooke Lake Reservoir. This would be accomplished with a direct intake into the Leech River with diversion through the Leech tunnel via Deception Gulch Reservoir or a pipeline along the north side of the Sooke Lake Reservoir. The diversion would enable the Sooke Lake Reservoir to be replenished quicker which would be an advantage during dry years or extended multi- year drought conditions. Storage development within Leech watershed would provide the most benefit for maximizing use for drinking water supply but development of a dam within this watershed may prove challenging and costly. Further feasibility assessment of dam construction in Leech watershed is required and could be completed as part of a hydrology water balance model and operating rules for the concurrent use of Leech River and SLR.

5.0 DRINKING WATER QUALITY AND TREATMENT

5.1 Drinking Water Quality Guidelines

5.1.1 Drinking Water Guidance in British Columbia

The quality requirements of drinking water in British Columbia are governed by the Provincial Drinking Water Protection Act (DWPA) and Drinking Water Protection Regulation (DWPR). The DWPA and DWPR define potable water as "*safe to drink and fit for domestic purposes without further treatment*." Criteria for potability are based on verification monitoring of bacteriological indicators in finished water as well as the Federal Guidelines for Canadian Drinking Water Quality.

The Drinking Water Protection Officer (DWPO) issues an annual Operating Permit which covers a 12-month period from March 31 to March 31 for municipal water systems in British Columbia. The water purveyor must pay an annual renewal fee and abide by the conditions of the permit. The water system purveyor must operate the water system in compliance with the conditions of the Operating Permit.

The Public Health Engineer issues a Construction Permit for any new construction, alterations or extensions following the review of design reports, design drawings and specifications for any proposed waterworks improvements. All works must be designed and sealed by a professional engineer registered in the Province of British Columbia.

5.1.2 Surface Water Treatment Objectives in British Columbia

Administration of drinking water guidance and development of policy resides with the Provincial Ministry of Health, while responsibility for implementation resides with the regional health authorities and their Drinking Water Officers (DWPOs). Island Health Authority (IHA) administers the DWPR for communities on Vancouver Island and adjacent area surrounding Kingcome on the mainland. The DWPOs may impose terms and conditions upon the construction and operating permits of water supply systems which may include treatment, monitoring, and water quality objectives.

While DWOs are conferred a degree of discretion in applying terms and conditions, guidance on exercising such discretion consistently and based on established policy is provided by the Ministry of Health through the *Drinking Water Officers' Guide* (DWOG) first published in 2007 and updated in August 2017. The contents of the DWOG are deemed "guidelines" under Section 4 of the DWPA, but DWPOs may deviate from them based on a sound rationale including risk to public health.

Part B of the DWOG includes the key technical document *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia*, first published in 2012, which describes the minimum goals for pathogen risk reduction from surface water sources. Ultimately, these objectives rely on the *Guidelines for Canadian Drinking Water Quality* as a reference for potability. Due to the difficulties in directly measuring waterborne pathogens, health-based treatment objectives are used as specifications for finished water and may be described as the "4-3-2-1-0" guideline. This guideline consists of the following minimum general treatment objectives:

- 4-log (99.99%) reduction or inactivation of enteric viruses
- 3-log (99.9%) reduction or inactivation of *Giardia* cysts and *Cryptosporidium* oocysts
- Two treatment processes (pathogen barriers) for surface water
- Less than or equal to one nephelometric turbidity unit of turbidity (≤ 1 NTU)
- No detectable *E. coli* (Escherichia coliform), fecal coliform, and total coliform

The DWOG also discusses the minimum conditions that should be considered for filtration exemption. These conditions are equivalent to the USEPA Filtration Avoidance Criteria discussed below. It is also acknowledged that increased threats identified by routine assessment and ongoing monitoring may necessitate filtration if the risk of adverse source water quality and public health risk is increased. The Medical Health Officer makes a determination that treatment is required. The DOWG, Part B, Section 4 outlines a risk based decision tree to guide the determination of corrective actions for drinking water and ultimately public health protection.

In 2022, the British Columbia Ministry of Health released two guideline documents for consideration when designing new water treatment facilities. These documents can be downloaded from the Ministry website and titles are provided below.

1. *Guidelines for Ultraviolet Disinfection of Drinking Water* (2022)
2. *Guidelines for Pathogen Log Reduction Credit Assignment* (2022)

The Sooke Lake and Goldstream Reservoirs water quality and CRD's primary and secondary disinfection practices currently meet the requirements of the DWPA and DWPR. The Goldstream River does experience high turbidity levels when landslides occur in the Goldstream River canyon, but the RWS does not use water from this source during high turbidity events.

5.1.3 Guidelines for Canadian Drinking Water Quality

Guidelines for Canadian Drinking Water Quality and the supporting Guideline Technical Documents are developed collaboratively by the Federal-Provincial-Territorial Committee on Drinking Water with the support of Health Canada. The current document and its predecessors have served as a reference for Canadian drinking water quality guidelines since 1968. The guidelines consider microbiological, chemical, physical, and radiological parameters.

It is widely acknowledged that the most significant risks to public health from drinking water pertain to microbiological hazards due to their association with acute and potentially severe adverse health effects. Guidelines for drinking water safety are expressed in terms of indicator and surrogate parameters, as well as general reduction requirements due to the difficulties in directly and rapidly detecting and measuring the wide range of disease causing bacterial, protozoan, and viral pathogens in water. Guidelines for the key parameters involved in producing microbiologically safe drinking water are summarized below:

- **Enteric Viruses**: A health-based treatment goal of at least 4-log removal and/or inactivation of enteric viruses is required to produce water with an acceptable risk. Routine monitoring is currently not feasible. Source protection and treatment measures should be implemented to reduce the risk when source waters are subject to fecal contamination or if enteric viruses have been responsible for prior outbreaks.

- **Enteric Protozoa – *Giardia Lamblia Cysts and Cryptosporidium Oocysts***: A health-based treatment goal of at least 3-log removal and/or inactivation of cysts and oocysts is required to produce water with an acceptable risk. This is based on a typical concentration for cyst/oocyst occurrence of 10 per 100 L in raw water. A greater log removal and/or inactivation may be required depending on source water quality. Treatment barriers and source protection measures should be implemented when source waters are subject to fecal contamination or if the water system has been implicated in previous waterborne outbreaks caused by *Giardia* or *Cryptosporidium*.
- ***E. coli* , Fecal and Total Coliforms**: A maximum acceptable concentration (MAC) for *E. coli*, fecal and total coliforms in drinking water is none detectable per 100 mL. Although most strains of *E. coli* are harmless, some strains have been found to cause severe gastrointestinal disease and even death in some cases. *E. coli* monitoring serves as an indicator of recent fecal contamination, and testing provides information on source water quality, treatment effectiveness, and the integrity of the transmission/distribution system. Fecal coliforms indicate the present of animal or human fecal contamination. Total coliforms are naturally occurring in surface water and soil and serve as indicators of treatment effectiveness and distribution system integrity but do not directly imply a health risk when present. Sudden changes in total coliform levels in source waters signals a change has occurred which merits further investigation. Presence in finished water may be due to a breach of treatment or distribution system integrity. Testing of *E. coli* and total coliforms provides a check that the system producing and delivering drinking water is intact, safe and under control.
- **Turbidity**: The continuous monitoring of turbidity is an easily measured surrogate for particulate or suspended matter that may potentially indicate source water quality changes, be used to monitor effectiveness of treatment and serve as a trigger for corrective actions when turbidity values deviate from established limits. Turbidity particles have also been shown to potentially shield pathogens from disinfectants and reduce the efficacy of UV and chlorine disinfection. Treatment specific turbidity limits for filtration systems are provided based on associated health-based pathogen removal goals. It is recommended that finished water entering distribution system maintain a turbidity less than or equal to1.0 NTU for effective disinfection.

Other related guideline technical documents include Quantitative Microbial Risk Assessment (QMRA) used to develop health-based treatment goals, Natural Organic Matter (NOM) and its impact on treatment effectiveness, by-product formation and aesthetics; and biological stability of drinking water distribution systems (in preparation).

The Sooke Lake Reservoir water quality and CRD's treatment (disinfection) practices currently meet the requirements of Health Canada's *Guidelines for Canadian Drinking Water Quality* (see Section 5.3.1 for details of existing RWS treatment).

5.1.4 Design Guidelines for Drinking Water Systems in British Columbia

BC Design Guidelines, largely based on (US) Ten States Standards and modified for British Columbia, have been developed for the Ministry of Health. A recently released document (see Section 5.1.2) includes coverage of filtration exemption requirements that are consistent with the USEPA filtration avoidance criteria and the policy described in the DWOG. Canada does not have the same avoidance regulations as the US, which define strict monitoring and protection requirements for unfiltered sources. Currently, there is no formal written exemption agreement with Island Health Authority that articulates filtration exemption conditions specific for the CRD, or which describes an agreed timetable for implementation of filtration. The Medical Health Officer can at his/her discretion, based on risk assessment, request that the CRD implement filtration. The CRD should start planning for future filtration so that sufficient planning, pilot studies and investigations (which can take many years) can be completed to enable CRD to quickly proceed to implementation should the Medical Health Officer direct CRD to install filtration.

5.1.5 Filtration Avoidance Criteria in the United States

Although the US drinking water regulations do not apply in Canada, it is useful to review US regulations as Canadian guidelines are influenced by US guidelines. As part of the US Safe Drinking Water Act (SDWA), the USEPA promulgated the *Surface Water Treatment Rule* (SWTR) in 1989 to address the risk of waterborne pathogens using performance-based targets for treatment expressed in terms of required reductions of *Giardia lamblia* cysts and enteric viruses. The required reductions specified for treated water required at least 3-log (99.99%) for *Giardia lamblia* and 4-log (99.99%) for enteric viruses. While these reductions were to be achieved by a combination of filtration and disinfection, recognition of high-quality protected source waters and adequate disinfection practices allowed the establishment of filtration avoidance criteria (40 C.F.R. §141.71(a) and (b)).

A total of eleven filtration avoidance criteria were established by the 1989 SWTR and retained by its subsequent enhancements. Two criteria concern source water quality, four criteria establish minimum levels of disinfection, and five criteria involve watershed protection and system operation. These criteria may be summarized as follows:

1. Low levels of source water fecal bacterial indicators
2. Low levels of source water turbidity
3. Adequate inactivation of Giardia, Cryptosporidium, and enteric viruses
4. Redundant disinfection equipment to ensure reliability
5. Adequate and consistent disinfectant residual levels at the entry point
6. Adequate disinfection residual levels throughout the distribution system
7. Adequate watershed protection and control
8. Adequate performance on annual on-site inspections
9. No evidence of waterborne disease outbreaks
10. Low levels of total coliform bacteria within the distribution system
11. Compliance with the disinfection by-products rules

The technical details of these criteria are provided in **Table 5.1.**

Table 5.1: USEPA Filtration Avoidance Criteria for Surface Waters

Source Water Quality		RWS Meets Criteria?
1	No more than 10% of samples taken prior to disinfection may contain fecal coliform concentrations more than 20 CFU/100 mL in any six-month period.	✓
2	Turbidity cannot exceed 5 NTU in samples taken prior to disinfection (with an exception for unusual and unpredictable events).	✓
Disinfection System		**RWS Meets Criteria?**
3	Must meet 3-log inactivation of *Giardia lamblia* cysts in at least 11 out of any preceding 12 months and 4-log virus inactivation every day but one during any given month.	✓
4	Must either be redundant in design or provide for the automatic shut-off of flow if the concentration of residual disinfectant falls below 0.2 mg/L.	X
5	Must not permit the residual disinfectant concentration entering the distribution system to fall below 0.2 mg/L for more than four continuous hours.	✓
6	Residual disinfectant concentration must not be undetectable in 5 percent of the samples taken during any month for 2 consecutive months.	✓
Watershed Protection and System Operation		**RWS Meets Criteria?**
7	Must have a comprehensive watershed control program that meets mandated standards designed to minimize the infiltration of the source by *Giardia lamblia* and enteric viruses.	✓
8	System must be inspected annually by the state enforcement authority to insure the efficacy of the watershed control program and disinfection procedures	✓
9	System must not have been identified as responsible for an outbreak of waterborne disease, or if it has, it must have implemented corrective measures adequate to prevent a recurrence.	✓
10	The system must remain in compliance with the MCL for total coliform concentrations in the distribution system.	✓*
11	The system must meet the MCL for disinfection by-products in the distribution system (THMs and HAAs).	✓

*RWS complies with applicable Canadian regulations for total coliform concentrations
Sooke and Goldstream watersheds meet the USEPA Filtration Avoidance Criteria for Surface Waters

The 1996 amendments to the SDWA directed the USEPA to address the threat of *Cryptosporidium*. The *Interim Enhanced Surface Water Treatment Rule* (IESWTR), promulgated in 1998, extended existing watershed control requirements for *Giardia lamblia* to also include *Cryptosporidium*.

The 1996 SDWA amendments also relaxed the filtration avoidance criteria for surface water systems, permitting State discretion to allow alternatives, due in part to the efforts of several large unfiltered systems including Seattle, New York City, Portland, Boston, and San Francisco. A new category termed "*limited alternative to filtration*" was created (SDWA Amendments of 1996, Sec. 106). A system must have "*uninhabited, undeveloped watersheds in consolidated ownership, and having control over access to, and activities in, those watersheds*" to qualify for alternative treatment. In such cases, State established alternatives to filtration would be permitted if the quality of the source water and the alternative treatment are deemed to ensure greater removal

or inactivation of regulated pathogens than would be achieved by the combination of filtration and chlorination.

In 2006, the USEPA promulgated the *Long Term 2 Enhanced Surface Water Treatment Rule* (LT2) to require public water systems to implement more stringent treatment for *Cryptosporidium*. The LT2 builds on the previous filtration avoidance criteria of the SWTR to require all unfiltered systems to inactivate *Cryptosporidium* in addition to other previously specified pathogens using acceptable disinfection technologies. Criteria were developed to award *Cryptosporidium* inactivation credit for UV irradiation, ozone, or chlorine dioxide-based processes. Unfiltered systems must apply at least two distinct disinfectants to meet the inactivation requirements for *Cryptosporidium* (2- or 3-log), *Giardia lamblia* (3 log), and enteric viruses (4-log). Each of two disinfectants must achieve the entire inactivation requirement for one of the three pathogen groups. The degree of treatment for *Cryptosporidium* depends on oocyst levels in the source water as determined by monitoring. If the mean source water level is equal or less than 0.01 oocyst/L (i.e., 1 oocyst per 100 L), then at least 2-log inactivation is required, while for higher levels at least 3-log inactivation is required. Major unfiltered systems in the US developed UV disinfection facilities to comply with the LT2 rule, including the San Francisco (Tesla) and New York City (Catskill-Delaware). These systems are similar to the RWS Goldstream and Sooke River Road Disinfection Facilities.

Several large water utilities continue to supply unfiltered water to their customers. All these supplies involve extensive source water protection and watershed management, source water quality monitoring, and multiple disinfection processes, notably all including UV and chlorine disinfection, the same as the disinfection practices used by the CRD. Most of these operate more than one source with the other source or sources being filtered. A summary of the largest unfiltered systems in North America is provided in **Table 5.2**.

Table 5.2: Unfiltered Water Supplies Summary

Metropolitan Area	Treatment Facility	Capacity (MLD)	Unfiltered Capacity (% Total)	Population (Million)	Treatment
Vancouver	Coquitlam	1,200	40	2.5	O_3-UV-Cl_2
Seattle	Cedar	680	60	4.0	O_3-UV-Cl_2
Boston	Carroll	1,040	100	4.9	O_3-UV-Cl_2
San Francisco	Tesla	1,200	85	2.7	UV-Cl_2
New York City	Catskill-Delaware	9,000	90	8.4	UV-Cl_2
Victoria	Goldstream /SRRDF	605/20	100	0.4	UV-Cl_2[b]

a. O_3 – ozone, UV – Ultraviolet light, Cl_2 – Chlorine
b. CRD also uses ammonia to provide a chloramine secondary residual in the transmission system.

Several water supplies, largely in the Pacific Northwest, have been converted from unfiltered to filtered supplies over the past two decades. A summary of these is provided in **Table 5.3**.

Table 5.3: Conversions from Unfiltered to Filtered Supplies

Metropolitan Area	Treatment Facility	Capacity (MLD)	Year Activated
Seattle	Tolt	450	2001
Vancouver	Seymour-Capilano	1,800	2010
Tacoma	Green River	570	2015
New York City	Croton	1,100	2015
Nanaimo	Nanaimo	120	2016
Comox Valley	Comox Valley	75	2021
Portland	Bull Run	550	2027*

*Anticipated completion

5.1.6 Beyond Regulations

The source water quality from RWS's primary Sooke Lake Reservoir supply is considered relatively high, with turbidity averaging well below 1.0 NTU and virtually undetectable levels of *Giardia* cysts and *Cryptosporidium* oocysts for several decades. Goldstream watershed has a similar water quality when it is used in the RWS system but does experience higher turbidity during wet weather when it is not typically used in the RWS system. Leech River water does experience higher turbidity levels and colour following flash rainstorms. Council Lake water is mixed with SLR water and water quality is good. There is no significant water quality information available from Council Lake Reservoir. However, for all sources, average values of turbidity and infrequent tests of highly infectious but poorly recovered pathogens do not provide the most useful statistics for making decisions potentially impacting the public health of a large population. In addition, flashy sources such as Leech River can have higher first flush turbidity levels and are expected to have a higher potential for pathogens. Brief periods of high turbidity and high pathogen counts can pose a significant risk to consumers. As articulated by an expert panel convened by the USEPA in 1991 to evaluate the continued filtration avoidance by New York City, unlike trace chemical contaminants that pose a risk from long-term exposure, risks due to pathogens are not mitigated by hundreds of days of low turbidity and low counts of microbes (Okun et al. 1997).

One of the filtration avoidance criteria of the SWTR relates to the absence of waterborne outbreaks. According to the British Columbia Centre for Disease Control, British Columbia has historically had higher reported cases of giardiasis and cryptosporidiosis than other parts of Canada, likely due to the absence of filtration on sources serving several large populations. BC communities which have previously experienced outbreaks include Penticton, Barriere, and Kelowna. It is widely acknowledged by public health professionals that most cases of waterborne infection and most community waterborne outbreaks are never detected. Active community waterborne disease surveillance is used by several US water supply systems. In New York City, coordinated public health programs are used to better detect the occurrence of waterborne

outbreaks. Evidence from such programs provides information supporting continued filtration avoidance.

The CRD drinking water quality from the Sooke Lake Reservoir is very good and it is difficult to provide economic justification for construction of filtration at this time. The secondary Goldstream Reservoir source is also good but at times it is subject to turbidity fluctuations during wet weather as a result of slides in the Goldstream River Canyon so it cannot be used reliably during wet weather without filtration. The current disinfection facilities are capable of satisfying Island Health treatment guidelines. Addition of future sources like Leech River will, however, likely require installation of filtration to meet current guidelines due to elevated levels of colour and at times turbidity. Other factors such as water quality changes due to climate change could also have future impacts on source water quality. Natural disasters such as wildfires could also have negative impacts on water quality.

Another consideration when assessing treatment requirements involves the uncertainty of future conditions. The most cost-effective treatment approach depends on the expected watershed and raw water quality conditions 20 years or more into the future. Risks to future watershed health and its water quality may be greatly diminished by proactive and preventative measures that provide multiple barriers to microbial pathogens and other hazards. The addition of filtration in combination with disinfection processes would provide a robust multiple-barrier system able to better mitigate potential source water quality impairment and protect public health. Addition of filtration would increase the reliability of finished water quality and improved water quality despite adverse watershed conditions reducing the vulnerability of the current system.

5.2 Existing Source Water Quality

5.2.1 Sooke Lake Reservoir Raw Water Quality

As the CRD's primary water source, the greatest amount of water quality data is available for the Sooke Lake Reservoir. As is typical of such reservoirs in the Pacific Northwest, available data demonstrates relatively high-water quality, with low turbidity, low alkalinity and favorably low bacterial indicators, nutrients, and organic matter. Notably, mineral content, as measured by total dissolved solids (TDS) is also quite low.

The historical raw water quality entering the Goldstream Disinfection Facility, largely or exclusively from Sooke Lake Reservoir, over the period of 2010 to 2019 is summarized in **Table 5.4**.

Table 5.4: Historical Raw Water Quality Information – Sooke Lake Reservoir

Parameter	Unit	Average	Minimum	Maximum	GCDWQ MAC
pH		7.3	NA	7.6	7.0-10.5
Colour	True Colour Units	6.4	ND	15.2	<15 (AO)
Alkalinity, Total	mg/L as $CaCO_3$	15.3	8.84	19.1	-
Hardness	mg/L as $CaCO_3$	17.3	ND	20.9	-
Total Dissolved Solids (TDS)	mg/L	27	ND	48	<500 (AO)
Total Organic Carbon (TOC)	mg/L as C	1.90	0.82	3.29	-
Dissolved Organic Carbon (DOC)	mg/L as C	1.72	ND	3.34	-
Conductivity, at 25˚C	µS/cm	42.2	27.5	62.9	-
Turbidity, Grab Samples	NTU	0.31	0.17	2.7*	<1
Ultraviolet Transmittance (UVT)	%	88.6	0.2*	94.4	-
Algae	Refer to 2020 *Greater Victoria Drinking Water Quality Annual Report*				

*Suspect data anomaly

Turbidity has consistently been observed to be below 1.0 NTU, as demonstrated by direct sampling data from Sooke Lake Reservoir over the five-year period from 2016 to 2021. The results of 561 readings in the south forebay and 220 readings in the North Basin are summarized in **Table 5.5.**

Table 5.5: Turbidity Sampling Data

Turbidity (NTU)	Sooke Lake Reservoir	
	South Forebay	North Basin
Average	0.34	0.30
Maximum	0.60	0.65
Minimum	0.20	0.16

The turbidity levels in the south forebay and north basin are similar with the north basin being only slightly lower. For the south forebay routine monitoring of raw water for *E. coli*, as a bacterial indicator of fecal contamination, is conducted at least 255 times per year and consistently demonstrates very low incidence of positive detections.

Monitoring for protozoan parasites has been conducted eight times per year and includes *Giardia* cysts *Cryptosporidium* oocysts. Despite processing a minimum of 100 L per sample, two decades of data have largely failed to detect either parasite in the Sooke Lake Reservoir. It is likely that these parasites are present at levels below the detection limit associated with the sample size and method used and that their concentrations may be elevated following severe storm events.

Limited monitoring of tributary creeks in 1999 did report positive detections of *Giardia* cysts, which is expected due to the ubiquitous nature of this parasite among wild animals in the watershed. While it is likely that the typical *Cryptosporidium* oocyst levels in the Sooke Lake Reservoir are relatively low (that is < 0.01 oocyst/L) and pose a low risk given existing watershed management practices and treatment barriers, the typical range of their concentrations at the existing and potential deep intake locations are unknown. More frequent sampling using larger sample volumes and capturing severe storm events would be useful. Also, it is critical to conduct recovery efficiency tests with each sample to convert detected numbers to concentration values. This practice has not been done despite the recovery efficiency for the conventional method (USEPA method 1623) ranging from 40% to 60% under ideal conditions and < 5% under adverse conditions.

Data collected during the 2016 to 2021 period for total phosphorus (TP) and Chlorophyll-a, the limiting nutrient for biological growth and surrogate for algal concentrations, respectively, are summarized in **Table 5.6**. The data supports the classification of Sooke Lake Reservoir as oligotrophic (i.e., relatively low in plant nutrients and containing abundant oxygen) in the deeper sections of the reservoir.

Table 5.6: CRD Sampling Data for Period 2016 to 2021 in Relation to Oligotrophic Status

Parameter	Sooke Lake Reservoir		Oligotrophic Lake Survey*	
	South Forebay	North Basin	Mean	Range
TP *mean* (µg/L as P)	3.3	4.5	8.0	3.0 – 17.7
Chlorophyl-a *mean* (µg/L)	1.1	0.9	1.7	0.3 – 4.5
Chlorophyll-a *max* (µg/L)	3.1	2.5	4.2	1.3 – 10.6

*As cited by Wetzel 2001

Data for raw water total organic carbon (TOC) and UV absorbance averaged 1.9 mg/L and 0.05/cm over the period 2010 to 2019. The average specific UV absorbance (SUVA) is 2.6 L $mg^{-1}m^{-1}$ which suggests that humic acids comprise a moderate contribution to TOC. This is significant in evaluating the impact of TOC on existing and potential treatment. Humic acids will typically dominate conventional coagulant demands and the low alkalinity conditions will impose additional constraints on coagulant type and dose.

Temperature is an important water quality parameter in terms of both aesthetic and operational considerations. Sooke Lake Reservoir experiences thermal stratification from spring to fall with the current intake depleting the cooler hypolimnetic waters by July. After such a depletion, the intake is essentially drawing from the fully mixed epilimnion at an elevated temperature. The aesthetic objective of less than 15 °C is then exceeded for up to several weeks. This not only impacts consumer satisfaction but increases the rate of biological growth and monochloramine residual decay, both of which increase the risk of nitrification occurring in the distribution system. Data from the north basin suggest that the hypolimnion extends below 20 m from the surface and water there remains between 5 ˚C and 10 °C throughout the year. Dissolved oxygen readings from the deep basin confirm that the hypolimnion remains aerobic consistent with the oligotrophic status and minimizing the risk of iron and manganese solubilization from the benthic deposits.

It should be noted that while a deep northern intake (see Section 4.5) would increase the accessible volume in the Sooke Lake Reservoir in an emergency or severe drought condition,

cycling of the reservoir poses a risk to water quality and replenishment of the reservoir on an annual basis and is not recommended. When summer demands peaked in 1998, an extreme drawdown of the reservoir level coincided with heavy rains causing serious erosion of the exposed shoreline and resulting in numerous consumer complaints regarding highly coloured and turbid water. As the TSD in 2050 will exceed that of 1998, the likelihood of such a scenario repeating during a combined drought and high demand condition will increase. However, the resulting drawdown may not be as significant due to the raising of the Sooke Lake Dam that was completed in 2002 and planned reservoir operations and balancing procedures. Diversion of Leech River would also assist in replenishing Sooke Lake Reservoir following a drought period.

5.2.2 Proposed SLR Deep Northern Intake Impacts on Water Quality

A limited sampling program of samples taken from the north basin of the Sooke Lake Reservoir and drawn from depths of greater than 20 m suggest that the impacts on overall water quality maybe favorable (Stantec 2021 Tech Memo). Further seasonal water sampling and water quality data will be required to confirm extraction from deeper depths will yield better water quality on a consistent basis. Due to thermal stratification during the approximate period of May to October, the hypolimnion remains low in temperature (5 to 10 °C) and is well oxygenated. At such depths, water is below the photic zone with low algae concentrations. Due to the oligotrophic conditions, there is insufficient microbial activity to deplete the dissolved oxygen sufficiently to produce anoxic conditions, a drop in oxidation-reduction potential (ORP), or the solubilization of iron and manganese that may be present. However, it is likely that the sediments deposited at the lake bottom are delicate and easily resuspended if sufficient fluid movement were present. Thus, drawing water from the north basin at depths greater than 20 m, yet also sufficiently above the bottom, is anticipated to provide the highest quality water from Sooke Lake Reservoir if used year-round.

Additionally, drawing water from the north basin would improve water quality in the RWS transmission, as well as distribution and storage tanks operated by municipalities. Water would more consistently be supplied below the aesthetic temperature objective of 15 °C, improving consumer satisfaction. Colder water would also decrease the rate of biological activity, thereby reducing the rate of bacterial growth both in the water and within biofilms at pipe surfaces. The colder water would also result in a slower decomposition of the residual disinfectant, allowing greater persistence to the extremities of the system thereby further suppressing biological activity.

5.2.3 Goldstream Watershed Raw Water Quality

The available data for water quality from the Goldstream Watershed lakes reveals a comparable quality to that of the Sooke Lake Reservoir, featuring the low mineral content typical of lakes from this region. The most vulnerable element of this source is the Goldstream River stretch from the Goldstream Reservoir to the Japan Gulch Reservoir, for which run-off and erosion following precipitation events may result in elevated turbidity due to active landslides in the Goldstream River Canyon. Such events typically occur from late fall to early winter months, while turbidity is lowest during summer months when intense precipitation events are rare. There are currently no reservoir operating rules for this system, and it is most often used in the wintertime during scheduled shutdowns for inspection and maintenance of the Kapoor Tunnel. The reservoirs then refill while winter rains are predominant and are available to use in the summer if required. It can also be used for emergency purposes for a short period if required. The CRD collects limited

water quality data from the Goldstream Reservoir (monthly) and Butchart Reservoir (quarterly). Data is not collected from Lubbe Reservoir. In 2020, the CRD completed the *Goldstream System Water Quality Assessment Study* which generally indicates good water quality in the Goldstream watershed. The Japan Gulch Reservoir because of its shallow depth is subject to occasional algal blooms in the summer months.

5.2.4 Leech River Raw Water Quality

Historical water quality data from the Leech River and watershed was limited until the CRD completed a *Water Quality Analyses Report* in October 2021. Efforts are currently underway to better understand the quality of water available from the Leech watershed and the report provides a good starting point. A review of available data indicates that during non-storm periods the water has relatively low turbidity and colour levels, but these do increase with wet weather during first flush rainfall events after long periods of dry weather. Colour levels exceeding 15 TCU aesthetic objective have been reported in over 58% of samples taken during the recently completed water quality study. The relevant water quality parameters, particularly colour and turbidity, are higher in value generally relative to the Sooke Lake Reservoir and prone to rapid increases and subsequent declines following major storm events. Both the quality and quantity of water available from the Leech Watershed is assumed to be “flashy”. Continued sampling of this potential future source is desired to provide a baseline of data for assessing future treatment requirements of this source.

Over 85% of the Leech watershed forested areas had been harvested by the time of the first CRD land purchase in 2007. Ongoing efforts to restore and rehabilitate the watershed are expected to improve water quality. Such improvements are a long-term endeavour that may yield higher quality water in the future when the Leech watershed is required to augment source water capacity. Increased treatment requirements will depend on the actual water quality observed from the Leech watershed and how it will be stored and used relative to the Sooke system.

5.2.5 Source Water Protection

The control and protection of the source waters is a key element of the CRD’s disinfection approach (ultraviolet light, chlorine, and ammonia) and maintaining the use of these sources without filtration. The CRD owns approximately 98% of the watershed lands draining into the Sooke and Goldstream water supply reservoirs. About 92% of the Leech watershed catchment upstream of the Leech Tunnel inlet is owned by the CRD and currently being restored for future use. A closed watershed policy restricts activities within the Greater Victoria Water Supply Area to those related to water supply functions and other authorized uses and prohibits public access.

CRD policy includes not only extensive source water protection but also the comprehensive concept of stewardship. As described in the Greater Victoria Water Supply Area Management Plan, stewardship of the water supply area is defined as:

> *The caring, thoughtful, and cautious management of the watersheds, ecosystems and processes that sustain source water quality, other important ecosystem goods and services, and cultural values, to ensure a safe and sustainable water supply and healthy ecosystems for future generations.*

CRD efforts to protect the watersheds and source water quality include:

- Security gates and fencing at key access points and video surveillance at key facilities
- Watershed patrols to monitor conditions and deal with unauthorized access and emergency situations
- Wildfire prevention, preparedness, detection, and rapid initial attack and suppression capabilities, supplemented by a response agreement with BC Wildfire Services
- Post-wildfire response capability to minimize impacts to water quality in source reservoir (e.g., silt curtain deployment)
- Hazardous spill prevention, preparedness, and response capabilities
- Forest management and restoration, including monitoring and managing forest health issues and invasive species
- Forest fuel management in key areas to protect water supply reservoirs and key facilities and infrastructure
- Active management of wild and domestic animal species that pose a risk to water quality
- Management of existing road network to provide access to water supply infrastructure and facilities and for emergency response while minimizing disruption to watershed hydrology
- Commissioning of consultant reports to evaluate impacts of climate change on water quality (Pinna Sustainability 2017 and Aquatic Scientific Consulting Ltd., 2019)
- Research and monitoring to better understand environmental changes and the relationships between ecological conditions and water quality.

5.3 Treatment Requirements

5.3.1 Existing Water Disinfection Facilities

Water from the Sooke Lake Reservoir enters the intake tower in the forebay of the south basin and is screened through 14-mesh traveling screens (0.5 mm openings). Screened water is then largely conveyed by twin pipelines (Main No. 10 and No. 11) to a head tank feeding the Kapoor Tunnel that conveys water to the Goldstream Water Disinfection Facility. A connection for main No. 15 diverts water prior to the Head Tank and is conveyed to the Sooke River Road Disinfection Facility via main No 15. (see **Figure 5.2).** During maintenance of the head tank and Kapoor Tunnel, or during an emergency, the Goldstream watershed is used via an intake in Japan Gulch reservoir which is diverted through 14-mesh traveling screens prior to entering the Goldstream Disinfection Facility.

In both the Goldstream and Sooke River Road disinfection facilities, UV light and free chlorine are applied in sufficient dose to achieve a 3-log inactivation of *Giardia* and *Cryptosporidium* and a 4-log inactivation of enteric viruses. Chlorination at the Goldstream facility uses bulk sodium hypochlorite while at the Sooke River Road facility, sodium hypochlorite is generated on-site from sodium chloride (salt). Following contact time adequate to achieve 4-log inactivation of viruses, ammonia is added to form monochloramine as a secondary residual disinfectant in the transmission and distribution systems. Turbidity in the source waters is less than 1 NTU.

The locations of the Goldstream and Sooke River Road disinfection facilities are indicated on **Figure 5.1**. The Goldstream facility produces approximately 97% of the supply for the Regional Water Supply Service, with Sooke River Road supplying approximately 3%. The Goldstream disinfection facility can draw water from the Goldstream watershed which has been done routinely

during the multi-day inspections of the Kapoor Tunnel that have occurred almost annually. The Sooke River Road disinfection facility is currently unable to utilize the Goldstream watershed source and only draws water from Sooke Lake Reservoir.

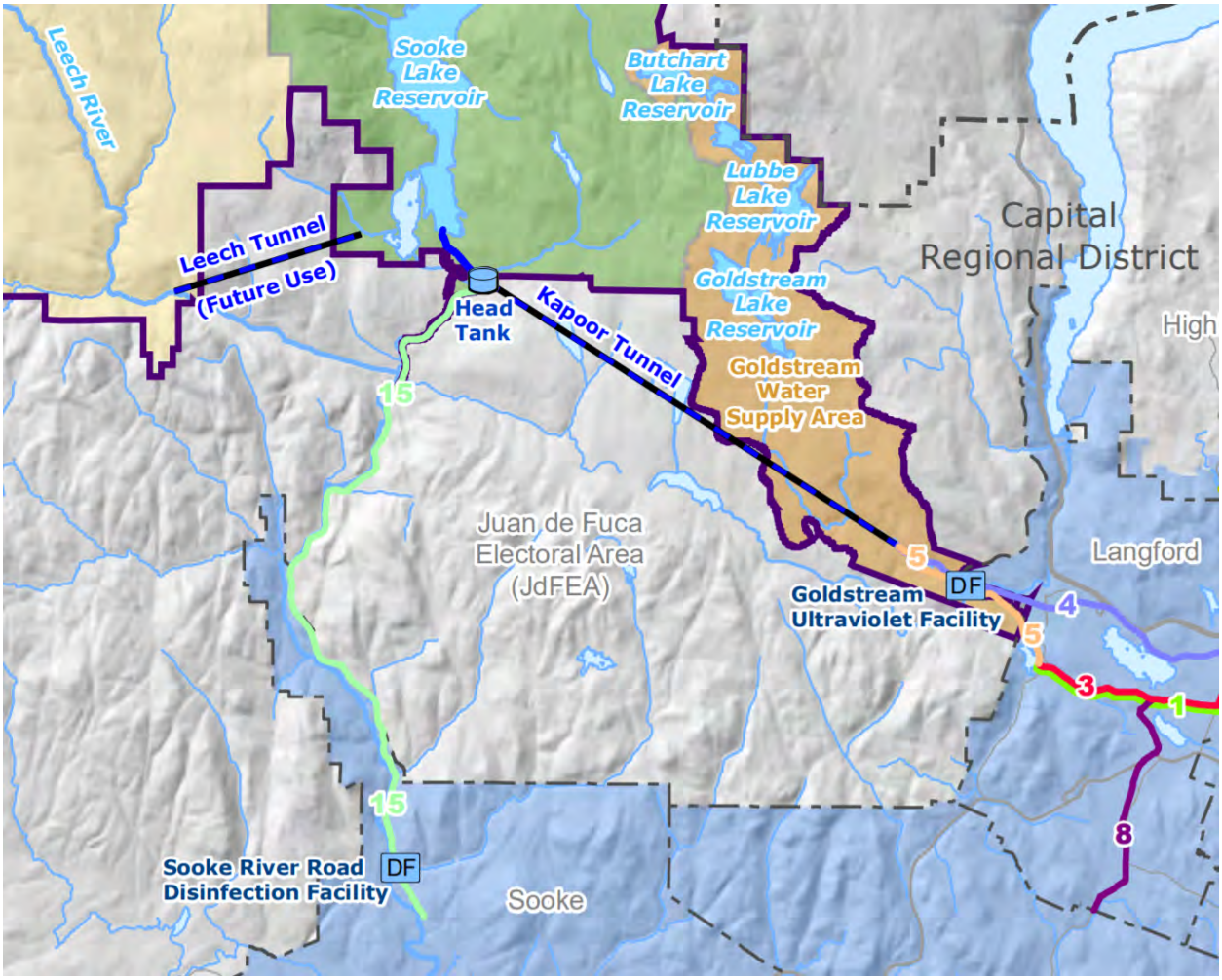


Figure 5.1: Locations of Existing Goldstream and Sooke River Road Disinfection Facilities

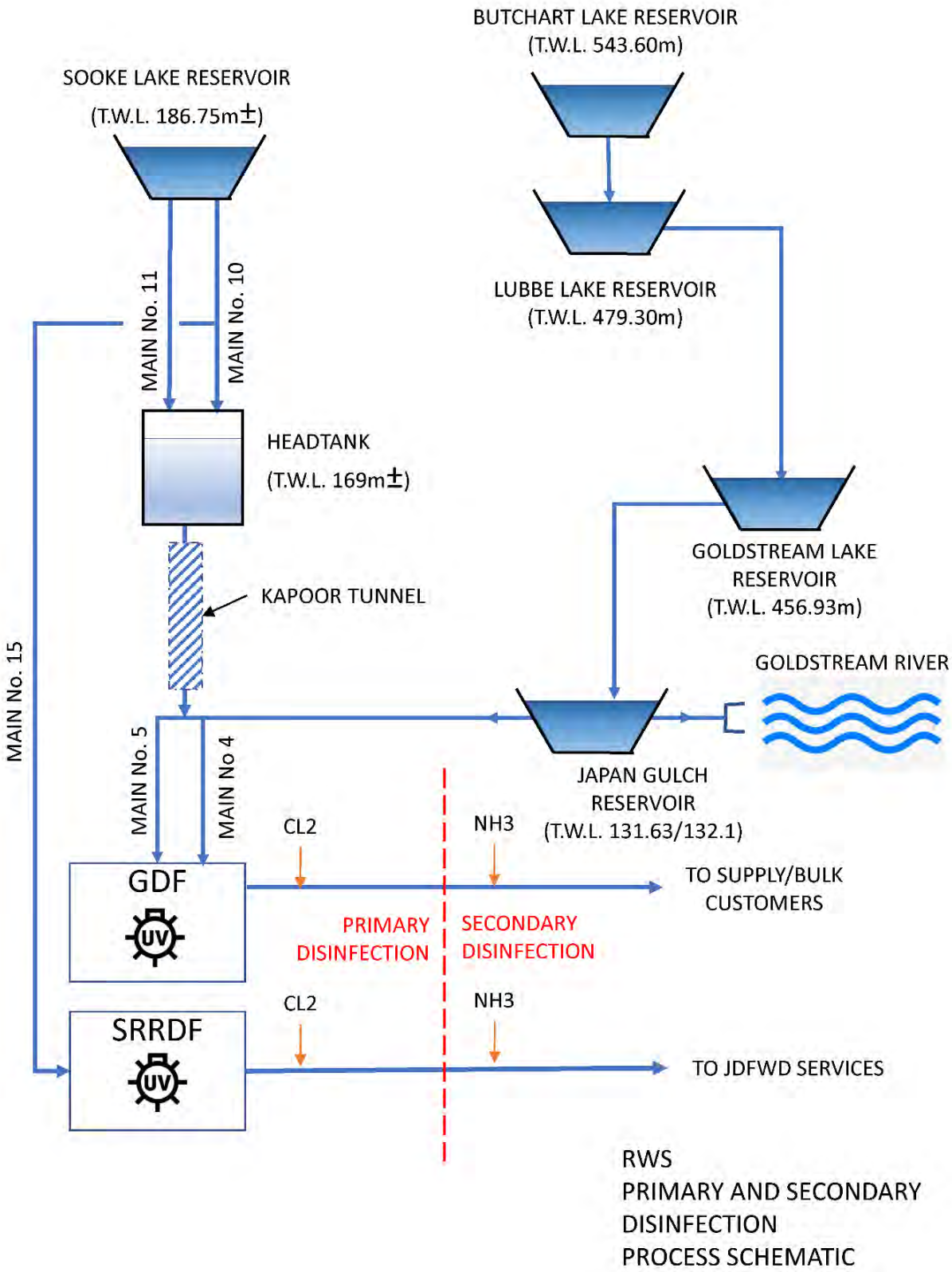


Figure 5.2: RWS Existing Disinfection System Schematic

5.3.2 Risks to Water Quality

Multiple risks and risk scenarios from climate change exist that would present a greater challenge to an unfiltered water supply than one which includes filtration. These typically involve a greater probability of impairment in water quality and efficacy of disinfection due to increases in particulate matter derived from (autochthonous) or transported to (allochthonous) the reservoirs. While the Sooke Lake Reservoir currently provides an excellent source of water which meets Provincial and Federal drinking water quality guidelines, introduction of additional water from Leech River watershed in the future will almost certainly result in degradation of water quality unless filtration is added.

A changing climate will impact both the quantity and quality of water flowing into CRD reservoirs. Changes to temperature regimes and shifts in precipitation patterns will likely result in direct and indirect hazards to CRD and its water supply. **Table 5.7** outlines typical climate parameters and their associated hazards, and details where these could impact source water quantity and quality.

Table 5.7: Climate Impacts on Water Source Quantity and Quality

Climate Parameter	Climate Hazards (Direct and Indirect)	Water Source Quantity Impacts (Y/N)	Water Source Quality Impacts (Y/N)
Temperature	Aquatic Invasive Species	Y	Y
Precipitation	Drought/Water Shortages	Y	Y
Temperature	Wildfires / Ash / Slope Erosion	Y	Y
Precipitation	Flooding and Extreme Precipitation	Y	Y
Precipitation	Landslides/Slope Failure	Y	Y

5.3.2.1 Climate Change

The CRD completed an initial assessment of climate projections for the region by the 2050s and 2080s. The projection for the 2050s included:

- A significant increase in average daytime high and nighttime low temperatures
- A significant reduction in summer precipitation and more prolonged dry periods
- A slight increase in overall precipitation in fall, winter, and spring
- An increase in the intensity, duration, and frequency of major rainfall events

These changes influence the complex physical, chemical, and biological processes occurring in the watersheds of the GVWSA, and limnological conditions of the Sooke Lake Reservoir in particular, that will impact water quality. Such changes include:

- Increased water temperature
- Lower dissolved oxygen levels at the reservoir bottom during summer months
- Lower summer water levels due to increase demand and evaporation
- Changes in the timing and duration of stratification of the water column

- Increased nutrient input from watershed sources and sediment release
- Increased turbidity due to increased storm intensity and soil erosion
- Increased algal biomass due to increased temperature and nutrients
- Longer duration algal blooms and likelihood of taste and odour events

Changes in temperature and precipitation events will impact watershed and limnological conditions that will ultimately impact source water quality and the type and extent of treatment required to produce the finished water quality needed to meet regulatory and public health requirements.

5.3.2.2 Droughts

In general terms, drought may be defined as a deficiency in precipitation over an extended period on a timescale ranging from a few months to extending over many years. Records indicate at least four interannual periods of drought lasting for several years in the Sooke Lake Reservoir Watershed over the past century, including 1928-1930, 1940-1942, 1991-1995, and 2001-2003. Climate change impacts are anticipated to increase the frequency and duration of such droughts. Diversion of Leech River water into the SLR would assist in curtailing impacts from extended year droughts because Leech watershed water could be used to fill the SLR.

Three major impacts of prolonged and extreme droughts include the desiccation of riparian vegetation that stabilize stream banks, increased likelihood of erosion, severe drawdown of the reservoir level impacting its chemistry and ecology, and most importantly, the increased likelihood of large-scale catastrophic wildfires in the watershed which could adversely impact water quality.

5.3.2.3 Wildfires

Dryer conditions prevailing over forested watersheds increase the likelihood of large-scale fires. The consequences of dryer conditions would potentially pose immediate and long-term impacts on source water quality due to increased sediment, organics, and ash. Wildfires spanning the watershed will produce large quantities of ash and alter the landscape for many years following the fire. Following wildfires, increased erosion and sediment transport to the reservoir is likely to continue until vegetation is restored and soils are restabilized. The transport of such material to the reservoir will likely result in increased turbidity and an increase in nutrient availability that may alter the trophic state of the reservoir. Such changes would necessitate augmenting treatment with filtration beyond the existing disinfection facilities to achieve required finished water quality objectives for the Regional Water Supply. The potential for wildfires is real as can be seen by the fires which ravaged the interior of British Columbia and other parts of the US Pacific Northwest in 2021.

Wildfires have the potential to increase erosion in watersheds which could impact turbidity levels and the introduction of light weight ash into the reservoir. Water filtration processes are designed to cope with these changes although the addition of different coagulant aids or filter aids may be required to deal with ash.

5.3.2.4 Severe Storms

Climate change impacts anticipate changes in the storm events with increased variability due to longer dry periods and shorter more intense wet periods. A substantial volume of precipitation may be delivered within a period of a few days via the phenomenon of an atmospheric river or “pineapple express” and such events have been experienced in November 2021. Climate modeling has suggested that most heavy and extreme precipitation events will be due to atmospheric rivers. Severe storms increase the tendency for run-off induced erosion, particularly when following drought conditions, and consequently can impact water quality parameters in the reservoir such as turbidity, colour, and nutrients.

Wind is a natural factor influencing forest structure in the Pacific Northwest. Severe wind events tend to be more common than wildfires and may result in large-scale increases in the windthrown trees when soils are saturated. Windthrow events expose forest soil and can destabilize riparian areas which can impact reservoir processes. The accumulation of windthrown trees increases the availability of fuel and severity of subsequent wildfires. Uprooting and destabilized stream beds and shore areas increase the impact of erosion from subsequent storm events. The combination of more intense wind and rainstorms may increase the likelihood of impacts on water quality.

Sustained wind over the surface of a reservoir may induce internal movement of water that disturbs thermal stratification and alters nutrient cycles. Severe winds may cause surface levels to rise on the lee end of the reservoir where water accumulates. The accumulated mass of water may then be pulled downward by gravity, encounter the denser metalimnion and flow back in the opposite direction of the wind. If sustained, such a condition may result in the entrainment of the epilimnion and lowering of the thermocline. Sustained winds may also establish standing waves or seiches both at the surface and internally within the layer separating the epilimnion and hypolimnion. Severe winds thus have the potential to disrupt the structure and cycling of materials within a reservoir, resulting in potential adverse effects on water quality.

Increasing frequency of severe storms and degradation in source water quality will increase the pressure to move to more robust treatment processes such as filtration.

5.3.2.5 Changes in Watershed Land Use

In many watersheds, potential land use changes are significant variables influencing risks to water quality. The CRD is in the enviable position that ownership and control of the water supply area are secured for the long-term management to preserve water quality within the active Sooke and Goldstream watersheds and to enhance the water quality available from the Leech watershed upon completion of major rehabilitation efforts. As commercial activities, including forestry and mining activities, are prohibited and access by the public is restricted, direct human induced changes to the watershed are not anticipated.

5.3.2.6 Seismic Risks

Seismic risks are present in the CRD WSA due to the existence of faults adjacent the Goldstream watershed, Leech River Valley and Sooke Lake Reservoir. Seismic events, depending on their severity, have the potential to impact water quality. Landslides in watersheds, breaks in pipes and damage to facilities all have the potential to impact drinking water quality and the level of service provided to RWS customers. Because water supply infrastructure is critical to post-disaster

recovery and life safety, it is prudent to consider seismic threats and mitigation at the master planning, preliminary engineering, and detail design of any water supply project.

The location of faults relative to critical RWS facilities including the Sooke Lake Dam and major transmission mains are shown in **Figures 5.3** and **5.4** for the west and east water supply areas. It is noted that fault lines cross main of the transmission mains or are adjacent to RWS dams and Kapoor Tunnel.

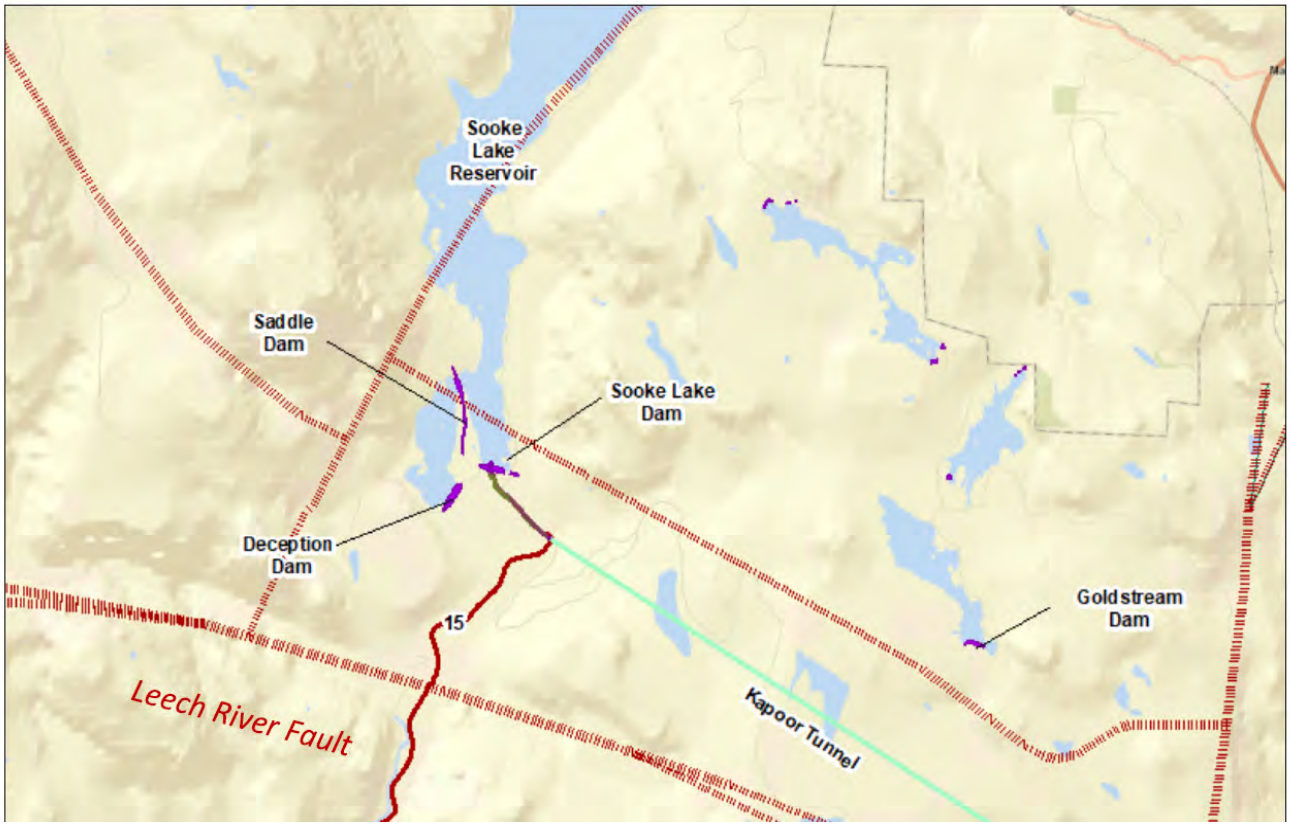


Figure 5.3: Faults in the CRD Supply Area (West)

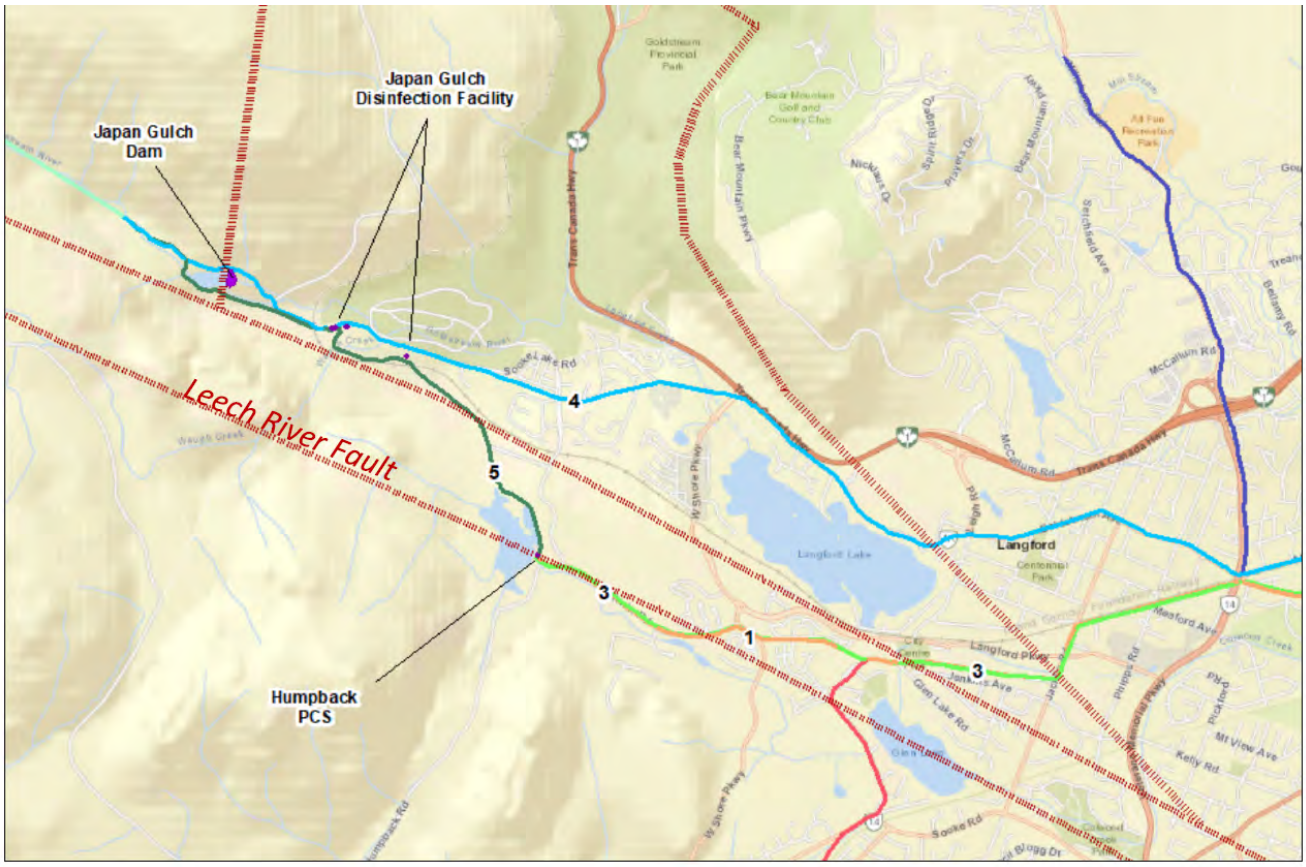


Figure 5.4: Faults in the CRD Supply Area (East)

Two new potentially active faults which could increase the seismic hazard to southern Vancouver Island have been identified in recent years. They are the Devil's Mountain Fault (DMF), that passes through the eastern Strait of Juan de Fuca, and the Leech River Valley Fault (LRVF) located west of Victoria (see **Figure 5.5**). Given the proximity of RWS water infrastructure, contribution of these two faults to the seismic hazard is likely to be significant. In particular, several of CRD's transmission mains cross these faults.

Figure 5.5: Leech River Valley – Devil's Mountain Fault System (Halchuk et al., 2019)3

5.3.3 Seismic Risk to Existing Facilities

The expected performance requirements of the various CRD water infrastructure could be defined in accordance with the following guidelines and Code:

- Dams: Canadian Dam Association guidelines (CDA. 2007)
- Pipelines American Lifelines Alliance guidelines (ALA, 2005)
- Buildings and other structures: National Building Code of Canada (NBCC, 2015)

Table 5.8 summarizes the expected Performance Level or Importance Category and the Annual Exceedance Probability (AEP) of the earthquake design ground motions based on the provisions of CDA (2007), ALA (2005) and NBCC (2015).

Table 5.8: Performance Level of CRD Water Infrastructure

CRD Water Infrastructure	Performance Level or Importance Category	Annual Exceedance Probability
Dams	Post Disaster	1/10,000
Pipelines – Major Water Body Crossings	Post Disaster	1/10,000
	Class IV	1/2,475
Pipelines – Water	Class IV	1/2,475
	Class III	1/975
Water Disinfection Plants	Post Disaster	1/2,475
Pump Stations, Chambers	Post Disaster	1/2,475
Tanks	Post Disaster	1/2,475
Buildings	Post Disaster	1/2,475
	Normal	1/2,475

Notes:

1. **Post Disaster:** Structures with Post Disaster Performance Level or Importance Category are structures that are essential to the provision of services after an earthquake and are defined in Table 4.1.2.1 of NBCC (2015) with seismic design per section 4.1.8 with special considerations noted in 4.1.8.10.2. Only facilities critical to the continuous operation of the systems shall be considered as Post Disaster.

2. **Normal:** Structures with Normal Performance Level or Importance Category are typical structures, not designated as “Post Disaster” or “High” structures and are defined in Table 4.1.2.1 of NBCC (2015) with seismic design per Section 4.1.8. Note that a water treatment plant designated as “post-disaster” may have “normal” structures on site. Only structures critical to the continuous operation of the systems as determined by CRD should be considered as “post-disaster”.

3. **Class III Pipelines:** Critical pipelines serving a large number of customers and presenting significant economic impact to the community or a substantial hazard to human life and property in the event of failure. These pipelines are intended to not experience damage that would result in loss of pressure integrity during and following ground motions with AEP of 1/975.

4. **Class IV Pipelines**: Essential pipelines required for post-earthquake response and recovery and intended to remain fully functional and operational during and following ground motions with AEP of ½,475 or 1/10,000. The Kapoor Tunnel would be an essential conveyance for the RWS.

5.3.4 Objectives of Water Treatment

Treated water objectives include the minimum pathogen reduction requirements and the specifications for finished water. The pathogen reduction requirements include those for enteric viruses and protozoan parasites, with a minimum of 4-log and 3-log, respectively. The key parameters for finished water quality are summarized in **Table 5.9**, based on regulations, guidelines, and aesthetic standards.

Table 5.9: Finished Water Quality Requirements and Regulated Objectives

Parameter	Unit	Value	Regulated Guideline Objectives	Monitoring Frequency
E. Coli	CFU/100 mL	None detected	None detected	Daily
Total Coliform	CFU/100 mL	None detected	None detected	Daily
Average Daily Turbidity	NTU	< 0.3	< 1.0 (unfiltered) <0.3 filtered	Continuous
Average Alkalinity	mg/L as $CaCO_3$	> 15	None	Daily
pH		7.5 – 10.5	7.0 -10.5	Continuous
DOC	mg/L	< 1.0	None	Weekly
True Colour	colour units	< 15	< 15	Weekly
Iron	mg/L	< 0.30	<0.30	Monthly
Manganese	mg/L	< 0.02	< 0.02	Monthly
Minimum total chlorine	mg/L	1.0 – 2.0	0.1-2.0	Continuous at clear well outlet
Taste and Odour		Acceptable	Acceptable	5 days per week
UVT% @254 nm		88-92	None	Continuous

5.3.5 Treatment Process Considerations

The raw water from Sooke Lake Reservoir and Goldstream watershed is a high-quality source with low turbidity and as such is appropriate for selection of an indicative direct filtration process, pending confirmation by piloting studies and detailed process and cost evaluations. Recent water quality sampling by the CRD on the Leech River indicates that the source does see elevated levels of colour and at times turbidity during first flash runoff. While some colour will be removed by coagulation and flocculation processes the use of a sedimentation or flotation process will likely be required. A dissolved air flotation process would deal with colour, mid level turbidity values of up to 100 NTU and it would also provide pre-treatment of algae. Planning for water treatment should include space and provision for sedimentation unit processes should they be necessary in the future. The raw water also has low alkalinity, typical of upland reservoirs in the Pacific Northwest, which may possibly impact coagulation and limit the dose of common coagulants such as alum. Consideration must be given to selection of high basicity coagulants such as aluminum chlorohydrate (ACH) and/or possible alkalinity adjustment in the raw water and finished water.

Elevated colour levels as are present in Leech River and algae concentrations in the SLR can impact the efficiency of the treatment process. These parameters should be monitored during plant operations to assess any changes in long term water quality. Identification of optimal process conditions to mitigate impacts of algae may be evaluated during piloting over the spring

and summer period. If the CRD proceeds with the deep northern intake in the future the potential for elevated algae concentrations will be reduced.

The Goldstream watershed water quality has been impacted by slides in the Goldstream River Canyon during wet weather but normally this source has not been used during those periods. The water quality during summer periods is similar to that of the SLR. Future water filtration will assist in dealing with high turbidity from the Goldstream watershed.

Potential future augmentation of source supply capacity using the Leech River watershed may impose more challenging treatment conditions depending on the timing of water draws from the Leech system and how it is incorporated into the Sooke supply. Selective transfer of water during higher quality periods could be considered but such transfers would require careful water quality monitoring and may not align with demand requirements. Water quality improvement during short storm events may be achieved by selective diversion of Leech River water and blending of Leech water into Sooke Lake Reservoir. A recent study completed by CRD indicates that the water quality in the Leech River can change quickly following rainstorms producing higher turbidity and colour exceeding drinking water quality objectives. However, though the Leech system is anticipated to yield water of lower quality than that currently available in the Sooke Lake Reservoir, it is generally considered good raw water source quality by objective water quality standards and not anticipated to present a significant challenge to conventional treatment with granular media filtration. Review of water quality data indicates that there may be a requirement to incorporate a flotation or sedimentation process into the filtration plant. The final process selection will be the subject of future pilot studies and preliminary design work.

5.3.6 Water Treatment Process Options

5.3.6.1 Water Treatment Plant Capacity

The treatment options considered will be sized to satisfy the forecasted maximum day demand (MDD) of the 2050 design horizon. Using the intermediate 1.25% annual demand growth projection scenario developed, the 2050 MDD firm capacity is 390 MLD. This is the net treatment capacity that must be provided, and an option specific process design capacity will be required to compensate for internal plant water uses due to filter backwashing. This is typically around 5% of MDD plant capacity so for planning purposes a plant with a net process capacity of 410 MLD (390 MLDx1.05) is recommended.

5.3.6.2 Filtration and Disinfection

For the CRD's Regional Water Supply, augmentation of treatment to provide filtration will have the primary benefit of adding an additional barrier against microbial pathogens, particularly *Giardia* and *Cryptosporidium*. In addition, changes in raw water quality over existing conditions to climate change, wildfire and slope failures in the watersheds could drive the future requirement for filtration. The use of Leech River water in the future will likely require installation of filtration as the source can have elevated levels of turbidity and colour following rainfall events. Additional aesthetic benefits may result from the removal of fine particulate and colloidal matter. These include decreased accumulation of organic matter in the distribution and storage system, including planktonic detritus and aquatic invertebrates. This will improve the general cleanliness of the distribution and storage system which will result in reducing the frequency of required

cleaning, improving the stability of disinfectant residuals, diminishing the rate of biological activity and risk of nitrification, avoiding aesthetic issues due to deposit resuspension, and improving the consistency and reliability of finished water quality. If filtration is implemented, the role of UV disinfection in protecting the public from the risk of protozoan pathogens becomes a second treatment barrier depending on the ultimate process selection. However, the combination of filtration and UV disinfection would provide much better treatment resiliency (consistent with the 2017 RWS Strategic Plan) and two independent barriers to protozoa. It is assumed here that existing disinfection systems using UV and chlorine will be continued. However, a more detailed analysis may be justified to reevaluate this assumption on a cost-benefit and life cycle cost basis during preliminary design of facilities.

Filtration has traditionally implied granular media filtration typically using a sand and anthracite filter media. This is the most common and cost effective treatment approach for large facility similar to the size required for the RWS. Membrane filtration has increasingly proven a viable option for many smaller to mid size systems but is not expected to be cost effective for the RWS. Another possible treatment scheme is the application of biological filtration, which involves granular media filters serving to remove both particulates and readily available organic matter, producing a biologically stable finished water. Biological filtration typically involves ozonation prior to filtration and uses granular activated carbon (GAC) as a filter media. While such systems have been in use since the 1950s in many European countries and more recently in North America, experience has shown that for high quality, low TOC waters such as that of Sooke and Goldstream reservoirs, the cost is not justified, and this option will not be considered further at this time.

Regardless of the ultimate selection of treatment process technology, provisions for advanced pretreatment processes should be included in the design in the event that raw water quality continues to decline. Future piloting studies and preliminary designs will ultimately provide the final selection of the treatment process for the CRD. At the master planning level, the potential treatment processes are evaluated based on their ability to provide satisfactory performance based on experience with similar water quality. This approach is considered suitable for master planning level efforts but will require confirmation by pilot studies.

5.3.6.3 Granular Media Filtration (Options 1 and 2)

Cost effective filtration at large scale has most commonly been achieved using gravity based granular media filtration. The granular media filter bed uses a combination of sand and anthracite with total media depths varying from 750 mm to 2000 mm. Deeper filter media designs have been shown to achieve higher filtration rates and hence smaller overall footprint than shallower filter media designs. Granular media filtration is a physicochemical process also referred to as chemically assisted filtration. Removal of particulates relies on proper chemical pre-treatment, primarily the addition of a coagulant to the raw water to destabilize particulate and colloidal matter, allowing aggregation and capture by filter media. Capture of particles occurs throughout the depth of a filter by adherence of particulates to media granules. Eventually, the available sites for particle capture are depleted and the filter must be backwashed to remove accumulated particulates during fluidization and agitation of the packed bed. Once the media is cleaned, it is allowed to resettle into a packed bed, and filtration resumes. A brief period follows known as filter ripening, often with a filter to waste period, during which coagulated water is passed through the media to prepare it for particle capture. The filter effluent is wasted during ripening, often being recycled to the front of the plant. Filtered or finished (post disinfection) water is used to backwash filters, and

the backwash wastewater is treated and typically recycled to the front of the plant. Based on extensive industry experience and research investigations, it is generally accepted that optimized chemically assisted filtration can achieve 3 to 5 log removal of *Cryptosporidium* oocysts and *Giardia* cysts, as well as filter effluent turbidities below 0.1 NTU. Conventional filtration is preceded by flocculation and clarification to reduce the particulate load to the filters and extend the filter production time between backwashing. The omission of clarification is referred to as direct filtration. The omission of both flocculation and clarification is referred to as in-line or contact filtration.

Granular media filters have been installed at a number of locations in British Columbia including Metro Vancouver's Seymour Capilano Filtration Plant, Comox Valley Regional District, District of Sechelt, District of Port Hardy, and the City of Penticton.

A clarification or flotation process is required when higher turbidity and colour levels must be removed. Several types of clarification are available. These include the conventional gravity sedimentation, dissolved air flotation (DAF), and various forms of solids contact clarification. Extensive North American experience has been evaluated in terms of relevant raw water quality parameters and used to develop selection criteria for the various granular media filtration pre-treatment process options (Valade et al. 2009), as shown in **Figure 5.6**. This figure provides general guidance for process selection but site specific pilot studies covering a range of seasonal raw water quality are recommended.

Based on the SLR and potential future Leech River source water quality in the GVWSA, the two most likely process choices for granular media filtration are direct filtration, with the possibility of future addition of DAF clarification when Leech River water is introduced into the SLR.

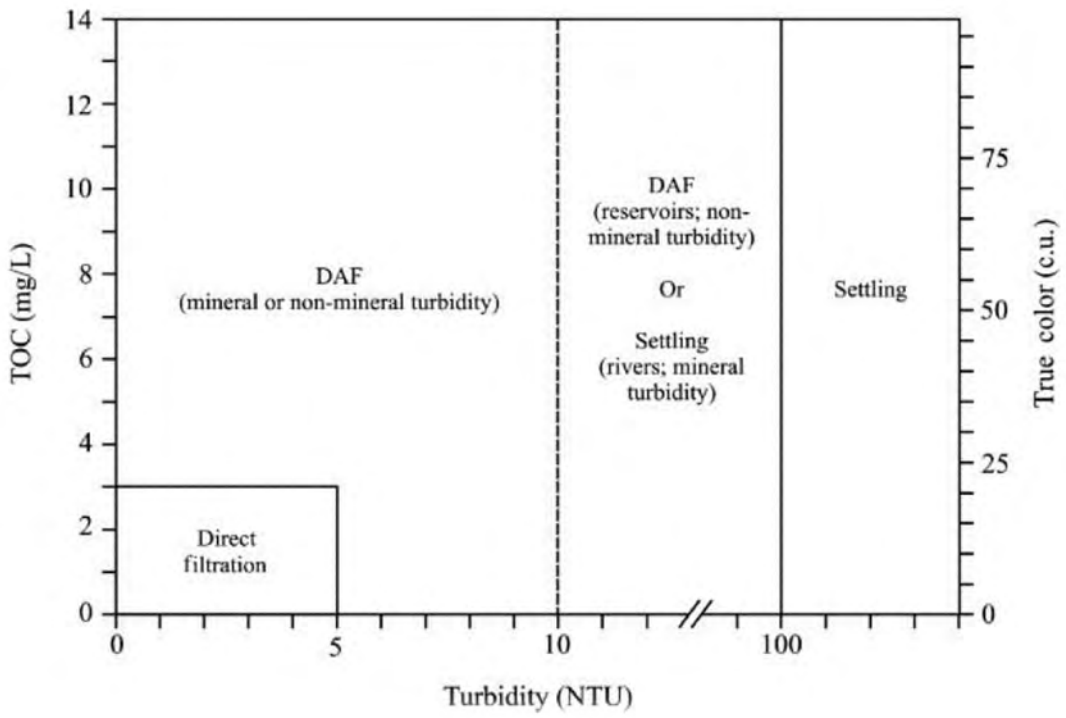


Figure 5.6: Process Selection Based on Average Water Quality (Valade et al. 2009)

All treatment options should be reviewed against the requirements of the recently published (2022) Drinking Water Officers guidance documents prepared by the Province of British Columbia and titled *Guidelines for Ultraviolet Disinfection of Drinking Water and Guidelines for Pathogen Log Reduction Credit Assignment.* Commonly referenced as the "4-3-2-1-0" guidance criteria are summarized below along with a summary of how the various treatment processes compare against these criteria. The comparison assumes that all options use free chlorine for virus reduction and only direct filtration options would employ UV as a second barrier to provide additional inactivation requirements for cryptosporidium and giardia protozoa. In many instances the addition of an additional treatment process, such as UV, will result in treatment levels which exceed the "4-3-2-1" guidance criteria. It is noted however, that DAF and Membranes would not require UV to meet guidance criteria and direct filtration would only require 0.5 log UV inactivation to meet requirements.

Table 5.10: BC "4-3-2-1" Guidance Criteria

	Criteria	Direct Filtration	DAF Filtration	Membranes
4	Log (99.99 Percent) Reduction Enteric Viruses	4 (chlorine)	4 (chlorine)	4 (chlorine)
3	Log (99.9 Percent) Inactivation of Giardia / Cryptosporidium Protozoa	2.5 (0.5 log UV)	3	4
2	Barriers of Treatment	2	2	2
1	Less than 1 NTU turbidity and target of 0.1 NTU for filtered water sources	1	1	1
0	Detectible *E Coli*, total coliform, and fecal coliform	0	0	0

5.3.6.4 Direct Filtration (Option 1)

Direct filtration is a process which uses granular media filtration and is considered most suitable for relatively stable sources that consistently demonstrate low turbidity and low organic matter. The process is simple and involves coagulation / flocculation, filtration, and disinfection. The Sooke Lake Reservoir and Goldstream average water quality is consistent with the recommendations for direct filtration. The complete process would include coagulant addition and flash mixing, flocculation, and direct filtration. Direct filtration would likely not be a suitable candidate once Leech River is brought online due to elevated colour levels however mixing Leech River and Sooke Lake water may produce a raw water that is treatable with direct filtration. This can be confirmed during pilot testing. The timing and provision for the addition of a colour removal pre-treatment process such as sedimentation or dissolved air flotation could be determined once pilot studies are completed, and once additional water supply is required beyond the safe yield available from Sooke Lake Reservoir.

The available *Giardia* and *Cryptosporidium* records for Sooke Lake Reservoir suggest that the water would fall into Bin 1 of the USEPA LT2 Rule for filtered systems. Health Canada guidelines require a minimum of 3-log total removal of *Giardia* cysts and *Cryptosporidium* oocysts. Provided filtered effluent turbidity limits are achieved, direct filtration may receive 2.5-log removal credit for oocysts. This would relax the inactivation requirements of subsequent UV disinfection or provide additional redundancy in treatment barriers. Virus inactivation would be obtained chiefly by using free chlorine, though 1.0-log credit is provided to direct filtration for virus removal. For all options,

if the filtration plant is located at Japan Gulch the existing Goldstream UV Disinfection Facility and chlorination systems can be incorporated into the process to meet the log inactivation requirements. It is noted that the RWS is able to take advantage of its transmission pipelines to provide adequate CT. This is a significant advantage because pipelines are a more efficient contactor than tanks which require baffling to obtain adequate contact residence time. Adequate CT for virus inactivation can also be provided by a dedicated contact volume which forms part of the clearwell equalization storage for a water treatment plant. Such clearwells are often baffled to improve the contact time which are essential to meeting the effective contact time or "T" requirement of CT calculations.

The resulting treatment objectives for a direct filtration treatment scheme are outlined in **Table 5.11**. Such an arrangement would exceed provincial requirements for pathogen removal but meet the 4-3-2-1-0 guideline for having at least two barriers for each pathogen category. UV would be required to meet the 3 log inactivation requirements for *Giardia* and *Cryptosporidium* protozoa.

Table 5.11: Log Inactivation / Removal Credits for Direct Filtration - Option 1

Parameter	Treatment Process				Total	No. of Treatment Processes
	Treatment IHA	Direct Filtration	UV Disinfection	Free Chlorine		
Giardia/Crypto	3	2.5	0.5	0	3.0	2
Viruses	4	1	0	4	5	2

The hydraulic loading rate or filtration rate for direct filtration currently ranges from 10 to 30 m/h with deeper bed filters often achieving higher filter rates. While higher rates may result in smaller plant size and associated cost savings, achieving consistent low turbidity filter effluent is highly dependent on proper chemical pre-treatment and usually requires use of filter aid polymers. The recently commissioned Comox Valley direct filtration plant is designed with a filtration rate of 15 m/h. Metro Vancouver's Seymour-Capilano Filtration plant uses 15 m/h in winter and 20 m/h in the summer. For a process capacity of 410 MLD, a total filtration surface area of 1,140 m^2 is required. Experience has shown that for a facility of the proposed size, the number of filters should not be less than 8 nor greater than 12. Also, provision of the process capacity should be achieved with one filter out of operation. Thus, using 12 filters total with 11 filters able to achieve the process capacity results in an area of 104 m^2 per filter. The total filter surface area required is 1,248 m^2.

Several assumptions must be made to estimate the total land area required. For each filter, additional area is required to accommodate the necessary channels and piping for filter influent, effluent, and backwash water provision, backwash wastewater conveyance, filtration to waste, air scour blowers and other appurtenances. It is also assumed that coagulant addition would utilize existing piping upstream of the plant. Backwash water would be supplied by gravity from elevated storage or from backwash pumps drawing directly from the clearwell.

Significant cost savings are achievable with granular media filtration at larger scales, particularly at filter areas in the vicinity of 100 m^2 or greater. To alleviate the challenges of backwashing large filters, a common design includes two cells within a single filter box using a common central gullet allowing each cell to be backwashed independently. Savings achieved from increased scale must

be balanced with operational and staging considerations and would require more detailed evaluation during design development.

Flash mixing followed by flocculation is assumed. Flocculation time for direct filtration typically ranges from 10 to 20 minutes over two to four stages, with decreasing mixing energy in each stage. Flocculation is commonly achieved by mechanical mixing with variable mixing energy input. The area required for flocculation is approximately 1,200 m^2 using a depth of 5 m for mechanical flocculation tanks and the process design flow of 410 MLD.

Residual waste streams must also be processed. These consists of spent filter backwash water, filter-to-waste water, and overflows from thickening and dewatering of solids removed from spent filter backwash water. Equalization storage of liquid residuals streams is usually required. Spent filter backwash water is usually settled by a dedicated clarifier, often with polymer aids to improve solids capture and recycled to the head of the plant. Solids are then concentrated in a gravity thickener and dewatered by centrifuge or another dewatering device. Polymer aids may be used at multiple points to improve solids capture and concentration. After appropriate processing, liquid streams are recycled to the front of the plant or discharged to the environment. The estimated area requirement for residuals is 2,000 m^2. The total area or footprint of the treatment and residuals facilities are estimated to require 6,748 m^2.

Due to the low alkalinity of Sooke Lake Reservoir and other sources (approx.15 mg/L as $CaCO_3$), common metal coagulants such as alum are unreliable without prior alkalinity addition. For low alkalinity waters, higher basicity coagulants, such as aluminium chlorohydrate (ACH) are preferred. The coagulant dose is estimated to be in the range of 5 to 10 mg/L, subject to confirmation by bench and pilot testing.

Pumping is required for several operations, though it can be minimized where possible using gravity and proper site planning. The main treatment process itself will be driven by gravity and require 4 to 5 m of head. Backwash pump size may be minimized using elevated storage which may also reduce overall footprint requirement. Key planning level process parameters are summarized in **Table 5.12**.

Table 5.12: Process Parameters for Direct Filtration - Option 1

Parameter	Total
Net Capacity	390 MLD
Gross Process Capacity	410 MLD
Coagulant Dose	5 – 10 mg/L
Chemical Rooms	300 m^2
Flocculation Time	20 min
Flocculation Process Area	1,200 m^2
Filtration Rate	15 m/h
Number of Filters	12
Area of each Filters	104m^2
Filtration Process Area	1,248 m^2
Residuals Processing Area	2,000 m^2
Operations Building	2,000 m^2
Total Treatment Process Area	**6,748 m^2**

5.3.6.5 Conventional Dissolved Air Flotation (DAF) Plus Filtration (Option 2)

Future raw water quality conditions may change sufficiently to challenge the performance of direct filtration. For example, increases in both the average and peak turbidity and TOC levels may increase due to changes in the watershed or incorporation of Leech River flows into Sooke Lake Reservoir. Water quality sampling by CRD in the Leech River has indicated elevated colour levels which normally require a clarification process such as gravity sedimentation or dissolved air flotation followed by granular media filtration. The most appropriate form of clarification is likely to be DAF (see Figure 5.6 above) because Leech and Sooke water have relatively low turbidity and will form small flocs which are easily floatable. The addition of DAF may be included in the initial design or provided as a subsequent retrofit, depending on the outcome of pilot investigations, timing of Leech River diversions to SLR, prevailing raw water quality and watershed conditions. The flocculation time for DAF is short and comparable to that of direct filtration, as the purpose of DAF would be to produce small aggregate floc for attachment to bubbles. The overall increase in treatment facility footprint is related to the DAF footprint. DAF filtration plants have been constructed at Port Hardy and Sechelt and have been very effective at removing high colour levels exceeding 100 TCU at these locations.

The provision of DAF clarification is recognized as having protozoan pathogen removing capabilities and enhancing the performance of filtration and improving UVT of the finished water overall. Consequently, the log reduction credits typically assigned such a process are slightly higher than those of direct filtration, provided the usual turbidity reduction performance is adequately achieved and verified on a continuous basis. Overall log reduction credits for Option 2 are shown in **Table 5.13.**

DAF could meet the Provincial treatment guidance requirements without UV, but provision of a second barrier would be considered resilient and robust treatment practice. In addition, if the plant is located at Japan Gulch, the existing Goldstream UV disinfection facilities can continue to be used.

Table 5.13: Log Inactivation / Removal Credits for Conventional DAF Filtration - Option 2

Parameter	Treatment Process				Total	No. of Treatment Processes
	Treatment IHA	DAF-Filtration	UV Disinfection	Free Chlorine		
Giardia/Crypto	3	3	Not required*	0	3	1*
Viruses	4	1	0	4	5	2

The practical range of hydraulic loading rate for high-rate DAF is 15 to 30 m/h with additional area required for saturators, air compressors, recycle pump systems, and DAF float residuals removal. The DAF area required is approximately one fifth of that required for filtration. A recycle flow for DAF must be provided for air saturation to produce 410 MLD for filtration. The recycle stream may be obtained from clarified or filtered effluent and typically amounts to 10% of the influent flow to the DAF. Thus, drawing the recycle stream from the DAF effluent, the total process capacity to the DAF units would be 430 MLD. At a loading rate of 20 m/h, this will require total DAF area of 900 m^2. This may be distributed between five DAF units, with a sixth redundant unit, yielding 180 m^2 per DAF and 1,080 m^2 total for all six DAF units. The total area for all processes including filtration for the DAF option is 8,320 m^2.

All other components as described for Option 1 would pertain to Option 2. If Option 1 is selected for implementation, the future provision for addition of DAF should be in included in the design. Two options for such a retrofit would be to reconstruct flocculation and DAF units upstream of the filters. A second option may be to apply the so-called DAF above filtration approach. Because the hydraulic loading rates for DAF and granular media filtration are comparable, it is possible to integrate DAF with filtration in the same filter box whereby the DAF separation occurs in the space above the filter media. The filter boxes are typically quite deep, 8 to 9 m, to avoid the potential for air binding in the filter media. This allows the saving of space and capital, as well as multiple other benefits. Several such facilities have been built or retrofitted in South Africa, Australia, and South America. This approach has been used in large plants where available space is limited, notably the Croton WTP serving New York City. The details of how future DAF augmentation are implemented, whether stand alone or integrated retrofit or constructed during the initial build, will depend on multiple site-specific factors, the outcome of pilot studies and will require separate detailed consideration. Process parameters for Option 2 are summarized in **Table 5.14.**

Table 5.14: Process Parameters for Conventional DAF Plus Filtration Option 2

Parameter*	Total
Net Capacity	390 MLD
Gross Process Capacity (DAF recycle flow included)	430 MLD
Chemical Rooms	300 m^2
Flocculation Process Area	1,200 m^2
DAF loading rate	20 m/h
Number of DAF units	6
Area per DAF unit	180 m^2
DAF Process Area	1,080 m^2
Filtration Process Area	1,240 m^2
Residuals Process Area	2,500 m^2
Operations Building	2,000 m^2
Total Treatment Process Area	**8,320 m^2**

5.3.6.6 Membrane Ultrafiltration (Option 3)

An increasingly competitive alternative to granular media filtration is pressure driven membrane filtration which includes microfiltration (MF) and ultrafiltration (UF) and removes particles by physical sieving at the interface of a fiber membrane having nominal pore sizes of 0.1 µm for MF and 0.01 µm for UF. Because MF and UF are similar in equipment design and operating characteristics and can be used interchangeably in most applications, they are commonly listed together as MF/UF. Two common configurations involve pressure vessels or submerged fibres, both involving assemblies of fibres into modules, with multiple modules assembled into skids or cassettes, and multiple skids or cassettes assembled into trains. In this way, a large surface area for filtration occupies a small footprint, providing significant benefit when space is limited. Currently, UF treatment is in service in Kamloops (160 MLD) and Nanaimo (120 MLD) and several other smaller locations.

MF/UF is an effective method of producing very low turbidity finished water (< 0.1 NTU), effectively providing an absolute barrier to protozoan oocysts. Direct challenge testing has been found to achieve > 6-log removal of *Cryptosporidium* and *Giardia*. Actual removal rates may be decreased significantly due to breaches in fibres or loose components. Membranes rely on the fact that they are a physical barrier and any breach or tear in a membrane or loose connections can allow small protozoa to pass through the membrane thereby compromising the treatment efficacy. Integrity testing is required to verify that the system is intact and to detect, locate, and correct any breaches. Direct integrity testing typically involves the pressurization of the fibres with air, isolation and measuring of pressure decay daily. The resolution of this verification method is limited which decreases the removal credit assigned in most jurisdictions to well below that demonstrated by challenge testing. Typical removal credits based on direct integrity testing are in the range of 3-log to 4-log for *Cryptosporidium* oocysts and *Giardia* cysts, depending on the product type. Indirect integrity testing is conducted continuously, often by turbidimeters to monitor the filtrate.

Regulations in the USA require continuous indirect integrity testing and at least daily direct integrity testing. The submerged UF type system such as the ZeeWeed 500d system by Suez or equivalent, is considered appropriate for Sooke Lake Reservoir water quality and this alternative is based on that system. Such systems have typically been assigned 4-log removal of oocysts on a product basis by challenge and integrity testing and validation. Overall log reduction credits for Option 2 are shown in **Table 5.15**.

Table 5.15: Log Inactivation / Removal Treatment Credits for Membrane Filtration - Option 3

Parameter	Treatment Process				Total	Total No. of Treatment Processes
	Treatment IHA	Ultrafiltration	UV Disinfection	Free Chlorine		
Giardia/Crypto	3	4	Not required*	0	4	1*
Viruses	4	0	0	4	4	1

The process layout assumes that the rejectate from membrane rinse water (equivalent to backwash in granular media filters) of the initial membranes is further processed by a secondary membrane stage thereby enabling recovery of most of the water. The permeate of the secondary stage is recycled to the head of the plant and blended with the raw water prior to coagulant addition and flash mixing. The rejectate of the secondary stage would contain a much higher concentration of solids and be processed by a dedicated DAF thickener. The float captured by the DAF thickener is accumulated in a storage tank until there is sufficient volume to operate a centrifuge dewatering system. The clarified DAF thickener subnatant is recycled to the front of the secondary membrane stage.

Pre-treatment would be like Options 1 and 2, involving a high basicity coagulant such as ACH at a relatively low dose and brief flocculation likely with a residence time of less than 10 minutes, possibly using only a single stage.

It is assumed the ZeeWeed 500d submerged UF system or equivalent is used for this facility, and that each cassette provides a net production of 2 MLD of permeate (or filtrate) using typical flux rate, backwash frequency, backwash duration, and transmembrane pressure. Optimization of these and other parameters may significantly increase the net production capacity of the system.

For an ultimate design flow of 390 MLD, this would require a total of approximately 200 cassettes for the primary stage. The secondary stage would consist of approximately 50 cassettes. It is important to note that once the tankage for each train has provided for the ultimate design flow, the staging of capacity increases is greatly simplified as it involves simply adding additional cassettes into available space in the tank of each train and arranging the required connections to feed, permeate, and air supplies. It is also of benefit to split the capacity into two independent treatment trains between the point of coagulant addition and conveyance of permeate to disinfection. Each train would involve a primary stage composed of 10 units with 10 cassettes in each, and secondary stage composed of 5 trains of 5 cassettes each. Each plant would also have a dedicated DAF thickener to process rejectate of the secondary stage. A common DAF solids storage tank and dewatering facility would likely be used for both trains.

Due to the modularity of UF systems, a reasonable estimate for the area requirement may be obtained using existing facilities. In this way, it is estimated that for a 390 MLD net capacity facility, involving coagulant addition and flash mixing, brief flocculation, primary and secondary UF stages, DAF thickening, and centrifuge dewatering, a total area of 7,850m^2 is required. Similar to other options, a 2,000 m^2 allowance is suggested for the operations building. This includes area provision for filtrate pumps, inlet and distribution channels, and clean-in-place (CIP) chemical storage.

Table 5.16: Membrane Total Treatment Process Area Information

Parameter*	Total
Net Capacity	390 MLD
Gross Process Capacity with recovery module	395 MLD
Flocculation Time	< 10 min
Flocculation Area	600 m^2
Chemical Rooms	350 m^2
UF system type	Submerged (Zeeweed 500d or equivalent)
Total number of primary cassettes	200 (2 x 10 trains x 10 cassettes)
Total number of secondary cassettes	50 (2 x 5 trains x 5 cassettes)
Membrane Area	3,400 m^2
Flux Rate	35 L/m^2/min
Typical Transmembrane Pressure	0.2 – 0.4 bar
Membrane Life	10 years
Residuals Area	1,500 m^2
Operations Building	2,000 m^2
Total Treatment Process Area	**7,850 m^2**

The three treatment process options considered are illustrated in **Figure 5.7**.

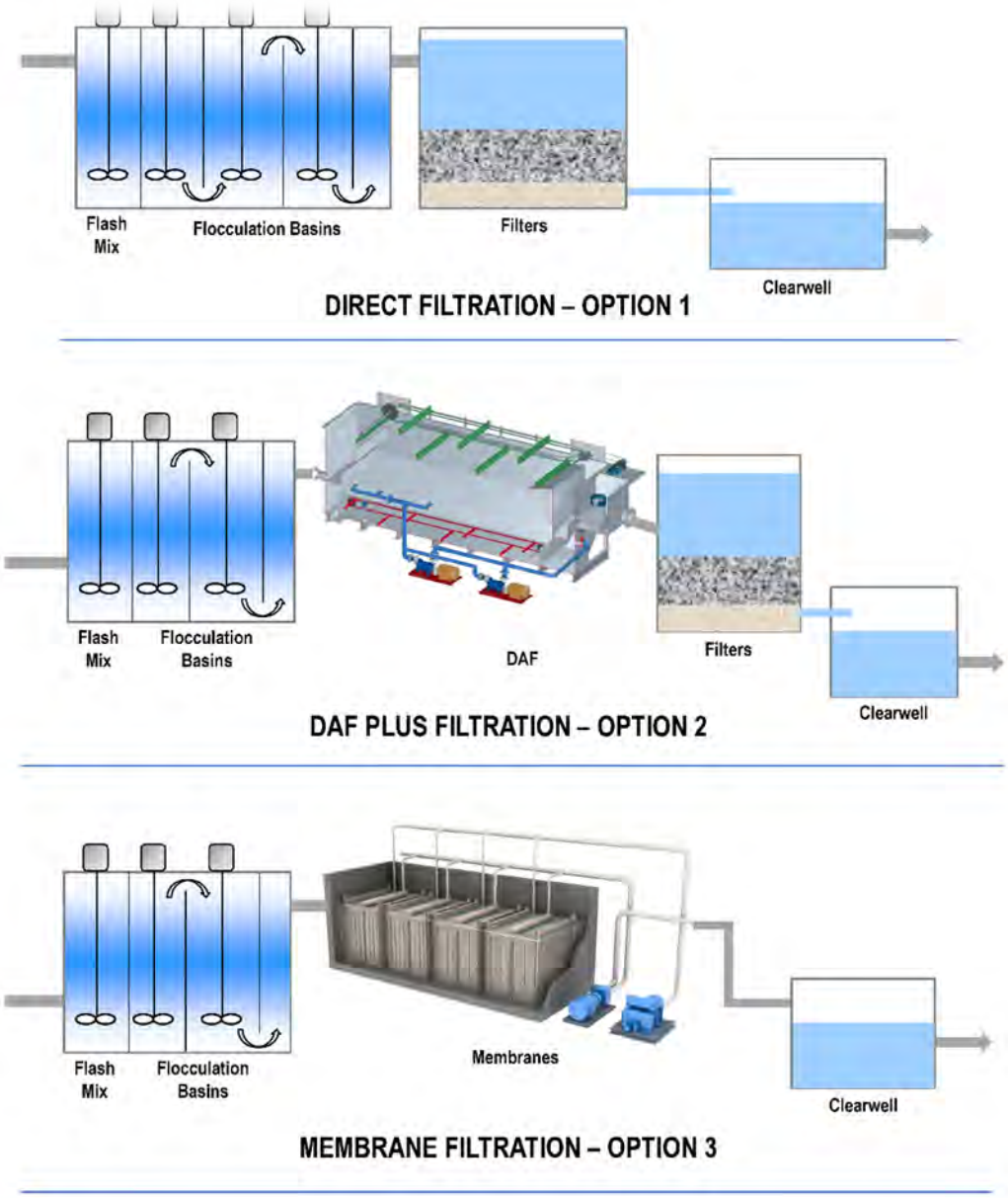


Figure 5.7: Treatment Process Options for Filtration

The three process options that have been considered are based on the raw water quality conditions in the Sooke Lake Reservoir, Goldstream Reservoirs, and the future Leech River source. The final selection should be made after detailed piloting studies are completed and should consider not only Sooke Lake Water but a blended source water with Sooke and Leech water. Once pilot studies are completed, preliminary designs can be completed for the selected treatment process using site specific process parameters. It is expected that the pilot program would focus on granular media filtration options as life cycle costs for membranes will be significantly higher.

All process options will be able to respond to post wildfire conditions provided the raw water quality does not deviate from established process performance design criteria for the selected process. The biggest changes in raw water quality could be potential increases in turbidity due to loss of forest cover or ash deposition in reservoirs. Short term changes in water quality can most likely be accommodated by more frequent backwashing of filters. A deep intake in SLR would also assist in maintaining raw water quality.

5.3.7 Residuals Treatment, Disposal, and Recycling

All filtration processes generate waste or residuals streams, consisting of solid-liquid flows of varying concentrations. These must be properly treated and disposed of, and the water recycled to the greatest extent practicable. The residuals streams for Options 1 and 2 include:

- Filter-to-waste
- Spent filter backwash water recycled to head of plant following pre -treatment (high rate settling and polymer addition)
- DAF clarifier float – Option 2 only
- Thickened solids overflow and dewatered solids centrate (supernatant)
- Dewatering waste (centrate)
- Sanitary wastes from washrooms and floor drains

In the case of Option 3 (Membranes), the residual streams include:

- UF reject water (primary and secondary stages, primary recycled through dedicated membrane module)
- Thickener float and subnatant
- Dewatering solids (centrate)
- Spent clean-in-place chemicals
- Sanitary wastes from washrooms and floor drains

For many facilities, sludge waste streams are commonly discharged to sanitary sewers or wastewater treatment facilities. Because of the hydraulic loading from backwash, backwash waters are rarely discharged to sewer and are often recycled to the head of the plant or returned to the receiving stream following pre-treatment. It is possible to reduce liquid discharge to less than 1% of the total flow and render it environmentally safe. This relatively smaller flow may be taken to sewer or treated and discharged to the environment. Dewatered solids with 20% to 25% solids may be ultimately disposed of to landfills or potentially used for beneficial purposes.

5.3.8 Proposed Filtration Plant Siting Considerations

Three options have been considered for siting of proposed water filtration plant including:

1. Adjacent to Head Tank south of Sooke Lake Dam (single centralized plant)
2. Adjacent to Japan Gulch Reservoir (single centralized plant)
3. Distributed plants – A large plant at Japan Gulch and a small plant at SRRDF

Table 5.17 summarizes the advantages and disadvantages of each filtration plant location.

Table 5.17: Comparison of Treatment Plant Siting Options

Plant Location (s)	Advantage	Disadvantage
Sooke Lake Dam Head Tank (Centralized Plant)	• Flow by gravity to Kapoor Tunnel and Sooke Transmission Main No. 15 • Flow by gravity to Kapoor Tunnel and downstream RWS transmission mains • Single plant serves both Greater Victoria and Sooke same as current RWS	• 3 phase power extension to plant is costly • Access road is long and would require significant upgrade • Travel time from Goldstream operations centre to plant; winter travel could be longer. • Site is remote • Decay of disinfectant requires higher dosage at plant • Not able to treat Goldstream water
Japan Gulch Reservoir (Centralized Plant)	• Site is easily accessible • 3 phase power can easily be extended • Close proximity to Goldstream Disinfection Facility	• Site elevation is around 130+- m so high lift pumping will be required to 169mHGL • A new east-west transmission main would be required to supply JDFWDS • Site is near flood inundation zone in the event of failure of Goldstream dams • Site is in close proximity to Leech River fault
Japan Gulch Reservoir and Sooke River Road Disinfection Facility (2 plants)	• Eliminates requirement to build transmission main to supply JDFWDS • Small membrane plant could be constructed adjacent to Sooke River Road Disinfection Facility • Power supply can easily be upgraded for new plants • Access to both treatment plant sites is good	• Would require operation of 2 water treatment plants • Additional operational and maintenance costs due to 2 plants • Two plants would be more costly to construct and operate

The Japan Gulch Reservoir location is considered the best available site for an expanded treatment facility at this time. Siting the plant at this location will require breaking the hydraulic gradeline of the transmission system to accommodate gravity granular media filtration. This location will require pumping to raise the HGL to 169m from approximately 124 m following filtration. Final site selection can be made as part of a water treatment plant preliminary design study. **Figure 5.8** provides an indicative potential sizing of a direct filtration facility in comparison to available sites adjacent to the Japan Gulch reservoir. **Figure 5.9** illustrates how the plant can be incorporated into the overall hydraulics of the RWS transmission system. A new balancing head tank (Stage 2 Balancing Tank in Figure 5.9) located near the Japan Gulch filtration plant site with a top water level elevation 169m could be constructed on the treated water pump station discharge mains to allow the RWS to operate hydraulically as it has for many years. This tank can also serve as a source of supply for backwashing filters. Experience at other locations has indicated that the sized of balancing storage is typically in the range of 10% of plant capacity. The final size of the balancing storage will be anticipated to range from 30 to 50 ML depending on the outcome of a hydraulic modeling study to optimize the sizing of the plant and Smith Hill balancing tanks.

The 1994 Plan recommended decommissioning of the Japan Gulch Reservoir and Dam. Decommissioning would free up valuable area for a new water filtration plant and future expansion area. The Japan Gulch site is downstream of the Goldstream dam failure flood inundation zone so a protection berm may be required as part of the design. Geotechnical and seismic evaluations of the site will also be required to confirm the viability of this site. If a transmission pipeline is built from the Goldstream Reservoir to Japan Gulch, the plant could also be constructed on the site where the current Japan Gulch reservoir exists.

The final site layout will be determined following preliminary design. The Howard English Fish Hatchery may have to be relocated to provided adequate space for the dam and reservoir decommissioning and a treatment plant construction near Japan Gulch.

Figure 5.8: Preliminary Layout of Direct Filtration Plant and Clearwell near Japan Gulch Reservoir (Indicative Siting for Footprint Estimates only)

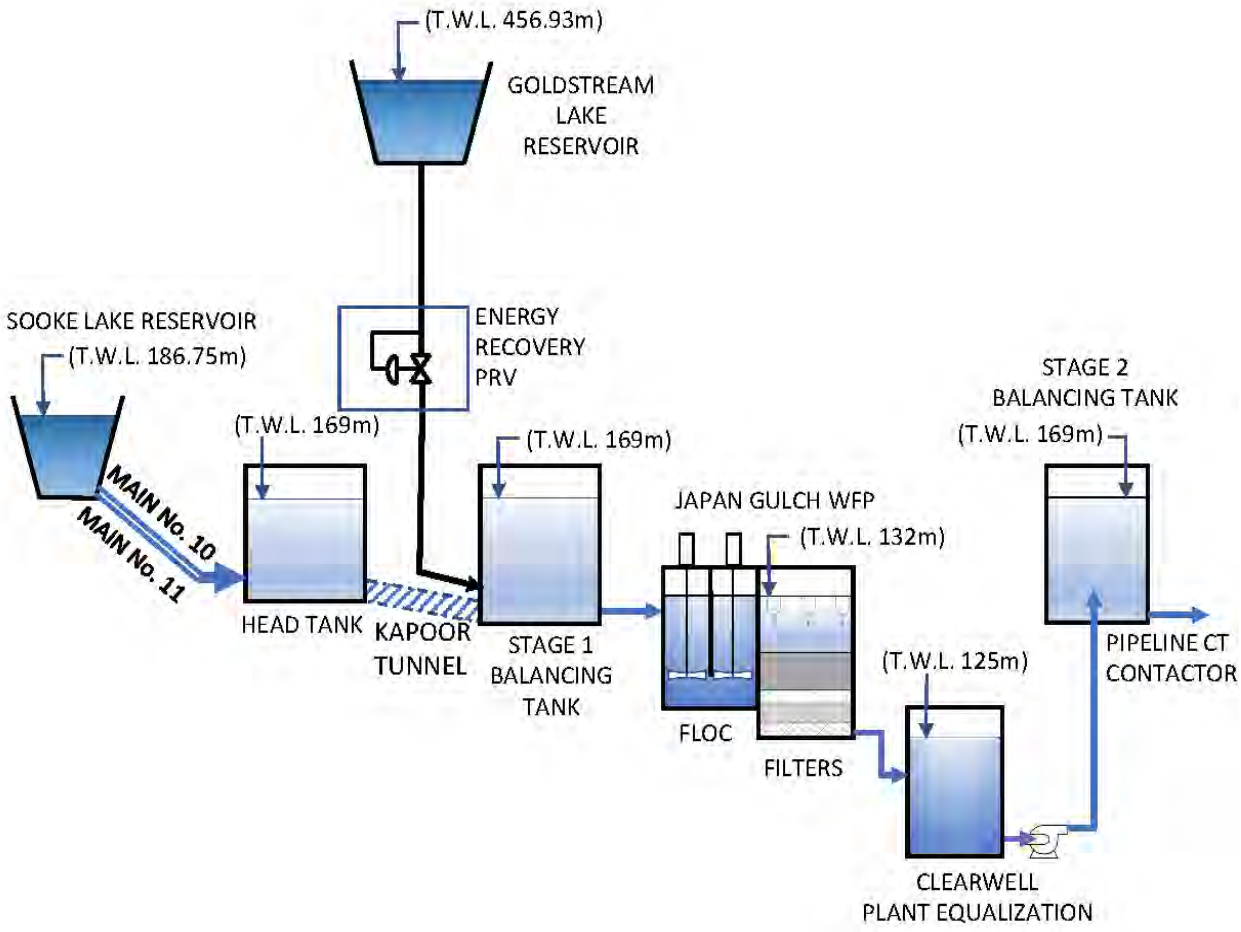


Figure 5.9: WFP & Balancing Storage Hydraulic Grade Line

5.3.9 Filtered Water Clearwell

Filtration facilities are typically designed to process water at a constant rate and satisfy the anticipated maximum day demand for the selected design horizon which typically ranges from 20 to 25 years. Filtered water storage, referred to as a clearwell, provides peak hour flow balancing equalization and reduces filtration flow fluctuations due to instantaneous transmission system demand and also serves as a source of filter backwash water. Such storage may also provide chlorine disinfection contact time. In this case, disinfection will be conducted downstream by existing Goldstream UV and chlorine facilities and the transmission main which serves as contact pipeline to provide residence time for disinfection. The RWS transmission system has a considerable pipeline length prior to first users so adequate contact time can also be achieved in the transmission mains as currently practiced for the Goldstream Disinfection Facility. It is anticipated that 30 to 50 ML of treated water storage will be located at the filtration facility site. A treated water pump station will pump the water to a HGL of 169 m which can be provided by direct pumping into the transmission system or pumping to an elevated Stage 2 head tank close to the plant. The clearwell storage would likely be constructed in 2 cells to facilitate inspection and maintenance activities. Further analysis, including hydraulic modeling of system storage tank sizing, should be conducted to evaluate the final filtered water storage requirements and sizing.

5.3.10 Capital and Operating Costs

The cost of treatment facilities depends on factors including actual maximum day demands, projected capacity requirements, the type of facilities to be constructed, site conditions, and implementation schedule. The following section presents a conceptual level opinion on the probable cost of treatment options for planning purposes.

A planning horizon of 2050, 28 years from the present, has been used to establish the ultimate design capacity of the treatment plant and associated total land requirements for filtration options. However, implementation of additional treatment will most likely be executed in stages of capacity increments based on a design horizon of 20 to 25 years as well as projected water demands to minimize redundant capacity and future inflationary cost increases. Thus, the timing of implementation would impact the cost of treatment. For example, the MDD forecast for 2040 using identical assumptions is 340 MLD, which is 13% less than the MDD of 390 MLD forecast for 2050. For planning level purposes, it is recommended that water treatment planning consider the 2050 design horizon for initial sizing and estimating construction costs.

A feasibility level opinion of probable cost is provided in **Table 5.18** for the three filtration options assessed in this 2022 Master Plan with the understanding that capacity increments for future expansion would be staged and an ultimate site development plan would be provided to plan the site layout for future expansions beyond the initial build. Sufficient site area would also be provided to provide additional pre-treatment such as DAF if required in the future.

Table 5.18: Opinion of Probable Cost for Filtration Plant Options

Treatment Options	Capital Cost (M$)	Operating Cost NPV (M$) *	LCC(M$)
1. Direct Filtration	$570	$205	$780
2. DAF plus Filtration	$660	$235	$900
3. Membranes	$750	$355	$1,200

*NPV calculated using 4% discount rate and Option 3 includes membrane replacement cost at ten-year intervals

A comparison of the capital cost, operating cost, and life-cycle cost suggests direct filtration (Option 1) to be the lowest capital and life cycle cost. These costs will be subject to change depending on market conditions at time of tender and other factors such as the outcome of detailed piloting and preliminary engineering investigations. Note the costs in Table 5.18 above are direct capital costs only and do not include the indirect costs and contingency which are the basis of the estimates included in Section 8.0 of this report.

5.3.11 Energy Consumption

It is generally recognized that the energy requirements for media filtration are less than that of membranes, though a detailed analysis is needed to provide a more accurate comparison.

The head available for granular media filtration may be provided by gravity with Sooke Lake Reservoir located above the treatment facility. In the case of MF/UF membranes, use of a complete or partial siphon to provide the permeate vacuum has been implemented at other sites and may be available for the CRD to offset electrical costs somewhat. A partial siphon was used for the City of Nanaimo's UF system commissioned in 2016 and successfully offsets permeate pumping requirements.

5.3.12 Treatment Options Analysis and Discussion

The three treatment options may be compared on the following basis:

- Log inactivation/removal capabilities for protozoan pathogens
- Area or land requirement
- Capital, O&M, and Life-Cycle Costs
- Ease of integration with existing works
- Energy consumption

The estimated land area requirements for treatment options are displayed in **Table 5.19**.

Table 5.19: Comparison of Treatment Options

Treatment Options		Protozoan Removal with UV (Log)	Land Area (m^2)	Life-Cycle Cost ($M)	Filtration Energy	Chemical Pre-Treatment
1	Direct Filtration	5.5	6,748	780	Low	Critical
2	DAF plus Filtration	6.0	8,320	900	Low	Critical
3	Membranes	7.0	7,850	1,200	High	Non-Critical

With UV incorporated and sized to provide 3 log inactivation in all options more than the required log removal of *Cryptosporidium* and *Giardia* is provided although at the expense of additional operating costs. It is noted however that only direct filtration would require at least 0.5 log of UV inactivation while DAF filtration and membranes would not require UV to meet Provincial requirements. The extent of this is greatest for Option 3 Membranes where the filtration processes achieve better particle removal and hence is given a higher removal credit by regulatory authorities. Total land area required is least for Option 1, Direct Filtration. Life cycle cost for Option 1 is the least, which is 87% of that for Option 2 and about 65% of that for Option 3. Energy requirements are also lowest for Option 1 and highest for Option 3. Staffing levels for all plant technologies are expected to be similar.

A distinct advantage of membrane filtration is the lower importance of chemical pre-treatment to achieve optimal particle and pathogen removal. In membrane filtration applications, chemical pre-treatment using coagulants is applied to reduce the rate of membrane fouling by colloidal and dissolved organic matter, thereby decreasing the frequency of required cleaning operations and prolonging membrane useful life. No ripening occurs and therefore filter-to-waste is not required. The amount of backwash water used is typically 5 to 10% of the water produced compared to 2 to 5% for granular media filtration. Due to the relative unimportance of chemical pre-treatment on low turbidity waters, membrane systems are less sensitive to changes in source water quality that may occur seasonally or due to storm events. The membranes would however still require some form of pre-treatment such as sedimentation or DAF for colour removal if Leech River is used as a source without blending with Sooke Lake water. Treating Leech water without blending would require a pre-treatment process.

All filtration and membrane processes will be capable of removing ash and turbidity. Conventional processes which have a separate solids separation pre-treatment process will be better equipped to treat higher levels of ash and turbidity. More frequent washing of filters may be required if significant ash and sediment due to wildfires impact the raw water quality significantly. The proposed Deep Northern Intake will also provide additional resiliency to raw water quality and treatment impacts from ash or turbidity events in creeks draining into the SLR.

5.3.13 Recommended Indicative Water Treatment Process

Based primarily on cost considerations and review of available water quality information, Stantec considers direct filtration to be an appropriate filtration process for the CRD's Regional Water Supply from Sooke Lake Reservoir with the presumptive site located in the vicinity of the Japan Gulch reservoir upstream of the existing Goldstream Disinfection Facility. This site was selected for ease of access and the ability to easily integrate into the existing transmission system. The

continuation of dual primary disinfection using UV, and secondary chlorine and ammonia is recommended with existing facilities replaced or renovated prior to reaching the end of their useful life or new facilities integrated into a filtration plant. The design for new filtration facilities should allow for the addition of dissolved air flotation in the future to deal with differing water quality if Leech River is used as a future source. The final process selection and siting can be finalized once piloting and preliminary designs are completed.

It is also recommended that increased monitoring of water quality be conducted at both the existing SLR intake and the proposed Deep Northern Intake basin to better assess the optimal elevation for extraction of water from the north basin. Other water quality parameters relevant to granular media filtration design and operation include turbidity, TOC, UV absorbance, alkalinity, pH, and temperature. Year-round monitoring should be initiated at a frequency sufficient to capture seasonal variations.

Pilot treatment studies should be initiated, which along with seasonal water quality data from existing and future intake locations, will be used to inform full scale design. During pilot testing it is recommended that a blend of Leech River and Sooke Lake Reservoir water be tested in various proportions to determine the effectiveness of direct filtration and whether a sedimentation process or flotation process will be required to meet treated water objectives.

Pilot studies should also include bench scale evaluation of backwash residuals treatment selection and optimization.

5.4 Transmission and Distribution System Water Quality

Over time, particulate, sediments, inorganic and organic matter will settle an accumulate in the transmission systems. The deterioration of water quality on large transmission systems similar to the CRD is a significant challenge. When initial finished water quality is sufficiently high, the risk of further deterioration is mitigated with the implementation of a filtration facility. The augmentation of treatment to include filtration provides additional benefits beyond health-based protozoan pathogen removal targets, namely by producing a superior finished water quality of greater chemical and biological stability that will improve water aesthetics and facilitate maintenance of transmission system integrity.

5.4.1 Particle Transport, Sedimentation and Accumulation in Transmission System

Despite the very low turbidity and pathogen content of the Regional Water Supply Service source water, over time a considerable amount of particulate matter will be loaded into the transmission and distribution system in the absence of filtration. Such material tends to deposit where flow is lowest, such as transmission mains during low flow periods in the winter, in storage facilities, upstream of closed valves, and dead ends. The presence of such material is associated with several undesirable effects.

This matter thus supports increased rates of bacterial growth, primarily non pathogenic, in transmission and distribution systems. Sediment and particulate accumulations in transmission systems provide nutrients and energy to heterotrophic bacteria, as well as increased surface area for biofilm growth. This material thus supports increased rates of bacterial growth in transmission and distribution. Negative impacts of such material include:

- As organic matter accumulates and decays, anaerobic conditions may result in the development of objectionable taste and odour and a rise in consumer complaints.
- Sudden flow reversals or flow increases and pressure surges may resuspend deposited material causing noticeable turbidity events.
- Greater disinfectant residual demand on disinfectant residual and inability to maintain residual to throughout the system, allowing accelerated bacterial growth and increased risk of nitrification.
- Biofilms may harbour and amplify opportunistic pathogens and act as a source of seed material to colonize building premise plumbing and microbial induced corrosion.
- Biological activity may increase rate of corrosion in areas with ferrous pipe materials.
- Interference with the routine bacteriological sampling of sanitary significance, such as total coliform bacteria. Regrowth of total coliform bacteria may mask coliform intrusion through breaches of integrity, thus making detection integrity losses more difficult. Elevated heterotrophic bacteria levels can suppress the detection of total coliforms and other indicator, increasing the rate of false negative total coliform results.
- Increased flushing requirements to remove accumulated deposits and consequent non-revenue water production. Increased frequency of storage facility cleaning requirements.
- Periodic taste and odour events.
- Greater formation potential for regulated and non-regulated disinfection by-products due to greater amount of precursor material.
- Infestations of invertebrate animals in the distribution system may rise to levels noticeable to consumers.

Such conditions are greatly minimized when particulate removal is provided by effective filtration.

5.4.2 Corrosion Control

The chemical stability of finished water reduces the potential for corrosion in the transmission and distribution system, as well as within the plumbing of home and building water systems. The CRD source water is of low alkalinity, and thus, has low buffering capacity.

The recently completed Greater Victoria pH and Corrosion Control Study (KWL) confirms that very few of the sampled buildings had elevated lead concentrations above the action or health limits of GCDWQ. Based on these results and in accordance with action threshold concentrations set by Health Canada, the Province and the USEPA, it appears that corrosion is not a major issue in the RWS and Greater Victoria area. However, it was noted in the consultant's report that provision for alkalinity and pH adjustment should be considered in the design of any future water filtration facilities. This approach would enable RWS to respond to future regulatory changes, provide pH and alkalinity adjustment to respond to operational requirements and compensate for consumed alkalinity as the result of coagulation chemical addition. Refer to the recently completed KWL Study Conclusions/Recommendations for additional information.

An important consideration in planning filtration treatment is the impact such treatment would have on the corrosivity of finished water. The proper selection of pre-treatment chemicals should

be included in pilot evaluations to address this issue. The addition of common coagulants will depress pH and alkalinity. At other plants with low alkalinity raw water similar to RWS sources a variety of chemicals have been used to reduce corrosivity including lime, caustic soda, carbon dioxide and soda ash. For example, Metro Vancouver's Seymour Capilano Filtration Plant (similar raw water quality to CRD sources) uses hydrated lime and carbon dioxide post filtration to increase pH and alkalinity prior to transmission.

5.4.3 Cross Connection Control

International experience has demonstrated that contamination of the system by uncontrolled cross-connections is one of the greatest risks to finished water quality and public health. In compliance with provincial regulation, the CRD has developed and implemented a comprehensive cross connection control program, as described in Bylaw No. 3516 (as amended by Bylaw 4037).

5.5 Water Treatment Implementation Strategy

5.5.1 Treatment Recommendations, Staging and Next Steps

In previous sections of this report, it has been determined that a treatment plant with a gross treatment capacity of 410 MLD will meet the projected 2050 maximum day demand of 390 MLD. The additional finished water capacity is provided for internal plant water use such as filter backwashing. Experience in North America has seen most water treatment plants constructed for a design horizon of anywhere from 20 to 30 years. At the same time that conceptual designs are prepared, an ultimate site development master plan for future expansion of treatment facilities should be prepared. With such a plan and hydraulic considerations through future added processes, future plant expansions can be easily accommodated, and individual projects coordinated. There are a number of investigations and studies that should be completed to finalize the selected water treatment process, and these are summarized below:

- Complete a pilot study to assess the performance of different filtration options and develop design criteria for design of future filtration facilities. The pilot program should consider treatment of SLR water, Goldstream water, Leech River water and a blend of SLR and Leech River water. Because of the significant cost of a membrane plant, the pilot program should be focused on direct filtration and DAF filtration using medium depth and deep bed filter designs. The pilot program should be operated through summer and winter conditions to determine if there are any impacts from season raw water quality changes.
- Undertake a treatment plant site selection study to finalize the plant siting.
- Complete a geotechnical investigation of the selected plant location.
- Complete an indicative design of filtration facility and undertake a siting study to finalize the location of the filtration plant. The indicative design should be comprehensive and should include consideration of flow control through the plant for SLR and Goldstream sources, hydraulic gradeline through the plant unit processes, treated water pumping, clearwell equalization storage, and primary and secondary disinfection. The design should assess the geotechnical considerations, seismic design, and protection from

flood inundation. The Opinion of Probable Construction Cost should be updated once the indicative design is complete.

- Complete hydraulic modeling to finalize the size of balancing storage sizing at the water treatment plant site in combination with the proposed Smith Hill Transmission balancing storage reservoir.

5.5.2 Power Supply

The provision of three-phase electrical power is required for the filtration facility. Capacity upgrade and extension of available power to the proposed filtration facility is required, including consideration of relocation of power lines to below ground surface to improve resiliency. Once an indicative design for the filtration plant is completed, initial discussions should be held with BC Hydro regarding power supply extension to the selected treated plant site.

Most major treatment plants will also have standby power generation so it would be prudent to plan for standby power installation at the water filtration plant to provide the desired reliability and resiliency for these critical infrastructure facilities.

5.5.3 Energy Recovery

Energy recovery of water from a pumped pipeline system via Jack Lake is an option that was investigated in the 1994 Plan. If this option is considered in the future or if a pipeline from Goldstream Reservoir is constructed, it may be possible to incorporate energy recovery into the final design. This option would involve the construction of small piped micro hydro systems that would have a generator installed. While these are potential options, the energy recovered is unlikely to offset the capital cost of such facilities.

5.5.4 Facility Security

Facility security is an important consideration at most water treatment plant sites. Given the remoteness of potential sites, fencing and controlled access is recommended as is currently practiced for the Goldstream Disinfection Facility. Additional monitoring facilities such as cameras, alarm systems, and door/access hatch switches are recommended.

5.5.5 SCADA

The CRD is currently updating their SCADA system and establishing a SCADA Master Plan for future upgrades. The proposed treatment plant would be integrated into the overall SCADA system to enable monitoring from defined locations within the CRD system. The proposed water treatment plant would have a main control room which could serve as the central control hub for monitoring RWS offsite and other facilities.

6.0 TRANSMISSION SYSTEM

6.1 Existing Transmission System

The existing RWS was described in Section 2 of this 2022 Master Plan. For the purposes of the transmission system assessment the following is highlighted:

- Sooke Lake Reservoir is the primary source of supply with a spillway crest elevation of 186.75 m
- Water flows from SLR to the Head Tank which maintains a HGL of 169 m to the RWS system
- A connection upstream of the Head Tank for Main No. 15 supplies the Sooke River Road Disinfection Facility
- Water is conveyed by gravity through the Kapoor Tunnel to the Goldstream Disinfection Facility
- Supply can be augmented to Japan Gulch Reservoir from Goldstream River. (This is a secondary source used by RWS when Kapoor Tunnel is out of service and has been modeled by GeoAdvice in the following sections and noted as “Kapoor Tunnel Out of Service” in hydraulic model runs.)

Figure 6.1 provides a simplified schematic of the RWS supply system for reference and context on supply system operation.

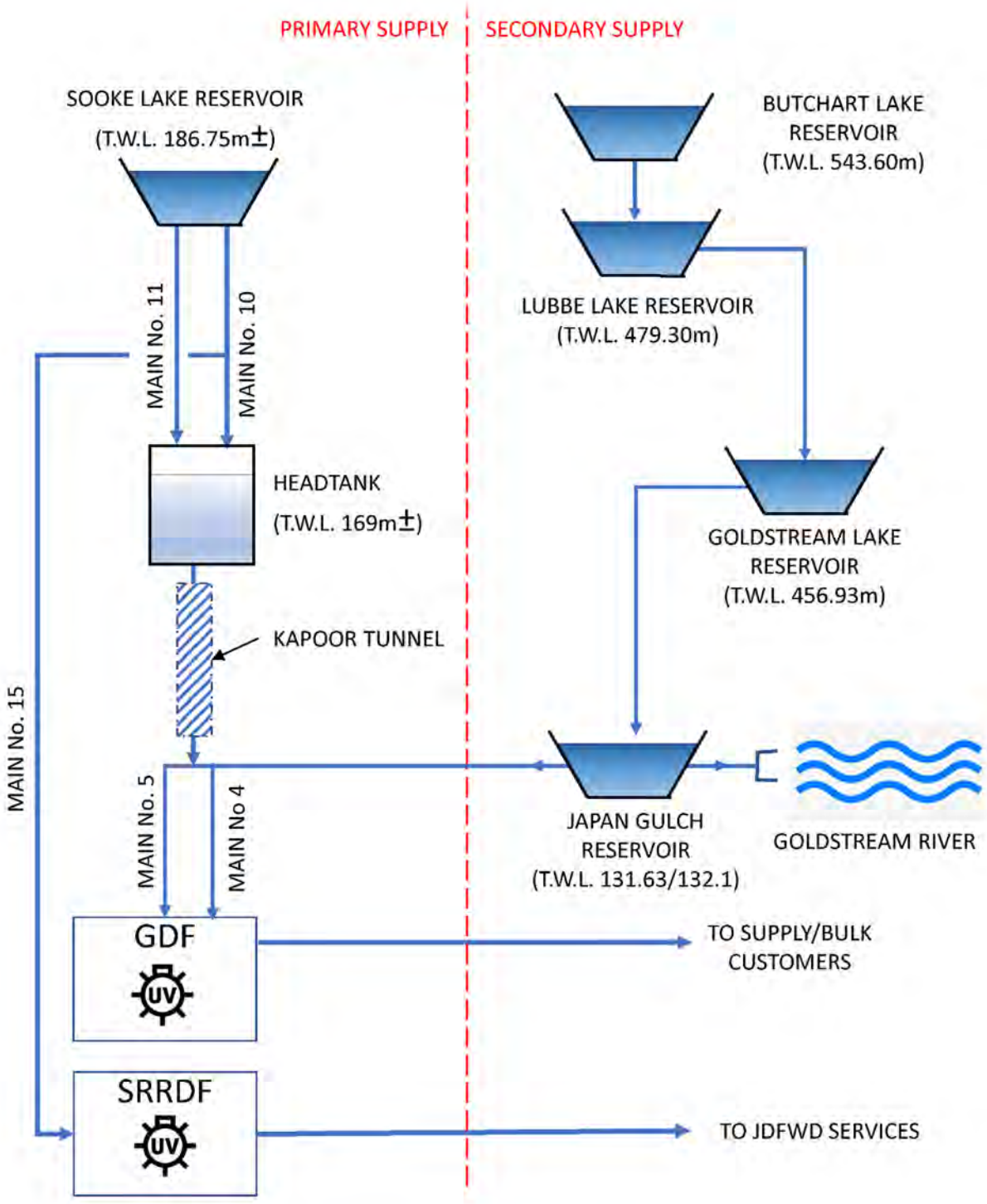


Figure 6.1: RWS Simplified Supply Schematic

6.1.1 Level of Service

The RWS 2017 Strategic Plan[1] recommended that the strategic priorities and actions in the RWS be established for the 2050 planning horizon. For this 2022 Master Plan, the 2025, 2038 and 2050 planning horizons are also considered.

Although the existing RWS system performs well, currently most local municipalities that operate their own distribution system, except for JDFWDS, generally do not have storage for their distribution networks and rely on the hydraulic capacity of the CRD transmission mains and CRD-owned storage tanks to meet maximum day, peak hour, and emergency fire demands. This approach requires that transmission system be oversized to meet these high demands which is not cost effective in the long term and requires continual unnecessary upgrading of the transmission system to meet these high demands. In most jurisdictions where regional water transmission facilities are operated to supply bulk water to customers, emergency flows, fire flows and peak hour flows within the municipal pressure zones are typically provided by the municipal tanks, pump stations and distribution systems. The regional bulk water provider's transmission system supplies up to the maximum day demand at transfer points to the municipal system.

Long term RWS planning would benefit by having level of service agreements between the CRD and individual municipalities, which clearly outline water supply parameters for each municipality at the boundary limits. Typically, the LoS is defined as flow and Hydraulic Grade line (HGL) for Average Day Demand (ADD) and Maximum Day Demand (MDD), at transfer points between the RWS system and the local municipal distribution system. The flow requirements change over time and are estimated by the local municipalities and communicated to the CRD. The HGL LoS do not typically change with time. Peak hour and emergency fire demands are typically provided from storage within the municipal systems because in the long term it is not cost effective to provide them directly from the bulk water providers transmission system. The LoS agreements could include provisions for short term changes in supply pressure to enable operational flexibility of the RWS transmission system.

Establishing flow and HGL metrics would provide all municipal customers with set boundary conditions to design downstream infrastructure. The CRD would then be able to optimize its long-term capital improvement planning process.

Potential contents for drafting a LoS agreement for the RWS would include the following :

- The CRD will maintain water quality to the transfer points within the requirements established by IHA under the Drinking Water Protection Act and Drinking Water Protection Regulation.
- Each municipality would review their specific flow requirements every 5 years and advise CRD of any changes.
- Provision of an established maximum day demand flow and HGL (pressure) at the transfer points to each municipality. The flows would be established based on historical water use and allowances for future demands calculated by IWS based on assessment of planned community growth. The costs for upgrade of the CRD transmission system

[1] Capital Regional District RWS Strategic Plan, 2017

and the growth component of the filtration plant could be covered by future Development Cost Charges for growth related capital improvements or rate structure tariffs to recover costs to pay for improvements to the RWS.

- Municipalities would actively participate in demand management initiatives including efforts to reduce long-term water consumption within their respective municipalities.
- The municipalities would be responsible for providing peak hour balancing storage, fire storage, emergency storage, distribution, and any required pumping within their municipal boundaries.
- The final water service criteria would be documented in a signed LoS agreement with each municipality.

6.1.2 Sooke Lake Reservoir Intake

6.1.2.1 History

The Sooke Lake Intake Tower was constructed in 1970 when the Sooke Lake Dam was constructed. The height of the Intake Tower was increased in 1991 by an extension of 6.2m to the concrete tower and a new mechanical room was constructed on top of the tower. In 1991, the existing generator/electrical room was equipped with a rotary-phase generator.

In 2002, the dam was enlarged and raised, and the Sooke Lake Reservoir top water level was raised by approximately 6m. The access bridge to the tower was reconstructed in 2002 using part of the bridge structure (span closest to the tower) from the original 1970 construction.

6.1.2.2 2016 Intake Tower Assessment

Stantec performed a structural condition assessment of the Sooke Lake Intake Tower in 2017. The structure was determined to be in good condition. The steel stairs and concrete walls in the drywell require annual inspection and minor repairs.

The Intake Tower structure was analyzed against the British Columbia Building Code (BCBC 2012) and the National Building Code (NBC 2015). It was determined that the Intake Tower did not meet the post-disaster requirements specified in the NBC 2015. Stantec concluded that the Intake Tower has a higher seismic capacity than typical structures built in the 1970's and was found to have a capacity of approximately 85% of the NBC 2015 "normal" importance seismic load. Based on the (relatively) high seismic capacity, Stantec did not recommend prioritizing the Intake Tower structure for a seismic retrofit.

The intake tower was upgraded with new travelling screens and other improvements in 2021.

6.1.2.3 Water Supply Reservoirs

The RWS is fed from the Sooke Lake Reservoir. Water from the SLR flows to a nearby downstream Head Tank through Main No. 10, a 1,200 mm diameter steel pipe and Main No.11, a 1,200 mm diameter concrete pipe, which parallel one another. The pipe bridge across the existing spillway channel that supports these mains underwent a seismic retrofit in 1999.

Mains No. 10 and No. 11 also serve to supply water to Main No. 15, a 600 mm diameter PVC and ductile iron pipe constructed in 2009, which is the only main servicing the Sooke River Road Disinfection Facility (SRRDF), also constructed in 2009. The SRRDF provides disinfected water for the CRD's JDFWD system.

The Head Tank is the entry point to the Kapoor Tunnel, the principal transmission conduit for the RWS excluding the JDFWD system which is supplied by a separate Main No.15. The 8.8 km long Kapoor Tunnel is 2.3m diameter and conveys water to an outlet point upstream of the Japan Gulch Reservoir (JGR), where it connects to Main No. 4 and Main No. 5. The hydraulic capacity of this tunnel is estimated to be 682 MLD based on headloss and velocity considerations and could serve the CRD well beyond the 2050 planning horizon to approximately the year 2100 MDD, provided additional source water is developed from Leech and demand conservation continues to lower water consumption. When the tunnel is out of service, the CRD uses the JGR system to supply the RWS, but the JDFWD system is uninterrupted.

The following is a list of source water reservoirs within the RWS:

- Sooke Lake Reservoir – Top Water Level of 186.75 m (controlled by a spillway weir crest) and a storage volume of 92.7 Mm^3. This reservoir is the primary source of water for the RWS.
- Secondary Source Reservoirs include:
    - Butchart Lake Reservoir – Top Water Level of 543.60 m and a storage volume of 3.3 Mm^3. This reservoir feeds into the Lubbe Reservoir.
    - Lubbe Lake Reservoir – Top Water Level of 479.30m and a storage volume of 3.0 Mm^3. This reservoir feeds into the Goldstream Reservoir. The Lubbe Dam No. 4 underwent remediation works in 2020.
    - Goldstream Lake Reservoir – Top Water Level of 456.93 m and a storage volume of 3.6 Mm^3. This reservoir feeds into the Japan Gulch Reservoir.
    - Japan Gulch Reservoir – Top Water Level of 132.1 m with flashboards it has a storage volume of 81 ML. It has a Top Water Level of 131.63 m without flashboards and a storage volume of 80ML. This reservoir feeds into Main No. 4. The JGR is operated without flashboards 98% of the time. Japan Gulch Reservoir TWL controls the hydraulic gradient to the RWS when Kapoor tunnel is out of service for inspection and maintenance. When the RWS system is operating on Japan Gulch the HGL is reduced by 37m (169-132m).

All four Goldstream reservoir volumes combined account for 10 Mm^3 or approximately 10.5% of the SLR's available storage volume (92.7 Mm^3). This storage is a good secondary source and provides supply during maintenance of Kapoor Tunnel as well as short-term emergency use.

6.1.2.4 Flow and Hydraulic Grade Line Calculations

As part of this 2022 Master Plan population and demand forecasting for long-term planning of the water supply to the year 2100 has been completed, including demands for the 2050 planning horizon established for this study. GeoAdvice was retained by CRD in December 2020, to undertake a hydraulic capacity assessment of the RWS transmission system. The GeoAdvice

study also assessed the capacity of the RWS transmission system to meet water supply requirements through the 2050 planning horizon, consistent with this study. Since this study was recently completed, it serves as useful information and input into development of transmission system upgrades for this 2022 Master Plan. Stantec has not completed any hydraulic modeling as part of this study since this was not part of the terms of reference for this study due to the recently completed GeoAdvice study. Stantec have reviewed the GeoAdvice report and find it to be consistent with modeling reports for water system hydraulic evaluation. The findings and recommendations of the GeoAdvice report have been used to develop the transmission system capital improvements for this 2022 Master Plan.

As part of the population and demand projections for this 2022 Master Plan, Stantec recommends using a mid-range annual growth rate of 1.25% to estimate future demand growth (see Section 3). GeoAdvice used 1.00% annual growth rate in their hydraulic assessments. The 1% growth rate for the GeoAdvice projections was obtained from a CRD commissioned BC Stats report. For consistency, the population and flow projections used by GeoAdvice are used only for the transmission system hydraulic assessment in this study because modeling results are available for this growth rate scenario. Should the population increase of 1.25%, as used for long term projections in this 2022 Master Plan, be realized, the implication is that capital works improvements associated with transmission improvements would be required sooner. Regular review of water demands will determine if any of the recommended works in this 2022 Master Plan need to be completed earlier.

GeoAdvice calculated the Maximum Day Demand using a peaking factor of 2.0. The Average Day Demand per capita rates for each municipality were taken from the *Population and Per Capita Demand Projections for Hydraulic Capacity Study*[2], for 2019-2038. For hydraulic assessment, Maximum Day Demand calculated by GeoAdvice to assess the transmission system as outlined in **Table 6.1.**

Table 6.1: Maximum Day Demand Projections

Flow Demand	2020	2025	2038	2050
Maximum Day Demand (L/s)	2,590 L/s	2,721 L/s	3,065 L/s	3,469 L/s

Table A-6.2 (Appendix A) summarizes the estimated minimum, maximum and average HGLs at the service connection points (modeling nodes) to the RWS. Model runs were also completed to assess the performance of the transmission system when Kapoor Tunnel is taken out of service. Table A-6.2 also summarizes the existing transmission system performance from the GeoAdvice report for 2018 demands. The Kapoor Tunnel – Out of Service scenario provides HGL performance when the Kapoor Tunnel is out of service and the system driving head is reduce to the 132m TWL of the Japan Gulch Reservoir.

[2] Capital Regional District, 2020

6.1.3 Transmission Main Recommended Upgrades

6.1.3.1 Recommended Upgrades

The Hydraulic Capacity Assessment report by GeoAdvice included a hydraulic analysis of the transmission mains to estimate the existing level of service defined by the 2018 MDD (Table A6.2 – Appendix A) as well as demand and hydraulic gradeline to the 2050 planning horizon. The Kapoor Tunnel “out of service” hydraulic operating scenario is an infrequent event and only occurs during inspection of the tunnel when the transmission is supplied by the Goldstream Watershed via Japan Gulch Reservoir. It is useful for assessing the sensitivity of system hydraulics when operating at a lower hydraulic gradeline driven by the top water level of 132m in Japan Gulch Reservoir.

Table 6.3 lists the recommended improvments. Deficient mains were generally indicated as mains having significant headloss greater than 2.5 m/km. **Figure 6.2** illustrates the deficieint segments of the transmission mains identified in the GeoAdvice report that have excessive headloss.

To maintain the flow capacity and HGL in the RWS transmission mains to the 2050 design horizon, various improvement options were identified by GeoAdvice to mitigate identified deficiencies including:

- Replacing deficient sections of transmission mains with larger diameter mains. Deficient mains were generally indicated as mains having significant headloss greater than 2.5 m/km.
- Twinning deficient sections of transmission mains to provide redundancy to critical mains and increase hydraulic capacity.
- Increasing operating pressure.
- Installing new transmission mains or introduce interconnections to improve redundancy and looping.
- Providing additional storage for system balancing and maintaining HGL during emergencies and out-of-service scenarios.

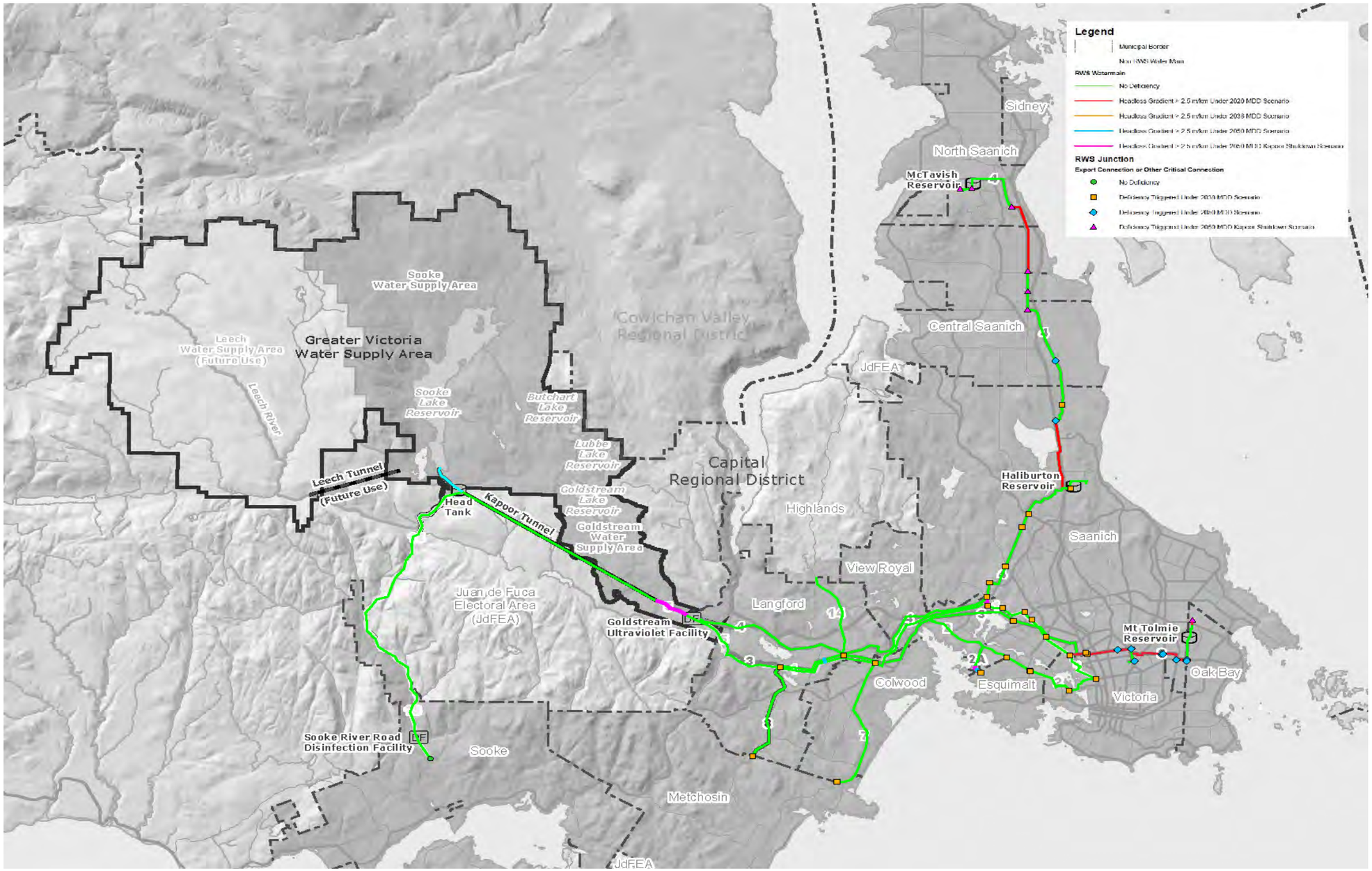


Figure 6.2: RWS Transmission Mains Hydraulic Capacity Deficiency Summary

The upgrades listed in **Table 6.3** were recommended by GeoAdvice to mitigate identified hydraulic capacity deficiencies and have not been independently confirmed by Stantec because GeoAdvice work was current and completed in 2020. The GeoAdvice work is consistent with good engineering practice for similar studies. A four-phase program of transmission system improvements starting in 2025 and completion by 2050 was recommended. **Figure 6.3** provides a location map of the proposed improvements listed in **Table A-6.2 (Appendix A)**.

Table 6.3: Recommended RWS Transmission Improvements

Option	Phase 1 - Implementation Recommended by 2025	
M7	Watkiss PCS Upgrade	Upsize inlet to 1,050 mm ø and outlet piping to 1,200 mm ø for both No. 1 and No. 4 Mains.
		Decommission existing Watkiss PCS lead PRV and replace with two 600 mm diameter lead PRVs.
		Revise downstream HGL settings for lead Watkiss PRVs to 105.5 m.
	Increase HGL of Main No. 1 from 116m to 169m	Implement valving changes along the length of Main No. 1, from Humpback PCS to Watkiss PCS.
		Install five (5) new PCSs to provide redundancy to Main No. 3 and to maintain existing connections with the JDFWD. • Irwin Road & Creekside Trail, connecting Main No. 1 to JDFWD 116 m pressure zone • Glen Lake Road, connecting Main No. 1 to Main No. 8 • Rex Road & Jacklin Road, connecting Main No. 1 to Main No. 3 and JDFWD 116 m pressure zone • Goldstream Avenue & Whitehead Place, connecting Main No. 1 to Main No. 7 • Atkins Road & Traverse Terrace, connecting Main No. 1 to JDFWD 116 m pressure zone
		Revise setpoint of the Millstream PCS lead PRV to achieve downstream HGL of 114 m.
Option	**Phase 2 - Implementation recommended between 2025 and 2038, recommended by 2030**	
M8	Implement part 1 Main No.4 Upgrades	Upsize 4.6 km of pipe to 1,350 mm ø from Goldstream Avenue at Veterans Memorial Parkway to the Watkiss PCS Inlet. Transmission mains upsize should consider longer term planning horizon of at least 75 years.
	Add 3rd Main from Sooke Lake to Head Tank	Install 1,200 mm ø main from Sooke Lake Reservoir to Head Tank to provide increased capacity and redundancy.

Option	Phase 3 - Implementation recommended between 2038 and 2050	
M9	Implement part 2 of Main No.4 Upgrades	Upsize 6.3 km of pipe to 1,500 mm ø from Niagara Main (near Goldstream Disinfection Facility) to Goldstream Avenue at Veterans Memorial Parkway. Transmission main size should consider longer term planning horizon of at least 75 years.
Option	**Phase 4 - Implementation recommended by 2050 planning horizon**	
M10	Twin Critical Main No. 3	Twin 4.6 km of Main No.3 (813/991mm diameter) from Dupplin Road at Tolmie Lane to Lansdowne Road at Foul Bay Road to address capacity.
M11	Twin Critical Main No. 4	Twin 2.6 km of Main No. 4 (743mm diameter) from the old connection with Haliburton Tank to Patricia Bay Highway at Hamsterly Road.
		Twin 3.1 km of Main No. 4 (610/762mm diameter) from Central Saanich Rd at Mount Newton Cross Road to Aldous Terrace at Lowe Rd.
		Twin 0.6 km of Main No. 4 (1,219/1,321mm diameter) for redundancy from the connection with Goldstream Supply Area to the Goldstream Disinfection Facility inlet or add a connection from Goldstream Supply Area directly to Main No. 5, which would remain normally closed except under emergency situations.

Table A-6.4 (Appendix A) shows a comparison of the expected HGL at connection points at the projected 2050 Maximum Day Demand flows before and after the recommended RWS transmission system improvements.

If the proposed transmission main from Goldstream Lake Reservoir to Japan Gulch, as identified in the 1994 Plan, were installed to maintain 169.0 HGL when Kapoor Tunnel is out of service, approximately 20% (9 of 50) deficiencies would be resolved. The majority of the HGL service level deficiencies at the connection nodes are caused by excessive headloss in the transmission mains.

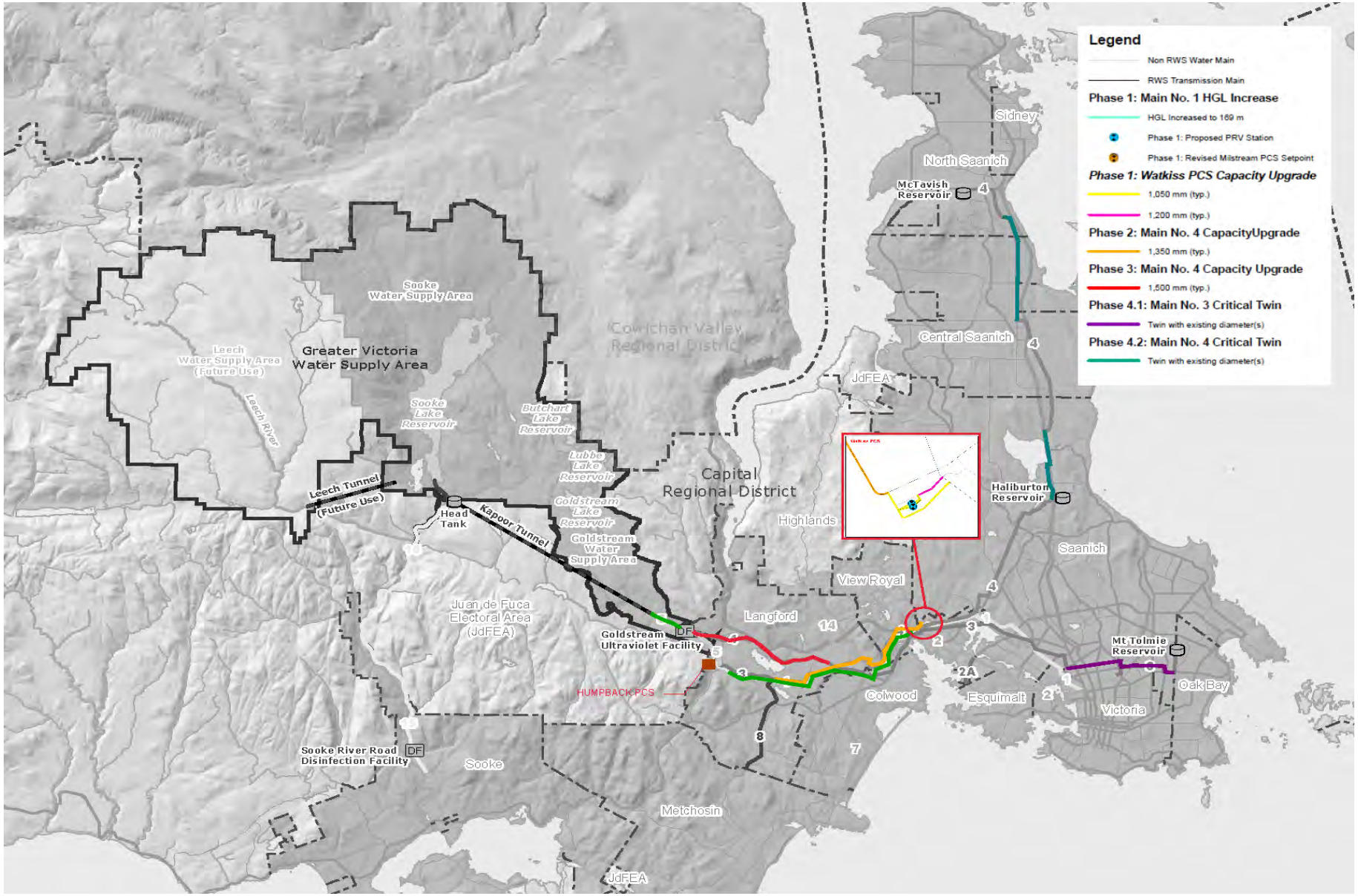


Figure 6.3: RWS Transmission Mains Recommended Improvements

Table 6.5 shows the number of nodes (at customer transfer points) with deficient HGL before and after the recommended transmission main improvements. There are 50 transfer points to the RWS. Without the improvements, 42 connection points will have deficient HGL by 2050. The recommended improvements will reduce the number of deficient connections to three and the level of deficiency is minor.

Table 6.5: HGL Deficiencies at Export Locations Before and After Recommended Upgrades Under MDD

Criteria	2020	2025	2038	2050	2050*
	Number of Deficient Nodes				
At export connection to customers – before recommended upgrades	0	0	31	42	49
At export connection to customers – after recommended upgrades	0	0	2**	3**	1**

*System operating at Japan Gulch HGL

**Assumes 1.0% annual demand growth rate

**Extremely minor head loss variations (< 1m) occur at connections with JDFWD at Mains No. 8 and 14. Open connections to JDFWD maintain in excess of 40 psi.

6.2 TRANSMISSION SYSTEMS DEVELOPMENT

6.2.1 Redundant Supply Options

6.2.1.1 Proposed Deep Northern Intake

Stantec has undertaken a feasibility assessment (see Section 4.5.1 and 5.2.2) of a proposed Deep Northern Intake location at Sooke Lake Reservoir to access the deeper zones of the north basin as well as assessment of a redundant conveyance system for Kapoor Tunnel. This option was identified in the 1994 Plan. Several options were identified for the intake location as part of this 2022 Master Plan. The assessment of raw water transmission system options from the proposed intake requires evaluation of alternative conveyance alignments to the site of the proposed water filtration plant at Japan Gulch Reservoir.

The proposed intake could be constructed using a micro tunneled lake tap where a pressurized face micro-tunnel boring machine (MTBM) would be launched from a shaft on land and mined into the lake at the necessary elevation. The pumps would be installed at the shore with the tunnel shaft used as the wetwell. The proposed intake could be connected to CRD's existing transmission system via a proposed redundant transmission pipeline or tunnel or via connection to the existing Kapoor Tunnel at the Head Tank.

A second option that was investigated uses a floating pumping station. The floating pump station would be constructed on a barge platform with a pedestrian/utility bridge to shore, similar to the Sooke Lake intake tower. Pump suctions or cans with fixed screens would have to be used or an adjustable intake system would be required to enable withdrawal from lower depths of the

reservoir. The system would be more cost effective if a lower level of hydraulic service capacity is provided because pumps and transmission pipeline would be smaller. The estimated cost of this option is $55.8M based on the recently constructed Seattle Public Utilities Morse Lake Floating Pump Station project which has similar capacity to the required pumping capacity for the Deep Northern Intake pump station.

6.2.2 Sooke Lake Reservoir Raw Water Transmission Options

As part of the *Deep Northern Intake, Transmission and Treatment Study* (Stantec 2021), five (5) options were assessed to convey water from a second intake in Sooke Lake Reservoir to a proposed Water Filtration Plant (WFP) near the Japan Gulch Reservoir (JGR). The options include gravity options similar to the Kapoor Tunnel, a combination of pumped and gravity options and entirely pumped options. For the pumped options, 3 phase power will have to be extended to all pumping station sites. Ideally, these power lines should be located underground in duct banks to provide better resiliency and reduce potential damage from falling trees or wildfires. The tunnel and pipeline routes are conceptual level options and detailed route assessments would be required as part of any preliminary design and would include geotechnical evaluation, seismic performance assessment and the location of active fault lines. A description of each option is provided below.

For transmission options from SLR to the proposed water filtration plant a planning horizon to the year 2100 is considered because of the design life of transmission mains and tunnels are in the 75 to 100 year range.

6.2.2.1 Option A: Proposed Gravity Tunnel

A proposed tunnel from the proposed Deep Northern Intake, similar to the Kapoor Tunnel, is an option for conveying water from the proposed Deep Northern Intake to a potential water filtration plant site at Japan Gulch. Option A consists of a 2,900 mm diameter tunnel to convey raw water at year 2100 Maximum Day Demand by gravity to the proposed water treatment plant location at Japan Gulch. The proposed tunnel length would be approximately 13 km as is shown in **Figure 6.4.**

While construction methods may vary, construction using a tunnel boring machine (TBM) appears feasible. A tunnel portal could be developed at the downstream end with mining proceeding towards the intake shaft adjacent to SLR. The tunnel would be constructed at a uniform slope. The tunnel launch portal would be located to minimize or eliminate the need for intermediate shaft construction and allow for efficient access for construction materials and handling of spoils from the tunnel excavation.

The tunnel is expected to be constructed entirely in rock based on the installation depths and available geologic mapping. Subsurface exploration would be needed to characterize subsurface rock and groundwater parameters to be used for design. Seismic issues as discussed in Section 5.3.2.6 would also need to be considered during detailed design. If a sufficient length of the tunnel proceeds through sound rock with low permeability, the tunnel may be left unlined. If geologic exploration indicates high permeabilities or materials that are not sound, lining may be needed. The determination of the lengths of lined and unlined sections will be determined during detailed design. The cost estimate for this option for this study was based on a fully lined tunnel for the entire 13 km.

Flow through the tunnel would be controlled by a flow control valve(s) located near Japan Gulch at the headworks to the treatment plant. Redundancy for the control valve(s) would be required as well as isolation valves so that flow can be stopped in the event of an issue with the control valves. Valves would modulate to maintain a setpoint flow through the plant. This type of flow control has been used at other locations including the Tolt Water Treatment Plant in Seattle and Metro Vancouver's Seymour Capilano Filtration Plant.

One of the concerns with a tunnel is that the effort required for access for inspections is significant, the tunnel must be drained, and stringent safety protocols are required for worker safety.

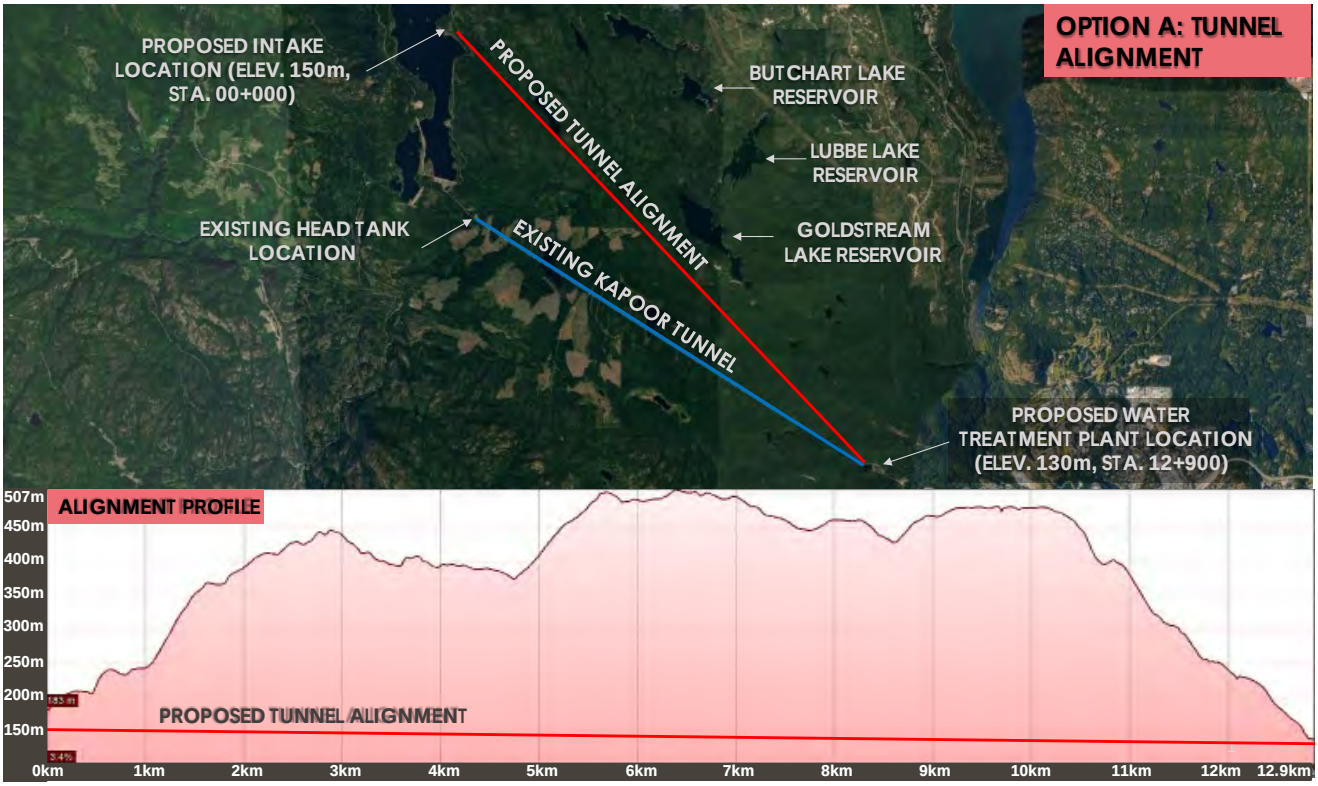


Figure 6.4: Option A – Proposed Intake and Gravity Transmission Tunnel

6.2.2.2 Option B: Proposed Overland Transmission Main Route Through Leechtown and Jack Lake

Option B consists of a 20 km, 2,400 mm diameter, open cut, buried transmission main and a series of pump stations following an overland route from the proposed Deep Northern Intake to the proposed water filtration plant at Japan Gulch. This option requires high combined horsepower pumping and has high annual operating costs due the static head on the pumps. This option was previously investigated in the 1994 Plan (Alternative A). Potential for some energy recovery would exist with this option but the recovered energy would be insufficient to pay for the operating costs of the pump stations. A sub option of this option B is to size a transmission main and pump system for emergency use only with capacity to service average day demand (377MLD) for the year 2100. The emergency use only option would require a smaller transmission main diameter of 2000 mm diameter for the 2100 ADD and would only be operated during planned outages of the Kapoor Tunnel or emergencies, thereby saving significant power costs.

Proposed Alignment

The proposed alignment follows existing service roads where possible as they are currently used to access the Sooke Lake Dam and SLR. This approach reduces the number of cut and fill areas required minimizing the cost associated with clearing, grubbing, and construction of new access roads. The roadways would be improved to a higher standard to allow improved access during inclement weather conditions. **Figure 6.5** shows the proposed alignment.

Starting from the proposed deep northern intake, the alignment parallels the eastern edge of Sooke Lake Reservoir, passes adjacent to the existing Head Tank, then turns south towards Leechtown before veering east and starting a steep incline that peaks at an elevation of 427 m. From there, the overland route follows a ravine between two access roads west of Jack Lake and continues along an access road on the northern shores of Jack Lake. The alignment follows a steep gully which brings the alignment from an approximate elevation of 290 m down to the final elevation of the proposed Japan Gulch water filtration plant at approximate elevation 130 m. There may be land ownership issues with this alignment that will need to be considered during the detailed design of this option.

The proposed alignment would allow for construction in a phased approach and allows for connection of a third main from the existing Sooke Lake Intake Tower to the Head Tank and provides and strengthens redundancy of the existing water supply system. The second phase would involve extension of the transmission main from the Head Tank to Japan Gulch. By establishing the proposed transmission main alignment adjacent to the existing Head Tank, a connection could be introduced to provide the option of conveying water from the proposed Deep Northern Intake to the entrance to Kapoor Tunnel. Another option for consideration is to bring the transmission main to Cabin Pond and then run the transmission main along the alignment of the previous power house penstock which followed an alignment to Japan Gulch.

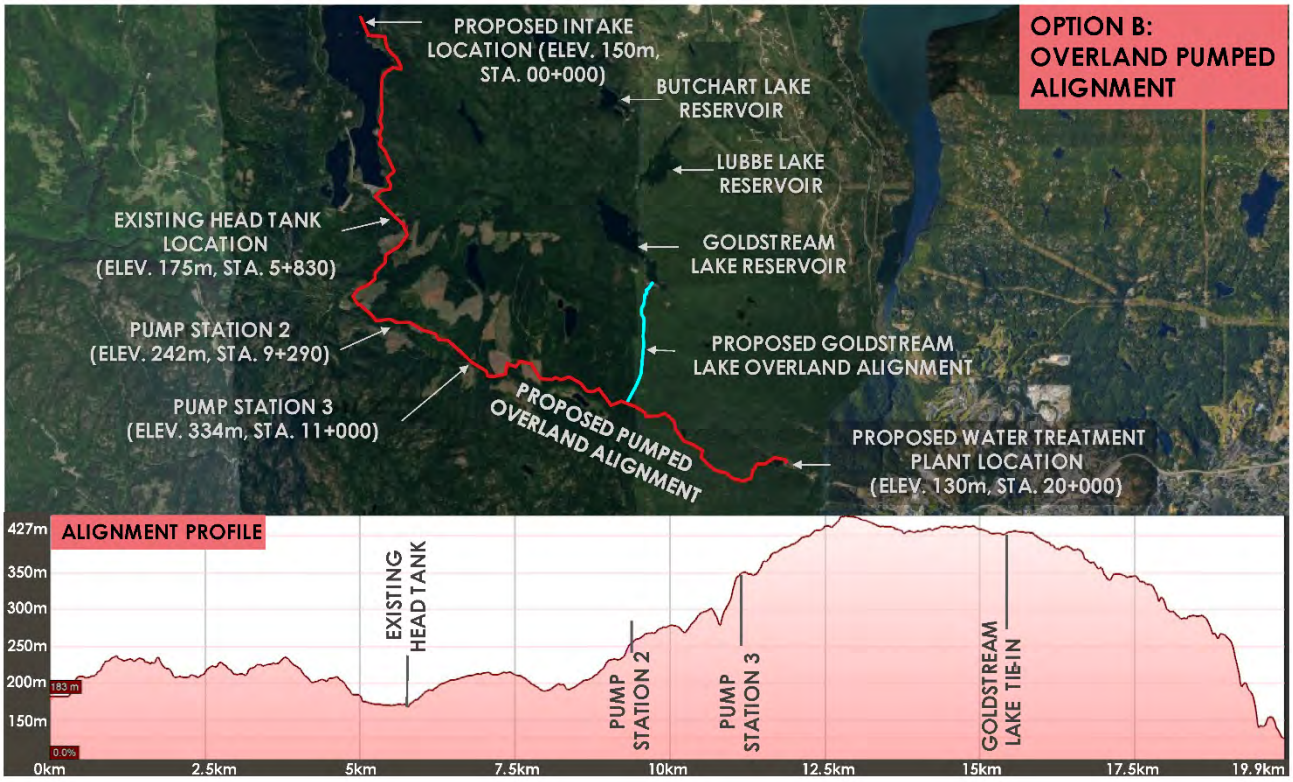


Figure 6.5: Option B – Overland Pumped Route – Jack Lake

Proposed Pump Stations

A 2,400 mm pipe diameter is required to convey the 2100 MDD using a roughness coefficient of 130. This main size can be reduced if the CRD wants to reduce the level of service with reduced flow capacity.

When analyzing the hydraulic profile of this alignment, net elevation rise between the proposed intake elevation (150m) and the highest anticipated point along the alignment (427m) was determined to be 277m. This static head (277m) is generally too great for a single pump station unless specialized high head pumping equipment, thicker wall steel pipe and high pressure valves are used, which is costly. One or more intermediate pump stations are recommended. Pumping head and total horsepower would be similar for a single or multi series pump system.

Stantec recommends that the maximum Total Dynamic Head (TDH) for a water pump station be limited to 100 m. Three pump stations are required to maintain the TDH below 100 m. **Table 6.6** summarizes the hydraulic characteristics of the three pumps stations**.** A low water level in SLR has been assumed at 160 m for preliminary sizing. **Figure 6.5** shows the proposed locations for the pump stations.

Table 6.6: Option B Pump Station Hydraulics

Node	Elevation (m)	Station (m)	Total Dynamic Head (m)	Required Shaft Horsepower (HP)
Sooke Lake Reservoir Intake PS1 (Floating Pump Station or land based fixed Pump Station)	160	00+000	91	13,134
Pump Station 2 on Figure 6.5	242	09+300	94.0	13,540
Pump Station 3 on Figure 6.5	334	11+000	95.0	13,726
WFP Headworks	130	20+000		

High Voltage power (14.4 kVA) will be required for each pump station. The existing power supply to Sooke Lake Reservoir is not adequate for the high horsepower pumping electrical demands. Based on the estimated horsepower requirements for the three (3) proposed pump stations, a separate power supply and substations would be required. The new power supply to the Sooke Lake Reservoir intake could be underground to ensure reliability depending on cost. Underground power supply would be in a concrete encased duct bank due to the high voltage. Overhead could also be considered but the power supply lines would be more vulnerable in the event of trees falling during storms or during a wildfire.

A sub-option of Option B, referenced as Option B1 is to provide a lower level of service and supply the 2100 ADD using a single pump station rather than multiple pump stations. This option would provide an adequate level of service during emergency condition should there be an issue with the Kapoor Tunnel. This option results in a shaft horsepower requirement of 23,733 HP.

6.2.3 Goldstream Reservoir Connector (1994 Plan, Alt A, a2)

The 1994 Plan explored an option of connecting the Goldstream Lake Reservoir system to Japan Gulch Reservoir. This option has a initial intake from the the existing high level overflow channel in Goldstream Lake Reservoir and also connects the Lubbe Lake Reservoir, and Butchart Lake Reservoir system to the proposed pumped Jack Lake overland transmission main alignment.

Figure 6.6 shows the alignment of an overland pipe from Goldstream Lake Reservoir to overland Jack Lake alignment. This option requires an intake into Goldstream Lake Reservoir and reduces water quality issues because the transmission main will bypass the unstable sections of the Goldstream Canyon where turbidity has been an issue in wet weather. Geotechnical and terrain assessment will be required to select the optimal route for the Goldstream Reservoir Connector.

In the existing configuration, this reservoir system flows by gravity to JGR. As shown in Figure 6.6, a 2.7 km overland gravity fed piped system could be introduced from the Goldstream Lake Reservoir at an approximate elevation 456 m down to a proposed tie in point along the proposed pumped overland route at approximate elevation of 402 m. This connection would provide additional redundancy by conveying waters from this reservoir system directly to the WTP. Another option for consideration is to bring the transmission main to Cabin Pond and then run the transmission main along the alignment of the previous power house penstock which followed an alignment to Japan Gulch. The final route selection can be determined at preliminary design.

The proposed Goldstream Connector also has other benefits for the RWS including :

- The transmission main could be operated at the 169m HGL by installation of PRVs or a Head Tank. There would be no need to operate at lower Japan Gulch Reservoir HGL (132m) when Kapoor Tunnel is out of service and other improvements or adjustments to the existing system to operate at lower HGL would not be required. This would benefit the CRD and some bulk water municipal customers (avoids operational/system changes).
- The transmission main would serve as the lower end of Jack Lake transmission main from the Deep Northern Intake.
- Once the entire Jack Alignment is constructed the pipeline could be used to reverse feed SLR to provide quicker replenishment of water levels during drought conditions.
- Once the water treatment plant is constructed, previous off catchment sources could be introduced into this pipeline to provide additional water supply.

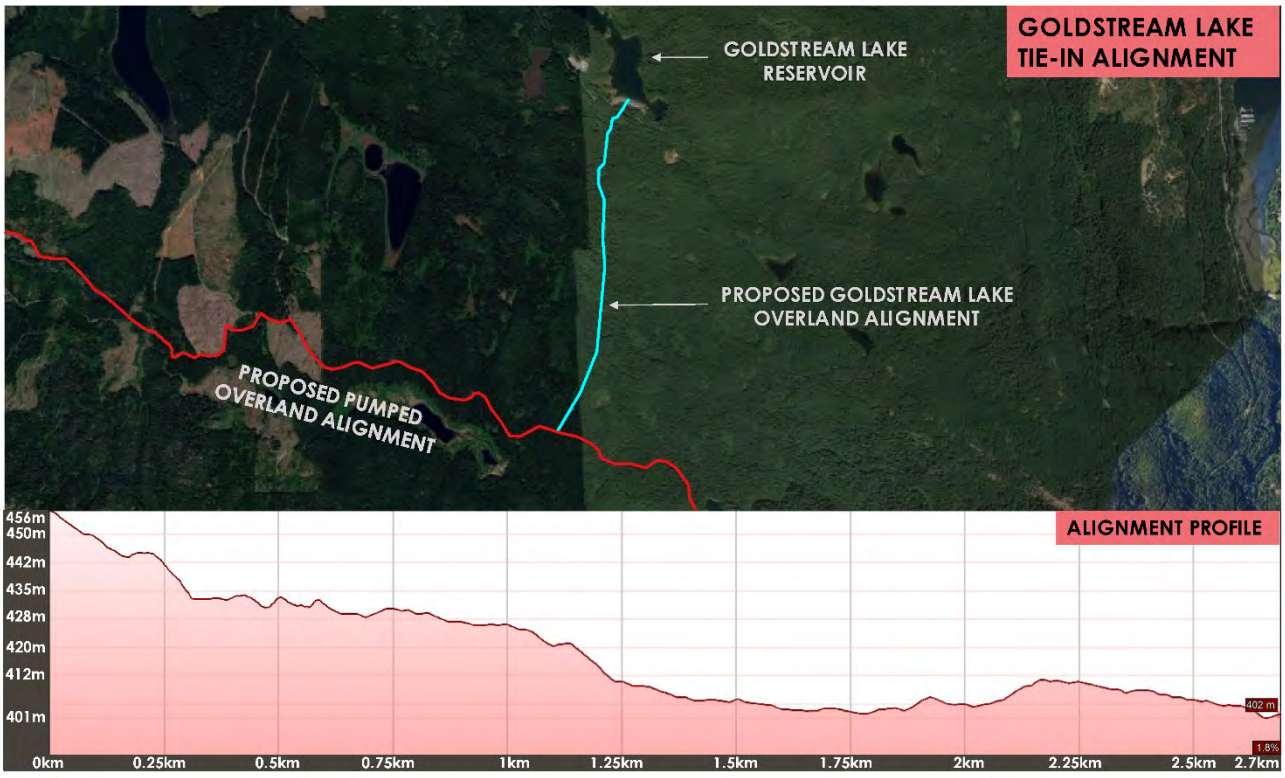


Figure 6.6: Goldstream Connector Option

6.2.3.1 Option C: Proposed Hybrid Overland Pumped Route/Tunnel

A hybrid version of Options A and B has been assessed where the proposed Sooke Lake Reservoir Deep Northern Intake pump station would be the only pump station. **Figure 6.7** shows an alignment consisting of 8.5 km of open cut, buried pipe connecting into a 9.7 km tunnel at elevation 200 m. The total length of the transmission main and tunnel is 18.2 km. This option avoids the need to pump an additional 227 m in elevation and significantly reduces the pumping horsepower.

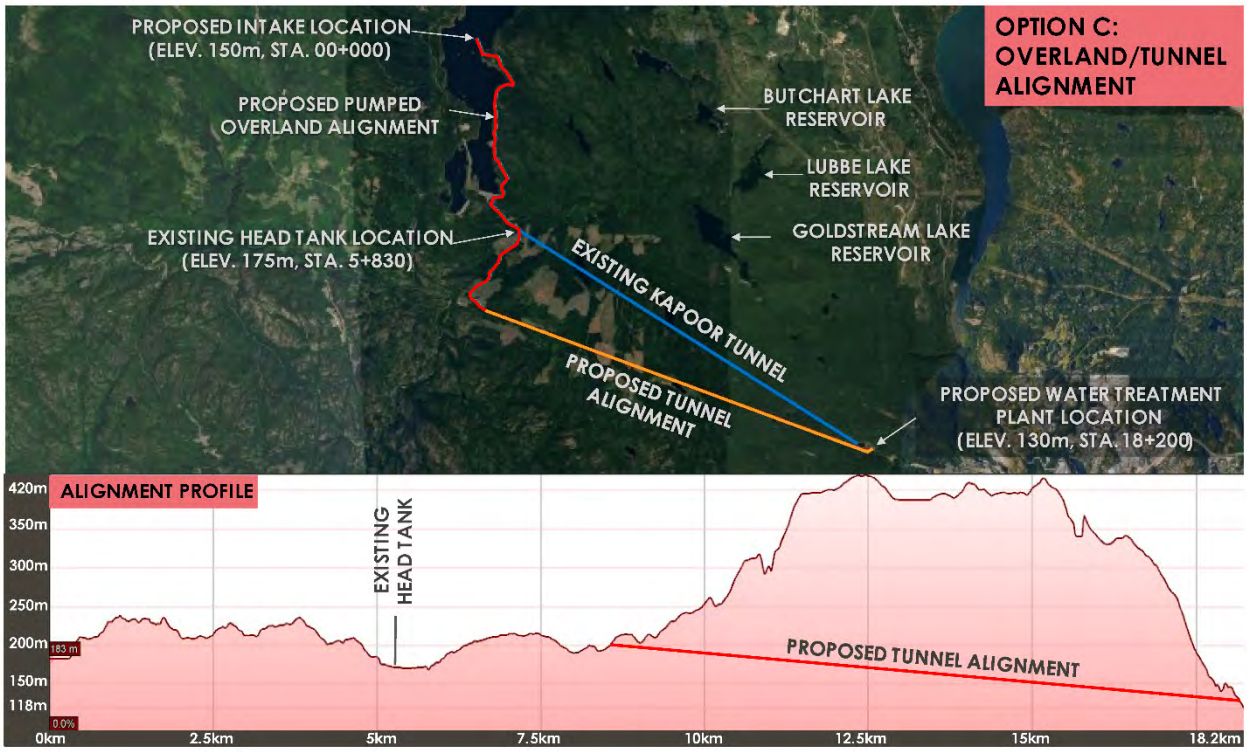


Figure 6.7: Option C – Overland/Tunnel Alignment

Table 6.7 provides additional data for this option.

This option allows for:

- A connection to the existing Head Tank from an overland conveyance pump providing additional redundancy for the existing system
- Significantly reduced pumping head, horsepower requirements and operating costs and would only require a single pumping station at the intake
- A phased construction approach with first stage consisting of connecting the proposed northern intake and transmission main to the existing Head Tank.

Table 6.7: Option C Pump Station Hydraulics

Node	Elevation (m)	Station (m)	Total Dynamic Head (m)	Required Shaft Horsepower (HP)
Sooke Lake Reservoir Intake PS	160	00+000	88	13,032
Tunnel	200	08+500	-	-
WFP Headworks	130	18+200	-	-

6.2.3.2 Option D: Proposed Overland Council Lake Alignment

Option D consists of a variation of Option B where a 17.5 km – 2,400 mm diameter open cut buried transmission main and a series of pump stations following a route from the proposed Deep Northern Intake to the Japan Gulch WTP. This option requires high horsepower pumping and has high annual operating costs. Potential for some energy recovery would exist with this option but the recovered energy would be insufficient to pay for the operating costs of the pumping stations. Another complexity of this option is land ownership along the transmission main alignment, as a significant portion of the alignment crosses land owned by private forestry companies.

The proposed alignment for this option follows existing service roads, where possible, minimizing the cost associated with clearing, grubbing, and construction of new access roads. The roadways would be improved to a higher standard to allow year-round access during inclement weather conditions. **Figure 6.8** shows the 17.5 km proposed alignment.

Starting from the proposed Sooke Lake Reservoir deep northern intake, the alignment follows an access road towards Council Lake. Approximately 2.5 km of new road construction would be required to bridge existing access roads as the alignment progresses past Council Lake. The alignment would then continue south along an existing access road toward the western shores of Jack Lake where the maximum elevation is estimated at 430m. This option mirrors the Option B alignment from Jack Lake to the proposed WTP. The proposed alignment provides no opportunity to utilize the existing Head Tank to provide redundancy to the existing water supply system via the Kapoor Tunnel.

Figure 6.8: Option D – Overland Council Lake Alignment

Goldstream Lake Reservoir Connection

The proposed Goldstream Lake Reservoir connection as outlined in Option B would be applicable for this option as this section of the proposed alignment is synonymous with that of Option B.

It was determined that 2,400mm is the optimal pipe diameter to convey the year 2100 MDD flow and maintain self-scouring velocities using a pipe roughness coefficient of 130 this pipe.

The net elevation rise between the proposed intake elevation (150 m) and the highest anticipated point along the alignment (430 m) was determined to be 280 m (static head).

CRD has requested one pump station be explored to provide the required pumping capacity to convey the 2100 MDD flow. **Table 6.8** summarizes the hydraulic characteristics of the single pump station option.

Table 6.8: Option D Pump Station Hydraulics Single Pump Station

Node	Elevation (m)	Station (m)	Total Dynamic Head (m)	Required Shaft Horsepower (HP)
Sooke Lake Intake	160	00+000	279	41,366
WFP Headworks	130	17+500	-	-

An elevation of 160 m has been selected as lowest level for pump selection condition only. Stantec recommends to not pump the SLR below elevation 177m so that it fills to full supply level during winter rains. The power supply to Sooke Lake is not adequate for the high horsepower pumping electrical demands. Based on the estimated horsepower requirements for the proposed pump station, a new separate high voltage power supply will be required. The new power supply to the Sooke Lake intake could be underground to ensure reliability. Overhead could also be considered but it would be subject to tree fall and wildfire damage.

Another variation on this option is to consider multiple pump stations versus a single pump station.

6.2.3.3 Option E: Proposed Overland Highway 1 Alignment

The proposed alignment for this option consists of a 21 km – 2,400 mm diameter open cut buried transmission main and a series of pump stations following a route from the proposed Deep Northern Intake located on the north end of SLR and over the Malahat (Highway 1) to the proposed Japan Gulch WFP. This option requires high horsepower pumping and has high annual operating costs. Potential for some energy recovery would exist with this option but the recovered energy would be insufficient to pay for the operating costs of the pumping stations. This option would also necessitate the analysis of a new intake location. A review of the bathymetry resulted in an approximate location for the new intake. This alternative location is shown in **Figure 6.9.**

The proposed alignment for this option follows existing forest service roads where possible minimizing the cost associated with clearing, grubbing, and construction of new access roads. The alignment would follow a mixture of existing access roads and trails to make this route feasible. The roadways and trails would be improved to a higher standard to allow year-round access during inclement weather conditions. **Figure 6.9** shows the 21 km proposed alignment.

Starting from the proposed Deep Northern Intake at the North end of SLR, the alignment follows an access road east towards the Saanich Inlet before turning south along the Malahat Highway. The alignment continues south passing along the eastern edge of Devereux Lake before following existing roads to the new WTP.

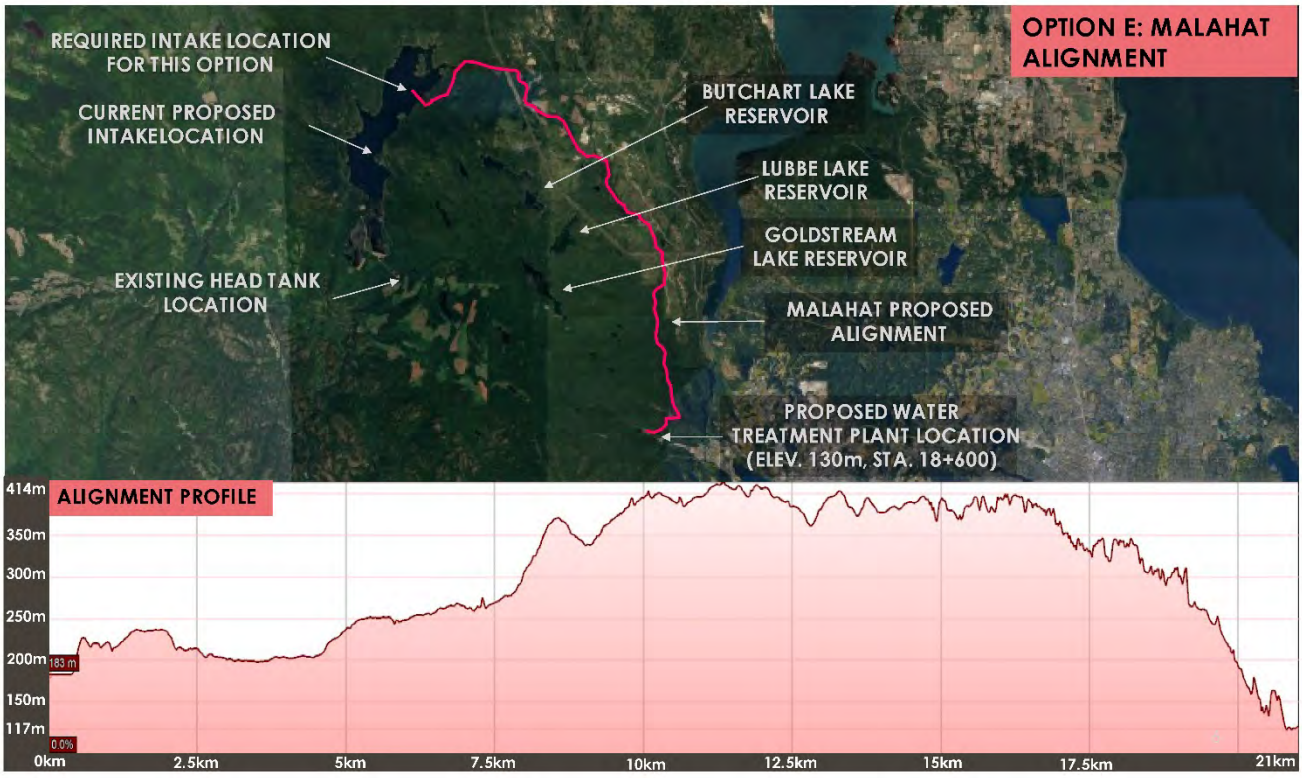


Figure 6.9: Option E – Overland Highway 1 Alignment

The estimated horsepower for this option is shown in **Table 6.9**.

Table 6.9: Option D Pump Station Hydraulics Single Pump Station

Node	Elevation (m)	Station (m)	Total Dynamic Head (m)	Required Shaft Horsepower (HP)
Sooke Lake Intake	160	00+000	279	41,366
WTP Headworks	130	21+000	-	-

6.2.4 Proposed East-West Connector

The RWS currently has two disinfection facilities in operation, the SRRDF which serves only the Sooke area, and the Goldstream Disinfection Facility (located immediately downstream of JGR) which serves the remainder of the RWS system. If a single water filtration plant is constructed at Japan Gulch, a new east – west transmission main to Sooke would be required to supply filtered water. The Sooke area would benefit from improved filtered water quality and also have redundant emergency supply access from the Goldstream supply once connected to the proposed filtration plant.

A 500 mm diameter transmission main is suitable for the 2050 JDFWDS demand only. It is recommended that the transmission main be sized at 1000 mm for a longer design horizon associated with the design life of transmission mains. Final sizing can be determined at preliminary design stage. The transmission main would convey filtered water to the Metchosin/District of Sooke municipal boundary. This main could also be used as an emergency supply main to feed (chlorinated water) water from SLR in the event there was an issue with the Kapoor Tunnel. This emergency supply option would also require twinning of Main No. 15 capacity. Although the water would be unfiltered, it could be chlorinated for emergency use if necessary.

Various alignment Options have been considered for a proposed Juan De Fuca Water District (JDFWD) transmission main:

1. Option 1 alignment follows Humpback Road starting at an elevation of 110m, continuing west along Sooke Road (Highway 14), and terminating at Sooke River Road where it would connect into the existing distribution system. This alignment is estimated to be 17.3 km and has an approximate high point of 170 m before continuing a steady descent to an approximate elevation of 16m. **Figure 6.10** shows the profile for this alignment. Booster pumping or raising of the HGL with the treatment plant low lift pumps will likely be required.

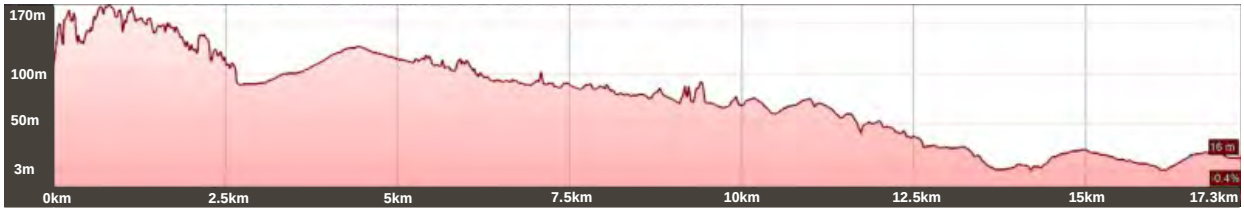


Figure 6.10: East-West Connector Transmission Main Alignment Profile – Option 1

2. Option 2 alignment follows Westshore Parkway starting at an elevation of 89 m, continuing west along Sooke Road and terminating at Sooke River Road where it would connect into the existing distribution sysem. This alignment is estimated to be 18.3 km and rises to an approximate high point of 136 m before terminating at an approximate elevation of 16 m. **Figure 6.11** shows the profile for this alignment. Booster pumping will be required on this alignment.

Figure 6.11: East-West Connector Transmission Main Alignment Profile – Option 2

3. The Option 3 alignment would replace Main No. 8 with a larger main and continue along Glenn Lake Road to south along Happy Valley Road, south along Rocky Point Road, west along Kangaroo Road and west along Sooke Road where this line could terminate at the Sooke River Road where it could connect into the existing distribution system. This alignment is estimated to be 23.4 km and rise to an approximate high point of 164 m before terminating at an approximate elevation of 16 m. **Figure 6.12** shows the profile for this alignment.

Figure 6.12: East-West Connector Transmission Main Alignment Profile – Option 3

Figure 6.13 shows the proposed alignment for all three options. All of these options are feasible but further studies are needed to determine to select the preferred option. For the purposes of preparing an Opinion of Probable Cost, Option 2 has been selected because the hydraulic profile will result in lower pumping costs.

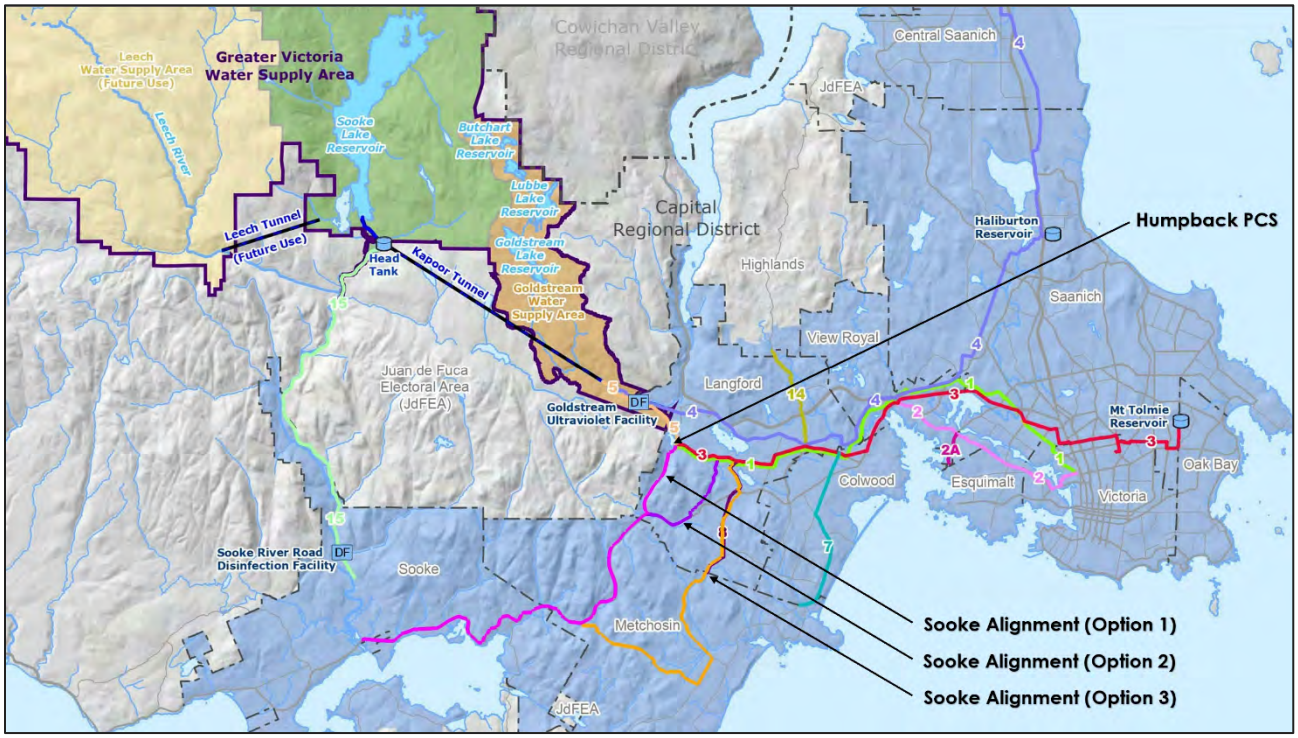


Figure 6.13: East-West Connector – Transmission Main Alignments

6.3 TRANSMISSION SYSTEM STORAGE

Further to the earlier references to water storage, Section 6.3 provides a supplementary discussion related to the transmission system storage including purpose, conclusions from the 1994 Plan, existing storage facilities, relationship with distribution storage, history, and limitations with the existing RWS system.

6.3.1 Water System Storage

Water system storage is typically provided for a variety of reasons and levels-of-service and transmission system storage is commonly included with large water utilities for one or more of the following beneficial purposes:

1. Lessens the effect of peak water demands (i.e. peak hour or instantaneous)
2. Reduces water velocity in the transmission mains and therefore less head-loss (energy or pressure loss)
3. Reduces the potential for transient pressure surges and potential system material failure (e.g. water-hammer)
4. Provides for a discretionary volume of emergency storage
5. Reduction in the design capacity of related works such as water treatment processes, transmission mains, valves, etc.
6. Beneficial for logistics related to capital improvement such as transmission main replacement or renewal, system maintenance (planned and unplanned)

Conversely, negative implications for providing storage include the capital and operating costs and the issue of managing the quality of any stored water during low demand periods where residence time is increased ("water age").

Large water systems such as the RWS, commonly include transmission storage independent from distribution system storage (discussed further on) and although water flows through a transmission system to service a distribution system, the reasons for and how transmission storage is operated are slightly different. Transmission systems in general deliver large volumes of water to many customers, ideally at a moderate pace and in turn delivers water to municipal distribution systems for more specific purposes within a community

An excerpt from the 1994 Plan stated the following:

> *"Thirdly, the appropriate balance between the size of the conveyance works (pipeline and booster pumps) and the size of the equalization [balancing] storage reservoirs [tanks] also has the ability to create cost effectiveness in a system such as that of the GVWD. With the long distances of conveyance facing the GVWD it becomes attractive financially and for reasons of the security of supply to equalize the instantaneous peak demands down by use of local reservoirs, not only to the maximum day levels but in some areas down to two-to-four-day maximum demands."* (reference Page 5-8)

Section 5.3.5, System Reservoirs, of the 1994 Plan also stated the following:

> *"The sizing of a reservoir [storage tank] is principally dependent on the pattern of water demands in the areas which the supply main balanced by the reservoir is serving as well as the cost of the supply main. Once costly water treatment is introduced, reservoir sizing is also affected by the cost of water production.*

> *In the District service area the need for large balancing reservoirs in the next century at Smith Hill and at Haliburton is created by growth exceeding the existing storage capacity in the Lower Mount Tolmie [CRD versus the District of Saanich's Mount Tolmie tank] and Haliburton Reservoirs, by relatively large distance from the Sooke Lake Reservoir source to the areas of water use, the high cost of water treatment and the predicted lower peak hydrographs associated with more intensive land use."* (Reference Page 5-13)

The general conclusions from the 1994 Plan remain valid and it should be noted that for example the RWS service has realized the effect of limited storage especially in the communities of Victoria, Esquimalt and Oak Bay through monitoring observations of peak or instantaneous high flows during events such as fire incidents, distribution main failures and even significant televised sporting events.

Further to transmission system storage, good engineering practice for distribution system design typically includes storage for balancing, fire protection and emergencies. The balancing storage volume is often a portion of the maximum day demand (e.g. Master Municipal Contract Documents, municipal bylaws, etc.), fire protection volume is generally a volume related to a minimum fire flow for a specified duration (typically determined by the Fire Underwriters Survey of Canada) and the emergency storage volume is often expressed as a portion of the sum of the balancing and fire storge with the intent of providing a reasonable amount of storage to maintain continuity of service during an emergency (i.e. failure of water supply or a water main, planned or unplanned interruptions, etc.).

6.3.2 Existing Transmission Storage Summary

The existing RWS storage details are provided in Table 2.4 Storage Tanks and Figure 2.5 and include storage directly from the lake reservoirs (i.e., Sooke Lake Reservoir and the Goldstream Reservoirs), the Head Tank, McTavish Tank and Mount Tolmie Tank. There are two other storage facilities, both of which are out-of-service, those being Smith Hill Reservoir (open reservoir) and Haliburton Tank all of which are described further.

6.3.2.1 Head Tank

The Head Tank is appropriately named as its primary function is to maintain constant head or pressure for the downstream system (e.g., Kapoor Tunnel, transmission mains, etc.). With a limited volume, it has little benefit for balancing of peak demands and the operating philosophy is to keep this tank full to maintain the head (top water level) by modulating inlet control valves.

6.3.2.2 McTavish Tank

The McTavish Tank is located at the terminus of RWS Main #4 in North Saanich, serves as a terminal transmission system storage tank and it works in conjunction with the storage tanks within the CRD's Saanich Peninsula water service (i.e., Bear Hill Tank, Dawson Tank, Dean Park Tanks, Cloake Hill Tank, etc.).

6.3.2.3 Mount Tolmie Tank

The Mount Tolmie Tank is located in the City of Victoria on the border with the District of Oak Bay. This storage tank primarily provides service to the water distribution systems for the City of

Victoria, District of Oak Bay and District of Saanich. The District of Saanich actually operates two pump stations at this location (drawing from the RWS Mount Tolmie Tank) to pump water to its Mount Tolmie Tank at a higher elevation servicing its distribution system.

6.3.2.4 Haliburton Tank (out-of-service)

The Haliburton Tank is out-of-service. The Haliburton Tank was commissioned as a level of service issue between the CRD and the GVWD prior to the GVWD joining the CRD. Once the HGL of Main #4 was raised this tank was no longer required but had remained in service for emergency use until a recent feeder main failure in 2021, at which time the connection was terminated, and the tank was drained. Long-term options for the tank include status quo, demolition or decommissioning or to reintroduce the tank to service to align with the 2017 Strategic Plan for emergency use, but only after completing improvements.

6.3.2.5 Smith Hill Reservoir (out—of-service)

Smith Hill Reservoir has been out-of-service for decades, being at the terminus of the original Main #1 and its operation predating the installation of Main #3 and the Mount Tolmie Tank. Although the site has not been decommissioned the existing system would not be acceptable to recommission without improvements, particularly since it is an open reservoir and the HGL (~67m) does not compliment the HGL of Main #3 or the local distribution systems.

The 1994 Plan stated:

> *"The reactivation of the Smith Hill Reservoir becomes necessary to balance Zone 1 draws in Victoria, Oak Bay, Southeast Saanich and Esquimalt from the GVWD sources."*

and

> *"…This is cost effective and hydraulically advantageous to provide and the reservoir will be able to balance more than just the peak day demands until growth in demands again catches up with the capacity."* (Reference Page 5-12)

Although this is an issue for utilizing the site for transmission storage, there is an option of servicing much of Victoria and Oak Bay from a HGL set by Smith Hill, less some localized topography serviced by the City of Victoria's distribution network. Another option is to install a water tower to compliment the Main #3 HGL, but this would result in an elevated structure.

A further option would be to install storage to the benefit of both the transmission system and the customer's distribution systems. This would require the replication of the existing HGL by use of pumps as identified in the 1994 Plan (Reference 1994 Plan Section 5.3.5 System Reservoirs). This 2022 Master Plan includes this option and identified a storage tank of 25,000m^3 volume at a HGL of 116m with a pump station to replicate the existing distribution system HGL. Until such time that details for storage are concluded and implemented the CRD plans to continue to own and manage the Smith Hill site property.

6.3.3 Existing Distribution Systems Storage

6.3.3.1 Saanich Peninsula Water Service (CRD)

For the Saanich Peninsula there are three levels of water service, the RWS (regional), SPW (sub-regional) and the municipal or distribution services. Although none of the municipal/distribution water systems have water storage facilities, the CRD provides water storage via the RWS and SPW services for the Peninsula.

6.3.3.2 Juan De Fuca Water Distribution Service (CRD)

The JDFWDS consists of numerous pressure zones and related distribution storage tanks. The RWS and the JDFWD services work well even though there is no transmission storage. It is recommended that a comprehensive evaluation of storage be completed as there may be a need for transmission storage in the future as demand on the RWS transmission increases. The potential need for storage may be lessened should the east-west connector main be installed and as well as balancing storage near Japan Gulch.

6.3.3.3 Westhills Development, Langford

The Westhills development/community located within the City of Langford, opted to construct and operate a water distribution system independent of the CRD's JDFWD water service. The Westhill's water system obtains water directly from the RWS service via Transmission Mains #1 and #3 and operates at the HGL provided by those mains. The system includes a supplementary fire pump system in absence of having water storage for fire suppression.

Until recently, this water system did not have distribution system storage and the utility operator recognized the vulnerability including limited fire protection especially as commercial and institutional developments occurred beyond the initial residential development (hence increased required fire demands), and the need for balancing and emergency storage. The utility has recently invested in two tanks (bolted steel) with a total volume of 8,600 m^3 which were commissioned in 2022.

6.3.3.4 District of Saanich

The District of Saanich has invested in its distribution system storage including Rithet Tank which obtains water from the RWS Main #4 and Mount Tolmie Tank which if supplied with water from the RWS Mount Tolmie Tank.

6.3.3.5 Other Distribution Water Services

The District of Oak Bay and the City of Victoria (including the Township of Esquimalt) have not invested in distribution storage, and they rely on the RWS system.

6.3.4 2022 Master Plan Storage Improvements and Next Steps

The conclusions related to transmission storage as identified in the 1994 Plan generally remain valid and the conceptual WFP site works have evolved to included balancing storage relative to the proposed WFP project. In particular, transmission storage at the Smith Hill site and proposed Japan Gulch site would result in many immediate and future benefits for the system. As noted in

Section 5.5.1 a hydraulic modelling study is recommended to finalize the size of balancing storage at the proposed water filtration plant site in combination with the proposed Smith Hill transmission balancing storage. It is recommended that a dynamic simulation model be developed to assess the balancing storage requirements at the proposed Japan Gulch Reservoir treatment plant site and the Smith Hill Reservoir site under diurnal patterns experienced during peak summer demand conditions. For cost estimating purposes a volume of 25,000m3 has been assumed for the Smith Hill tank storage, size to be confirmed based on the outcome of further hydraulic modeling.

Coordination with the municipalities/distribution system water providers should continue in order to develop a comprehensive and optimized plan for system storage regardless of system ownership.

The 2022 Master Plan has included the following proposed improvements related to transmission storage:

1. Japan Gulch Water Filtration Plant – Stage 2 Balancing Tank
2. Smith Hill Storage Tank and Pump Station

7.0 2022 MASTER PLAN OPTIONS & ALTERNATIVES

The 1994 Plan evaluated six Alternatives, based on assessments of water supply requirements. The Alternatives involved either raising Sooke Lake Reservoir or pumping from the northern basin of Sooke Lake Reservoir and secondly, three emergency supply provisions as follows:

1. Restoration of the three Upper Goldstream River dams and reservoirs
2. A pumped Jack Lake supply system from Sooke Lake Reservoir
3. A Northern Supply line (transmission main) to the Saanich Peninsula

The combinations resulted in six Alternatives identified as follows:

Table 7.1: 1994 Long-Term Water Supply Plan Alternatives

Alternative A	Raise Sooke Lake Reservoir/Restore Goldstream dams
Alternative B	Lower Sooke Lake Reservoir/Restore Goldstream dams
Alternative C	Raise Sooke Lake Reservoir/Jack Lake supply system
Alternative D	Lower Sooke Lake Reservoir/Jack Lake supply system
Alternative E	Raise Sooke Lake Reservoir/Northern Supply line
Alternative F	Lower Sooke Lake Reservoir/Northern Supply line

“Alternative A”, which included 21 capital projects, was ultimately selected for implementation. Since 1994, IWS has made substantial progress in its implementation as discussed in Section1, Table 1.1 of this 2022 Master Plan.

The principal considerations in the 1994 Alternatives involved:

1. Whether to raise the Sooke Lake Reservoir water level by raising the Sooke Lake Dam or pump from the deep northern basin of the SLR to increase the usable reservoir storage volume
2. Whether or not to restore the Goldstream Reservoir Dams
3. Redundancy of raw water transmission for the Kapoor Tunnel

For consideration 3, the 1994 Plan included evaluation of emergency water supply options in the event of a loss of the Kapoor Tunnel. The emergency design flows provided a lower level of service and was initially established to be 113 MLD or 337 L/c/d and in the future at 180 MLD or 272 L/c/d.

The development of Alternatives for this 2022 Master Plan will use similar methodology from the 1994 Plan described above. For this 2022 Master Plan, the principal considerations are:

1. Security of supply (Now and in the future)
2. Conveyance of water between Sooke Lake Reservoir and Japan Gulch
3. Siting of the proposed filtration treatment plant

7.1 Gap Analysis

7.1.1 Supply

As noted in Section 3.0, the projected 2050 annual demand assuming a 1.25% population increase is estimated at 74 Mm^3Y. This demand is greater than the recommended 1:50 year safe yield capacity of 67Mm^3Y. Additional water sources such as augmentation with flows from Leech watershed, further demand reduction or other potential sources should be planned for development within the next 25 years to ensure that future demands can be met. Continued water conservation efforts and achieving a modest demand reduction to 300 L/c/d would allow the Sooke watershed supply to be adequate until the year 2060.

The development of Alternatives should consider how the security of water supply can be strengthened during the next 25 years.

7.1.2 Raw Water Conveyance from Sooke Lake Reservoir to Japan Gulch

Kapoor Tunnel is the principal raw water transmission conduit for the RWS excluding the JDFWD which is served by Main No.15. This 8.8 km long, 2.3 m diameter tunnel conveys water to an outlet point upstream of the Japan Gulch Reservoir (JGR). The hydraulic capacity of this tunnel is estimated to be 682 MLD and could serve the CRD beyond the planning horizon of 2050 to approximately 2100 provided additional source water is developed from the Leech watershed and demand management continues to maintain current or lower water consumption levels. When the tunnel is out of service, the CRD uses the Goldstream watershed system to supply the RWS.

The lack of redundancy of the critical Kapoor Tunnel supply conduit is a vulnerability to the security of the RWS supply. Consideration of a secondary conveyance main between SLR and Japan Gulch Reservoir, even if at an emergency Level of Service (2100 ADD), is prudent planning.

7.1.3 Treatment

Multiple risks and risk scenarios exist that would present a greater challenge to an unfiltered water supply than one which includes filtration. These typically involve a greater probability of impairment in water quality. Risks to future watershed health and its water quality may be greatly diminished by proactive and preventative measures that provide multiple barriers to microbial pathogens and other hazards. The addition of filtration, in combination with UV and chlorine, would provide a robust multiple-barrier system and be able to better mitigate potential source water quality impairment and protect public health. The addition of filtration would increase the reliability of finished water quality despite adverse watershed conditions, future climate change and reduce the vulnerability of the RWS unfiltered system.

The CRD understands the risk of having an unfiltered water supply and recognizes a filtration plant will be required in the future to improve resiliency. This options analysis will consider filtration technologies and siting options for the treatment plant and technologies.

7.1.4 Treated Water Transmission Mains and Storage

A program of improvements for the transmission mains and storage tank has been developed for the CRD through a series of engineering studies including the 1994 Plan and the recent GeoAdvice report. These transmission main improvements are described in Section 6, Table 6.3. The improvements are considered constant to all the developed Alternatives and will not be further evaluated in this section.

7.2 2022 Master Plan Options

Table 7.2 shows the hierarchy of the high-level options for 3 categories of infrastructure improvements to the RWS.

Table 7.2: 2022 Master Plan Categories Options

Category	Component	
Supply	Sooke Lake Reservoir (Deep Northern Intake)	Leech River (Future Intake)
Raw Water Transmission Mains	Leech River to Sooke Lake Reservoir	Sooke Lake Reservoir to Japan Gulch
Filtration	Siting	Filtration Technologies

Within the high-level Options presented in **Table 7.2**, there are additional considerations that make the evaluation of options more challenging and complex. There are potentially 18 options as outlined in **Table 7.3** that require evaluation compared to the 2017 Strategic Plan objectives.

Table 7.3: 2022 Master Plan – 18 Options for Evaluation

Category	Component	Option	Description
Supply	Sooke Lake Reservoir (Intake)	S1	Deep Northern Intake
		S2	Lake Bottom Marine Intake
		S3	Floating Pump Station Intake
	Leech River (Intake)	S4	Leech River Diversion Intake to Leech Tunnel
		S5	Leech River Dam / Storage
Raw Water Transmission	Leech River to Sooke Lake Reservoir	RWT1	Leech Tunnel to Deception Gulch Reservoir
		RWT2	Leech Tunnel to Sooke Lake Reservoir deep basin
	Sooke Lake Reservoir to Japan Gulch	RWT3	Sooke Lake Reservoir to Japan Gulch tunnel
		RWT4	Hybrid pumping/tunnel alternative
		RWT5	Overland route through Leechtown and Jack Lake – 3 PS
		RWT6	Overland Council Lake Alignment – 3 PS & 1 PS
		RWT7	Overland Hwy 1 Malahat Alignment - 3 PS & 1PS
Filtration	Filtration Plant Sites	T1	Sooke Lake Reservoir site
		T2	Japan Gulch site
		T3	Japan Gulch site + Sooke River Road site
	Filtration Technology	T4	Direct Filtration
		T5	Dissolved Air Flotation (DAF) with granular media filtration
		T6	Membrane Filtration

Most of these 18 options are described in more detail in Sections 5 and 6 of this 2022 Master Plan. The advantages and disadvantages for the Options are listed in **Tables 7.4** to **7.9**.

Table 7.4: Sooke Lake Reservoir Intake Options

Supply: Sooke Lake Reservoir (Intake)	Advantages	Disadvantages
Deep Northern Intake (S1)	• Provides access to high quality water • Facilitates deeper drawdown for emergency condition or extreme seismic event • Ability to select best depth for water withdrawal pending outcome of further sampling/study • Provides redundancy for the existing Intake Tower • Improves resiliency of water extraction from SLR and provides and enables water extraction from lower levels of North Basin of SLR.	• High CAPEX • Complex pumping/intake installation. • Marine construction required • Difficult for O&M staff to access intake screen if there is a problem. • Hydrology studies recommend to not lower SLR below elevation 177m.
Lake Bottom Marine Intake (S2)	• Gravity flow from SLR deep basin to existing Intake Tower • Less complex construction • Provides redundancy to the existing intake • Screens can be cleaned from shore by air bursting system	• Alignment selection needs to reduce high points or dredging required • Marine construction required • Difficult for O&M staff to access intake screen if there is a problem • Divers required for screen inspection
Floating Pump Station (S3)	• Water quality addressed through an adjustable deep intake. • Expandability/modular • Can easily be built for lower capacity or level of service. • Provides redundancy to the existing Intake Tower	• Concept is pioneering but there are examples such as Seattle Public Utilities. • High voltage power supply to offshore pump station will require detailed engineering assessment and may have high CAPEX. • Marine construction required • Maintenance access to floating platform will be a challenge for transportation of tools and equipment. • Operator access to the pump station will require nonstandard safety procedures. • Capacity of the pump station will be limited to the number/capacity of discharge watermains from the pump station to the existing intake tower at Sooke Lake Dam.

Table 7.5: Leech River Intake Supply Options

Supply: Leech River (Intake)	Advantages	Disadvantages
Leech River Diversion intake to Leech Tunnel (S4)	• Leech River diversion tunnel capacity is increased by surcharging its inlet but could operate as a gravity conduit for direct diversion. • Could provide additional storage in the Leech Watershed. • Relatively low-cost solution to increasing the recharge capacity of the Sooke Lake Reservoir but reservoir balancing model required to confirm feasibility. • Direct diversion without dam can be completed using gravity flow through tunnel at a relatively low cost. • Can be used to augment SLR conservation flows.	• Available yield from this watershed in summer months is affected by limited local storage in DGR to store the runoff and diversions from Leech River. • Fishery compensation requirements in the lower reaches of the Sooke River to which Leech River is discharging (BC Environmental Flow Needs (EFN) policy. • Diversion of Leech River to SLR limited to wet weather months. • Leech watershed water quality could impact the blended water quality of the Sooke Lake Reservoir supply.
Leech River Dam (S5)	• A high dam could provide additional storage. • Leech watershed has significant additional catchment area (greater than Sooke watershed) to meet long term water demands of RWS beyond planning horizon.	• A high dam would be expensive to construct. • Leech watershed water quality could impact the blended water quality of the Sooke Lake Reservoir supply. • Steep unstable slopes in watershed. Further geotechnical assessment will be required. • Low return on investment for storage volume/dam height due to steep geometry of Leech River Valley. • Dam safety requirements. • The environmental impact of constructing this size dam and reservoir may not satisfy current environmental regulatory standards and would require a long permitting period.

Table 7.6: Leech River to Sooke Lake Reservoir Transmission Options

Raw Water Transmission Leech River to Sooke Lake Reservoir	Advantages	Disadvantages
Leech Tunnel to Deception Gulch Reservoir (RWT1)	• DGR can be used with upgrade to the Saddle Dam and diversion structure to transfer flows directly to SLR. • Removal of organic material from bottom sediments would help with water quality • Low cost to implement	• If dredging is required, disposal of significant volumes of dredge spoils would be difficult. • Rehabilitation of Deception Gulch Dam and Sooke Lake Saddle Dam would be required.
Leech Tunnel to Sooke Lake Reservoir deep basin (RWT2)	• Discharge directly to Sooke Lake Reservoir and bypassing Deception Gulch Reservoir • Potential lower cost to install a Leech River Bypass in comparison to Sooke Lake Reservoir Saddle Dam upgrade. • Isolates the Deception Gulch Reservoir from the Sooke Lake Reservoir.	• Transmission main construction adjacent could encounter wet conditions since it would be adjacent to Deception Gulch Reservoir. • Requires that the Leech River diversion dam be concurrently constructed to provide sufficient hydraulic head for conveyance of the flow. • Could end up being a higher cost because of geotechnical conditions and high water table.

Table 7.7: Sooke Lake Reservoir to Japan Gulch Transmission Options

Raw Water Transmission Sooke Lake Reservoir to Japan Gulch	Advantages	Disadvantages
Sooke Lake Reservoir to Japan Gulch tunnel (RWT3)	• Provides full redundancy to the Kapoor Tunnel. • Pumping not required to convey source water from SLR to Japan Gulch. • Supply not interrupted during extended periods of power outages.	• Most expensive option • Provides fully redundant capacity years in advance of system demands. • More difficult to access for inspection/maintenance
Hybrid pumping/tunnel (RWT4)	• Open cut /buried construction transmission main from Sooke Lake Reservoir connecting into a tunnel. • Reduces the cost of tunnelling. • Allows for staged construction of pumped transmission mains to match demand requirements. • Pumped portion can be sized for emergency supply only.	• More expensive than pumping options. • High head pumps required for pumped portion of the transmission system. • High operations and maintenance costs. • Large standby power generators required for pump station.
Overland route through Leechtown and Jack Lake – 3 PS (RWT5)	• Redundancy for the Kapoor Tunnel • Bi-directional flow to convey the Upper Goldstream watershed peak runoff to the Sooke Lake Reservoir for equalizing storage if necessary. • Potential power generation to offset the pumping power requirements. • Can be sized for a lower level of service average day demand (ADD) instead of maximum day demand. Results in smaller transmission main size and lower pumping costs. • Addresses redundancy requirements. • If system is used as an emergency supply only the pumping costs can be reduced because Kapoor Tunnel will continue as the primary gravity supply. • Potential to utilize existing head tank. • Facilitates the incorporation of the Goldstream Reservoir piped connection to Japan Gulch.	• This option requires high horsepower pumping and high annual operating costs depending on Level of Service. • Substantial improvements to road access required. • Based on the estimated horsepower requirements, a separate power supply and substation will be required for the three (3) proposed pump stations. • BC Hydro power supply to the 3 pumping stations will be expensive. • Large capacity standby power generators may be required at each pumping station depending on Level of Service.

Raw Water Transmission Sooke Lake Reservoir to Japan Gulch	Advantages	Disadvantages
Overland Council Lake Alignment – 3 PS (RWT6)	• Redundancy for the Kapoor Tunnel during peak flow periods and/or emergency conditions. • Slightly shorter route compared to Jack Lake Option. • Potential energy recovery to offset the District power requirements. • Facilitates the incorporation of the Goldstream Reservoir piped connection to Japan Gulch	• This Option may require high horsepower pumping and high annual operating costs depending on the Level of Service. • Single pump station option would have high discharge pressure which is not common for a municipal water system. • Substantial improvements to road access required. • Based on the estimated horsepower requirements, a separate 14.4 kVA power supply and substation will be required for the three (3) proposed pump stations. • BC Hydro power supply to the 3 pumping stations will be expensive. • Large capacity standby power generators may be required at each pumping station depending on Level of Service.
Overland Hwy 1 Malahat Alignment - 3 &1 PS (RWT7)	• Redundancy for the Kapoor Tunnel during peak flow periods and/or emergency conditions. • Potential energy recovery to offset the power requirements. • The alignment proposed for this option follows existing forest service roads where possible minimizing the cost associated with clearing, grubbing, and construction of new access roads. This alternative would follow a mixture of existing access roads and trails to make this alignment feasible. The roadways and trails would be improved to a higher standard to allow year-round access and during inclement weather conditions.	• The proposed alignment provides no opportunity to utilize the existing Head Tank. • This option requires high horsepower pumping and high annual operating costs. • Substantial improvements to road access required. • Based on the estimated horsepower requirements, a separate power supply and substation will be required for the proposed pump stations. • BC Hydro power supply to the pumping stations will be expensive. • Large capacity standby power generators may be required at each pumping station depending on the Level of Service. • Does not facilitate the Goldstream Reservoir piped connection to Japan Gulch.

Table 7.8: Filtration Siting Options

Filtration Siting Options	Advantages	Disadvantages
Sooke Lake Reservoir Site (T1)	• SLR site provides the ability to supply Main No.15 from a single facility, eliminating the need for enhanced treatment at the Sooke River Road Disinfection Facility. • Water supply to Kapoor Tunnel and Main No. 15 can be fed by gravity or east-west JDF connector.	• Significantly reduced access, requiring substantial improvements to road access and electrical power supply • 3 phase power extension to site will be expensive. • Higher operating costs for residual waste disposal. • SLR location cannot treat water from the Goldstream watershed using existing means of conveyance. • Long drive to site for operators is inefficient and difficult in winter conditions.
Japan Gulch Site (T2)	• Japan Gulch site has the ability to treat water from the Goldstream watershed, Sooke Watershed, and future Leech supply. • Improved access for transportation of personnel, equipment, and chemical deliveries. • Goldstream secondary source can serve as an emergency supply and secondary source. It can be used year-round with filtration. • Filtration facility would be in close proximity to existing UV disinfection facility and would not require operators to work at 2 locations. • BC Hydro power is available nearby at the Goldstream Disinfection Facility. • Residual waste disposal easier to manage.	• This location will require high capacity, low lift pumping to 169 m HGL as the head must be broken to accommodate granular media or membrane filtration (T4, T5 and T6). • Accommodating supply from a centralized Japan Gulch WTP to the JDFWD may be achieved by east – west connector main. • Flood protection of site required.
Japan Gulch + Sooke River Road Sites (T3)	• Water quality improvements for the Juan de Fuca communities may be achieved by augmenting existing treatment at SRR with a small membrane plant, which likely would cost less than the construction of a transmission main between Langford and Sooke.	• Two treatment facilities will require additional operators and have higher operations and maintenance costs • Membrane filtration likely required at SRR due to site constraints. • No redundancy of supply for Main No. 15.

Table 7.9: Filtration Options

Treatment Filtration Options	Advantages	Disadvantages
Direct Filtration (T4)	• Direct filtration is considered most suitable for relatively stable sources that consistently demonstrate low turbidity and low organic matter. • Table B.1 from the Guidelines for Canadian Drinking Water Quality: Guideline Technical Document shows that direct filtration will receive 2.5-log removal credit for cryptosporidium oocysts but 0.5 log must be provided by UV to achieve 3.0 log IHA requirement for protozoa. • 1.0-log credit is provided to direct filtration for virus removal • Higher filtration rates for direct filtration may result in smaller plant size and associated CAPEX cost savings. • Modular design could facilitate phased construction of the treatment facility. • Generally recognized that the energy requirements for media filtration are less than that of membrane filtration. • The amount of backwash water used is typically 2 to 5% for granular media filtration.	• Achieving consistent low turbidity filter effluent is highly dependent on proper chemical pre-treatment and usually requires use of filter aid polymers. • Residual waste streams must be processed. Equalization storage of liquid residuals streams is usually required. • Due to the low alkalinity of Sooke Lake Reservoir and other sources, common metal coagulants such as alum are unreliable without prior alkalinity addition. pH adjustment may be required. • Future raw water quality conditions with addition of Leech River may change sufficiently to challenge the performance of direct filtration. • Filtration technology is not as robust to perform well during raw water quality excursions that may occur following a wildfire. • May need to have additional space provision for pre-treatment process such as DAF to deal with future Leech River Water Quality (to be confirmed by piloting).
Dissolved Air Flotation (DAF) and Filtration (T5)	• DAF is the most appropriate form of clarification to provide more consistent and reliable treatment performance for colour and algae removal. • DAF may be included in the initial design or provided as a subsequent retrofit • The flocculation time is short and comparable to that of direct filtration.	• The overall increase in treatment facility footprint is related to the DAF footprint. • The recycle stream may amount to 10% of the influent flow to the DAF. • Higher capital and operating costs than Direct Filtration option (T4). • DAF filtration is more costly than direct filtration.

Treatment Filtration Options	Advantages	Disadvantages
	• Can deal with future Leech River colour levels as well as algae from all sources. • DAF clarification is recognized as having protozoan pathogen removing capabilities and enhancing the performance of filtration overall.	
Membrane Filtration (T6)	• Membrane filtration, which includes microfiltration (MF) and ultrafiltration (UF), are an increasingly competitive alternative to granular media filtration. • Removes particles having nominal sizes of 0.1 µm for MF and 0.01 µm for UF by physical sieving at the interface of a fiber membrane • MF/UF is an effective method of producing very low turbidity filtrate (< 0.1 NTU). • Provides an absolute barrier to protozoan oocysts. • Direct challenge testing has been found to achieve > 6-log removal of Cryptosporidium oocysts and Giardia cysts. • Membrane systems are less sensitive to changes in source water quality that may occur seasonally or due to storm events	• The rejectate of the secondary stage membrane will contain a much higher concentration of solids and must be processed by a dedicated DAF thickener. • The amount of backflush water used is typically 5 to 10% of the water produced, compared to 2 to 5% for granular media filtration. • Recycle flows treatment more complex than Direct Filtration or Direct Filtration + DAF options. • Membrane life is 8 to 10 years and significant capital cost for replacement. • Highest capital and operating cost of the three treatment technologies. • Pre-treatment still required for colour removal.

7.3 OPTIONS EVALUATION AND ALTERNATIVE PLANS DEVELOPMENT

7.3.1 Evaluation Criteria

The RWS 2017 Strategic Plan provides guidance on the Commitments for the Regional Water Supply. These Commitments are grouped into 3 categories shown below:

- Provide high quality, safe drinking water
- Provide an adequate, long-term supply of drinking water
- Provide a reliable and efficient drinking water transmission system

The 2017 Strategic Plan also identified Areas of Focus, Strategic Priorities, and Actions including:

- CRD Board Priorities - Sustainable and Livable Region
- Climate Change Impacts - Mitigation and Adaptation
- Preparing for Emergency and Post - Disaster Water Supply
- Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure
- Planning for the Future Use of the Leech Water Supply Area
- Demand Management - Addressing Changing Trends in Water Demand

7.4 Options Evaluation

The 1994 Plan included an options evaluation to ultimately arrive at the preferred Alternative A capital program. Since that time, significant capital works have been completed and several Strategic Plans have been prepared. This 2022 Master Plan compares the options developed as part of this report against the most recent 2017 Strategic Plan objectives.

In **Table 7.11** through to **Table 7.15**, the Options are evaluated for alignment with the 2017 Strategic Plan Commitments and Areas of Focus. Each Option is scored based on meeting the criteria outlined in the 2017 Strategic Plan using the scoring criteria shown in **Table 7.10**.

Table 7.10: Scoring of Options

Very Good (5)	Good (4)	Average (3)	Fair (2)	Poor (1)
The Option is very favorable and far exceeds minimum expectations.	The Option is favorable and clearly exceeds minimum expectations.	The Option is acceptable and meets or somewhat exceeds minimum expectations.	The Option barely meets minimum expectations.	The Option fails to meet minimum expectations.

Table 7.11: Supply Options S1 thru S3

Supply	Criteria Weighting	Sooke Lake Reservoir Intake					
		Option S1 - Deep Northern Intake	Score	Option S2 - Lake Bottom Marine Intake	Score	Option S3 - Floating Pump Station	Score
2017 Strategic Plan Commitments							
Provide high quality, safe drinking water	3	Accessing water from the deep Sooke Lake Reservoir basin will provide high quality water.	5	Accessing water from the deep Sooke Lake Reservoir basin will provide high quality water.	4	Floating Pump Station Intake access to deeper water elevations will be limited to the length of intake boom below the water surface. The floating pump station will access high quality water from the lower elevations when the lake level has been significantly reduced.	4
Provide an adequate, long-term supply of drinking water	3	The intake Options to the deep basin of the Sooke Lake Reservoir will not increase the capacity of this source since the drawdown is limited to approximately 177 m based on hydrology assessment.	4	The intake Options to the deep basin of the Sooke Lake Reservoir will not increase the capacity of this source since the drawdown is limited to approximately 177 m based on hydrology assessment.	3	The intake Options to the deep basin of the Sooke Lake Reservoir will not increase the capacity of this source since the drawdown is limited to approximately 177 m based on hydrology assessment.	4
Provide a reliable and efficient drinking water transmission system	3	Redundancy added for Sooke Lake Reservoir intake.	3	Redundancy added for Sooke Lake Reservoir intake if Lake Bottom Intake is connected directly to Kapoor Tunnel Head Tank.	3	Redundancy added for Sooke Lake Reservoir intake.	3
2017 Strategic Plan Areas of Focus							
CRD Board Priorities - Sustainable and Livable Region	2	Deep Northern Intake will provide access to coldest water and will enable management of the Sooke watershed supply such that the reservoir can be refilled during the annual hydrologic cycle. Deep intake will allow greater drawdown of the reservoir during extreme drought conditions.	4	A gravity Lake Bottom Marine Intake will provide access to coldest water and will enable management of the Sooke watershed supply such that the reservoir can be refilled during the annual hydrologic cycle. Since the additional intake pipe is proposed to be connected to the existing Head Tank the drawdown will be controlled by SLR to Head Tank available head.	3	Floating Pump Station Intake will not always provide access to coldest water but will enable management of the Sooke watershed supply such that the reservoir can be refilled during the annual hydrologic cycle. This intake will allow greater drawdown of the reservoir during extreme drought conditions.	4
Climate Change Impacts - Mitigation and Adaptation	2	Deep Northern Intake will provide access to coldest water when the surface waters may be warmer due to climate change. Deep intake will allow greater drawdown of the reservoir during extreme drought conditions.	5	Lake Bottom Marine Intake will provide access to coldest water when the surface waters may be warmer due to climate change. This intake will not allow greater drawdown of the reservoir during extreme drought conditions.	3	Floating Pump Station Intake access will be limited to the length of intake boom below the water surface when the surface waters may be warmer due to climate change. This intake will allow greater drawdown of the reservoir during extreme drought conditions.	4
Preparing for Emergency and Post - Disaster Water Supply	3	Deep Northern Intake provides full redundancy to the existing Intake Tower and could convey raw water to the Kapoor Tunnel Head Tank or directly to Japan Gulch. Depending on Transmission Option selected, this option could be a gravity supply which would continue to provide water during an extended power outage.	5	Lake Bottom Intake provides redundancy to the existing Intake Tower since it connects from the Sooke Lake Reservoir deep basin to the Intake Tower. If the Intake Tower or Kapoor Tunnel are out-of-service, this option has no benefit.	5	Floating Pump Station Intake does provide redundancy to the existing Intake Tower since it connects from the Sooke Lake Reservoir to the Intake Tower. If the Intake Tower or Kapoor Tunnel are affected by a natural disaster, this option has no benefit. The system could be connected to a secondary transmission system to Japan Gulch.	3
Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure	1	The Deep Northern Intake could be connected to the existing Kapoor Tunnel Head Tank or to a new redundant Transmission Main from Sooke Lake Reservoir to Japan Gulch.	4	The Lake Bottom Intake is connected to the existing Intake Tower and is marginally beneficial to preparing for new infrastructure.	3	The Floating Pump Station Intake is connected to the existing Head Tank and is beneficial to preparing for proposed future Jack Lake infrastructure as well as allowing for pumping to Kapoor Tunnel.	4
Planning for the Future Use of the Leech Water Supply Area	1	Several Leech Water Supply Options will direct water from the Leech Watershed to the Sooke Lake Reservoir or Deception Gulch Reservoir.	4	Several Leech Water Supply Options will direct water from the Leech Watershed to the Sooke Lake Reservoir or Deception Gulch Reservoir.	4	Several Leech Water Supply Options will direct water from the Leech Watershed to the Sooke Lake Reservoir or Deception Gulch Reservoir.	4
Demand Management - Addressing Changing Trends in Water Demand	1	All of the supply Options have a neutral impact on the Demand Management Initiatives.	3	All of the supply Options have a neutral impact on the Demand Management Initiatives.	3	All of the supply Options have a neutral impact on the Demand Management Initiatives.	3
Total- Meeting Strategic Plan Objectives - Total Raw Score		**37**		**31**		**33**	
Total- Meeting Strategic Plan Objectives - Total Weighted Score		**80**		**67**		**69**	

Table 7.12: Supply Options S4 thru S5

Supply	Criteria Weighting	Leech River (Intake)			
		Option S4 - Leech River Diversion Intake to Leech Tunnel	Score	Option S5 - Leech River Dam	Score
2017 Strategic Plan Commitments					
Provide high quality, safe drinking water	3	Leech watershed water appears to be lower quality than Sooke Lake Reservoir.	3	Leech watershed water may be lower quality than Sooke Lake Reservoir.	3
Provide an adequate, long-term supply of drinking water	3	The yield of the Leech watershed is estimated to be greater than that of the Sooke and Goldstream watersheds combined. Seasonal flows require the development of storage impoundment dams for which options are limited and would involve significant capital investment for construction of a new dam. A dam at the inlet of the Leech tunnel will provide additional storage. CRD already has a water license for drinking water use on Leech River. May only be used to replenish Sooke Lake Reservoir in winter months to meet Environmental Flow Needs (EFN) policy in summer months (to be confirmed with Province through discussions).	3	The yield of the Leech watershed is estimated to be greater than that of the Sooke and Goldstream watersheds combined. Seasonal flows require the development of storage impoundment dams for which options are limited and would involve significant capital investment for construction of a new dam. A dam at the inlet of the Leech tunnel will provide additional storage. Could supply Sooke Lake Reservoir in summer months. CRD already has a water license on Leech River.	4
Provide a reliable and efficient drinking water transmission system	3	Redundancy added for water supply.	3	Redundancy added for water supply and additional storage created.	3
2017 Strategic Plan Areas of Focus					
CRD Board Priorities - Sustainable and Livable Region	2	A review of limited water quality from Leech watershed indicates that turbidity is low, but there are times when colour levels are elevated. Filtration facility would likely be required concurrently or prior to the development of this water supply.	3	A review of limited water quality from Leech watershed indicates that turbidity is low, but there are times when colour levels are elevated. Filtration facility would likely be required concurrently with the development of this water supply.	3
Climate Change Impacts - Mitigation and Adaptation	2	Additional yield to refill Sooke Lake Reservoir will be limited to winter months only	3	Additional Leech watershed storage will benefit the replenish of Sooke Lake Reservoir in winter months.	4
Preparing for Emergency and Post - Disaster Water Supply	3	Seasonal supply only to meet Environmental Flow Needs (EFN) requirements in summer months.	3	Year-round supplementary supply to Sooke Lake Reservoir.	4
Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure	1	First investment towards integration of Sooke and Leech watersheds.	3	Provides for ultimate integration of Sooke and Leech watershed supplies.	4
Planning for the Future Use of the Leech Water Supply Area	1	Provides for seasonal access to the Leech watershed supply.	3	Provides for ultimate integration of Sooke and Leech watershed supplies.	4
Demand Management- Addressing Changing Trends in Water Demand	1	All of the supply Options have a neutral impact on the Demand Management Initiatives.	3	All of the supply Options have a neutral impact on the Demand Management Initiatives.	3
Total- Meeting Strategic Plan Objectives - Total Raw Score		**27**		**32**	
Total- Meeting Strategic Plan Objectives - Total Weighted Score		**57**		**67**	

Table 7.13: Raw Water Transmission Options RWT1 thru RWT4

Raw Water Transmission	Criteria Weighting	Leech River to Sooke Lake Reservoir				Sooke Lake Reservoir to Japan Gulch			
		Option RWT1 - Leech Tunnel to Deception Gulch Reservoir	Score	Option RWT2 - Leech Tunnel to SLR Deep Basin	Score	Option RWT3 - Tunnel	Score	Option RWT4 - Hybrid Pumping/Tunnel	Score
2017 Strategic Plan Commitments									
Provide high quality, safe drinking water	3	Leech River water may be lower quality than Sooke Lake Reservoir. This option has Deception Gulch Reservoir as a transfer point between Leech River intake and Sooke Lake Reservoir. Deception River water is also lower water quality and bottom sediments in Deception Gulch Reservoir are a concern.	3	Leech River water may be lower quality than Sooke Lake Reservoir. This option avoids transferring to Deception Gulch Reservoir.	4	Transmission alignment and conveyance method (gravity vs. pumped) does not impact water quality.	3	Transmission alignment and conveyance method (gravity vs. pumped) does not impact water quality.	3
Provide an adequate, long-term supply of drinking water	3	Excavating Deception Gulch Reservoir would provide an additional storage volume, but excavation and disposal would be costly.	3	A dam at the inlet of the Leech tunnel would provide additional storage. Could supply Sooke Lake Reservoir in winter months.	4	Increases the transmission capacity between Sooke Lake Reservoir and Japan Gulch and provide redundancy.	4	Increases the transmission capacity between Sooke Lake Reservoir and Japan Gulch and provides redundancy	4
Provide a reliable and efficient drinking water transmission system	3	Additional supply but does not impact the lack of transmission redundancy between Sooke Lake Reservoir and Japan Gulch.	3	Additional supply but does not impact the lack of transmission redundancy between Sooke Lake Reservoir and Japan Gulch.	3	Provides full redundancy to the Kapoor Tunnel, SLR intake and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Supply not interrupted during extended periods of power outages. Gravity conveyance is preferred to pumping since it increases the reliability of supply during emergency conditions. Does not allow the connection of the Goldstream Reservoir emergency connection.	4	Provides full redundancy to the Kapoor Tunnel, SLR intake and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less reliable than gravity connection. Does not allow the connection of the Goldstream Reservoir emergency connection.	3
2017 Strategic Plan Areas of Focus									
CRD Board Priorities - Sustainable and Livable Region	2	Deception Gulch Reservoir is a shallow reservoir with reported poorer water quality and located adjacent to Sooke Lake Reservoir. Filtration facility would likely be required concurrently with the development of this water supply.	3	A review of limited water quality from Leech watershed indicates that turbidity is low, but there are times when colour levels are elevated. Filtration facility would likely be required concurrently with the development of this water supply.	3	Potential energy recovery at the discharge end of tunnel. Greenhouse gas (GHG) lower than pumped options.	4	Higher GHG impacts due to pumping requirements Lower potential energy recovery at the discharge end of tunnel.	3
Climate Change Impacts - Mitigation and Adaptation	2	Seasonal availability only.	4	Seasonal availability only.	4	Lowest GHG impact of all the Raw Water Transmission Options.	5	Pumping will increase the GHG emissions and impact the carbon footprint for the conveyance system.	4

Raw Water Transmission	Criteria Weighting	Leech River to Sooke Lake Reservoir				Sooke Lake Reservoir to Japan Gulch			
		Option RWT1 - Leech Tunnel to Deception Gulch Reservoir	Score	Option RWT2 - Leech Tunnel to SLR Deep Basin	Score	Option RWT3 - Tunnel	Score	Option RWT4 - Hybrid Pumping/Tunnel	Score
Preparing for Emergency and Post - Disaster Water Supply	3	Emergency backup storage to Sooke Lake Reservoir but has limited storage.	3	Emergency backup storage to Sooke Lake Reservoir.	3	Redundant connection from Sooke Lake Reservoir to Japan Gulch provides security of supply following a natural disaster. Supply not interrupted during extended periods of power outages Gravity conveyance is preferred to pumping since it increases the reliability of supply during emergency conditions Does not allow the connection of the Goldstream Reservoir emergency connection.	5	Redundant connection from Sooke Lake Reservoir to Japan Gulch provides security of supply following a natural disaster. Pump station is a vulnerability since requires continuous power supply. Does not allow the connection of the Goldstream Reservoir emergency connection.	4
Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure	1	This Deception Gulch Reservoir could serve as a receiving reservoir for water diverted from Leech River, which could then be transferred to Sooke Lake Reservoir via the existing gate and culvert system.	3	No redundancy to the existing Intake Tower. Seasonal access to Leech watershed supply.	3	This connection is the foundation for many other system improvements contemplated in this 2022 Master Plan.	5	This connection is the foundation for many other system improvements contemplated in this 2022 Master Plan.	4
Planning for the Future Use of the Leech Water Supply Area	1	Provides for ultimate integration of Sooke and Leech watershed supplies. May trigger the need for filtration plant.	4	Provides for ultimate integration of Sooke and Leech watershed supplies. May trigger the need for filtration plant.	4	Will accommodate future Leech watershed diversions to Sooke Lake Reservoir.	4	Will accommodate future Leech watershed diversions to Sooke Lake Reservoir.	4
Demand Management - Addressing Changing Trends in Water Demand	1	All the supply Options have a neutral impact on the Demand Management Initiatives.	3	All the supply alternatives have a neutral impact on the Demand Management Initiatives.	3	All of the transmission Options have a neutral impact on the Demand Management Initiatives.	3	All of the transmission Options have a neutral impact on the Demand Management Initiatives.	3
Total- Meeting Strategic Plan Objectives - Total Raw Score		**29**		**31**		**37**		**32**	
Total- Meeting Strategic Plan Objectives - Total Weighted Score		**60**		**66**		**78**		**67**	

Table 7.14: Raw Water Transmission Options RWT5 Thru RWT7

Raw Water Transmission	Criteria Weighting	Sooke Lake Reservoir to Japan Gulch					
		Option RWT5 - Overland route through Leechtown and Jack Lake - 3 PS	Score	Option RWT6 - Overland Council Lake Alignment - 3 & 1 PS	Score	Option RWT7 - Overland Malahat Alignment – 3 & 1 PS	Score
2017 Strategic Plan Commitments							
Provide high quality, safe drinking water	3	Transmission alignment and conveyance method (gravity vs. pumped) does not impact water quality.	3	Transmission alignment and conveyance method (gravity vs. pumped) does not impact water quality.	3	Transmission alignment and conveyance method (gravity vs. pumped) does not impact water quality.	3
Provide an adequate, long-term supply of drinking water	3	Increases the transmission capacity between Sooke Lake Reservoir and Japan Gulch and provides redundancy.	3	Increases the transmission capacity between Sooke Lake Reservoir and Japan Gulch and provides redundancy.	3	Increases the transmission capacity between Sooke Lake Reservoir and Japan Gulch and provides redundancy.	3
Provide a reliable and efficient drinking water transmission system	3	Provides full redundancy to the Kapoor Tunnel, SLR intake and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less reliable than gravity connection. Allows the connection of the Goldstream Reservoir Connector.	3	Provides full redundancy to the Kapoor Tunnel, SLR intake and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less reliable than gravity connection. Allows the connection of the Goldstream Reservoir Connector.	3	Provides full redundancy to the Kapoor Tunnel, SLR intake and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less reliable than gravity connection. Does not allow the connection of the Goldstream Reservoir Connector.	2
2017 Strategic Plan Areas of Focus							
CRD Board Priorities - Sustainable and Livable Region	2	GHG calculations for pumped options score lower than gravity transmission options. Potential energy recovery.	3	GHG calculations for pumped options score lower than gravity transmission options. Potential energy recovery.	3	GHG calculations for pumped options score lower than gravity transmission options. Potential energy recovery.	3
Climate Change Impacts - Mitigation and Adaptation	2	Pumped conveyance of raw water to the treatment facilities is not impacted by climate change.	3	Pumped conveyance of raw water to the treatment facilities is not impacted by climate change.	3	Pumped conveyance of raw water to the treatment facilities is not impacted by climate change.	3
Preparing for Emergency and Post - Disaster Water Supply	3	This alignment would facilitate the connection of the Goldstream Reservoir to Japan Gulch using a shared pipe. Goldstream connection is a gravity supply.	4	This alignment would facilitate the connection of the Goldstream Reservoir to Japan Gulch using a shared pipe. Goldstream connection is a gravity supply.	4	This alignment would not allow the connection of the Goldstream Reservoir to Japan Gulch using a shared pipe. Goldstream connection is a gravity supply. Pumping is less reliable during emergency conditions. Reliability of supply is less secure.	3
Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure	1	This connection is the foundation for many other system improvements contemplated in this 2022 Master Plan.	4	This connection is the foundation for many other system improvements contemplated in this 2022 Master Plan.	4	This connection is the foundation for many other system improvements contemplated in this 2022 Master Plan.	4
Planning for the Future Use of the Leech Water Supply Area	1	Will accommodate future Leech watershed diversions to Sooke Lake Reservoir.	4	Will accommodate future Leech watershed diversions to Sooke Lake Reservoir.	4	Will accommodate future Leech watershed diversions to Sooke Lake Reservoir.	4
Demand Management - Addressing Changing Trends in Water Demand	1	All of the transmission Options have a neutral impact on the Demand Management Initiatives.	3	All of the transmission Options have a neutral impact on the Demand Management Initiatives.	3	All of the transmission Options have a neutral impact on the Demand Management Initiatives.	3
Total- Meeting Strategic Plan Objectives - Total Raw Score		**30**		**30**		**28**	
Total- Meeting Strategic Plan Objectives - Total Weighted Score		**62**		**62**		**56**	

Table 7.15: Treatment Options T1 thru T3

Treatment Options	Criteria Weighting	Treatment Plant Siting					
		Option T1 - Sooke Lake Reservoir	Score	Option T2 - Japan Gulch	Score	Option T3 - Japan Gulch & Sooke River Road	Score
2017 Strategic Plan Commitments							
Provide high quality, safe drinking water	3	Sooke Lake Reservoir site is an additional 10+km from Japan Gulch and may result in some water quality degradation during transmission.	4	The shorter transmission distance from Japan Gulch to end users will ensure that there is minimal water quality degradation in the transmission pipes.	5	Having 2 treatment facilities to operate and maintain could result in different water quality from the 2 facilities.	4
Provide an adequate, long-term supply of drinking water	3	Sooke Lake Reservoir location cannot treat water from the Goldstream watershed using existing means of conveyance.	3	Japan Gulch location can treat water from the Goldstream watershed using existing means of conveyance.	4	Japan Gulch location can treat water from the Goldstream watershed using existing means of conveyance. Sooke River Road location cannot treat Goldstream Reservoir supply.	4
Provide a reliable and efficient drinking water transmission system	3	Location provides the ability to supply the JDFWD service area from a single facility, eliminating the need for filtration treatment at the Sooke River Road disinfection facility or a costly Langford/JDFWD transmission main. Does not require repumping after treatment.	5	Japan Gulch site will require additional transmission mains and pump stations to Sooke. This location will require low lift pumping as the head must be broken to accommodate gravity granular media or membrane filtration.	4	2 treatment facilities to operate and maintain.	3
2017 Strategic Plan Areas of Focus							
CRD Board Priorities - Sustainable and Livable Region	2	All the location alternatives support the Sustainable and Living Region priorities.	3	All the location alternatives support the Sustainable and Living Region priorities. This Option requires the decommissioning of the Japan Gulch dam.	3	All the location alternatives support the Sustainable and Living Region priorities. This Option requires the decommissioning of the Japan Gulch dam.	
Climate Change Impacts - Mitigation and Adaptation	2	Carbon footprint for plant site is largest of 3 alternatives due to longer travel distance. Significant impacts on natural habitat to construct new access road and extend BC Hydro power supply.	4	Carbon footprint for plant site smallest of 3 alternatives due to shorter travel distance for construction traffic and ongoing operations traffic. Loss of natural habitat is minimal.	5	Carbon footprint for 2 plant site is greater than Japan Gulch centralized site.	
Preparing for Emergency and Post - Disaster Water Supply	3	Poor access to site during emergencies and natural disasters. Gravity supply will not be affected by power outages.	3	More accessible site during emergencies and natural disasters. Pumping required which could be impacted during extended power failures.	4	More accessible site during emergencies and natural disasters. Pumping required which could be impacted during extended power failures.	
Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure	1	Site will likely require multiple operations groups at filtration plant and UV/chloramination facility.	3	Site is adjacent to existing IWS treatment processes and control center.	5	Sooke River Road would likely be operated as unattended site with remote monitoring from JG or Sooke Lake Reservoir site.	
Planning for the Future Use of the Leech Water Supply Area	1	No differences between siting Alternatives.	3	No differences between siting Alternatives.	3	No differences between siting Alternatives.	
Demand Management - Addressing Changing Trends in Water Demand	1	Neutral impact on the Demand Management Initiatives.	3	Neutral impact on the Demand Management Initiatives.	3	Neutral impact on the Demand Management Initiatives.	
Total- Meeting Strategic Plan Objectives - Total Raw Score		**31**		**36**		**30**	
Total- Meeting Strategic Plan Objectives - Total Weighted Score		**68**		**78**		**66**	

Table 7.16: Treatment Options T4 thru T6

Treatment Options	Criteria Weighting	Filtration Plant Technology					
		Option T4 - Direct Filtration	Score	Option T4 - Dissolved Air Floatation	Score	Option T4 - Membrane Filtration	Score
2017 Strategic Plan Commitments							
Provide high quality, safe drinking water	3	Direct filtration is considered most suitable for relatively stable sources that consistently demonstrate low turbidity and low organic matter.	3	DAF is the most appropriate form of clarification to provide more consistent and reliable treatment performance. Can deal with future Leech River colour levels as well as algae.	4	Removes particles having nominal sizes of 0.1 µm for MF and 0.01 µm for UF by physical sieving at the interface of a fiber membrane MF/UF is an effective method of producing very low turbidity filtrate (< 0.1 NTU). Provides an absolute barrier to protozoan oocysts.	5
Provide an adequate, long-term supply of drinking water	3	Cost effective filtration at large scale has most commonly been achieved using gravity based granular media filtration. Direct filtration may receive 2.5-log removal credit for oocysts. This would lower the inactivation requirements of subsequent UV disinfection, but 0.5 log inactivation is still required through use of UV to meet guidelines. Virus inactivation would be obtained chiefly by using free chlorine, though 1.0-log credit is provided to direct filtration for virus removal.	3	Potential future augmentation of source supply capacity using the Leech watershed may impose more challenging treatment conditions depending on the timing of water draws from the Leech system and how it is incorporated into the Sooke supply. DAF will be used in combination with filtration to provide a more robust treatment train for varying raw water conditions.	4	MF/UF is an effective method of producing very low turbidity filtrate (< 0.1 NTU), effectively providing an absolute barrier to protozoan cysts and oocysts. Multiple skids or cassettes assembled into trains yields a large surface area for filtration which occupies a small footprint, providing significant benefit when space is limited.	4
Provide a reliable and efficient drinking water transmission system	3	Filtration technologies options have a neutral impact on the water transmission system.	3	Filtration technologies options have a neutral impact on the water transmission system.	3	Filtration technologies options have a neutral impact on the water transmission system.	3
2017 Strategic Plan Areas of Focus							
CRD Board Priorities - Sustainable and Livable Region	2	Carbon footprint for plant construction is smallest of 3 alternatives. Lowest power consumption.	5	Carbon footprint for plant construction is largest of 3 alternatives. Middle power consumption.	3	Carbon footprint for plant construction is middle of 3 alternatives. Highest power consumption.	4
Climate Change Impacts - Mitigation and Adaptation	2	Direct filtration will provide good water treatment for treatment raw water quality that may have been degraded by climate change. Carbon footprint for plant construction is smallest of 3 alternatives. Lowest power consumption.	5	Treatment technology is more robust for treatment raw water quality that may have been degraded by climate change. Carbon footprint for plant construction is largest of 3 alternatives. Middle power consumption.	3	Treatment technology is most robust for treatment raw water quality that may have been degraded by climate change, but pre-treatment will still be required for colour removal. Carbon footprint for plant construction is middle of 3 alternatives. Highest power consumption.	4
Preparing for Emergency and Post - Disaster Water Supply	3	Will provide high quality water post-disaster and during emergency conditions.	4	Will provide high quality water post-disaster and during emergency conditions.	4	Will provide high quality water post-disaster and during emergency conditions	4
Supply System Infrastructure Investment - Renewing Existing and Preparing for New Infrastructure	1	Supplemental pre-treatment processes may be required once other water sources are blended with Sooke Lake Reservoir raw water. Modular design will allow for phased construction to match demand growth.	3	DAF technology combined with granular media filtration will provide high quality treatment for future Leech watershed raw water. Modular design will allow for phased construction to match demand growth.	4	UF/MF technology will provide high quality treatment. Modular design will allow for phased construction to match demand growth.	3
Planning for the Future Use of the Leech Water Supply Area	1	Suitable for treatment of lower quality Leech watershed water. Will not remove colour.	3	Suitable for treatment of lower quality Leech watershed water. Will remove colour.	4	Suitable for treatment of lower quality Leech watershed water. Will not remove colour.	3
Demand Management - Addressing Changing Trends in Water Demand	1	All the treatment alternatives have a neutral impact on the Demand Management Initiatives	3	All the treatment alternatives have a neutral impact on the Demand Management Initiatives	3	All of the treatment alternatives have a neutral impact on the Demand Management Initiatives.	3
Total- Meeting Strategic Plan Objectives - Total Raw Score		**32**		**32**		**33**	
Total- Meeting Strategic Plan Objectives - Total Weighted Score		**68**		**68**		**70**	

7.5 Summary of Options Evaluation and Development of Alternative Plans

Table 7.17, on the following page, summarizes the raw and weighted scoring of the 18 Options for future improvements for the Regional Water Supply. These are relative scorings and show how well the Options align with the 2017 Strategic Plan objectives. Cost estimates for the 18 Options are included in **Table 7.17**.

There are numerous other projects related to Treated Water Transmission and Storage that were not included in Section 8.2 Options Evaluation. **Table 7.18** shows these additional projects that have been concluded in previous engineering studies and considered essential to maintaining the Level of Service to the local municipal customers. These projects are common to the Alternative Plans that will be developed and evaluated in the following section.

In addition to the transmission projects listed in Table 7.18, there are other projects discussed in Section 6 of this report that require further study and should be included in the recommended program of improvements. These other projects include:

- Goldstream Reservoir Connector
- Goldstream Connector Head Tank
- Balancing Head Tank at Japan Gulch Filtration Plant
- Smith Hill Storage Tank and Pump Station
- East -West Connector Transmission Main

Table 7.17: Scoring Summary and Cost Estimates

Category	Component	Options	Option	Raw Score	Weighted	Cost M$2022
Supply	Sooke Lake Reservoir (Intake)	S1	Deep Northern Intake	37	80	$46.90
		S2	Lake Bottom Marine Intake	31	67	$16.20
		S3	Floating Pump Station Intake	33	69	$65.2*
	Leech Watershed (Intake)	S4	Leech River Diversion Intake to Leech Tunnel	27	57	$16.7**
		S5	Leech River Dam	32	67	$115**
Raw Water Transmission	Leech River to Sooke Lake Reservoir	RWT1	Leech Tunnel to Deception Gulch Reservoir	29	60	$105.60
		RWT2	Leech Tunnel to Sooke Lake Reservoir deep basin	31	66	$32.40
	Sooke Lake Reservoir to Japan Gulch	RWT3	Sooke Lake Reservoir to Japan Gulch tunnel	36	75	$390
		RWT4	Hybrid pumping/tunnel	31	64	$540
		RWT5	Overland route through Leechtown and Jack Lake – 3 PS	30	62	$486
		RWT6	Overland Council Lake Alignment – 3 &1 PS	30	62	$454 - $699
		RWT7	Overland HWY 1 Malahat Alignment - 3 &1 PS	28	56	$508 - $809
Filtration	Siting	T1	Sooke Lake Reservoir	31	68	Base Case + $25M
		T2	Japan Gulch	36	78	Base Case
		T3	Japan Gulch + Sooke River Road	30	66	Base Case + $15M
	Treatment Technologies	T4	Direct Filtration	32	68	$736
		T5	Dissolved Air Flotation with filtration	32	68	$852
		T6	Membrane Filtration	33	70	$969

*Indicative based on SPU Lake Morse project

**From 1994 Plan adjusted by 2.31 multiplier ENR CCI (2022)/ENR CCI (1994) to be confirmed following geotechnical and environmental studies. Indirect costs added.to 1994 estimate.

Table 7.18: Treated Water Transmission Projects

Phase 1 - Implementation Recommended by 2025	
Watkiss PCS Upgrade	Upsize inlet to 1,050 mm ø and outlet piping to 1,200 mm ø for both No. 1 and No. 4 Mains
	Decommission existing Watkiss PCS lead PRV and replace with two 600 mm diameter lead PRVs
	Revise downstream HGL settings for lead Watkiss PRVs to 105.5 m
Increase HGL of Main No. 1 from 116m to 169m	Implement valving changes along the length of Main No. 1, from Humpback PCS to Watkiss PCS.
	Install five (5) new PCSs to provide redundancy to Main No. 3 and to maintain existing connections with the JDFWD. • Irwin Road & Creekside Trail, connecting Main No. 1 to JDFWD 116 m pressure zone. • Glen Lake Road, connecting Main No. 1 to Main No. 8. • Rex Road & Jacklin Road, connecting Main No. 1 to Main No. 3 and JDFWD 116 m pressure zone. • Goldstream Avenue & Whitehead Place, connecting Main No. 1 to Main No. 7. • Atkins Road & Traverse Terrace, connecting Main No. 1 to JDFWD 116 m pressure zone.
	Revise setpoint of the Millstream PCS lead PRV to achieve downstream HGL of 114 m.
Phase 2 - Implementation recommended between 2025 and 2038, recommended by 2030	
Implement part 1 Main No.4 Upgrades	Upsize 4.6 km of pipe to 1,350 mm ø from Goldstream Avenue at Veterans Memorial Parkway to the Watkiss PCS Inlet. Transmission mains upsize should consider longer term planning horizon of at least 75 years.
Add 3rd Main from Sooke Lake to Head Tank	Install 1,200 mm ø main from Sooke Lake Reservoir to Head tank to provide increased capacity and redundancy
Phase 3 - Implementation recommended between 2038 and 2050	
Implement part 2 of Main No.4 Upgrades	Upsize 6.3 km of pipe to 1,500 mm ø from Niagara Main (near Goldstream Disinfection Facility) to Goldstream Avenue at Veterans Memorial Parkway. Transmission main size should consider longer term planning horizon of at least 75 years.
Phase 4 - Implementation recommended by 2050 planning horizon	
Twin Critical Main No. 3	Twin 4.6 km of Main No.3 (813/991mm diameter) from Dupplin Road at Tolmie Lane to Lansdowne Road at Foul Bay Road to address capacity.
Twin Critical Main No. 4	Twin 2.6 km of Main No. 4 (743mm diameter) from the old connection with Haliburton Tank to Patricia Bay Highway at Hamsterly Road.
	Twin 3.1 km of Main No. 4 (610/762mm diameter) from Central Saanich Rd at Mount Newton Cross Road to Aldous Terrace at Lowe Rd.
	Twin 0.6 km of Main No. 4 (1,219/1,321mm diameter) for redundancy from the connection with Goldstream Supply Area to the Goldstream Disinfection Facility inlet or add a connection from Goldstream Supply Area directly to Main No. 5, which would remain normally closed except under emergency situations.

It was decided to preselect preferred Options for the Supply and Treatment Categories to limit the number of Alternatives to evaluate.

7.5.1 Supply

Based on the scoring of Supply Options and the cost estimates provided in Table 7.17, Options S1 – Deep Northern Intake and Option S3 – Floating Pump Station are the preferred Options for improving the security of supply. Although Option S1 has the highest score and the lower cost, there is limited engineering completed on this option and it does not provide flexibility to stage construction for lower level of service. It is recommended that Option S3 – Floating Pump Station be included in the recommended program of improvements at this time and the Deep Northern Intake be further evaluated in the future at preliminary design once geotechnical investigations are completed.

7.5.2 Treatment

There are two issues for consideration–siting and technology for the filtration plant. Based on the detailed evaluation of filtration options presented in Section 5.3 of this report and the financial analysis, it is clear that direct filtration is the most cost-effective filtration technology for the Regional Water Supply. The final process technology will be confirmed through a pilot study.

From the evaluation of siting Options shown in **Table 8.6**, the Japan Gulch location is the highest scored Option.

All Alternatives for further consideration will include a direct filtration treatment plant at the Japan Gulch location.

7.5.3 Raw Water Transmission

There are five Options for Raw Transmission between Sooke Lake Reservoir and Japan Gulch which include:

RWT3	Sooke Lake Reservoir to Japan Gulch tunnel
RWT4	Hybrid pumping/tunnel
RWT5	Overland route through Leechtown and Jack Lake – 3 PS or 1 large high lift pump station
RWT6	Overland Council Lake Alignment – 3 PS
RWT7	Overland Malahat Alignment - 3 PS

These options can be further reduced to 3 options:

1. Gravity tunnel RWT3
2. Hybrid pumping/gravity tunnel RWT4
3. Pumped conveyance RWT5

For the pumped Options, RWT5 (Jack Lake Alignment) is the lowest cost option at $486 M. Options RWT6 and RWT7 were not included in the Alternative Plans since they are more

expensive pumping Options. When the project proceeds in the future, the design engineer should re-evaluate all three options based on prevailing conditions at the time of construction

The CRD has requested that Stantec include a Pumped Alternative at a lower level of service flow or 2100 ADD. The size of the transmission main can be reduced from 2.4 m to 1.2 m. The cost of the pump stations and transmission mains for this lower pumping rate reduced from $486 M to $292 M.

Four Alternatives were developed by comparing Options for further evaluation and foundation of the recommended plan of improvements.

Table 7.19: Alternative Plans for Regional Water Supply

Alternatives	Filtration Plant Site	Sooke Lake Reservoir to Japan Gulch Transmission Options	Cost 2022$ Sooke Lake Reservoir to Japan Gulch Transmission Only
Alternative 1	Japan Gulch (T2)	Pumped at 2100 ADD demand (RWT5*)	$292 M
Alternative 2	Japan Gulch (T2)	Pumped at 2100 MDD demand (RWT5)	$486 M
Alternative 3	Japan Gulch (T2)	Tunnel (RWT3)	$390 M
Alternative 4	Japan Gulch (T2)	Hybrid pumping/tunnel (RWT4)	$540 M

RWT5* is the Jack Lake transmission main alignment with the pump stations and transmission sized for 2100 ADD flow (377 MLD)

The four Alternatives are based on a direct filtration treatment plant located at Japan Gulch and 4 different raw water transmission options. The filtration plant and the Sooke Lake Reservoir to Japan Gulch Transmission Options are the two highest capital cost components of this 2022 Master Plan.

For the evaluation of Alternatives, only the three commitments from the Strategic Plan were considered rather than the 3 Commitments and the 6 Areas of Focus. In addition, IWS has identified additional criteria that should be considered when evaluating the Alternatives. These criteria include:

1. Level of Service maintenance/improvement opportunities
2. Resolves needs gap in engineered assets
3. Redundancy and security of supply

The intent of evaluating the Alternative against these additional criteria is to assess how well these Alternatives meet the operational needs of the RWS to provide an adequate long-term supply and safe drinking water.

In addition to the non-financial criteria, the evaluation of Alternatives needs to consider capital and operating cost.

The four Alternatives were evaluated against six non-financial criteria using a 1-10 scoring system. The maximum non-financial score for any Alternative is 60 points.

The costs for the four Alternatives are scored with lowest cost getting 40 points and highest cost getting 0 points and the other Alternatives scored by prorating to the lowest cost Alternative.

7.6 Comparison of Alternatives and Conclusion

Table 7.20 presents a comparison for the four Alternatives with scoring for the six non-financial criteria. The financial scoring is shown on the bottom of the table.

The financial score was calculated based on 40 points to the lowest cost, 0 points to the highest cost and the other two Options costs prorated between low and high cost.

Based on this analysis, the preferred Raw Water Transmission Option is Alternative 1 – Pumping at 2100 ADD Jack Lake Alignment RWT5*.

Table 7.20: Evaluation of Alternatives 1-4

Criteria	Alternative 1 (T2/T4 + RWT5*)		Alternative 2 (T2/T4 + RWT5)		Alternative 3 (T2/T4 + RWT3)		Alternative 4 (T2/T4 + RWT4)	
	Pumping @ 2100 ADD (Jack Lake alignment)	Score	Pumping @ 2100 MDD (Jack Lake alignment)	Score	Tunnel	Score	Hybrid Pumping/Tunnel	Score
Provide high quality, safe drinking water	High level of treatment will ensure that there is minimal water quality degradation in the transmission pipes.	9	High level of treatment will ensure that there is minimal water quality degradation in the transmission pipes.	9	High level of treatment will ensure that there is minimal water quality degradation in the transmission pipes.	9	High level of treatment will ensure that there is minimal water quality degradation in the transmission pipes.	9
Provide an adequate, long-term supply of drinking water	Pumping sized for reduced level of service only (2100 ADD)	7	Pumping sized for full redundancy of Kapoor Tunnel. (2100 MDD)	8	Gravity supply at 2100 MDD.	10	Pumping sized for full redundancy of Kapoor Tunnel. (2100 MDD)	8
Provide a reliable and efficient drinking water transmission system	Low lift pumping to HGL 169m as the head must be broken to accommodate gravity granular media or membrane filtration. Raw Water Transmission pumping may be sized for reduced level of service only.	7	Low lift pumping to HGL 169m as the head must be broken to accommodate gravity granular media or membrane filtration. Raw Water Transmission pumping may be sized for reduced level of service only.	7	Low lift pumping to HGL 169m as the head must be broken to accommodate gravity granular media or membrane filtration.	8	Low lift pumping to HGL 169m as the head must be broken to accommodate gravity granular media or membrane filtration. Raw Water Transmission pumping could be sized for reduced level of service only.	7
Level of Service maintenance and/or /improvement	RWS currently does not have filtration treatment. Japan Gulch site could accommodate at plant sized for 2050 MDD and expandable to 2100 MDD Site could accommodate additional pre-treatment processes if water quality deteriorates in the future due to climate change or different water supply sources. Site will treat raw water from Sooke, Leech and Goldstream watersheds. Pumped connection is sized for 2100 ADD demand. Reduced LoS.	7	RWS currently does not have filtration treatment. Japan Gulch site could accommodate at plant sized for 2050 MDD and expandable to 2100 MDD. Site could accommodate additional pre-treatment processes if water quality deteriorates in the future due to climate change or different water supply sources. Site will treat raw from Sooke, Leech and Goldstream watersheds. Pumped connection may be sized for emergency flow only. Site is adjacent to existing IWS treatment processes and control center.	6	RWS currently does not have filtration treatment. Japan Gulch site could accommodate at plant sized for 2050 MDD and expandable to 2100 MDD Site could accommodate additional pre-treatment processes if water quality deteriorates in the future due to climate change or different water supply sources. Site will treat raw from Sooke, Leech and Goldstream watersheds. Tunnel connection would be sized for 2100 MDD flows Site is adjacent to existing IWS treatment processes and control center.	9	RWS currently does not have filtration treatment. Japan Gulch site could accommodate at plant sized for 2050 MDD and expandable to 2100 MDD Site could accommodate additional pre-treatment processes if water quality deteriorates in the future due to climate change or different water supply sources. Site will treat raw from Sooke, Leech and Goldstream watersheds Pumped connection may be sized for emergency flow only. Site is adjacent to existing IWS treatment processes and control center.	8
Resolves needs gap deficiency	Provides filtration which does not currently exist and improves connectivity between water supply sources and Japan Gulch. Pumped connections less preferred to gravity connections.	7	Provides filtration which does not currently exist and improves connectivity between water supply sources and Japan Gulch. Pumped connections less preferred to gravity connections.	7	Provides filtration which does not currently exist and improves connectivity between water supply sources and Japan Gulch	9	Provides filtration which does not currently exist and improves connectivity between water supply sources and Japan Gulch. Pumped connections less preferred to gravity connections.	8
Redundancy and security of supply	Provides partial redundancy to the Kapoor Tunnel and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less secure than gravity connections. More pump stations with this alternative. Pumped connection sized initially for emergency supply only (2100 ADD).	6	Provides partial redundancy to the Kapoor Tunnel and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less secure than gravity connections. More pump stations with this alternative. Pumped connection may be sized for 2100 MDD.	7	Provides full redundancy to the Kapoor Tunnel, SLR intake and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch.	9	Provides partial redundancy to the Kapoor Tunnel and Mains 10 &11 required to convey source water from Sooke Lake Reservoir to Japan Gulch. Pumping is less secure than gravity connections. Pumped connection may be sized initially for emergency supply only.	8
Total Non-Financial Score	**43**		**44**		**54**		**48**	
Cost ($M)	**$292M**		**$486M**		**$390M**		**$540**	
Financial Score	**40**		**9**		**24**		**0**	
Combined Score	**83**		**53**		**78**		**48**	

7.7 2022 Master Plan Recommended Program of Improvements

Table 7.21 provides a summary of the improvements recommended in this 2022 Master Plan to the year 2050 based on a direct filtration treatment plant located at Japan Gulch and providing emergency redundancy to Kapoor Tunnel with a pumped overland transmission system at 2100 ADD flow. The Sooke Lake Reservoir Floating Pump Station/Intake is recommended as the preferred Option to achieve redundancy to the Intake Tower. A connection from the Goldstream Reservoir to Japan Gulch is included in the recommended program.

Table 7.21: 2022 Master Plan Recommended Program of Improvements

Alternative 1 – Direct Filtration Treatment Plant at Japan Gulch			Cost ($M) (2022)
Supply	S3	Deep Northern Intake/Floating Pump Station	$72.5[A]
	S4/RWT1	Leech River Diversion	$16.7
	M1	Sooke Lake Saddle Dam Hydraulic Improvements	$10.0
Water Treatment	T2/T4	Japan Gulch Dam Decommissioning	$10.3
	T2/T4	Direct Filtration	$736.2
	T2/T4	Clearwell	$24.0
	T2/T4	Treated Water Pump Station	$29.8
	M2	Japan Gulch Water Filtration Plant Stage 2 Balancing Tank	$15.4
Raw Water Transmission Mains	M3	DNI Transmission Main to Head Tank	$38.8
	M4	3rd Main - Sooke Lake Dam to Head Tank	$7.4
	RWT5*	Jack Lake - Head Tank to Japan Gulch + 2 PS @ 2100 ADD	$208.7
Goldstream Reservoir Connector	M5	Goldstream Dam to Japan Gulch	$67.1
	M6	Stage 1 Balancing Tank	$5.5
Treated Water Transmission Mains	M7	Phase 1 Upgrades	$7.5
	M8	Phase 2 Upgrades	$38.2
	M9	Phase 3 Upgrades	$55.3
	M10	Phase 4.1 Upgrades	$47.7
	M11	Phase 4.2 Upgrades	$48.9
East-West Connector	M12	Option 2 Transmission Main	$58.6
Storage Tank	M13	Smith Hill Storage Tank	$12.8
	M14	Smith Hill Tank Pump Station	$17.1
		Total	**$1,528**

[A]Based on SPU Morse Lake Pump Station project
*Jack Lake alignment with Pump Stations and transmission main sized for 2100 ADD Level of Service flow ~375 ML

8.0 OPINION OF PROBABLE COSTS FOR RECOMMENDED IMPROVEMENTS

8.1 Basis of Capital Estimates

The Opinions of Probable Cost were prepared using the parametric estimating method. This approach is beneficial when little or no design information is available and is used at early project stages including Master Planning and Project Definition. The estimate is a Class D indicative estimate and will have an accuracy of +/- 50%. Costs from recent, similar projects provide valuable information, but the historical data must always be reviewed to ensure it aligns with current market conditions at time of tender. Cost estimates should be updated following completion of preliminary design.

The recommended improvements included in this 2022 Master Plan are based on conceptual or planning level of detail without preliminary or detailed design engineering. No new geotechnical investigations were completed as part of this study. Geotechnical information is limited to available investigations completed for previously completed projects in the RWS and may not be applicable to site specific conditions which can only be determined by future investigations on a site specific basis.

The parametric method produces a high-level estimate using various factors (parameters) developed from similar past projects, historical databases, engineering practices, and technologies, such as:

- Cost per metre of watermain
- Cost per m^3 of tank volume
- Cost per MLD of treatment capacity
- Cost per MLD of pumping capacity

This method of estimating is sometimes referred to as Rough Order of Magnitude (ROM) by PMP designated professionals. Further refinement of cost class estimates to a higher level of accuracy requires preliminary design. All cost estimates are in 2022 Canadian dollars.

8.1.1 Estimate Exclusions

The following items have not been considered or included in the preliminary Opinion of Probable Cost estimates.

- Land or right-of-way acquisition
- Subsurface conditions
- Hazardous material removal and disposal
- Foreign exchange fluctuations
- Commodity price excursions
- Risk assessment and mitigation
- Unforeseen excessive inflation increases over historical annual rates
- Any new equipment for plant operations (i.e., forklifts, trucks, etc.)

8.1.2 Direct and Indirect Costs

In preparing planning level budget estimates, the Capital Regional District has used certain direct and indirect costs as described below.

8.1.2.1 Direct Costs

Direct costs are line items that are included in the tender Schedule of Quantities and Prices. The following items are included in the Opinions of Probable Cost estimates for construction costs:

Mobilization/Demobilization	2%
Bonding	1.5%
Insurance	1.5%
General Conditions (Division 1 requirements)	10%
Construction Contingency	35%
Inflation to Mid-point of Construction - (% per annum)	2%

% are applied to Total Construction Costs

Total Construction Costs are the sum of the items in the Schedule of Quantities and Prices excluding Mobilization/Demobilization, Bonding, Insurance, General Conditions, Construction Contingency, and Inflation to mid-point of construction.

Recently annual inflation has been higher than 2% but over the long-term inflation rates have generally been in the 2 to 2.5% range. The CRD should revisit inflation estimates at the time of finalizing costs for projects once schedules are better refined and preliminary engineering and investigations are complete.

8.1.2.2 Indirect Costs

Indirect costs are other soft costs that the CRD include in their Capital Budget estimates. The following items are included in the Opinions of Probable Cost estimates:

Engineering (% of Direct Costs)	15%
Administration & Program Management (% of Direct Costs)	6%
Miscellaneous/Specialty Consultants (% of Direct Costs)	2%

% are applied to Total Direct Costs

Direct Costs include Total Construction Costs plus Mobilization/Demobilization, Bonding, Insurance, General Conditions, Construction Contingency, and Inflation to mid-point of construction.

8.1.2.3 Other Estimate Allowances

The CRD frequently includes the following allowances as a percentage of Direct + Indirect Costs in preparing capital budget estimates:

Interim Financing (% of Subtotal)	0%
Project Contingency (% of Subtotal)	5%

Interim financing accounts for Interest during Construction which typically applies to Alternative Service Delivery procurement projects. Since the procurement model for the Water Master Plan projects has not been determined, there is no allowance for Interim Financing in the Opinions of Probable Cost estimates.

8.1.3 Allowance for Contingency

Contingency includes considerations for errors, omissions, and unknowns which are fully expected to occur, but which cannot be specifically identified at the time of the estimate, and, if not considered, underestimate the final installed cost and result in an overrun. Contingency is not meant to cover functional scope changes, acts of God, unusual economic situations, or gross estimate inaccuracies.

Since these projects are developed only to conceptual level of planning, a construction contingency of 35% has been applied to the estimated construction costs, consistent with industry best practices.

In addition, an overall project contingency of 5% has been applied to the total direct + indirect costs for each project.

8.1.4 Allowance for Inflation to Midpoint of Construction

The construction cost estimates are based on 2022 dollars. The estimated 2022 construction costs have been escalated by 2% per year to the midpoint of construction. Inflation rates could be higher depending on market conditions at time of tender.

8.1.5 Accuracy

Engineers and Geoscientists BC (EGBC) provide the following classification definition and accuracy estimate:

> *Class D estimate (±50%): A preliminary estimate which, due to little or no site information, indicates the approximate magnitude of cost of the proposed project, based on the client's broad requirements. This overall cost estimate may be derived from lump sum or unit costs for a similar project. It may be used in developing long term capital plans and for preliminary discussion of proposed capital projects.*

8.2 Proposed Deep Northern Intake Capital Costs

A 2021 study by Stantec concluded that a deep northern intake into Sooke Lake Reservoir would provide benefits in terms of improved raw water quality, emergency water supply, resiliency of supply during drought conditions and improvements in water quality. The final approach to which option is used for the deep northern intake, a micro tunneled intake/fixed shore pump station or a floating pump station can be determined at the preliminary engineering phase. For planning purposes, the most expensive option has been used for cost estimates.

The Deep Northern Intake project is comprised of four (4) primary component projects. The extension of the transmission main to Japan Gulch can be deferred until after the WFP at Japan Gulch is constructed. **Table 8.1** shows the costs and timing of these four (4) projects.

Table 8.1: Deep Northern Intake Projects

Deep Northern Intake	2022 $	Inflated $	Start of Construction	Duration (years)
Floating Pump Station	$72,505,000	$87,929,000	2030	4
DNI Transmission Main DNI Pump Station to Sooke Lake Head Tank	$38,768,000	$47,483,000	2031	2
3rd Main - Sooke Lake Dam to Sooke Lake Head Tank	$7,384,000	$9,134,000	2032	2
Jack Lake Transmission Main from Sooke Lake Head Tank to Japan Gulch	$208,649,000	$284,959,000	2036	3

8.3 Phase 2 Seismic Assessments

In 2021, Stantec completed a high-level *Seismic Assessment of Critical Facilities Study – Phase 1* which serves as a register of all major facilities and includes their importance within the Regional Water Supply, year of construction, foundation type, superstructure type, seismic force resisting system, and seismic code in place at time of design.

Assets requiring a Phase 2 seismic assessment have been identified and categorized in order of importance and risk with approximate costs. The Phase 2 seismic assessments will typically consist of site reconnaissance to determine missing structural element sizes and piping connections to below grade walls and slabs, geotechnical field exploration to determine the latest seismic site class, ground accelerations, and soil bearing capacities, followed by a detailed seismic assessment to the latest National Building Code of Canada. The detailed seismic assessment would include preparation of Issued for Tender detailed drawings and specifications.

The estimated costs to complete Phase 2 assessments for primary, secondary, and tertiary structures are approximately $1,500,000, $745,000, and $700,000, respectively, for total cost of $2,945,000. This cost does not include the potential capital costs to complete the seismic upgrades, if needed.

8.4 Goldstream Reservoir Connector to Japan Gulch

A project (Alternative A, a2) was identified in the 1994 Plan to improve system resiliency and includes construction of a new connection from the Goldstream Lake Reservoir to the proposed water filtration plant location at Japan Gulch and decommissioning the existing Japan Gulch Reservoir. A proposed transmission main could be constructed to bring water to the Japan Gulch site from Goldstream Lake Reservoir. The conceptual design of this transmission main includes a balancing tank upstream of Japan Gulch at a HGL of 169m, the same as the Sooke Lake Head Tank.

Table 8.2: Goldstream Reservoir Connector

Goldstream Connector	2022$	Inflated $	Start of Construction	Duration (years)
Goldstream Dam to Japan Gulch	$67,075,000	$82,971,000	2032	2
Goldstream 169m Head Tank	$5,538,000	$6,850,000	2032	2

8.5 Large Diameter Transmission Main Capacity Improvements

The Hydraulic Capacity Assessment Report by GeoAdvice included a hydraulic analysis of the transmission mains to estimate headloss for various future flow conditions to the 2050 planning horizon. A summary of recommended improvements is described in Section 6.1.3 of this 2022 Master Plan. The upgrades listed in **Table 8.3** were recommended to mitigate identified hydraulic capacity deficiencies. Cost estimates in 2022 dollars and inflated dollars are included in Table 8.3 for the four phases of the improvement program.

In the long term, an East-West connector main to Juan de Fuca Water District is recommended with sufficient capacity to provide treated water to West Shore communities. Three options for route to the new transmission main have been considered in this study. Option 2 was selected as the preferred option for calculation of an opinion of Probable Cost.

The East-West Connector transmission main is shown from 2035 to 2037 in the long-term capital budget to coincide with construction of water filtration facilities. The construction timing of this main should be reviewed and should be coordinated with the construction of the water filtration plant so that filtered water can be provided to Juan de Fuca Water Distribution.

Table 8.3: Large Diameter Treated Water Transmission Main Capacity Improvements

Option	Phase 1 - Implementation Recommended by 2025		2022$	Inflated
M6	Watkiss PCS Upgrade	Upsize inlet to 1,050 mm ø and outlet piping to 1,200 mm ø for both No. 1 and No. 4 Mains	$7,499,000	$7,838,000
		Decommission existing Watkiss PCS lead PRV and replace with two 600 mm diameter lead PRVs		
		Revise downstream HGL settings for lead Watkiss PRVs to 105.5 m		
	Increase HGL of Main No. 1 from 116m to 169m	Implement valving changes along the length of Main No. 1, from Humpback PCS to Watkiss PCS.		
		Install five (5) new PCSs to provide redundancy to Main No. 3 and to maintain existing connections with the JDFWD. • Irwin Road & Creekside Trail, connecting Main No. 1 to JDFWD 116 m pressure zone. • Glen Lake Road, connecting Main No. 1 to Main No. 8. • Rex Road & Jacklin Road, connecting Main No. 1 to Main No. 3 and JDFWD 116 m pressure zone. • Goldstream Avenue & Whitehead Place, connecting Main No. 1 to Main No. 7. • Atkins Road & Traverse Terrace, connecting Main No. 1 to JDFWD 116 m pressure zone.		
		Revise setpoint of the Millstream PCS lead PRV to achieve downstream HGL of 114 m.		
Option	**Phase 2 - Implementation recommended between 2025 and 2038, recommended by 2030**		**2022$**	**Inflated**
M7	Implement part 1 Main No.4 Upgrades	Upsize 4.6 km of pipe to 1,350 mm ø from Goldstream Avenue at Veterans Memorial Parkway to the Watkiss PCS Inlet. Transmission mains upsize should consider longer term planning horizon of at least 75 years.	$38,204,000	$44,085,000

Option	Phase 3 - Implementation recommended between 2038 and 2050		2022$	Inflated
M8	Implement part 2 of Main No.4 Upgrades	Upsize 6.3 km of pipe to 1,500 mm ø from Niagara Main (near Goldstream Disinfection Facility) to Goldstream Avenue at Veterans Memorial Parkway. Transmission main size should consider longer term planning horizon of at least 75 years.	$55,293,000	$77,792,000
Option	**Phase 4 - Implementation recommended by 2050 planning horizon**		**2022$**	**Inflated**
M9	Twin Critical Main No. 3	Twin 4.6 km of Main No.3 (813/991mm diameter) from Dupplin Road at Tolmie Lane to Lansdowne Road at Foul Bay Road to address capacity.	$47,670,000	$81,771,000
M10	Twin Critical Main No. 4	Twin 2.6 km of Main No. 4 (743mm diameter) from the old connection with Haliburton Tank to Patricia Bay Highway at Hamsterly Road.	$48,928,000	$83,930,000
		Twin 3.1 km of Main No. 4 (610/762mm diameter) from Central Saanich Rd at Mount Newton Cross Road to Aldous Terrace at Lowe Rd.		
		Twin 0.6 km of Main No. 4 (1,219/1,321mm diameter) for redundancy from the connection with Goldstream Supply Area to the Goldstream Disinfection Facility inlet or add a connection from Goldstream Supply Area directly to Main No. 5, which would remain normally closed except under emergency situations.		
		Totals	**$197,594,000**	**$295,416,000**

8.6 Storage Tanks

The recommended treated water transmission system storage includes a balancing/head tank at the proposed Japan Gulch Water Filtration Plant and a storage tank at Smith Hill. A balancing/head tank is also proposed for the Goldstream Reservoir Connector. Estimated costs and timing of these projects are shown in **Table 8.4**.

Table 8.4: Storage Tank Projects

Storage Tanks	2022$	Inflated $	Start of Construction	Duration (years)
WFP Clearwell	$23,999,000	$32,134,000	2036	2
Japan Gulch WFP Balancing Storage (Phase 2 Balancing Storage)	$15,384,000	$20,599,000	2036	2
Smith Hill Storage Tank	$12,800,000	$17,859,000	2038	2
Goldstream Reservoir Connector Phase 1 Balancing Tank	$5,538,000	$6,850,000	2032	2

8.7 Pump Stations

Three proposed pump stations will be required for the future development of the RWS. The proposed Deep Northern Intake can be a fixed or floating pump station. Costs presented in **Table 8.5** are the most expensive options, which is a fixed pump station. The water filtration plant requires a pump station to boost HGL from the Japan Gulch site elevation of approximately 130 m to a HGL of 169 m as head through the plant will be broken for gravity filtration.

Table 8.5: Pump Stations

Pump Stations	2022$	Inflated $	Start of Construction	Duration (years)
DNI - Floating Pump Station	$72,505,000	$87,929,000	2030	4
WFP – Treated Water Pump Station	$29,800,000	$39,873,000	2036	2
Smith Hill Tank Pump Station	$17,148,000	$23,888,000	2038	2

8.8 Water Filtration Plant

Based on technical and cost considerations, Stantec considers direct filtration to be the most appropriate treatment selection for the CRD's Regional Water Supply, with the presumptive site located adjacent to the Japan Gulch reservoir upstream of the existing Goldstream Disinfection Facility.

8.8.1 Opinion of Probable Capital and Operating Costs

The cost of the proposed treatment facilities depends on factors including projected capacity requirements, the type of facilities to be constructed, site conditions, and implementation schedule. The following section presents a conceptual level opinion on the probable cost of treatment options for planning purposes.

A planning horizon of 2050, nearly 30 years from the present, has been used to establish the ultimate design capacity of the treatment plant and associated total land requirements for filtration options. However, implementation of additional treatment will most likely be executed in stages of capacity increments based on a design horizon of 20 to 25 years to minimize redundant capacity and cost increases. Thus, the timing of implementation would impact the cost of treatment. For example, the MDD forecast for 2040 using identical assumptions is 340 MLD, which is 13% less than the MDD of 390 MLD forecast for 2050. For planning level purposes, it is recommended that water treatment planning consider the 2050 design horizon.

A feasibility level opinion of probable cost is provided in **Table 8.6** for the three filtration options identified, in this 2022 Master Plan, with the understanding that capacity increments may be staged, and that DAF may involve a future upgrade to a direct filtration plant.

Table 8.6: Opinion of Probable Cost for a 390 MLD Filtration Plant Options

Treatment Options	Capital Cost (M$)	Operating Cost NPF (M$) *	LCC(M$)	Inflated Capital Cost $ 2029
1. Direct Filtration	$570	$205	$780	$996
2. DAF-Filtration	$660	$235	$900	$1,153
3. Membranes	$750	$355	$1,200	$1,300

*NPV calculated using 4% discount rate and Option 3 includes membrane replacement cost at ten-year intervals

A comparison of the capital cost, operating cost, and life-cycle cost suggests Option 1-Direct Filtration to be the lowest capital and life cycle cost.

Applying the additional soft direct and indirect costs plus an allowance for inflation to the midpoint of construction increases the OPC above the direct construction cost shown in Table 8.6. The planning, designing and construction phases of a major capital project such as a Water Filtration Plant is a typically takes 5 to 7 years. It is recommended that CRD undertake pilot and preliminary design engineering in the next few years so design can be complete by 2032 to enable the plant to be constructed by 2037.

8.9 Present and Future Value Estimates

Table 8.7 summarizes the Recommended RWS Capital Improvements Program up to 2050. Present and future inflated values to mid point year of construction are provided for budgeting purposes. Estimates should be updated at preliminary design phase and adjusted for inflation depending on market conditions and timing of construction. **Figure 8.1** is a graphical presentation of this recommended Capital Improvement Program. Detailed cost estimating worksheets for each of the 27 projects are included in **Appendix B**.

Table 8.7: Recommended RWS Capital Improvements Program

	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**

*Jack Lake alignment with Pump Stations and transmission main sized for 2100 ADD Level of Service flow ~375 MLD

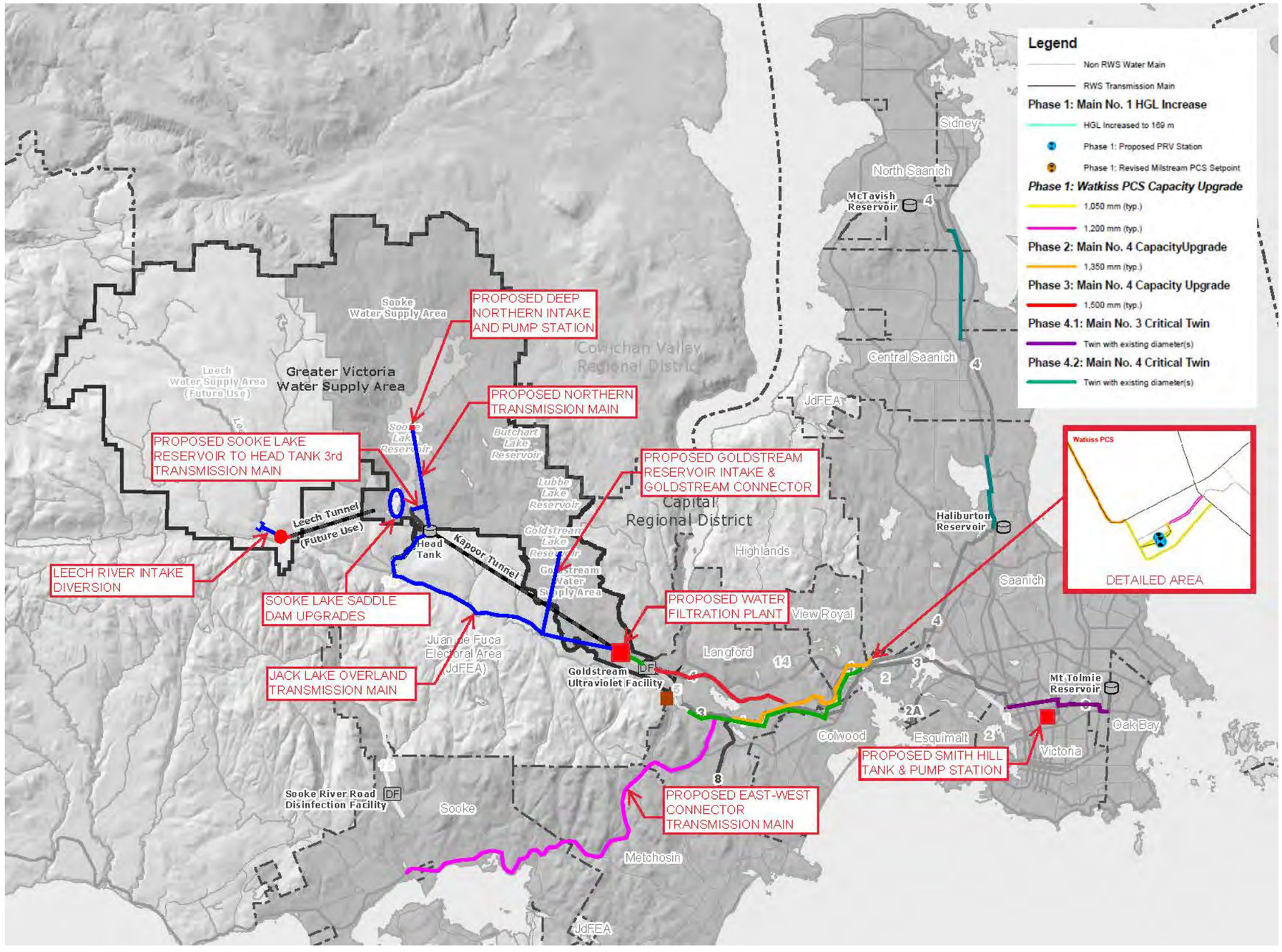


Figure 8.1: Recommended RWS Capital Improvement Program

9.0 CONCLUSIONS

This section of the 2022 Master Plan summarizes conclusions based on the work completed as part of this study and other concurrent studies (Stantec 2021). The CRD should review the 2022Master Plan progress regularly once further investigations are completed and to monitor overall progress on achieving objectives and improving overall resiliency of the Regional Water Supply system. While a Master Plan is a comprehensive overall plan, it must be reviewed on a regular basis to respond to changes in regulatory requirements, climate change, trends in water use, demand management and population growth.

9.1 Water Sources

The Sooke watershed should continue to serve as the primary supply for the RWS. This source will reach its sustainable safe yield capacity limit between 2045 and 2050 depending on demand management initiatives implemented by the CRD. Continued demand management initiatives to reduce the per capita consumption to an achievable 300 L/c/d is recommended. Reducing demand to 300 L/c/d would extend the capacity of this source to the year 2060 at a 1.25% annual population growth rate.

The Leech watershed has the potential to provide significant additional water supply to augment SLR supply in the long term; however, storage will be required as there is little inflow into the watershed during the summer months. Another option to be explored further is a direct intake into the Leech River for diversion of water to Deception Gulch Reservoir (DGR) and ultimately to SLR. One option is to complete improvements to the Sooke Lake Saddle Dam and the Deception Gulch Dam and spillway to enable transfer of water directly to SLR. DGR can also be used to receive water from Leech River in the interim and be used for Sooke River conservation flows thereby conserving water currently released annually for conservation flows. A hydrology study and reservoir balancing model which would look at the operation of SLR and Leech River diversion or storage options to assess the best alternative for optimal use of Leech River water.

The Goldstream reservoirs have served as a secondary source during Kapoor Tunnel maintenance activities. The CRD should consider connecting this system via transmission main to the Japan Gulch Reservoir. The transmission main would alleviate turbidity issues from slides in the Goldstream River Canyon and maintain the Goldstream raw water quality. The transmission main alignment should facilitate the future connection of the Jack Lake overland transmission main alignment and ultimate connection to a filtration plant at Japan Gulch.

The CRD should continue to optimize use of water sources under their ownership and licence rather than investigate sources that are not within their current jurisdiction.

9.2 Water Supply Dams

IWS manages numerous dams with the primary purpose of providing a reliable supply of safe drinking water to the residents of the region. A comprehensive dam safety program is in place to manage the dams within the legislated framework. The IWS should continue to make investment in dam safety to manage these assets and mitigate dam safety issues. Recent dam safety reviews have highlighted the importance of improving existing dam performance monitoring systems to current industry best practices as well as alignment with the 2017 Strategic Plan objectives. In

general, the dams have performed well, and more specific conclusions and their alignment with 2017 RWS Strategic plan objectives include:

- [water quantity] - In the near and intermediate terms, the existing dams will provide the primary and secondary water storage requirements to address the seasonal variations in water yield and the annual demand variations of the customers to the year 2050.
- [reliability] -The existing dams are being managed by IWS to identify and mitigate risk "as low as reasonably practical."
- [water quantity] - In the future, off-catchment lands could be considered for additional water supply, recognizing the reasons for which the earlier sources of water and reservoirs were decommissioned from service. Some of these sources could be recommissioned once water filtration facilities are constructed.
- [reliability] - From a reliability perspective, continue to manage and mitigate the dam risks and carry-on with the IWS Dam Safety Program.
- [water quantity and reliability] - Since the Goldstream watershed is needed for a secondary water supply short-term only) the dams will need to be maintained.
- [water quantity] - The existing dams and related storage reservoirs will provide the quantity of water to meet the demands of the system for the planning horizon of this 2022 Master Plan.
- [water quantity and reliability] - Sooke Lake Reservoir is the primary source of water and will continue for years to come.
- [reliability] - Based on the Strategic Plan theme of reliability, the Goldstream watershed, dams and related reservoirs shall be maintained for secondary or redundancy of water supply.
- [water quantity and reliability of supply] - At a certain demand threshold nearing the end of the planning horizon of 2050 additional water supply will be required.
- [water quantity and reliability] - Deception Gulch Dam and Reservoir could be re-commissioned to full pool.

9.3 Water Quantity

Hydrological assessments of the Sooke and Leech watersheds have been completed. Based on this work, it is estimated the Sooke watershed can supply 40% additional annual demand (up to 67Mm^3Y) over current demand levels during a 1:50 year drought precipitation condition. Additional water source development will be required around the year 2050 to support population growth but should be in service by 2045. The timing of additional source development will be somewhat dependent on demand management initiatives.

The Leech River watershed has the capability of providing additional water supply but requires development of storage or a direct intake that would enable water to be transferred to Sooke Lake Reservoir during the shoulder seasons. Leech River water can be transferred to DGR via the existing Leech tunnel. Diversion to DGR using a direct intake into Leech River would also enable more resiliency in supply because the SLR could be filled quicker following a drought condition

and would provide additional protection should drought conditions extend over a period of several years.

The steep topography of the Leech River watershed will require construction of a high dam to store and utilize Leech River water. A high dam would be costly and further assessment on costs of development of a high dam versus benefit will need to be completed. The feasibility of dam construction in the Leech River valley will have to be evaluated following geotechnical investigation and assessment by dam design specialists. In addition, a Phase 2 Hydrology study and a reservoir water balance and operating model should be developed to optimize and further develop alternatives for concurrent use of Sooke and Leech watershed sources.

9.4 Proposed Deep Northern Intake

A study completed by Stantec (2021) indicated there is potential to access water in the Sooke Lake Reservoir deep northern basin with a proposed intake. This intake would serve as an emergency intake, while at the same time enabling access to better quality water with a more consistent temperature from deep zones of Sooke Lake Reservoir. It is noted that the intake will not allow additional water supply from Sooke Lake Reservoir as the future extraction water level should be limited to 177m to ensure the reservoir is replenished by normal annual precipitation. Hydrological analysis indicates it is possible to withdraw 40% additional water (up to 67.3 Mm^3 annually) from SLR during a 1:50 year drought condition. During emergency drought conditions this intake would make the system more resilient with the diversion of Leech River—one of the main objectives of the 2017 Strategic Plan. The proposed intake will be located at an approximate elevation of 150 m (Floating Pump Station inlet piping would also be designed to reach the 150 m elevation) so that during an emergency or drought condition it could be used to provide additional water for a short duration The CRD understands that it may take several years of precipitation to fill the reservoir following such an event. If Leech River water is diverted to SLR during a drought condition the SLR fill time would be reduced and the likelihood of concurrent back-to-back drought conditions would be reduced, thereby improving overall reliability and resilience of the water supply in extreme drought conditions.

Two options are available for a Deep Northern Intake. The first option is a conventional pump station constructed on shore with a MTBM used to tunnel the intake from shore. The second option is a floating pumping station. The final selection of which style of pump station to construct can be made at preliminary design phase.

9.5 Demand Management

Continued demand management is an integral component of managing the available water supply for the RWS. Demand management initiatives and water efficient fixtures and appliances have significantly reduced RWS demands. Reducing demands further will extend the life of the existing water sources and defer requirement for capital investment in new sources.

9.6 Transmission

9.6.1 Kapoor Tunnel

The Kapoor Tunnel is a critical conveyance infrastructure for the RWS. The CRD has done a good job in managing this asset and completing maintenance repairs. The tunnel has sufficient

hydraulic capacity to convey projected demands to near the year 2100. The CRD should continue with condition assessment inspections of the tunnel to manage this critical asset.

There is no redundancy for the Kapoor Tunnel. Based on inspections and maintenance completed by the CRD and others, the tunnel is in good condition; however, due to the tunnel proximity to the Leech River Valley fault, a seismic evaluation of the tunnel should be completed. Further detailed seismic assessment is warranted to identify if there are any significant vulnerabilities. It is noted that the Kapoor Tunnel has the hydraulic capacity to supply demands to the year 2100, so provided it is maintained and seismically stable, additional capital investment on a second conveyance system from SLR can be deferred for many years. Other considerations such as emergency water supply may warrant construction of a second transmission main earlier, but this transmission main can likely be sized for an emergency level of service flow (ADD) to reduce capital costs.

9.6.2 Other Transmission Main Improvements

Several options were investigated to provide transmission redundancy from Sooke Lake Reservoir. These options include a second gravity tunnel similar to Kapoor Tunnel, pumped open cut and buried transmission mains and hybrid pumped transmission main/tunnel options. All options are feasible and have different capital and life cycle costs.

A first stage would involve construction of the Deep Northern Intake pump station with a transmission pipeline extended to the Sooke Lake Head Tank. A third intake pipe from Sooke Lake Dam would be connected to the transmission pipeline. The second stage (Sooke lake Head Tank to Japan Gulch) could be deferred to a later date and could include a transmission main via Jack Lake as previously explored in the 1994 Plan.

Several transmission improvement projects have been identified to increase hydraulic capacity (see Table 9.2 and 9.3) including a transmission main connection to Goldstream Lake Reservoir and an East-West connector main to the District of Sooke, which would provide water from a single water filtration plant located near Japan Gulch Reservoir in the future. This would defer the need to construct a second smaller water treatment plant at the Sooke River Road Disinfection Facility. The other transmission system improvements are related to replacement of old main and additional capacity and level of service requirements identified in the 2018 GeoAdvice hydraulic capacity report.

9.7 Storage Tanks

System storage deficiencies have been identified for peak hour and discretionary emergency storage. Fire storage is not proposed as part of the transmission system but would be provided as part of the municipal water distribution system along with pumping as required. The RWS transmission system would supply up to the 2100 MDD level of service. This would extend the life of the RWS transmission system and defer the requirement for future capacity investments in both transmission and treatment.

An equalization clearwell at the filtration plant would have benefits of balancing filtration plant flows so the plant can be sized for MDD rather than PHD. The costs for the WFP would increase significantly if system peak hour balancing storage is not provided at the filtration plant. This

balancing storage tank (Clearwell) could be located with a TWL of 169m to replicate the historic hydraulic supply conditions of the RWS.

A second tank, proposed at the location of the previous Smith Hill open reservoir, will provide balancing and emergency storage for significant service areas in the City of Victoria, District of Oak Bay, and the District of Saanich.

9.8 Water Treatment

The water quality provided by RWS meets current provincial standards as well as Federal Guidelines for Canadian Drinking Water Quality. The water supply is, however, unfiltered, with the only treatment barriers provided being primary disinfection with UV light and chlorine and chloramines for secondary transmission system disinfection. This system has provided acceptable water quality because of the high quality of the Sooke Lake Reservoir source. In the future it is possible that Island Health Authority may require water filtration for major water supplies serving large populations, so CRD should begin planning for water treatment within the next 5 to 10 years. Pilot studies, siting investigations and preliminary designs will be required to enable Project Definition with sufficient detail provided for Provincial and Federal funding applications.

The selected treatment process of direct filtration is suitable for treatment of Sooke Lake Reservoir and Goldstream Reservoir water and likely even a blended Sooke Lake / Leech River water, but this will have to be confirmed by pilot plant studies. Good practice would be to design the plant to enable addition of a pre-treatment process such as dissolved air flotation or conventional sedimentation in the event that raw water quality conditions deteriorate in the future.

9.9 Water Filtration Plant Siting

Three WFP sites have been investigated. The preferred site for a future water filtration plant is adjacent to the Japan Gulch Reservoir. This site is easily accessed for operations and can easily be connected to the RWS transmission system. The site will have to be protected from potential flood inundation from the Goldstream River, but this can be easily accommodated with appropriately designed river training and flood protection works. Following filtration, treated water pumping will be required to maintain the RWS system HGL of 169m.

9.10 Risk and Resiliency

The AWWA J100 process has been used to identify threats and vulnerabilities to the RWS (Stantec 2021). Several risks, threats, and vulnerabilities have been identified in the CRD system including seismic risks, wildfire risks and potential future risks such as climate change. The CRD should continue planning any capital improvements to mitigate the identified risks. The risks and threats identified in the AWWA J100 process should be reviewed every 5 years to monitor progress on mitigating risks as well as identifying any new risks that emerge.

9.11 Future Studies

9.11.1 Seismic Assessments and Upgrades (Phase 2)

The CRD should proceed with Phase 2 seismic assessment for critical water supply facilities as identified in the *Seismic Assessment of Critical Facilities Study – Phase 1 (Stantec 2021)* within the next 5 years.

9.11.2 Deep Northern Intake Options Analysis

As additional water quality data is collected in the area of the proposed Deep Northern Intake, further studies, and analysis of location options for the proposed intake should be conducted. This next phase study could be undertaken in 2030.

9.11.3 Leech Watershed Development

This 2022 Master Plan has identified the Leech watershed as a potential, viable, future water supply for the RWS. Additional studies and assessment of the storage options or direct intake and diversion of the Leech watershed are required. Planning for the Leech diversion works, or storage should commence no later than 2032 as it is required to be online around 2042 as the safe yield of the Sooke watershed will be reached in 2045 at current demand levels.

9.11.4 Transmission Options Study

Several options were investigated to provide a secondary transmission system from Sooke Lake Reservoir to Japan Gulch. These options include another tunnel, transmission mains, and combined tunnel/transmission main options. All options are feasible and have different capital and life cycle costs. The options should be further refined at a conceptual design level which would include field route reconnaissance and detailed cost estimates to determine the best option. The timing of the study will depend on the findings of the Kapoor Tunnel Phase 2 Seismic Assessment. If the Kapoor Tunnel is assessed as being at risk, the CRD may choose to accelerate the construction of a redundant transmission main between Sooke Lake Reservoir and Japan Gulch. Consideration for the Level of Service for the redundant transmission main should be included in future studies.

9.11.5 Water Filtration Pilot Studies

The conclusion of this 2022 Master Plan is that the conversion of the RWS to a filtered water supply is not urgent, although changes in regulatory requirements may accelerate this conversion. It is prudent to start planning for a water filtration plant in the next 10 years. A piloting study to evaluate different treatment process configurations for Sooke Lake Reservoir and blended Sooke Lake Reservoir / Leech River water should be completed. Once the results of the pilot investigation are completed, preliminary designs can be prepared to refine capital cost estimates.

9.11.6 Storage Tanks

The issue of storage requires a more detailed examination. The RWS is supplying the instantaneous PHD and fire flows, which is not typical of transmission mains for large utilities. If this issue is not addressed, it will result in an oversizing of the future water filtration plant and

transmission mains. The planned improvements for the transmission mains are based on maintaining a LoS for MDD conditions. If the RWS is supplying PHD, the LoS will not be achieved. This detailed examination of storage should be undertaken within the next 3 years.

10.0 RECOMMENDATIONS

Based on the work completed for this 2022 Master Plan the following specific recommendations are provided below.

	Recommendation	$ 2022 Estimated Cost	Inflated Cost	Timing
Water Sources				
1	Complete Phase 2 hydrology study water balance model and develop reservoir operating rules in consideration of water use and dam safety including optimization for future concurrent use of Leech and Sooke watershed water. Investigate feasibility of direct diversion of Leech River water to SLR via DGR or construction of storage dam on the Leech River. Study the feasibility of direct intake or dam construction on the Leech River. The study should include the assessment of Goldstream watershed as well as the Council watershed to see how the use of water in the WSAs can be optimized.	$1,000,000	$1,020,000	2023
2	Complete one year of water quality monitoring on SLR to identify deep northern basin water quality and seasonal quality fluctuations at various water extraction depths.	$200,000	$204,000	2023
3	Complete one year of water quality monitoring on Deception Gulch Reservoir to obtain baseline water quality data for this source.	$100,000	$102,000	2023
4	Study the upgrade requirements for Sooke Lake Saddle Dam and Deception gulch Dam/spillway to facilitate transfer of Leech River water to SLR. Investigate use of DGR water for fisheries conservation flows to offset conservation flows from SLR.	$300,000	$312,000	2024
5	Continue with Dam Safety Review (obligation), Capex improvements for rehabilitation, renewal, increased performance, and real-time performance monitoring.	As required		As required
6	Continue with Dam Safety Program investigations and improvements for RWS dams.	As required		As required
7	Maintain Goldstream Reservoirs as a secondary source and complete preliminary engineering for intake into Goldstream Reservoir and a transmission main to Japan Gulch.	$500,000	$520,000	2024
8	IWS should continue with demand management program to enable RWS to optimize the use of their available sources. Continued public education, ICI programs and lawn irrigation management will extend the life of the RWS water sources.	As required		2022-2050
9	Once the SLR reaches a demand level of 67.3 Mm^3Y it should not be drawn down below 177m to reduce the impact of the SLR not being able to fill during the winter precipitation period in drought years. The	NA		NA

	Recommendation	$ 2022 Estimated Cost	Inflated Cost	Timing
	reservoir should only be drawn down in an emergency condition.			
10	The SLR demand should be managed so the life of this source can be extended. The annual demand should not be increased beyond 40% of current demand to a maximum of 67.3. Mm^3. The Phase 2 hydrology study (Item #1 above) should assess if future extractions from Leech watershed can assist in increasing water supply yield in combination with SLR.	NA		NA
	Kapoor Tunnel			
1	The CRD should completed a detailed seismic assessment of the Kapoor Tunnel to assess its resiliency against the latest seismic design codes as part of the overall management of this asset.	$400,000	$416,000	2024
	Deep Northern Intake			
1	Complete a conceptual design of a floating pump station and transmission main connection to the Head Tank. A conceptual design should also be completed for a fixed land pump station along with cost estimates to compare the optimal solution for extraction of water from the deep northern basin. (Option S3)	$1,500,000	$1,940,000	2035
	Water Treatment			
1	Complete a water filtration pilot program to select the final filtration process for water filtration. The pilot program should be completed over a period of at least one year to cover seasonal changes in raw water quality from the SLR and Leech River. The pilot should be run with SLR only, Leech River water only and blended water from both sources to determine if raw water conditions significantly impact filtration performance. Spiked turbidity and ash challenge testing should be completed as part of the pilot program to assess the filtration performance under more adverse water quality conditions.	$1,500,000	$1,561,000	2023-2025
2	Complete an indicative preliminary level design for a water filtration plant located at the Japan Gulch site. The layout should be developed for initial build and ultimate build so that the Japan Gulch site can be planned for future plant expansion. A geotechnical investigation should be completed at the Japan Gulch Site. Assess mitigation requirements for seismic design and flood inundation protection as part of the indicative design.	$2,000,000	$2,208,000	2027
3	Complete detailed design of water filtration plant.	Included in Item 4 costs		2029-2031
4	Construct water filtration plant. (T2/T4)	$736,155,000	$836,353,000	2033-2037

	Recommendation	$ 2022 Estimated Cost	Inflated Cost	Timing
5	Depending on treatment process selected assess the requirement for continued primary disinfection using UV. If UV is not required decommission the existing GDF and SRRDF following construction of WFP.	Included in WFP costs		
Raw Water Transmission				
1	Construct third 1,219 mm transmission main from SLR to Head Tank. (M4)	$7,384,000	$9,134,000	2032
2	Complete detail design of Goldstream Reservoir Intake and transmission main from Goldstream Reservoir to Japan Gulch.	Included in item 3 costs		
3	Construct Goldstream Reservoir Connector transmission system. (M5)	$67,075,000	$82,971,000	2032
4	Complete design and construction of DNI and pump station + raw water transmission system from SLR to Japan Gulch. (S3 + M3 + RWT5*)	$254,801,000	$341,576,000	2045 to 2050
Treated Water Transmission (see Table 9.3)				
1	Phase 1 Upgrades (M7) • Watkiss PCS Upgrade • Increase Main No. 1 to 169 m HGL	$7,499,000	$7,838,000	2023
2	Phase 2 Upgrades (M8) • Main No.4 Upgrades (Part 1) • Main No. 4 Replace Concrete Pipe Sections	$38,204,000	$44,085,000	2025-2029
3	Phase 3 Upgrades (M9) • Part 2 Main No.4 Upgrade	$55,293,000	$77,792,000	2039
4	Phase 4 Upgrade			
	• Twin Main No.3 (M10)	$47,670,000	$81,771,000	2049
	• Twin Main No.4 (M11)	$48,928,000	$83,930,000	2049
5	East-West Connector – Option 2 (M12)	$58,562,000	$77,639,000	2036
Storage Tanks				
1	Construct Smith Hill Balancing Storage (M13)	$12,820,200	$17,859,000	2038
2	Construct Smith Hill Tank Pump Station (M14)	$17,148,000	$23,888,000	2038

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Appendix A
Hydraulic Data Tables (from GeoAdvice 2020)

Table A-6.2: HGL at RWS Connection Points for 2018 MDD Demands

						2018 MDD Scenario - Kapoor Tunnel - In Service				2018 MDD Scenario - Kapoor Tunnel - Out of Service			
Junction ID	Export	Description	Main ID	Main No.	Main HGL	Max HGL (m)	Min HGL (m)	Avg HGL (m)	Avg Flow (L/s)	Max HGL (m)	Min HGL (m)	Avg HGL (m)	Avg Flow (L/s)
JCT07047	Holland Meters	1280 Burnside Rd West (Burnside / Holland Meter, 2 meters in Chamber, Branch	PPE05627	1	116	113	106	111	2	113	100	109	2
JCT15815	Wilkinson Meter	3802 Wilkinson Rd (Branch)	PPE03244	1	116	112	104	110	53	112	98	108	52
JCT15809	Marigold Meter	353 Marigold Rd (Branch)	PPE04840	1	116	112	103	109	0	112	97	108	0
JCT15806	Burnside / Admirals Meter	621 Burnside Rd West (Burnside / Admirals, Branch)	PPE04839	1	116	112	103	109	0	112	96	107	0
JCT15750	Dupplin Meter	394 Dupplin Rd (Branch)	PPE03795	1	116	112	102	109	37	112	95	107	36
JCTGA20670	Admirals Meter	1102 Admirals Rd (Line)	PPE25238	2A	116	113	105	110	24	112	98	108	23
JCT15746	Cecilia/Craigflower Meter	Unmetered Esquimalt Connection (Esquimalt PCS)	PPE52852	2	116	112	104	109	54	112	97	108	53
JCT15721	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE52848	2	116	112	102	109	53	112	96	107	52
JCT15720	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE52847	2	116	112	102	109	53	112	96	107	52
JCTGA19058	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE10527	2	116	112	102	109	53	112	95	107	52
JCT20453	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE10530	2	116	112	102	109	53	112	95	107	52
JCT20457	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE10532	2	116	112	102	109	53	112	95	107	52
JCT17314	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE08685	2	116	112	102	109	53	112	95	107	52
JCT24772	Cecilia/Craigflower Meter	Unmetered Victoria Connection	PPE08702	2	116	112	102	109	53	112	95	107	52
JCTGA20620	Admirals / TCH Meters	3150 Admirals Rd (TCH / Admirals, 2 Meters in Chamber, Branch)	PPE67157	3	116	112	103	109	23	112	97	108	22
JCT15790	Tillicum Meter	314 Burnside Rd West (Branch)	PPE00575	3	116	112	102	109	63	112	96	107	62
JCT15763	Cloverdale Meter	729 Cloverdale Ave (Branch)	PPE06632	3	116	111	97	107	40	111	91	105	40
JCT15754	Tolmie / Douglas Meter	3199 Douglas St (Tolmie / Douglas, Branch)	PPE05759	3	116	111	97	107	99	111	91	105	98
JCT15774	Somerset Meter	3193 Somerset St (Branch)	PPE01634	3	116	111	93	106	12	111	88	104	12

						2018 MDD Scenario - Kapoor Tunnel - In Service				2018 MDD Scenario - Kapoor Tunnel - Out of Service			
Junction ID	Export	Description	Main ID	Main No.	Main HGL	Max HGL (m)	Min HGL (m)	Avg HGL (m)	Avg Flow (L/s)	Max HGL (m)	Min HGL (m)	Avg HGL (m)	Avg Flow (L/s)
JCT15777	Maplewood Meter	3220 Maplewood Rd (Branch)	PPE01635	3	116	111	91	105	110	111	87	103	106
JCT17446	Mallek Meter	2999 Cook St (Cook / Mallek, Branch)	PPE10641	3	116	111	91	105	8	111	87	103	8
JCT20606	Cook Meter	2999 Cook St (Cook / Mallek, Branch)	PPE03572	3	116	111	91	105	52	111	87	103	50
JCT15758	North Dairy Meter	1650 North Dairy Rd (Branch)	PPE03592	3	116	110	84	102	0	110	81	100	0
JCT15757	Shelbourne Meter	3199 Shelbourne St (Branch)	PPE03370	3	116	110	84	102	126	110	81	100	126
JCT15738	Richmond Meter	3101 Richmond Rd (Branch)	PPE01718	3	116	110	81	101	5	110	79	99	5
JCT15737	Oak Bay #1/2 Meter	1998 Lansdowne Rd (Branch)	PPE08849	3	116	110	80	101	205	110	78	99	204
JCT15744	Oak Bay #3/Foul Bay Meter	3133 Foul Bay Rd (Branch)	PPE05366	3	116	110	80	101	69	110	78	99	68
JCTGA19076	Cedar Hill #1/2/Mount Tolmie Meter	1855 Cedar Hill Cross Rd (East, Branch)	PPE10831	3	77	78	75	77	193	78	75	77	191
JCT07078	Burnside Meters	1446 Burnside Rd West (Burnside / Helmcken, 3 Meters in Chamber (Burnside West Line and 2 Branch)	PPE05495	4	169	164	144	158	2	130	105	119	2
JCT15825	Blue Ridge Meter	1398 Blue Ridge Rd (Branch)	PPE08641	4	169	163	143	157	6	129	105	119	6
JCT15827	Roy Meter	1298 Roy Rd (Branch)	PPE03216	4	169	163	142	157	1	129	104	119	1
JCT15833	Layritz Meter	698 Mann Ave (Branch)	PPE06920	4	169	163	141	156	52	129	103	118	52
JCT15836	Markham Meter	4701 West Saanich Rd (Branch)	PPE14377	4	169	162	140	155	84	129	102	117	84
JCT15845	Cherry Tree Meter	4869 Cherry Tree Bend (Branch)	PPE03088	4	169	162	138	154	197	129	100	117	190
JCT15850	SPS - Central Saanich	Main No. 4 Connection to Hamsterly PS / Bear Hill Reservoir	PPE05123	4	169	158	130	148	188*	128	94	110	185*
JCT15861	Alderley Meter	5551 Alderley Rd (Branch)	PPE00189	4	114	114	114	114	33	114	89	103	33
JCTGA19018	Martindale Meters	(Central Saanich Consumption) (0402MTR02) Martindale PS - 2 meters billed	PPE01515	4	114	99	99	99	5	99	87	97	6
JCTGA18892	Lochside Meters	(Central Saanich Consumption) (0403MTR02, 0403MTR03) Lochside, Stellys PS - 2 meter	PPE01306	4	114	114	106	109	6	113	86	99	6
JCT15969	Tsawout Meters	(Central Saanich Consumption) (0462MTR02) Tsawout Chamber - 2	PPE05718	4	114	114	104	109	4	113	85	98	4

						2018 MDD Scenario - Kapoor Tunnel - In Service				2018 MDD Scenario - Kapoor Tunnel - Out of Service			
Junction ID	Export	Description	Main ID	Main No.	Main HGL	Max HGL (m)	Min HGL (m)	Avg HGL (m)	Avg Flow (L/s)	Max HGL (m)	Min HGL (m)	Avg HGL (m)	Avg Flow (L/s)
		meters 2" & 10", 7538 Central Saanich R											
JCTGA19070	Mt Newton Meter	(Central Saanich Consumption) Mount Newton PS	PPE13977	4	114	94	94	94	13	94	85	92	12
JCT16015	SPS - North Saanich	Main No. 4 Connection to Lowe Road PS	PPE02751	4	114	114	89	100	189	110	81	91	188*
JCTGA19080	McTavish Inlet Meter	McTavish Inlet Meter	PPE14093	4	114	113	85	98	149	110	81	90	133*
JCT05133	JdF Distribution System	Main No. 7 Start	PPE04836	7	116	115	111	113	60	114	103	111	57**
JCT04007	JdF Distribution System	Main No. 7 Terminus (Metchosin)	PPE04319	7	116	115	111	113	5	114	104	111	6**
JCT02874	JdF Distribution System	Main No. 8 Start	PPE02902	8	116	116	114	115	70	115	105	113	67**
JCT02589	JdF Distribution System	Main No. 8 Terminus (Metchosin)	PPE00374	8	116	115	112	114	13	115	104	112	13**
JCT04656	JdF Distribution System	Main No. 14 Start	PPE02814	14	169	166	156	163	7	130	116	125	8**
JCTGA036	JdF Distribution System	Main No. 14 Terminus (Highlands)	PPE07823	14	169	166	155	163	0	130	116	125	0**
JCT00885	JdF Distribution System	Main No. 15 Terminus (Sooke)	PPE00953	15	91-98	95	89	92	85	99	88	93	81

Table A-6.4: HGL at RWS Connection Points for 2050 MDD Demands – Before Upgrades (Red Shade) and After Upgrades (Green Shade)

					2050 MDD Scenario - Kapoor Tunnel - In Service		2050 MDD Scenario - Kapoor Tunnel - Out of Service	
					Before Upgrades	After Upgrades	Before Upgrades	After Upgrades
Junction ID	Connection Point	Main No.	LoS Sooke Lake Reservoir (HGL - m)	LoS Goldstream System (HGL - m)	Average HGL (m)	Average HGL (m)	Average HGL (m)	Average HGL (m)
JCT00885	Main No. 15 Terminus	15	92	93	98	99	99	99
JCT02589	Main No. 8 Terminus	8	114	112	113	114	110	113
JCT02874	Main No. 8 Start	8	115	113	115	115	111	115
JCT04007	Main No. 7 Terminus	7	113	111	113	114	109	113
JCT04656	Main No. 14 Start	14	163	125	160	162	121	125
JCT05133	Main No. 7 Start	7	113	111	113	114	109	113
JCT07047	Export - Holland Meters (x2)	1	111	109	110	112	107	112
JCT07080	Burnside Meters (Burnside/Helmcken - Supply Outlet x2)	4	158	119	154	158	115	121
JCT15720	Craigflower Meter - Craigflower Rd @ Lampson St. #3	2	109	107	108	110	105	110
JCT15721	Craigflower Meter - Craigflower Rd @ Lampson St. #2	2	109	107	108	110	105	110
JCT15737	Oak Bay Meters #1 & #2 - Lansdowne Rd @ Foul Bay Rd	3	101	99	101	103	97	102
JCT15738	Richmond Meter - Richmond Rd (Supply Outlet)	3	101	99	101	103	98	103
JCT15744	Oak Bay #3 & Foul Bay Meters - Foul Bay Rd @ Lansdowne Rd	3	101	99	100	103	97	102
JCT15746	Craigflower Meter - Craigflower Rd (Esquimalt PCS)	2	109	108	109	111	105	110
JCT15750	Dupplin Meter - Dupplin Rd (Supply Outlet)	1	109	107	108	110	105	110
JCT15754	Tolmie/Douglas Meter - Douglas St (Supply Outlet)	3	107	105	106	108	103	108
JCT15757	Shelbourne Meter - Shelbourne St @ N Dairy Dr.	3	102	100	102	104	98	103
JCT15758	North Dairy Meter - North Dairy Rd (Supply Outlet)	3	102	100	102	104	98	103

					2050 MDD Scenario - Kapoor Tunnel - In Service		2050 MDD Scenario - Kapoor Tunnel - Out of Service	
					Before Upgrades	After Upgrades	Before Upgrades	After Upgrades
Junction ID	Connection Point	Main No.	LoS Sooke Lake Reservoir (HGL - m)	LoS Goldstream System (HGL - m)	Average HGL (m)	Average HGL (m)	Average HGL (m)	Average HGL (m)
JCT15763	Cloverdale Meter - Douglas St (Supply Outlet)	3	107	105	106	108	103	108
JCT15774	Somerset Meter - Tolmie Ave (Supply Outlet)	3	106	104	105	107	102	106
JCT15777	Maplewood Meter - Cook St (Supply Outlet)	3	105	103	104	106	101	106
JCT15790	Tillicum Meter - Tillicum Rd (Supply Outlet)	3	109	107	108	110	105	110
JCT15806	Burnside/Admirals Meter - Burnside Rd (Supply Outlet)	1	109	107	109	111	105	110
JCT15809	Marigold Meter - Marigold Rd (Supply Outlet)	1	109	108	109	111	105	110
JCT15815	Wilkinson Meter - Wilkinson Rd (Supply Outlet)	1	110	108	109	111	106	111
JCT15825	Blue Ridge Meter - Blue Ridge Rd (Supply Outlet)	4	157	119	153	158	115	121
JCT15827	Roy Meter - Roy Rd (Supply Outlet)	4	157	119	153	157	114	120
JCT15833	Layritz Meter - Layritz Park (Supply Outlet)	4	156	118	152	156	113	119
JCT15836	Markham Meter - West Saanich Rd (Supply Outlet)	4	155	117	151	156	113	119
JCT15845	Cherry Tree Bend Meter - Cherry Tree Bend	4	154	117	151	155	112	118
JCT15850	Hamsterly Pump Station	4	148	110	144	148	105	111
JCT15860	Alderley Meter - Alderley Rd (Supply Outlet)	4	114	103	114	115	99	105
JCT15959	Lochside Meters	4	109	99	110	110	95	101
JCT15969	Central Saanich Rd - Tsawout Meter (Supply Outlet x2)	4	109	98	109	109	95	100
JCT16015	Lowe Meter - Lowe Road Pump Station	4	100	91	102	102	88	94
JCT17314	Cecelia & Craigflower Meter - Unmetered Victoria Connection	2	109	107	108	110	105	110
JCT17446	Mallek Meter - Cook St (Supply Outlet)	3	105	103	104	106	101	106

					2050 MDD Scenario - Kapoor Tunnel - In Service		2050 MDD Scenario - Kapoor Tunnel - Out of Service	
					Before Upgrades	After Upgrades	Before Upgrades	After Upgrades
Junction ID	Connection Point	Main No.	LoS Sooke Lake Reservoir (HGL - m)	LoS Goldstream System (HGL - m)	Average HGL (m)	Average HGL (m)	Average HGL (m)	Average HGL (m)
JCT20453	Cecelia & Craigflower Meter - Unmetered Victoria Connection	2	109	107	108	110	105	110
JCT20457	Cecelia & Craigflower Meter - Unmetered Victoria Connection	2	109	107	108	110	105	110
JCT20606	Cook St Meter - Cook St @ Mallek Cres	3	105	103	104	106	101	106
JCT23804	Mount Newton Meter	4	108	98	108	109	94	100
JCT23902	McTavish Reservoir Inlet	4	98	90	100	101	87	93
JCTGA036	Main No. 14 Terminus	14	163	125	160	162	121	124
JCTGA18864	Martindale Meter	4	112	101	112	112	97	103
JCTGA18880	Cecilia & Craigflower Meter - Unmetered Victoria Connection	2	109	107	108	110	105	110
JCTGA19058	Cecelia & Craigflower Meter - Unmetered Victoria Connection	2	109	107	108	110	105	110
JCTGA19076	Mount Tolmie, Cedar Hill #1 & Cedar Hill #2 Meters (RWS Connection)	3	77	77	77	77	77	77
JCTGA19080	McTavish Inlet Meter	4	98	90	101	101	87	93
JCTGA20620	Admirals/TCH Meters - Admirals Rd (Supply Outlet)	3	109	108	109	111	106	110
JCTGA20670	Admirals Meter	2A	110	108	109	111	106	111
					FAIL: HGL < LoS Target		PASS: HGL > LoS Target	

Appendix B
Cost Estimates

	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	12/31/2032	$82,971,000
Stage 1 Balancing Tank	M6	$5,538,000	12/31/2032	$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				
Storage Hill Tank	M13	$12,820,000	12/31/2038	$17,859,000
Smith Hill Tank Pump Station	M14	$17,148,000	12/31/2038	$23,888,000
	Totals	**$1,528,000,000**		**$2,048,000,000**

*Jack Lake alignment with Pump Stations and transmission main sized for 2100 ADD Level of Service flow ~375 MLD

CAPITAL REGIONAL DISTRICT
2022 Master Plan

S3

Deep Northern Intake/Floating Pump Station					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$831,700
1.1	Bonding	%	1	1.5%	$623,800
1.2	Insurance	%	1	1.5%	$623,800
1.3	General Conditions	%	1	10%	$4,158,500
				Subtotal General Requirements	$6,237,800
2.0	Sooke Lake Reservoir Intake Pump Station (2100 ADD Firm Capacity - 375 MLD)				
2.1	Pump Station Floating Structure	LS	1	$4,178,744	$4,178,744
2.2	Pumps and motors - 75 MLD @ 92.6m TDH - 1,500 HP	each	6	$450,000	$2,700,000
2.3	Process stainless steel piping, fittings, welding, appurtenances	LS	1	$1,350,000	$1,350,000
2.4	Electrical, Instrumentation, Controls	LS	1	$2,468,623	$2,468,623
2.5	Standby power 4 X 1.5 MW generators	MW	6	$1,000,000	$6,000,000
2.6	ATS	each	1	$150,000	$150,000
2.7	Diesel tank farm for standby power	LS	1	$1,000,000	$1,000,000
2.8	BC Hydro High Voltage Supply and Connections	m	25,000	$700	$17,500,000
				Total Construction Costs	$41,585,167
Direct Costs:					
	Construction Costs				$41,585,167
	Contingency (% of Construction Costs)		35%		$14,554,800
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$11,942,900
			12/31/2031	9.74	
				Total Direct Costs	$68,082,867
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$10,212,400
	Administration & Program Management (% of Direct Costs)		6%		$4,085,000
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$1,361,700
				Total Indirect Costs	$15,659,100
				Subtotal (Direct + Indirect Costs)	$83,741,967
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$4,187,100
				Total Capital Costs	$87,929,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT

S4/RWT1

2022 Master Plan

Leech River Diversion					Prepared on: 8-Apr-22
Item No.	Description	Installed Cost			
		Unit	Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$191,600
1.1	Bonding	%	1	1.5%	$143,700
1.2	Insurance	%	1	1.5%	$143,700
1.3	General Conditions	%	1	10%	$957,800
				Subtotal General Requirements	$1,436,800
2.0	Diversion works				
2.1	Diversion of Leech River to open channel flow in Leech Tunnel	LS	1	$8,141,600	$8,141,600
				Total Construction Costs	$9,578,400
Direct Costs:					
	Construction Costs				$9,578,400
	Contingency (% of Construction Costs)		35%		$3,352,400
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$7,359,100
			12/31/2044	22.75	
				Total Direct Costs	$20,289,900
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$3,043,500
	Administration & Program Management (% of Direct Costs)		6%		$1,217,400
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$405,800
				Total Indirect Costs	$4,666,700
				Subtotal (Direct + Indirect Costs)	$24,956,600
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$1,247,800
				Total Capital Costs	$26,204,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M1

Sooke Lake Saddle Dam Hydraulic Improvements					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$114,700
1.1	Bonding	%	1	1.5%	$86,000
1.2	Insurance	%	1	1.5%	$86,000
1.3	General Conditions	%	1	10%	$573,600
				Subtotal General Requirements	$860,300
2.0	Saddle Dam Modifications				
2.1	Hydraulic modifications to dam culverts for additional flow*	LS	1	$4,875,200	$4,875,200
				Total Construction Costs	$5,735,500
Direct Costs:					
	Construction Costs				$5,735,500
	Contingency (% of Construction Costs)		35%		$2,007,400
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$4,406,600
			12/31/2044	22.75	
				Total Direct Costs	$12,149,500
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$1,822,400
	Administration & Program Management (% of Direct Costs)		6%		$729,000
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$243,000
				Total Indirect Costs	$2,794,400
				Subtotal (Direct + Indirect Costs)	$14,943,900
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$747,200
				Total Capital Costs	$15,691,000

* Deception Gulch Dam and Sooke Lake Saddle Dam require upgrades to bring Deception Gulch Reservoir to full pool

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

T2/T4

Japan Gulch Dam Decommissioning					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$117,600
1.1	Bonding	%	1	1.5%	$88,200
1.2	Insurance	%	1	1.5%	$88,200
1.3	General Conditions	%	1	10%	$588,200
				Subtotal General Requirements	$882,200
2.0	Decommissioning				
2.1	Removal and disposal of Japan Gulch Dam	LS	1	$5,000,000	$5,000,000
				Total Construction Costs	$5,882,200
Direct Costs:					
	Construction Costs				$5,882,200
	Contingency (% of Construction Costs)		35%		$2,058,800
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$2,078,400
			12/31/2033	11.74	
				Total Direct Costs	$10,019,400
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$1,502,900
	Administration & Program Management (% of Direct Costs)		6%		$601,200
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$200,400
				Total Indirect Costs	$2,304,500
				Subtotal (Direct + Indirect Costs)	$12,323,900
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$616,200
				Total Capital Costs	$12,940,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

T2/T4

WFP - Direct Filtration					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$8,444,400
1.1	Bonding	%	1	1.5%	$6,333,300
1.2	Insurance	%	1	1.5%	$6,333,300
1.3	General Conditions	%	1	10%	$42,222,200
				Subtotal General Requirements	$63,333,200
2.0	Filtration Plant				
2.1	390 MLD Direct Filtration Plant	LS	1	$358,889,000	$358,889,000
				Total Construction Costs	$422,222,200
Direct Costs:					
	Construction Costs				$422,222,200
	Contingency (% of Construction Costs)		35%		$147,777,800
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$178,240,500
			12/31/2035	13.74	
				Total Direct Costs	$748,240,500
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$112,236,100
	Administration & Program Management (% of Direct Costs)		6%		$44,894,400
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$14,964,800
				Total Indirect Costs	$172,095,300
				Subtotal (Direct + Indirect Costs)	$920,335,800
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$46,016,800
				Total Capital Costs	$966,353,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

T2/T4

WFP - Treated Water Pump Station					Prepared on: 8-Apr-22
Item No.	Description	Unit	Quantity	Installed Cost Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$401,900
1.1	Bonding	%	1	1.5%	$301,400
1.2	Insurance	%	1	1.5%	$301,400
1.3	General Conditions	%	1	10%	$2,009,400
				Subtotal General Requirements	$3,014,100
2.0	Pump Station				
2.1	Site clearing, stripping, grading, granular sub-base, base course, gravel fills throughout site and behind building walls	LS	1	$500,000	$500,000
2.2	Pump station walls, roof, concrete and reinforcement, outfit (25m X 20m)	m^2	500	$4,000	$2,000,000
2.3	Pumps and motors - 78 MLD @ 50 m TDH - 1,000 HP	each	6	$400,000	$2,400,000
2.4	Process stainless steel piping, fittings, welding, appurtenances	LS	1	$1,200,000	$1,200,000
2.5	Electrical, Instrumentation, Controls	LS	1	$1,830,000	$1,830,000
2.6	Standby power - 3 X 1.5 MW generators	MW	4.5	$1,000,000	$4,500,000
2.7	ATS	each	1	$150,000	$150,000
2.8	Diesel tank farm for standby power	LS	1	$1,000,000	$1,000,000
2.9	BC Hydro High Voltage Supply and Connections	m	5,000	$700	$3,500,000
				Total Construction Costs	$17,080,000
Direct Costs:					
	Construction Costs				$17,080,000
	Contingency (% of Construction Costs)	35%			$5,978,000
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$7,815,700
			12/31/2036	14.74	
				Total Direct Costs	$30,873,700
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$4,631,100
	Administration & Program Management (% of Direct Costs)		6%		$1,852,400
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$617,500
				Total Indirect Costs	$7,101,000
				Subtotal (Direct + Indirect Costs)	$37,974,700
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$1,898,700
				Total Capital Costs	$39,873,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

T2/T4

WFP - Clearwell					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$275,300
1.1	Bonding	%	1	1.5%	$206,500
1.2	Insurance	%	1	1.5%	$206,500
1.3	General Conditions	%	1	10%	$1,376,500
				Subtotal General Requirements	$2,064,800
2.0	Clearwell				
2.1	39,000 m^3 clearwell	m^3	39,000	$300	$11,700,000
				Total Construction Costs	$13,764,800
Direct Costs:					
	Construction Costs				$13,764,800
	Contingency (% of Construction Costs)		35%		$4,817,700
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$6,298,700
			12/31/2036	14.74	
				Total Direct Costs	$24,881,200
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$3,732,200
	Administration & Program Management (% of Direct Costs)		6%		$1,492,900
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$497,600
				Total Indirect Costs	$5,722,700
				Subtotal (Direct + Indirect Costs)	$30,603,900
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$1,530,200
				Total Capital Costs	$32,134,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M2

Japan Gulch Water Filtration Plant Stage 2 Balancing Tank					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$176,500
1.1	Bonding	%	1	1.5%	$132,400
1.2	Insurance	%	1	1.5%	$132,400
1.3	General Conditions	%	1	10%	$882,400
				Subtotal General Requirements	$1,323,700
2.0	Storage/Balancing Tank				
2.1	25,000 m^3 cast in place concrete tank	m^3	25,000	$300	$7,500,000
				Total Construction Costs	$8,823,700
Direct Costs:					
	Construction Costs				$8,823,700
	Contingency (% of Construction Costs)		35%		$3,088,300
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$4,037,700
			12/31/2036	14.74	
				Total Direct Costs	$15,949,700
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$2,392,500
	Administration & Program Management (% of Direct Costs)		6%		$957,000
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$319,000
				Total Indirect Costs	$3,668,500
				Subtotal (Direct + Indirect Costs)	$19,618,200
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$980,900
				Total Capital Costs	$20,599,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M3

DNI Transmission Main to Head Tank					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$444,700
1.1	Bonding	%	1	1.5%	$333,500
1.2	Insurance	%	1	1.5%	$333,500
1.3	General Conditions	%	1	10%	$2,223,500
				Subtotal General Requirements	$3,335,200
2.0	Transmission Main				
2.1	1.8m steel piping including bends, thrusting, valves	m	4,200	$4,500	$18,900,000
				Total Construction Costs	$22,235,200
Direct Costs:					
	Construction Costs				$22,235,200
	Contingency (% of Construction Costs)		35%		$7,782,300
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$6,748,000
			06/30/2032	10.24	
				Total Direct Costs	$36,765,500
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$5,514,800
	Administration & Program Management (% of Direct Costs)		6%		$2,205,900
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$735,300
				Total Indirect Costs	$8,456,000
				Subtotal (Direct + Indirect Costs)	$45,221,500
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$2,261,100
				Total Capital Costs	$47,483,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M4

3rd Main - Sooke Lake Dam to Head Tank					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$84,700
1.1	Bonding	%	1	1.5%	$63,500
1.2	Insurance	%	1	1.5%	$63,500
1.3	General Conditions	%	1	10%	$423,500
				Subtotal General Requirements	$635,200
2.0	Transmission Main				
2.1	1.2m steel piping including bends, thrusting, valves	m	1,200	$3,000	$3,600,000
				Total Construction Costs	$4,235,200
Direct Costs:					
	Construction Costs				$4,235,200
	Contingency (% of Construction Costs)		35%		$1,482,300
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$1,355,000
			12/31/2032	10.74	
				Total Direct Costs	$7,072,500
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$1,060,900
	Administration & Program Management (% of Direct Costs)		6%		$424,400
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$141,500
				Total Indirect Costs	$1,626,800
				Subtotal (Direct + Indirect Costs)	$8,699,300
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$435,000
				Total Capital Costs	$9,134,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

RWT5*

Jack Lake – Head Tank to Japan Gulch + 2 PS @ 2100 ADD					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$2,393,400
1.1	Bonding	%	1	1.5%	$1,795,100
1.2	Insurance	%	1	1.5%	$1,795,100
1.3	General Conditions	%	1	10%	$11,967,100
				Subtotal General Requirements	$17,950,700
2.0	Pump Stations				
	Pump Station #2				
2.1	Site clearing, stripping, grading, granular sub-base, base course, gravel fills throughout site and behind building walls	LS	1	$200,000	$200,000
2.2	Pump station walls, roof, concrete and reinforcement, outfit (25m X 20m)	m^2	500	$4,000	$2,000,000
2.3	Pumps and motors - 125 MLD @ 93.942 m TDH - 2,400 HP	each	4	$500,000	$2,000,000
2.4	Process stainless steel piping, fittings, welding, appurtenances	LS	1	$1,000,000	$1,000,000
2.5	Electrical, Instrumentation, Controls	LS	1	$1,560,000	$1,560,000
2.6	Standby power - 4 X 1.5 MW generators	MW	6	$1,000,000	$6,000,000
2.7	ATS	each	1	$150,000	$150,000
2.8	Balancing Wet Well (1,000m3)	m^3	1,000	$300	$300,000
	Pump Station #3				
2.9	Site clearing, stripping, grading, granular sub-base, base course, gravel fills throughout site and behind building walls	LS	1	$200,000	$200,000
2.10	Pump station walls, roof, concrete and reinforcement, outfit (25m X 20m)	m^2	500	$4,000	$2,000,000
2.11	Pumps and motors - 125 MLD @ 95,285 m TDH - 2,400 HP	each	4	$500,000	$2,000,000
2.12	Process stainless steel piping, fittings, welding, appurtenances	LS	1	$1,000,000	$1,000,000
2.13	Electrical, Instrumentation, Controls	LS	1	$1,560,000	$1,560,000
2.14	Standby power - 4 X 1.5 MW generators	MW	6	$1,000,000	$6,000,000
2.15	ATS	each	1	$150,000	$150,000
2.16	Balancing Wet Well (1,000m3)	m^3	1,000	$300	$300,000
3.0	Transmission Mains and PCS				
3.1	1.8 m steel piping including bends, thrusting, valves HT to Jack Lake	m	11,600	$4,500	$52,200,000
3.2	1.8 m steel piping including bends, thrusting, valves Jack Lake to Japan Gulch	m	4,800	$4,500	$21,600,000
3.3	PCS to reduce pressure from 427m to 169m	each	3	$500,000	$1,500,000
				Total Construction Costs	$119,670,700
Direct Costs:					
	Construction Costs				$119,670,700
	Contingency (% of Construction Costs)			35%	$41,884,700
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$59,086,600
			12/31/2037	15.74	
				Total Direct Costs	$220,642,000
Indirect Costs:					
	Engineering (% of Direct Costs)			15%	$33,096,300
	Administration & Program Management (% of Direct Costs)			6%	$13,238,500
	Miscellaneous/Specialty Consultants (% of Direct Costs)			2%	$4,412,800
				Total Indirect Costs	$50,747,600
				Subtotal (Direct + Indirect Costs)	$271,389,600
	Interim Financing (% of Subtotal)			0%	$0
	Project Contingency (% of Subtotal)			5%	$13,569,500
				Total Capital Costs	$284,959,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M5

Goldstream Connector - Goldstream Dam to Japan Gulch					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$769,400
1.1	Bonding	%	1	1.5%	$577,100
1.2	Insurance	%	1	1.5%	$577,100
1.3	General Conditions	%	1	10%	$3,847,100
				Subtotal General Requirements	$5,770,700
2.0	Transmission Main and Access Roadway				
2.1	1.2m steel piping GS dam to Jack Lake	m	2,400	$3,000	$7,200,000
2.2	1.8m steel piping Jack Lake to Japan Gulch	m	4,800	$4,500	$21,600,000
2.3	Access Roadway	m	2,400	$1,000	$2,400,000
2.4	Pressure Control Stations	each	3	$500,000	$1,500,000
				Total Construction Costs	$38,470,700
Direct Costs:					
	Construction Costs				$38,470,700
	Contingency (% of Construction Costs)		35%		$13,464,700
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$12,308,100
			12/31/2032	10.74	
				Total Direct Costs	$64,243,500
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$9,636,500
	Administration & Program Management (% of Direct Costs)		6%		$3,854,600
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$1,284,900
				Total Indirect Costs	$14,776,000
				Subtotal (Direct + Indirect Costs)	$79,019,500
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$3,951,000
				Total Capital Costs	$82,971,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M6

Stage 1 Balancing Tank					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$63,500
1.1	Bonding	%	1	1.5%	$47,600
1.2	Insurance	%	1	1.5%	$47,600
1.3	General Conditions	%	1	10%	$317,600
				Subtotal General Requirements	$476,300
2.0	Storage/Balancing Tank				
2.1	9,000 m^3 cast in place concrete tank	m^3	9,000	$300	$2,700,000
				Total Construction Costs	$3,176,300
Direct Costs:					
	Construction Costs				$3,176,300
	Contingency (% of Construction Costs)		35%		$1,111,700
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	
			12/31/2032	10.74	$1,016,200
				Total Direct Costs	$5,304,200
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$795,600
	Administration & Program Management (% of Direct Costs)		6%		$318,300
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$106,100
				Total Indirect Costs	$1,220,000
				Subtotal (Direct + Indirect Costs)	$6,524,200
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$326,200
				Total Capital Costs	$6,850,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M 7

Treated Water Transmission Mains - Phase 1 Upgrades					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$86,000
1.1	Bonding	%	1	1.5%	$64,500
1.2	Insurance	%	1	1.5%	$64,500
1.3	General Conditions	%	1	10%	$430,100
				Subtotal General Requirements	$645,100
2.0	Phase 1				
2.1	Watkiss PCS Upgrade	each	1	$500,000	$500,000
2.2	Main No.1 Upgrade - Semi-Urban	m	39	$4,000	$156,000
2.3	Associated PCS Upgrade as a result of Main No.1 HGL Increase	each	6	$500,000	$3,000,000
				Total Construction Costs	$4,301,100
Direct Costs:					
	Construction Costs				$4,301,100
	Contingency (% of Construction Costs)	35%			$1,505,400
		2.0%	Mid-point	Years	$262,200
	Inflation to Mid-point of Construction - (% per annum)		6/30/2024	2.23	
				Total Direct Costs	$6,068,700
Indirect Costs:					
	Engineering (% of Direct Costs)	15%			$910,300
	Administration & Program Management (% of Direct Costs)	6%			$364,100
	Miscellaneous/Specialty Consultants (% of Direct Costs)	2%			$121,400
				Total Indirect Costs	$1,395,800
				Subtotal (Direct + Indirect Costs)	$7,464,500
	Interim Financing (% of Subtotal)	0%			$0
	Project Contingency (% of Subtotal)	5%			$373,200
				Total Capital Costs	$7,838,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M8

Treated Water Transmission Mains - Phase 2 Upgrades					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$438,200
1.1	Bonding	%	1	1.5%	$328,700
1.2	Insurance	%	1	1.5%	$328,700
1.3	General Conditions	%	1	10%	$2,191,200
				Subtotal General Requirements	$3,286,800
2.0	Phase 2				
2.1	Main No.4 Upgrade - Rural	m	1,340	$3,500	$4,690,000
2.2	Main No.4 Upgrade - Semi Urban	m	2,345	$4,000	$9,380,000
2.3	Main No.4 Upgrade - Urban	m	911	$5,000	$4,555,000
				Total Construction Costs	$21,911,800
Direct Costs:					
	Construction Costs				$21,911,800
	Contingency (% of Construction Costs)	35%			$7,669,100
		2.0%	Mid-point	Years	$4,553,400
	Inflation to Mid-point of Construction - (% per annum)		6/30/2029	7.23	
				Total Direct Costs	$34,134,300
Indirect Costs:					
	Engineering (% of Direct Costs)	15%			$5,120,100
	Administration & Program Management (% of Direct Costs)	6%			$2,048,100
	Miscellaneous/Specialty Consultants (% of Direct Costs)	2%			$682,700
				Total Indirect Costs	$7,850,900
				Subtotal (Direct + Indirect Costs)	$41,985,200
	Interim Financing (% of Subtotal)	0%			$0
	Project Contingency (% of Subtotal)	5%			$2,099,300
				Total Capital Costs	$44,085,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M9

Treated Water Transmission Mains - Phase 3 Upgrades					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$634,300
1.1	Bonding	%	1	1.5%	$475,700
1.2	Insurance	%	1	1.5%	$475,700
1.3	General Conditions	%	1	10%	$3,171,300
				Subtotal General Requirements	$4,757,000
2.0	Phase 3				
2.1	Main No.4 Upgrade - Rural	m	1,640	$3,500	$5,740,000
2.2	Main No.4 Upgrade - Semi Urban	m	1,869	$4,000	$7,476,000
2.3	Main No.4 Upgrade - Urban	m	2,748	$5,000	$13,740,000
				Total Construction Costs	$31,713,000
Direct Costs:					
	Construction Costs				$31,713,000
	Contingency (% of Construction Costs)		35%		$11,099,600
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$17,421,000
			6/30/2039	17.24	
				Total Direct Costs	$60,233,600
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$9,035,000
	Administration & Program Management (% of Direct Costs)		6%		$3,614,000
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$1,204,700
				Total Indirect Costs	$13,853,700
				Subtotal (Direct + Indirect Costs)	$74,087,300
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$3,704,400
				Total Capital Costs	$77,792,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M10

Treated Water Transmission Mains - Phase 4.1 Upgrades					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$546,800
1.1	Bonding	%	1	1.5%	$410,100
1.2	Insurance	%	1	1.5%	$410,100
1.3	General Conditions	%	1	10%	$2,734,100
				Subtotal General Requirements	$4,101,100
2.0	Phase 4.1				
2.1	Main No.3 Upgrade - Urban	m	4,648	$5,000	$23,240,000
				Total Construction Costs	$27,341,100
Direct Costs:					
	Construction Costs				$27,341,100
	Contingency (% of Construction Costs)		35%		$9,569,400
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$26,404,200
			6/30/2049	27.25	
				Total Direct Costs	$63,314,700
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$9,497,200
	Administration & Program Management (% of Direct Costs)		6%		$3,798,900
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$1,266,300
				Total Indirect Costs	$14,562,400
				Subtotal (Direct + Indirect Costs)	$77,877,100
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$3,893,900
				Total Capital Costs	$81,771,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M11

Treated Water Transmission Mains - Phase 4.2 Upgrades					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$561,300
1.1	Bonding	%	1	1.5%	$420,900
1.2	Insurance	%	1	1.5%	$420,900
1.3	General Conditions	%	1	10%	$2,806,300
				Subtotal General Requirements	$4,209,400
2.0	Phase 4.2				
2.1	Main No.4 Upgrade - Rural	m	2,645	$3,500	$9,257,500
2.2	Main No.4 Upgrade - Semi-Urban	m	3,649	$4,000	$14,596,000
				Total Construction Costs	$28,062,900
Direct Costs:					
	Construction Costs				$28,062,900
	Contingency (% of Construction Costs)		35%		$9,822,000
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$27,101,300
			6/30/2049	27.25	
				Total Direct Costs	$64,986,200
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$9,747,900
	Administration & Program Management (% of Direct Costs)		6%		$3,899,200
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$1,299,700
				Total Indirect Costs	$14,946,800
				Subtotal (Direct + Indirect Costs)	$79,933,000
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$3,996,700
				Total Capital Costs	$83,930,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M12

East-West Connector - Option 2 Transmission Main					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$671,800
1.1	Bonding	%	1	1.5%	$503,800
1.2	Insurance	%	1	1.5%	$503,800
1.3	General Conditions	%	1	10%	$3,358,800
				Subtotal General Requirements	$5,038,200
2.0	Linear Piping and Access				
2.1	1.0m steel piping including bends, thrusting, valves	m	4,300	$2,500	$10,750,000
2.2	0.5m steel piping including bends, thrusting, valves	m	14,000	$1,250	$17,500,000
2.3	Downstream PRV	ea	1	$300,000	$300,000
				Total Construction Costs	$33,588,200
Direct Costs:					
	Construction Costs				$33,588,200
	Contingency (% of Construction Costs)		35%		$11,755,900
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$14,771,500
			6/30/2036	14.24	
				Total Direct Costs	$60,115,600
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$9,017,300
	Administration & Program Management (% of Direct Costs)		6%		$3,606,900
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$1,202,300
				Total Indirect Costs	$13,826,500
				Subtotal (Direct + Indirect Costs)	$73,942,100
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$3,697,100
				Total Capital Costs	$77,639,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M13

Smith Hill Tank					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$147,100
1.1	Bonding	%	1	1.5%	$110,300
1.2	Insurance	%	1	1.5%	$110,300
1.3	General Conditions	%	1	10%	$735,300
				Subtotal General Requirements	$1,103,000
2.0	Storage Tank				
2.1	Concrete cast-in-place tank	m^3	25,000	$250	$6,250,000
				Total Construction Costs	$7,353,000
Direct Costs:					
	Construction Costs				$7,353,000
	Contingency (% of Construction Costs)		35%		$2,573,600
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$3,901,700
			12/31/2038	16.74	
				Total Direct Costs	$13,828,300
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$2,074,200
	Administration & Program Management (% of Direct Costs)		6%		$829,700
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$276,600
				Total Indirect Costs	$3,180,500
				Subtotal (Direct + Indirect Costs)	$17,008,800
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$850,400
				Total Capital Costs	$17,859,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

CAPITAL REGIONAL DISTRICT
2022 Master Plan

M14

Smith Hill Tank Pump Station					Prepared on: 8-Apr-22
Item No.	Description	Unit	Installed Cost		
			Quantity	Unit Price	Total Costs
1.0	General Requirements				
1.0	Mobilization/Demobilization	%	1	2%	$196,700
1.1	Bonding	%	1	1.5%	$147,500
1.2	Insurance	%	1	1.5%	$147,500
1.3	General Conditions	%	1	10%	$983,500
				Subtotal General Requirements	$1,475,200
2.0	Pump Station				
2.1	Site clearing, stripping, grading, granular sub-base, base course, gravel fills throughout site and behind building walls	LS	1	$500,000	$500,000
2.2	Pump station walls, roof, concrete and reinforcement, outfit (25m X 20m)	m^2	500	$4,000	$2,000,000
2.3	Pumps and motors 20 MLD @ 50 m TDH	each	6	$300,000	$1,800,000
2.4	Process stainless steel piping, fittings, welding, appurtenances	LS	1	$900,000	$900,000
2.5	Electrical, Instrumentation, Controls	LS	1	$1,560,000	$1,560,000
2.6	Standby power 1 X 1.5 MW generators	MW	1.5	$1,000,000	$1,500,000
2.7	ATS	each	1	$100,000	$100,000
				Total Construction Costs	$9,835,200
Direct Costs:					
	Construction Costs				$9,835,200
	Contingency (% of Construction Costs)		35%		$3,442,300
	Inflation to Mid-point of Construction - (% per annum)	2.0%	Mid-point	Years	$5,218,700
			12/31/2038	16.74	
				Total Direct Costs	$18,496,200
Indirect Costs:					
	Engineering (% of Direct Costs)		15%		$2,774,400
	Administration & Program Management (% of Direct Costs)		6%		$1,109,800
	Miscellaneous/Specialty Consultants (% of Direct Costs)		2%		$369,900
				Total Indirect Costs	$4,254,100
				Subtotal (Direct + Indirect Costs)	$22,750,300
	Interim Financing (% of Subtotal)		0%		$0
	Project Contingency (% of Subtotal)		5%		$1,137,500
				Total Capital Costs	$23,888,000

Notes:

1 Costs are in 2022 Canadian Dollars.

2 Construction costs will vary depending on market conditions at the time of tender.

Denise Dionne

From: Ted Robbins
Sent: Tuesday, August 02, 2022 12:09 PM
To: Denise Dionne
Subject: FW: Capital Regional District | Regional Water Supply Master Plan

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From: Kate Richey <kate.richey@malahatnation.com>
Sent: Wednesday, July 20, 2022 9:20 AM
To: Ted Robbins <trobbins@crd.bc.ca>
Subject: RE: Capital Regional District | Regional Water Supply Master Plan

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Hello Ted,

Thank you for getting back to me and I appreciate the additional time. I think a meeting to hear an overview of the plan would be helpful, let me discuss with the Malahat team and see what the interest is.

Thanks,
Kate

From: Ted Robbins <trobbins@crd.bc.ca>
Sent: July 15, 2022 1:48 PM
To: Kate Richey <kate.richey@malahatnation.com>
Subject: RE: Capital Regional District | Regional Water Supply Master Plan

Hi Kate,

Thank-you for responding to us regarding the Master Plan. Malahat Nation can definitely have more time to respond to our request and I would be happy to meet and provide and overview of the Plan if you would like - you can let me know.

Regards,
Ted

Ted Robbins (he/him/his) | General Manager
Integrated Water Services, Capital Regional District
479 Island Highway, Victoria, BC V9B 1H7
T:250.360.3061 | C :250.217.9084 | trobbins@crd.bc.ca

Please consider the environment before printing this e-mail

From: Kate Richey <kate.richey@malahatnation.com>
Sent: Thursday, July 14, 2022 1:32 PM
To: Denise Dionne <ddionne@crd.bc.ca>; Referrals <referrals@malahatnation.com>

Cc: Ted Robbins <trobbins@crd.bc.ca>; Caitlyn Vernon <CVernon@crd.bc.ca>; Tanya Duthie <tduthie@crd.bc.ca>
Subject: RE: Capital Regional District | Regional Water Supply Master Plan

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Hello Denise,

I would like to request further time for Malahat to review the Master plan, this is a topic of great importance to Malahat and we would like to provide comment.

Regards,
Kate

From: Denise Dionne <ddionne@crd.bc.ca>
Sent: June 10, 2022 4:40 PM
To: Referrals <referrals@malahatnation.com>
Cc: Ted Robbins <trobbins@crd.bc.ca>; Caitlyn Vernon <CVernon@crd.bc.ca>; Tanya Duthie <tduthie@crd.bc.ca>
Subject: Capital Regional District | Regional Water Supply Master Plan

You don't often get email from ddionne@crd.bc.ca. Learn why this is important

Good afternoon,

Please see attached letter from Ted Robbins, General Manager, Integrated Water Services.

Regards,

Denise Dionne (she, her) | Administrative Coordinator 2
Integrated Water Services | Capital Regional District
479 Island Highway, Victoria, BC V9B 1H7
T: 250.360.3087 | F : 250.474.4012
www.crd.bc.ca | Facebook | Twitter | YouTube

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REPORT TO SSI TRANSPORTATION COMMISSION
MEETING OF MONDAY, JULY 25, 2022

ISSUE SPEED READER BOARDS

BACKGROUND

During the special meeting of the Transportation Commission on June 21st, 2022, the Commission recommended funding for the acquisition and installation of speed reader boards (SRB) in the Five Year Capital Plan. Staff have included an estimated amount in the 2023 – 2027 Capital Plan with the funds therefore becoming available in March of 2023. At the Transportation Commission meeting on June 27th, 2022, the Commission made speed reader boards their top priority.

Staff have investigated and located a supplier of solar powered speed reader boards complete with battery backup which are far less costly than options considered in previously. Staff have made preliminary enquiries with Emcon Services Inc., the Ministry of Transportation and Infrastructure (MoTI), and who are willing to install the mounting posts for the speed reader boards. CRD staff will need to apply for a permit from MoTI to locate and install the speed reader boards on MoTI right of way locations. The Commission has identified five (5) locations for the boards which are:

- Cusheon Lake Road
- North End Road
- Lower Ganges Road at Baker Road
- Lower Ganges Road near Country Grocer
- Fulford – Ganges Road near Embe Bakery

In general, ICBC supports speed reader boards on the approach to communities where speed is identified as problematic. The locations are to be assessed by MoTI and the CRD to determine if speed reader boards are warranted. Staff submitted a grant application to ICBC in the amount of $2,500 per board, which upon analysis, ICBC increased to $4,240 per board, and this amount is reflected in the section below. ICBC has expressed acceptance and verbal/e-mail approval of the grant application.

When considering speed reader boards, specifications are governed by the MoTI Traffic & Electrical Manual, Section 410.2. Speed reader boards are typically used at speed transition zones such as where traffic speed is reduced from 70 to 50. Justification for a speed board must be provided for each proposed location. Justification could be in the form of data from a speed camera, accident reports or visual observation. If approved by MoTI, MoTI coordinates the installation of the speed reader boards.

FINANCIAL IMPLICATIONS

PROJECT COST	Amount
Five (5) Sierzega Model GR33CL Speed Reader Boards c/w Solar Panel and Battery Backup @ $7,000 each	$35,000
Installation material including galvanized metal posts and foundations	$5,000
Installation labour	$5,000
Programming of Speed Reader Boards	$2,500

Contingency at 10%	$4,750
CRD Project Management and Administration at 10%	$5,225
TOTAL PROJECT COST	**$57,475**
PROJECT FUNDING	**Amount**
ICBC Grant @ $4,240 per SRB	$21,200
Capital Reserve Fund (CRF)	$36,275
TOTAL PROJECT FUNDING	**$57,475**

ALTERNATIVES

Alternative 1
That the Salt Spring Island Transportation Commission recommends to the Capital Regional District Board that the Salt Spring Island Transportation Service 2022 Capital Plan be amended to include a project for the acquisition and installation of five (5) speed reader boards with the total project budget of $57,475, funded from ICBC Grant ($21,200) and Capital Reserve Fund ($36,275).

Alternative 2
That the Salt Spring Island Transportation Commission refer back to staff for additional information.

CONCLUSION

The balance in the Transportation Commission Capital Reserve Fund ($288,960) has sufficient funds available to acquire and install five (5) speed reader boards at the locations identified by the Transportation Commission. Traffic speed and its reduction has been identified as a top priority by the Transportation Commission and these SRBs will ameliorate the situation and positively contribute to traffic calming in and around Ganges and surrounding areas.

RECOMMENDATION

That the Salt Spring Island Transportation Commission recommends to the Capital Regional District Board that the Salt Spring Island Transportation Service 2022 Capital Plan be amended to include a project for the acquisition and installation of five (5) speed reader boards with the total project budget of $57,475, funded from ICBC Grant ($21,200) and Capital Reserve Fund ($36,275).

Submitted by:	Dean Olafson, P. Eng., MBA, Engineering Manager, Salt Spring Electoral Area
Submitted by:	Karla Campbell, BPA, MBA, Senior Manager, Salt Spring Electoral Area
Submitted by:	Lia Xu, Manager, Finance Services, Planning and Local Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

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REPORT TO TRANSPORTATION COMMITTEE
MEETING OF WEDNESDAY, JUNE 15, 2022

SUBJECT **Regional Trails – Widening & Lighting Policies**

ISSUE SUMMARY

In November 2021, the CRD Board requested that staff report back on current endeavors and the advisability of developing new policies relating to lighting and trail improvement/widening.

BACKGROUND

The Regional Trails Management Plan (RTMP, 2016) guides management of existing and future regional trails, including the Galloping Goose, Lochside and E&N regional trails, for a 15-year horizon. The RTMP further outlines permitted uses, trail development standards and management policy direction.

Based on direction in the RTMP, a Regional Trails Widening Study was prepared in 2020 to consider widening, separating and lighting two high-use urban sections along the Goose and the Lochside regional trails, respectively. The study recommended a separated-use pathway design with lighting be implemented, and provided specifics regarding the type of lighting to be used and a priority sequence for implementation. In October 2021, the CRD Board directed staff to actively develop partnerships and pursue grant funding opportunities, including submission to the federal Active Transportation Fund, to support implementation of the separated-use pathway design with lighting.

If approved by the Board, the updated Regional Parks and Trails Strategic Plan (Strategic Plan) describes strategic priorities aimed at climate action and resiliency, as well as access and equity. Proposed actions to meet these strategic priorities include a number of initiatives that will improve the multi-modal transportation functionality of regional trails. Developing policy to support the successful implementation of these actions is recognized as an important step to be undertaken through an update to the RTMP, bringing it into alignment with CRD strategic priorities that have shifted since 2016.

IMPLICATIONS

Alignment with Board & Corporate Priorities

A CRD Board priority is to plan for and deliver an effective long-term regional multi-modal transportation system and to increase use of public transit, walking and cycling. The CRD's Regional Growth Strategy includes a target to reduce greenhouse gas emissions (GHG) by 61% from 2007 levels by 2038. Climate action has been a CRD Board priority since 2009 and, in 2019, the CRD Board declared a climate emergency. Regional trail improvements, such as widening, separation of uses and lighting on regional trails, may encourage more people to shift from gas vehicle use to active modes of transportation.

Alignment with Existing Plans & Strategies

In 2021, the CRD Board approved regional transportation priorities to reduce congestion, advance mode share targets for walking, cycling and transit use and take action on climate change. The Regional Transportation Plan (2014), and related Regional Pedestrian and Cycling Master Plan (2011), guide planning and development of a regional multi-modal transportation network. Policy direction relating to both widening/separating of uses and lighting is consistent with these plans' directions to increase options for, and use of, alternate modes of travel.

Intergovernmental Implications

The CRD's regional trails are located on, or near, the traditional territories of many First Nations and are managed under leases and licenses of occupation negotiated with the province and a number of municipalities. These governments and their agencies will be consulted on policy development relating to regional trails.

Social Implications

When the Regional Trails Management Plan was developed (2014-2016), the CRD provided no lighting along regional trails and had no plan to light regional trails. During the 2020 Widening Study's public engagement process, lighting was identified as a way of improving trail user experience and safety. A lighting policy for the regional trails will help to determine how and where lighting will be implemented and will be developed through a public engagement process for an updated RTMP.

Environmental & Climate Implications

The 2020 Widening Study proposes use of LED efficient lighting, the most environmentally sustainable choice outside of solar. Standardized design and service levels are recognized in the Strategic Plan as a key element of planning and implementing a regional active transportation network.

Service Delivery Implications

As regional trail widening and lighting are undertaken across the regional trail system, there will be resource implications associated with the planning, design, development and maintenance of the system. Lighting of regional trails and widening/separating use on regional trails is considered an increased service level requiring more staff time to manage and maintain.

Financial Implications

In 2022, the estimated cost for the initial 2 km of the Galloping Goose widening and lighting project, including engineering design, project management and construction, is $6 million. The Strategic Plan identifies the need to develop a funding strategy to support priority regional trail enhancement and expansion projects, including: separated use pathway with lighting enhancements in high use sections of the Galloping Goose and Lochside regional trail development.

CONCLUSION

The Regional Trails Management Plan includes policy direction relating to when the CRD will consider widening a regional trail and/or separating uses into use-specific paths but does not provide design standards or implementation criteria. The Regional Trails Management Plan does not include policy direction for when lighting will be provided on regional trails. Once approved, the Strategic Plan identifies updating the Regional Trails Management Plan to include actions supporting a regional active transportation network, including the establishment of design standards and the development of policy supporting widening/separating and lighting. A funding strategy to support these initiatives is identified as a short-term strategy in the Strategic Plan.

RECOMMENDATION

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

Submitted by:	Jeff Leahy, RFP, Senior Manager, Regional Parks
Concurrence:	Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

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REPORT TO TRANSPORTATION COMMITTEE
MEETING OF WEDNESDAY, JUNE 15, 2022

SUBJECT **Temporary Closures of Regional Trails**

ISSUE SUMMARY

To provide information on the process for temporarily closing regional trails.

BACKGROUND

At the November 10, 2021 Capital Regional District (CRD) Board meeting, staff were directed to report on the current process for temporarily closing regional trails and whether it is advisable to develop a policy for the closures.

The CRD operates and maintains a 100-kilometre regional trail network comprised of the Galloping Goose Regional Trail, Lochside Regional Trail and the E&N Rail Trail – Humpback Connector. On occasion, staff have to implement service disruptions on the regional trail network to address operational issues or complete infrastructure repairs. When work activities are required on the regional trails, staff explore opportunities to complete the work without closing the regional trails. However, when temporary closures are required, staff utilize a set of operational guidelines that are adaptable to the variety of circumstances associated with each closure. The operational guidelines include a hierarchy of controls, including public communications in advance of the closure, temporary traffic control devices, and may include an engineered traffic management plan to implement a detour route around the closed area. Staff report that when a temporary closure of a regional trail is implemented with these measures, public complaints and inquiries are minimal. The operational guidelines are outlined in Appendix A and have been shared with the CRD Regional Transportation Working Group

There is no CRD Board approved policy with respect to regional trail closures or detour routes. Detour routes are developed to provide passage around closed sections of regional trails and they are subject to municipal or provincial government review or a permit process as the detour routes are outside of the CRD's jurisdiction. There is no regional consistency on the review or permit process for the detour routes. In order to streamline closures and have consistency across the region, a shared approach to regional trail closures and detour routes should be developed by the Transportation Working Group prior to the development of a CRD Board approved policy.

IMPLICATIONS

Intergovernmental Implications

On July 14, 2021, the CRD Board directed staff to advance advocacy and implementation actions developed for each of the priorities, including the creation of a Regional Transportation Working Group. The Transportation Working Group has discussed the need to update the CRD Pedestrian and Cycling Master Plan's planned cycling network. Once the network has been updated, the working group will prepare a key project list, implementation sequence and supportive actions to advance network completion. Supportive actions include matters such as a shared approach for trail closures, detours and trail crossings.

Financial Implications

Costs associated to implement temporary closures are as follows:

Temporary Closures of Unpaved Sections of Regional Trails

- Temporary closures of unpaved sections of regional trails cost $1,000 to $3,000 for staff time and material. If additional on-site traffic management is required, costs range from $500 to $1,000 per day.

Temporary Closures of Paved Sections of Regional Trails

- Temporary closures of paved sections of regional trails cost $2,000 to $5,000 for staff time and material. An engineered traffic management plan costs $3,000 to $5,000. If additional on-site traffic management is required, costs range from $500 to $1,000 per day.

Service Delivery Implications

Temporary closures to sections of regional trails are provided through the CRD Regional Parks temporary closure process. Staff will continue to work with the Transportation Working Group to develop a shared approach to trail closures and detours.

Alignment with Board & Corporate Priorities

One of the CRD Board's priorities includes to plan for and deliver an effective long-term regional multi-modal transportation system and to increase use of public transit, walking and cycling. The increased planning, communication efforts and signed detour routes that are implemented when paved portions of the regional trails are temporarily closed ensure that active transportation can still be achieved during the service disruption.

CONCLUSION

When the CRD is required to close a portion of a regional trail, efforts are taken to minimize the impacts of the service disruption. Staff currently utilize a set of operational guidelines that focus on public communication and site safety to implement temporary closures of a regional trail. To develop a policy for trail closures and detour routes, the Transportation Working Group must establish a shared approach on how closures and detour routes are reviewed, approved, and implemented across the region.

RECOMMENDATION

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

Submitted by:	Jeff Leahy, RPF, Senior Manager, Regional Parks
Concurrence:	Larisa Hutcheson, P.Eng., General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENT

Appendix A: Summary of Services Provided for Temporary Closures on Regional Trails

APPENDIX A

SUMMARY OF SERVICES PROVIDED
FOR TEMPORARY CLOSURES ON REGIONAL TRAILS

June 2022

Temporary Closures of Unpaved Sections of Regional Trails

Unpaved sections of the regional trail network are typified as having lower visitation levels than paved portions and have higher levels of recreational use. Temporary closures generally contain the following elements:

Temporary Closures of Unpaved Sections of Regional Trails	
Type of Closure	Services Typically Provided
Planned Short-Term Closure (generally shorter than 2 days)	• Public communications issued prior to closure • On-site signage installed prior to closure • On-site traffic management, as required
Unplanned Short-Term Closure (generally shorter than 2 days)	• Public communications issued as soon possible • On-site signage installed as soon as possible • On-site traffic management, as required
Planned Long-Term Closure (generally longer than 2 days)	• Public communications plan developed and implemented (news release, alerts, stakeholder notification) • On-site signage on site prior to closure • On-site traffic management, as required
Unplanned Long-Term Closure (generally longer than 2 days)	• Public communications plan developed and implemented as soon as possible (news release, alerts, stakeholder notification) • On-site signage as soon as possible • On-site traffic management, as required

Temporary Closures of Paved Sections of Regional Trails

Paved sections of the regional trail network are typified as having higher visitation levels than unpaved sections and have more active transportation use. Temporary closures generally contain the following elements:

Temporary Closures of Paved Sections of Regional Trails	
Type of Closure	Services Typically Provided
Planned Short-Term Closure (generally shorter than 2 days)	• Public communications issued prior to closure • On-site signage installed prior to closure • On-site traffic management, as required
Unplanned Short-Term Closure (generally shorter than 2 days)	• Public communications issued as soon possible • On-site signage installed as soon as possible • On-site traffic management, as required
Planned Long-Term Closure (generally longer than 2 days)	• Public communications plan developed and implemented (news release, alerts, stakeholder notification) • On-site signage on site prior to closure • Develop engineered traffic management plan and provide signed detour route prior to closure (subject to municipal approval/permits) • On-site traffic management, as required
Unplanned Long-Term Closure (generally longer than 2 days)	• Public communications plan developed and implemented as soon as possible (news release, alerts, stakeholder notification) • On-site signage as soon as possible • Develop engineered traffic management plan and provide signed detour route as soon as possible (subject to municipal approval/permits) • On-site traffic management, as required

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REPORT TO TRANSPORTATION COMMITTEE
MEETING OF WEDNESDAY, AUGUST 03, 2022

SUBJECT **Island Rail Corridor Advocacy Timelines**

ISSUE SUMMARY

To provide the Transportation Committee with advocacy next steps and timelines to protect the Island Rail Corridor and advance restoration of rail service.

BACKGROUND

The Capital Regional District (CRD) Board has consistently recognized the 295 km Island Rail Corridor as a key component of the regional transportation system. The Snaw-naw-as Nation is seeking the segment of the corridor through their reserve to revert to the Nation, as the corridor is no longer used for railway purposes. The British Columbia (BC) Court of Appeal has given Canada until March 2023 to determine its intent for the corridor before the Nation can return to court to enforce its right of reversion.

On July 13, 2022, the CRD Board approved three advocacy motions related to the need for urgent action on the Island Rail Corridor, as follows:

- **Motion 1:** That the Board escalate advocacy for restoration and resumption for rail operations on the E&N Corridor and requests that the Chair communicates with provincial, federal, First Nations and other regional elected officials on behalf of the Board.

- **Motion 2:** Request staff provide the Board with steps to be taken and timelines for heightened urgent advocacy in support of protecting the corridor particularly with the federal government, given the court deadline of March 2023.

- **Motion 3:** That the CRD Board supports the Island Corridor Foundation request for federal and provincial governments to work together to: 1) equitably settle Indigenous claims within and along the Island Rail Corridor; 2) create a multi-disciplinary team, reflecting all affected interests, to advance rail as a transportation option on Vancouver Island; and 3) that this action be ongoing and not delay decisions required by March 2023.

A previous staff report to the June 15, 2022 Transportation Committee outlined a high-level advocacy approach, including audience analysis and tactics. This analysis, as well as an Island Corridor Foundation (ICF) business case, identified that advocacy should target provincial and federal government action on the following matters to ensure future rail use on the corridor:

1) Equitably resolve outstanding claims related to Indigenous interests within and along the corridor; and,
2) Demonstrate, through planning and funding commitments, that preservation of the corridor and restoration of rail service is in the public interest.

Actions Taken
In response to the direction received from the CRD Board, the CRD Chair sent letters to the following stakeholders:

- The Honourable Omar Alghabra, P.C., M.P., Federal Minister of Transport
- The Honourable Rob Fleming, M.L.A., BC Minister of Transportation and Infrastructure
- Laurel Collins, M.P., Member of Parliament for Victoria
- Alistair MacGregor, M.P., Member of Parliament for Cowichan – Malahat – Langford
- Randall Garrison, M.P., Member of Parliament for Esquimalt – Saanich – Sooke
- Tyler Brown, Board Chair, Regional District of Nanaimo
- John Jack, Chairperson, Alberni-Clayoquot Regional District
- Jesse Ketler, Board Chair, Comox Valley Regional District
- Lori Iannidinardo, Board Chair, Cowichan Valley Regional District

The letters to the Ministers request action be taken to advance the CRD Board motions of July 13 while the letters to the Victoria area Members of Parliament ask for their assistance in securing federal engagement. The correspondence to the regional district Chairs encourage them to attend any meetings the federal and provincial governments initiate and asks them to encourage the federal and provincial governments to address this critical issue.

Staff have also engaged with senior staff from the federal Ministry of Transportation, BC Ministry of Transportation and Infrastructure, Cowichan Valley Regional District, Nanaimo Regional District and Comox Valley Regional District. Staff have shared the CRD Board's position and requested a status update from each in relation to the Island Rail Corridor.

Separately, the Island Corridor Foundation, as the land owner, has been asked to advise the 14 First Nations in which the corridor is located of the CRD's actions.

Advocacy Next Steps
The CRD Board can take the following advocacy next steps to catalyze senior government action on the above matters:

Step 1: Raise Federal Government Awareness and Catalyze Senior Government Action
The CRD Board will undertake advocacy to raise federal government awareness of why restoration of rail service and corridor preservation are in the public interest. CRD Board advocacy will also emphasize the need for urgent senior government action.

Specific actions targeted for Q3 2022 include:
1) News release and Chair media (e.g., CFAX interviews).
2) Chair to liaise with federal and provincial elected officials from the South Island.

Step 2: Promote Inter-Jurisdictional Cooperation
Concurrently to the Step 1 actions, the CRD Board will join ICF in requesting the creation of a multi-disciplinary team that will bring together all interests in the corridor to support open dialogue and information sharing. A dedicated team is needed, given the impending March 2023 timeline.

Specific actions targeted for Q3 2022 include:
1) Request that province target first multi-disciplinary team meeting for early Q4 2022, pending senior government direction.

2) CRD Chair to speak with other regional Districts that have an interest in the corridor across Vancouver Island and encourage them to attend any meetings the federal and provincial government initiate.

Step 3: Advance Rail as a Transportation Option
Once a multi-disciplinary team is established, work through this team to advance rail as a transportation option. Such work could begin in Q1 2023, informed by progress on actions set out in Step 1 and Step 2.

Staff will evaluate advocacy success at the end of each quarter, and report through the Board Priorities Dashboard under Board Priority 1(b): Protect the E&N Corridor.

IMPLICATIONS

Intergovernmental Implications
The ICF initial business case indicates they expect senior levels of government to resolve outstanding Indigenous claims. Within the context of the United Nations Declaration on the Rights of Indigenous Peoples and the British Columbia *Declaration Act*, both the federal and provincial governments are responsible for ensuring Indigenous interests and rights are integrated into decision-making about the future use of the Island Rail Corridor.

The CRD Board Chair would lead advocacy initiatives and communicate with Ministers in the federal and provincial governments and the Chairs of regional districts on Vancouver Island.

Financial Implications
The proposed advocacy next steps can be implemented within existing service budgets.

Service Delivery Implications
The proposed advocacy next steps can be implemented within existing work plans.

Alignment with Board & Corporate Priorities
Undertaking the proposed advocacy supports delivery of Board Priority 1(b) “Protect the E&N Corridor as a transportation corridor and participate in a Provincial working group to come to agreement on the future use of the E&N Corridor.”

Alignment with Existing Plans & Strategies
The 2014 Regional Transportation Plan (RTP) identifies the Island Rail Corridor as part of its Regional Multi-Modal Transportation Network and calls for the long-term protection of the corridor for transportation. Inter-jurisdictional cooperation among all affected parties to come to agreement on the future use of the corridor is aligned to existing CRD plans and strategies.

The proposed advocacy next steps have been developed in alignment with the approach and tactics set out in the 2019 CRD Advocacy Strategy. Consistent, targeted and focused messaging will be critical to success.

CONCLUSION

The CRD Board has consistently recognized the 295 km Island Rail Corridor as a key component of the regional transportation system. Board advocacy over the next six months is needed to ensure the corridor is not lost for transportation use. The proposed advocacy next steps set out clear actions and timing to advance rail as a transportation option, consistent with Board motions in support of Island Rail Corridor protection.

RECOMMENDATION

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

Submitted by:	Emily Sinclair, MCIP, RPP, Senior Manager, Regional and Strategic Planning
Concurrence:	Andy Orr, Senior Manager, Corporate Communications
Concurrence:	Kevin Lorette, P. Eng., MBA, General Manager, Planning & Protective Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

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REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **902 Foul Bay Road Housing Agreement and Bylaw – Agreement Rectification**

ISSUE SUMMARY

To modify the defined term included in an affordable housing agreement, previously adopted by Bylaw, for a development at 902 Foul Bay Road in the City of Victoria.

BACKGROUND

The CRD currently administers the resale control agreements on a number of below-market home ownership units within housing developments throughout the region. On July 13, 2022, the CRD adopted Bylaw No. 4501, "Resale Control and Housing Agreement Bylaw (902 Foul Bay)", to secure four units of affordable housing in perpetuity, where perpetuity is 99 years or destruction of the building, whichever is longer.

However, an incorrect definition of "Term" was left in the housing agreement which went before the Board on July 13, 2022, whereby the term was the lesser, not the longer, of 99 years or the destruction of the building.

Consistent with the CRD's Board's intention to secure the affordable units and the intentions of Victoria, the Developer, and CRD as to the correct discussed definition of "Term", the CRD and the Developer corrected the error and proceeded to registration with the corrected "Term" definition.

Given that section 483 of the *Local Government Act* requires any amendment to be done with consent of the owner and by bylaw, a bylaw affirming the correction to the housing agreement is recommended.

ALTERNATIVES

Alternative 1

1. That Bylaw No. 4511, "Resale Control and Housing Agreement Bylaw (902 Foul Bay Road), 2022, Amendment Bylaw No. 1, 2022" be introduced and read for a first, second and third time; and
2. That Bylaw No. 4511 be adopted.

Alternative 2

That the 902 Foul Bay Road Housing Agreement and Bylaw report be referred back to staff for additional information.

IMPLICATIONS

The *Local Government Act* requires modification to a housing agreement to be done with the consent of the owner and by bylaw. While the law of rectification and mutual mistake likely apply to consider the insertion of the correct definition of "Term" not a modification, it is wise to pass a bylaw to approve the correction and update the housing agreement notice in the Land Title Office, to ensure the units are property secured for affordable housing purposes.

CONCLUSION

The Developer, Victoria, and CRD staff had previously negotiated the "term" definition as agreed and while the agreement can be registered without a modification bylaw, in order to ensure consistency with the *Local Government Act*, a modification bylaw and updated housing agreement notice are recommended.

RECOMMENDATION

1. That Bylaw No. 4511, "Resale Control and Housing Agreement Bylaw (902 Foul Bay Road), 2022, Amendment Bylaw No. 1, 2022" be introduced and read for a first, second and third time; and
2. That Bylaw No. 4511 be adopted.

Submitted by:	Don Elliott, MUP, Senior Manager, Regional Housing
Concurrence:	Kevin Lorette, P. Eng., MBA, General Manager, Planning & Protective Services
Concurrence:	Steven Carey, Acting General Manager, Corporate Services & Corporate Officer
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Bylaw No. 4511

Appendix A

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4511

****

A BYLAW TO MODIFY A HOUSING AGREEMENT
(902 FOUL BAY ROAD)

****

WHEREAS:

A. On July 13, 2022, under s.483 of the *Local Government Act*, RSBC 2015, c 1, and s. 219 of the *Land Title Act*, RSBC 1996, c 250, the Capital Regional District and the Owner of 902 Foul Bay Road (PID 007-652-674 BLOCK G, SECTION 68, VICTORIA DISTRICT, PLAN 1247) with consent of its lender approved entering into an agreement, by bylaw, to ensure the availability of the certain affordable housing units;

B. The Owner, the Regional District, the Owner's lender, and the City of Victoria intended the defined "term" of the affordable housing agreement, covenant, and its associated option and right of first refusal, to run in perpetuity, meaning the later of 99 years or the destruction of the building, despite an incorrect definition appearing in the version appended to Bylaw No. 4501;

C. The Capital Regional District Board wishes to rectify the corrected definition of "Term", with the consent of the Owner and the Owner's lender;

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

1. Per the *Local Government Act* section 483, the definition of "Term" in the housing agreement and restrictive covenant attached to Bylaw No. 4501 as Appendix 1 is amended to and ratified as:
   "Term" means the period commencing on the date of registration of this Agreement in the LTO and ending on the later of (a) the date which is ninety-nine (99) years thereafter, or (b) the date of destruction or statutorily deemed destruction of the Project.

2. If necessary, the Chair of the Capital Regional District is permitted to execute a modification to the Housing Agreement and the Corporate Officer or designate is authorized to sign and file in the Land Title Office an updated Notice of Housing Agreement per the *Local Government Act*.

3. This bylaw may be cited for all purposes as "Resale Control and Housing Agreement Bylaw (902 Foul Bay Road), 2022, Amendment Bylaw No.1, 2022".

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

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REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **604 Nelson Street Housing Agreement and Bylaw – Agreement Rectification**

ISSUE SUMMARY

Rectification is required for a correction to an affordable housing agreement for a development at 604 Nelson Street in the Township of Esquimalt.

BACKGROUND

The Capital Regional District (CRD) currently administers the resale control agreements on a number of below-market home ownership units within housing developments throughout the region. On July 13, 2022, the CRD adopted Bylaw No. 4500, "Resale Control and Housing Agreement Bylaw (604 Nelson Street)", to secure certain affordable housing in perpetuity, where perpetuity is 99 years or destruction of the building, whichever is longer.

However, an incorrect definition of "Term" was left in the housing agreement which went before the Board on July 13, 2022, whereby the term was the lesser, not the longer, of 99 years or the destruction of the building.

Consistent with the CRD's Board's intention to secure the affordable units and the intentions of Esquimalt, the Developer, and CRD as to the correct definition of "Term", the CRD and the Developer corrected the error and proceeded to registration with the corrected "Term" definition.

Given that section 483 of the *Local Government Act* requires any amendment to be done with consent of the owner and by bylaw, a bylaw affirming the correction to the housing agreement is recommended.

ALTERNATIVES

Alternative 1
1. That Bylaw No. 4512, "Resale Control and Housing Agreement Bylaw (604 Nelson Street), 2022, Amendment Bylaw No. 1, 2022", be introduced and read for a first, second and third time; and
2. That Bylaw No. 4512 be adopted.

Alternative 2
That this report be referred back to staff for additional information.

IMPLICATIONS

The *Local Government Act* requires modification to a housing agreement to be done with the consent of the owner and by bylaw. The owner's lenders have consented to this bylaw and the housing agreement amendment. A bylaw is needed to approve the correction and update the housing agreement notice in the Land Title office, to ensure the units are property secured for affordable housing purposes.

CONCLUSION

The Developer, Esquimalt, and CRD staff had previously negotiated the "term" definition as agreed and while the agreement can be registered without a modification bylaw, in order to ensure consistency with the *Local Government Act*, a modification bylaw and updated housing agreement notice are recommended.

RECOMMENDATION

1. That Bylaw No. 4512, "Resale Control and Housing Agreement Bylaw (604 Nelson Street), 2022, Amendment Bylaw No. 1, 2022", be introduced and read for a first, second and third time; and
2. That Bylaw No. 4512 be adopted.

Submitted by:	Don Elliott, BA, MUP, Senior Manager, Regional Housing
Concurrence:	Kevin Lorette, P. Eng., MBA, General Manager, Planning & Protective Services
Concurrence:	Kristen Morley, J.D., General Manager, Corporate Services & Corporate Officer
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENT

Appendix A: Bylaw No. 4512

Appendix A

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4512

****

A BYLAW TO MODIFY A HOUSING AGREEMENT
(604 NELSON STREET)

****

WHEREAS:

A. On July 13, 2022, the Owner of lands legally described as PID: 004-930-941 Lot B, Suburban Lot 37, Esquimalt District, Plan 11993; PID: 005-398-860 Lot 1, Suburban Lot 45, Esquimalt District, Plan 9871; and PID: 005-398-991 Lot 2, Suburban Lots 37 and 45, Esquimalt District, Plan 9871 Except Part in Plan 16394, known as 604 Nelson Street, with consent of its lenders, agreed to enter a s. 483 *Local Government Act*, RSBC 2015, c 1 housing agreement and s. 219 *Land Title Act*, RSBC 1996, c 250 restrictive covenant to protect certain affordable units to be built on the lands;

B. The Owner, the Regional District, the Owner's lenders, and the Township of Esquimalt intended the defined "term" of the affordable housing agreement, covenant, and its associated option and right of first refusal, to run in perpetuity, meaning the later of 99 years or the destruction of the building, despite an incorrect definition appearing in the version appended to Bylaw No. 4500; and

C. The Capital Regional District Board wishes to rectify the corrected definition of "term" with the consent of the Owner and the Owner's lenders;

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

1. Per the *Local Government Act* section 483, the definition of "Term" in the housing agreement and restrictive covenant attached to Bylaw No. 4500 as Appendix 1 is amended to and rectified as:
   "Term" means the period commencing on the date of registration of this Agreement in the LTO and ending on the later of (a) the date which is ninety-nine (99) years thereafter or (b) the date of destruction or statutorily deemed destruction of the Project.

2. If necessary, the Chair of the Capital Regional District is authorized to execute the Housing Agreement and the Corporate Officer or designate is authorized to sign and file in the Land Title Office an updated Notice of Housing Agreement per the *Local Government Act*.

3. This Bylaw may be cited for all purposes as "Resale Control and Housing Agreement Bylaw (604 Nelson Street), 2022, Amendment Bylaw No. 1, 2022".

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

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REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **Federal Strategic Priorities Fund – Grant Application Resolution for Two Regional Parks Projects**

ISSUE SUMMARY

A Capital Regional District (CRD) Board resolution is required to confirm submission authorization of two applications to the Strategic Priorities Fund grant program.

BACKGROUND

The federal Strategic Priorities Fund (SPF) grant program is an application-based program available to local governments and other recipients outside of the Metro Vancouver Regional District to support infrastructure and capacity-building projects. The SPF program targets funds for investment that are large in scale, regional in impact or that are innovative. The fund has contributed nearly $300 million to 170 projects since 2014.

Following the CRD grant process, information on the SPF grant opportunity was distributed organization-wide to scan for grant-ready and grant-eligible projects. Staff from the CRD's Regional Parks Division recommended submitting two SPF capital infrastructure stream applications to address the critical infrastructure renewal needs of the Brett Avenue and Swan Lake trestles and to support Lochside Regional Trail widening and lighting initiatives in priority sections identified through the Regional Trail Widening and Lighting Study.

The Lochside Regional Trail and Brett Avenue Enhancement Project and the Lochside Regional Trail and Swan Lake Enhancement Project applications were submitted on June 30, 2022, through the Union of British Columbia Municipalities (UBCM) online application portal (Appendix A). A CRD Board resolution to show support for the proposed activities and willingness to provide overall grant management is required, as is evidence of secured funds.

The projects reflect inter-jurisdiction cooperation, benefit multiple communities and meet the Strategic Priorities Fund program outcomes. The projects will improve trail safety, infrastructure quality and user comfort, and will increase overall capacity on a busy section of the CRD regional trail network in the District of Saanich.

ALTERNATIVES

Alternative 1

That the Capital Regional District Board confirm submission authorization of the federal Strategic Priorities Fund grant applications for the Lochside Regional Trail and Brett Avenue Enhancement Project and the Lochside Regional Trail and Swan Lake Enhancement Project and that staff be directed to provide overall grant management.

Alternative 2

That the report be referred back to staff for further information.

IMPLICATIONS

Financial Implications

Lochside Regional Trail and Brett Avenue Trestle Enhancement Project:

Project Area: Brett Avenue Trestle and 1,280 m segment of the Lochside Regional Trail, between Switch Bridge and Swan Lake Trestle (Appendix B).
Project Scope: Brett Trestle replacement and construction of a 6.5 m wide separated use pathway with installed lighting.
Estimated Budget: Total Project Cost = $4,388,131.00; Grant Request = $4,376,354.00

Lochside Regional Trail and Swan Lake Trestle Enhancement Project:

Project Area: Swan Lake Trestle and 625 m segment of the Lochside Regional Trail, between Swan Lake Trestle and McKenzie Avenue (Appendix C).
Project Scope: Swan Lake Trestle replacement and construction of a 6.5 m wide separated-use pathway with installed lighting.
Estimated Budget: Total Project Cost = $8,156,619.00; Grant Request = $6,000,000.00.

The two projects have been identified in the preliminary 2023-2027 Capital Plan, to be funded through grant funding sources. The Strategic Priorities Fund covers up to 100% of net eligible costs of approved projects, up to a maximum of $6 million.

Service Delivery Implications

The projects will enhance active transportation mobility by replacing critical trestle infrastructure along the Lochside Regional Trail, by widening and separating the existing 3-4 m wide multi-use trail and by installing LED lighting at 45 m intervals along appropriate sections of the trail corridor. The 6.5 metre separated use pathway design with lighting recommended by the CRD's Regional Trail Widening Study has received strong public support.

CONCLUSION

Staff from the CRD's Regional Parks Division have submitted two capital infrastructure stream applications to the Strategic Priorities Fund grant program. The Lochside Regional Trail and Brett Avenue Enhancement Project and the Lochside Regional Trail and Swan Lake Enhancement Project applications were submitted on June 30, 2022 through the Union of British Columbia Municipalities (UBCM) online application portal. A CRD Board resolution to show support for the proposed projects and for providing overall grant management is required, as is evidence of secured funds.

RECOMMENDATION

That the Capital Regional District Board confirm submission authorization of the federal Strategic Priorities Fund grant applications for the Lochside Regional Trail and Brett Avenue Enhancement Project and the Lochside Regional Trail and Swan Lake Enhancement Project and that staff be directed to provide overall grant management.

Submitted by:	Jeff Leahy, RPF, Senior Manager, Regional Parks
Concurrence:	Russ Smith, Acting General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Strategic Priorities Grant Application (Two Projects Combined)
Appendix B: Lochside Regional Trail and Brett Avenue Enhancement Project Map
Appendix C: Lochside Regional Trail and Swan Avenue Enhancement Project Map

APPENDIX A

Strategic Priorities Fund Application

Submission Date: June 30th, 2022

Draft Submission (as of June 27, 2022)

Section 1: Project Information

1. Project Title:
- Lochside Regional Trail and Brett Avenue Trestle Enhancement Project, Capital Region, Victoria, BC
- Lochside Regional Trail and Swan Lake Trestle Enhancement Project, Capital Region, Victoria, BC

2. Project Category:
    - Capital Infrastructure Stream - Local Roads, Bridges and Active Transportation
    - Capital Infrastructure Stream - Local Roads, Bridges and Active Transportation

3. Is this project the subject of a recent infrastructure grant application?
    - No
    - No

4. Project Rationale: Why is the project needed and how does the project meet the need?
    - The Lochside Regional Trail and Brett Avenue Trestle Enhancement Project (the Project) is needed to:
        i. Improve trail safety, infrastructure quality and user comfort, and increase overall capacity on a busy section the Capital Regional District (CRD) regional trail network in the District of Saanich.
        ii. Improve active transportation and mobility choice along a key 1280 metre section of the Lochside Regional Trail (Saanich Spur), part of an existing multi-use regional trail network.
        iii. Address the Brett Avenue Trestle critical infrastructure replacement need (built in 1917 and converted in 1995 for use in the CRD multi-use regional trail network). Condition assessments conducted in 2013 and 2018 indicate the Trestle is approaching end of useful life without the implementation of a significant renewal program.
        iv. Provides strategic investment for a regionally significant project through the widening of a 1280 metre section of existing 3 to 4 metre wide multi-use trail (established in 2001) to create a 6.5 metre-wide separated use trail with LED lighting (installed at 45 metre intervals where applicable based on environmental considerations), as defined in the 2020 CRD Regional Trails Widening Study.
        v. The 6.5 metre separated use pathway design with lighting recommended by the 2020 CRD Regional Trails Widening Study has received strong public support to improve safety and user comfort, and to accommodate a projected increase in trail users over the next 20 years.
        vi. Provides the full replacement and widening of the Brett Avenue Trestle (while reflecting the aesthetic of the historical trestle), following asset management principles as the infrastructure approaches end of life. Condition assessments conducted in 2013 and 2018 indicate the Trestle is approaching end of life and is in need of major renewal/replacement.
        vii. The project will enhance active transportation mobility, improve trail safety and user experience, and will reduce GHGs from increased active transportation.

viii. The project will action key strategies identified in provincial, regional and municipal policy guidance, notably the goals identified in the 2020 BC South Island Transportation Strategy (to ensure sustainable options for a variety of travel modes, strengthen connections between communities, improve safety and reliability of the transport network, support and encourage active transportation options) and the 2018 CRD Regional Growth Strategy (to increase multi-modal connectivity and mobility).

ix. Failure to undertake the full replacement and widening of the Brett Avenue Trestle will result in the need to explore major rehabilitation options which include increased long-term maintenance costs.

The Project aligns with the renewed CRD Regional Parks and Trails Strategic Plan (2022-2032) priority item – Climate Action and Resiliency Action 4-1b (plan for and implement priority regional trail enhancement and expansion projects).

- The Lochside Regional Trail and Swan Lake Trestle Enhancement Project (the Project) is needed to:
  i. Improve trail safety, infrastructure quality and user comfort, and increase overall capacity on a busy section the Capital Regional District's regional trail network in the District of Saanich.
  ii. Improve active transportation and mobility choice along a key 625 metre section of the Lochside Regional Trail (Saanich Spur), part of an existing multi-use regional trail network.
  x. Address the Swan Lake Trestle critical infrastructure replacement need (built in 1917 and converted in 1995 for use in the CRDs multi-use regional trail network). Condition assessments conducted in 2013 and 2018 indicate the Trestle is approaching end of useful life without the implementation of a significant renewal program.
  iii. Provides strategic investment for a regionally significant project through the widening of a 625 metre section of existing 3 to 4 metre wide multi-use trail (established in 2001)to create a 6.5 metre-wide separated use trail with LED lighting (installed at 45 metre intervals where applicable based on environmental considerations), as defined in the 2020 CRD Regional Trails Widening Study.
  iv. The 6.5 metre separated use pathway design with lighting recommended by the 2020 CRD Regional Trails Widening Study has received strong public support to improve safety and user comfort, and to accommodate a projected increase in trail users over the next 20 years.
  xi. Provides the full replacement and widening of the Swan Lake Trestle (while reflecting the aesthetic of the historical trestle), following asset management practices as the infrastructure approaches end of life. Condition assessments conducted in 2013 and 2018 indicate the Trestle is approaching end of life and is in need of major renewal/replacement.
  v. The project will enhance active transportation mobility, improve trail safety and user experience, and will reduce GHGs from increased active transportation.
  vi. The project will action key strategies identified in provincial, regional and municipal policy guidance, notably the goals identified in the 2020 BC South Island Transportation Strategy (to ensure sustainable options for a variety of travel modes, strengthen connections between communities, improve safety and reliability of the transport network, support and encourage active transportation options).
  vii. Failure to undertake the full replacement and widening of the Swan Lake Trestle will result in the need to explore major rehabilitation options which include increased long-term maintenance costs.

- The Project aligns with the renewed CRD Regional Parks and Trails Strategic Plan (2022-2032) priority item – Climate Action and Resiliency Action 4-1b (plan for and implement priority regional trail enhancement and expansion projects).

5. Project Description: Detailed list of the physical works and location of the project.
    - The Lochside Regional Trail and Brett Avenue Trestle Enhancement Project includes:
        i. Enhance (through widening, separating and lighting) a 1280 m section of an existing 3 to 4 metre wide multi-use trail (built in 1986) to create a 6.5 metre-wide separated use pathway with lighting.
        ii. Full replacement and enhancement (through widening) of the Brett Avenue Trestle (built circa 1917, modified in 1995 for use in the CRDs multi-use regional trail network). The Brett Avenue Trestle is nearing end of life, as illustrated through condition assessments conducted in 2013 and 2018. Long-term renewal planning has identified replacement options, with full replacement and enhancement as the preferred option based on the significance of the structure as an active transportation link. Anticipated service life of replacement structure is 40 years (following standardized asset maintenance practices).
        iii. The project is located in the District of Saanich, along a busy section of the CRDs Lochside Regional Trail (known as the Saanich Spur), between McKenzie Avenue and the Saanich Uptown Centre and Mobility hub (an emerging regional economic centre and planned transit hub providing multi-modal connection to all parts of the region).
        iv. The trail corridor is owned by the BC Transportation Financing Authority and is managed by the BC Ministry of Transportation and Infrastructure. The trail is operated by the Capital Regional District through a Lease agreement. The Brett Avenue Trestle is under the jurisdiction of the Capital Regional District.
        v. The project is located adjacent to Swan Lake Christmas Hill Nature Sanctuary and Swan Lake Park. Environmental restoration measures are proposed by Swan Lake Christmas Hill Nature Sanctuary in collaboration with the Lochside Regional Trail and Brett Avenue Trestle Enhancement Project.
        vi. The project area is the busiest section of the regional trail used by approximately 2,000 users per day in peak times for active transportation, recreation, and tourism. 20-year user volume projections include a projected increase of 2.5% per year, reaching approximately 3,500 users per day by 2040. Approximately 80% of trail users are cyclists and 20% are pedestrians. Trail issues include: high use volumes, high speed differentials between user types, lack of safety and personal security, conflicts at intersections, poor trail etiquette, and emerging mobility technology. The separated use pathway with lighting design is based on the best practices for active transportation and accessibility and aims to address these issues.
        vii. Project components will include project management and oversight, archaeological review, environmental and geotechnical assessments, detailed designs, continued public and First Nations consultation, trail construction, trestle replacement, installation of lights and reflectors, pavement markings, and the replacement of trail amenities including signage and benches.

- The Lochside Regional Trail and Swan Lake Trestle Enhancement Project includes:
    i. Enhance (through widening) a 625 m section of an existing 3 to 4 metre-wide multi-use trail (built in 1986) to create a 6.5m wide separated use pathway with lighting.
    ii. Full replacement and enhancement (through widening) of the Swan Lake Trestle (built circa 1917, modified in 1995 for use in the CRDs multi-use regional trail network). The Swan Lake Trestle is nearing end of life, as illustrated through condition assessments conducted in 2013 and 2018. Long-term renewal planning has identified replacement options, with full replacement and enhancement as the preferred option based on the significance of the structure as an active transportation link. Anticipated service life of replacement structure is 40 years (following standardized asset maintenance practices).
    iii. The project is located in the District of Saanich, along a busy section of the CRDs Lochside Regional Trail (known as the Saanich Spur), between McKenzie Avenue and the Saanich Uptown Centre and Mobility hub (an emerging regional economic centre and planned transit hub providing multi-modal connection to all parts of the region).
    iv. The trail corridor is owned by the BC Transportation Financing Authority and is managed by the BC Ministry of Transportation and Infrastructure. The trail is operated by the Capital Regional District through a Lease Agreement. The Swan Lake Trestle is under the jurisdiction of the CRD.
    v. The project is located adjacent to Swan Lake Christmas Hill Nature Sanctuary and Swan Lake Park. Blenkinsop Creek flows through the area and environmental restoration/flood mitigation measures are proposed by Swan Lake Christmas Hill Nature Sanctuary in collaboration with the Lochside Regional Trail and Swan Lake Trestle Enhancement Project.
    vi. The project area is the busiest section of the regional trail used by approximately 2,000 users per day in peak times for active transportation, recreation, and tourism. 20-year user volume projections include a projected increase of 2.5% per year, reaching approximately 3,500 users per day by 2040. Approximately 80% of trail users are cyclists and 20% are pedestrians. Trail issues include: high use volumes, high speed differentials between user types, lack of safety and personal security, conflicts at intersections, poor trail etiquette, and emerging mobility technology. The separated use pathway with lighting design is based on the best practices for active transportation and accessibility and aims to address these issues.
    vii. Project components will include project management and oversight, archaeological review, environmental and geotechnical assessments, detailed designs, continued public and First Nations consultation, trail construction, trestle replacement, installation of lights and reflectors, pavement markings, and the replacement of trail amenities including signage and benches.

6. Project Location:
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project coordinates:
        i. South end of Phase D: N48 27.393, W123 22.666
        ii. North end of Phase D: N48 27.794, W123 22.080
        iii. Centre of Brett Ave Trestle: N48 27.658, W123 22.266

- Lochside Regional Trail and Swan Lake Trestle Enhancement Project coordinates:
    i. South end of Phase E: N48 27.803, W123 22.068
    ii. North end of Phase E: N48 28.220, W123 21.679
    iii. Centre of Swan Lake Trestle: N48 27.878, W123 21.966

Section 2: Required Documentation

7. Requested Documents
    - Detailed Cost Estimate Template (x1 per application)
        i. Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: https://goto.crd.bc.ca/teams/pcs/rp/1660AssetManagement/Detailed%20Cost%20Estimate%20Template-Strategic%20Priorities%20Fund-Captial%20Insfrastructure%20Stream%20LRT%20Phase%20D%20and%20Brett.xlsx
        ii. Lochside Regional Trail and Swan Lake Trestle Enhancement Project: https://goto.crd.bc.ca/teams/pcs/rp/1660AssetManagement/Detailed%20Cost%20Estimate%20Template-Strategic%20Priorities%20Fund-Captial%20Insfrastructure%20Stream%20LRT%20Phase%20E%20and%20Swan.xlsx
    - Map (x2 per application)
        i. Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: https://goto.crd.bc.ca/teams/pcs/rp/6130ParksTrails/GIS%20Regional%20Trails/RT_GGLSWidening_ContextJune2022GrantApplication.pdf https://goto.crd.bc.ca/teams/pcs/rp/6130ParksTrails/GIS%20Regional%20Trails/RT_GGLSWidening_PhaseDJune2022GrantApplication.pdf
        ii. Lochside Regional Trail and Swan Lake Trestle Enhancement Project: https://goto.crd.bc.ca/teams/pcs/rp/6130ParksTrails/GIS%20Regional%20Trails/RT_GGLSWidening_ContextJune2022GrantApplication.pdf https://goto.crd.bc.ca/teams/pcs/rp/6130ParksTrails/GIS%20Regional%20Trails/RT_GGLSWidening_PhaseEJune2022GrantApplication.pdf
    - Subset of reports to include:
        i. Options Analysis for the Swan Lake and Brett Avenue Trestles (2018)
        ii. Separated Use Pathway Design (2020)
        iii. CRD Regional Trails Widening Study (2020) – conceptual designs per section
        iv. Lease Agreement – BCTFA and CRD (2015)
        v. Regional Trails Widening and Lighting Engagement Report (2021)
        vi. Regional Parks and Trails Strategic Plan (2022-2032)
        vii. Regional Trails Management Plan (2016)
        viii. CRD Asset Management Strategy (2019)
        ix. Additional exerts from documents include: CRD Regional Growth Strategy, CRD Regional Transportation Plan Report Card, Regional Parks Sustainable Service Delivery Report Cards, and the District of Sannich Active Transportation Plan.

    - Board Resolution:
        i. CRD Board Resolution - Regional Trails Widening and Lighting Project
        ii. Planned 2022 CRD Board Resolution staff report & signed grant submission approval memo.

8. How funding is being secured?
    - Funding is being secured through capital reserve funds. Reference: 2023-2027 Capital Plan. The 2022 budget planning process, in which departments specify the financial resources required to achieve identified service levels and capital investment requirements is currently underway. The preliminary financial plan will be presented to the Regional Park Committee October 27, 2022. Year-end adjustments will be presented to the CRD Board in February 2023, with approval of the Financial Plan Bylaw March 31, 2023.
    - Borrowing option not included in this application. Application guidelines note the 3rd reading of borrowing bylaw would be required as part of the application.
9. Class of Cost Estimates
    - Capital Infrastructure Stream Class of Cost Estimate:
        i. Lochside Regional Trail and Brett Avenue Trestle Enhancement Project:
            - Brett Avenue Trestle (Class B) and Trail Widening and Lighting (Class D)
        ii. Lochside Regional Trail and Swan Lake Trestle Enhancement Project:
            - Swan Lake Trestle (Class B) and Trail Widening and Lighting (Class D)
    - Year cost estimates determined:
        i. Lochside Regional Trail and Brett Avenue Trestle Enhancement Project:
            - Brett Avenue Trestle (2018) and Trail Widening and Lighting (2021)
        ii. Lochside Regional Trail and Swan Lake Trestle Enhancement Project:
            - Swan Lake Trestle (2018) and Trail Widening and Lighting (2021)
    - How were the cost estimates determined?
        i. Lochside Regional Trail and Brett Avenue Trestle Enhancement Project:
            - Brett Avenue Trestle
                - Options Analysis for the Swan Lake and Brett Avenue Trestles on the Lochside Regional Trail, Saanich, BC – 2018
            - Trail Widening and Lighting
                - CRD Regional Trails Widening Study – 2020 (plus internal CRD review of cost estimates in 2021)
        ii. Lochside Regional Trail and Swan Lake Trestle Enhancement Project:
            - Swan Lake Trestle
                - Options Analysis for the Swan Lake and Brett Avenue Trestles on the Lochside Regional Trail, Saanich, BC – 2018
            - Trail Widening and Lighting
                - CRD Regional Trails Widening Study – 2020 (plus internal CRD review of cost estimates in 2021)
10. What contingency plans are in place to increased project costs?
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project:
        i. Brett Avenue Trestle Replacement: Options analysis report from 2018, demolish and full replacement with steel costing plus 12% used as baseline valuation for this submission. Design, construction, and project management costs have also been included, with a 10% contingency and a 5.2% increase for inflation (2023).
        ii. Lochside Regional Trail Widening and Lighting: Baseline costing based on preliminary conceptual design and alignment, including design, construction, and project management cost, with a 33% contingency and a 10% increase for inflation.

- Lochside Regional Trail and Swan Lake Trestle Enhancement Project:
    i. Swan Lake Trestle Replacement: Options analysis report from 2018, demolish and full replacement with steel costing plus 12% used as baseline valuation for this submission. Design, construction, and project management costs have also been included, with a 10% contingency and a 5.2% increase for inflation (2023)
    ii. Lochside Regional Trail Widening and Lighting: Baseline costing based on preliminary conceptual design and alignment, including design, construction, and project management cost, with a 33% contingency and a 10% increase for inflation

Section 3: Project Details

11. Has the project started:
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: No
    - Lochside Regional Trail and Swan Lake Trestle Enhancement Project: No
12. Estimated Project Start Date:
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: 2023 (April)
    - Lochside Regional Trail and Swan Lake Trestle Enhancement Project: 2025 (January)
13. Estimated Project Completion Date:
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: 2026 (December)
    - Lochside Regional Trail and Swan Lake Trestle Enhancement Project: 2027 (December)

14. Risks to meet timelines (Same for both projects):
    - Schedule Risks: Work may be required to be conducted within fish windows or outside of bird nesting periods. Mitigation measures include environmental assessments will be conducted to meet compliance.
    - Environmental Risks: Full replacement of the Trestles may have ecological risks, from a potentially large disturbance area due to the logistics and materials, as well as the potential for mobilization of creosote during the removal of the existing structure. Mitigation measures include following environmental protection best practices, as outlined in the Lochside Trail Trestles at Brett Avenue and Swan Lake Environmental Review and through the development of a detailed Environmental Protection Plan.
    - Archeological/Cultural Risks: Soil disturbance may result in uncovering archeological sites and/or items of cultural significance which may impact the schedule of construction. Mitigation measures include completing a CRD Heritage Site Information Review form which is then reviewed by an archeologist and follows the Province of BC Archeology Policy. A report will also be submitted to local First Nations for their review and input. The CRD First Nations Relation division provides assistant for Regional Parks day-to-day service delivery activities with First Nations and works directly with First Nations governments in areas of common interest.
    - Material/Supply Chain Risks: Supply chain delays and skilled labour shortage may impact the ability to commence construction. Mitigation measures include issuing tender documents well in advance of projected construction start dates, connect with local community of contractors to gauge capacity, and build contingencies into project schedules.
    - Budget Risks: Cost estimates have been drafted in the current economic climate and include contingencies. Unpredictable market conditions or inflationary pressures may pose

a risk to the project timelines. Mitigation measures include ensuring project contingencies and capital reserve funds are available to capture cost overruns.

- Multiple Partners Risk: The Lakeside Regional Trail (Saanich Spur) corridor is owned by the BC Transportation Financing Authority and managed by BC Ministry of Transportation and Infrastructure. The Lochside Regional Trail (Saanich Spur) is operated by the Capital Regional District through a Lease agreement.

15. Request to use own labor force and equipment for the project?
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: No
    - Lochside Regional Trail and Swan Lake Trestle Enhancement Project: No
16. Phased Approach: No
    - The Regional Trails Management Plan (2016) identified a short-term need to assess the feasibility of widening and lighting the Galloping Goose Regional Trail between Selkirk Trestle and McKenzie Avenue/Highway 1, as well as widening and lighting the Lochside Regional Trail between the Switch Bridge and McKenzie Avenue. The Regional Trails Widening Study (2021) provided recommended priorities for implementation. Due to the high dollar value of the trail widening and lighting, and critical infrastructure renewal, stand-along project scope of works have been developed.
        i. Selkirk Trestle and Galloping Goose Regional Trail Phase 1 (Section A, B, C)
        ii. Brett Avenue Trestle and Lochside Regional Trail Phase 2 (Section D) – SPF Application #1
        iii. Swan Lake Trestle and Lochside Regional Trail Phase 2 (Section E) – SPF Application #2
        iv. Galloping Goose Regional Trail Phase 3 (Section F)
17. Alternative Project Options Considered? Yes, multiple alternatives have been considered to maximize funding opportunities.
18. Estimated Total Project Costs:
    - Brett Avenue Trestle and Lochside Regional Trail Enhancement $4,388,131.00
    - Swan Lake Trestle and Lochside Regional Trail Enhancement $8,156,619.00
19. Strategic Priorities Funding Request:
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project $4,376,354.00
    - Lochside Regional Trail and Swan Lake Trestle Enhancement Project $6,000,000.00
20. Borrowing:
    - Lochside Regional Trail and Brett Avenue Trestle Enhancement Project: No
    - Lochside Regional Trail and Swan Lake Trestle Enhancement Project: No
21. Other Grants
    - An Active Transportation Fund application has been submitted by the Ministry of Transportation and Infrastructure (March 31, 2022), in partnership with the Capital Regional District for the Selkirk Trestle and Galloping Goose Regional Trail Phase 1 (Section A, B, C) project. The Capital Regional District will take a lead role in this project to: contribute funding, provide staffing to coordinate, manage, procure contracts, oversee contracts,

facilitate engagement, and prepare communications material, as well as monitor and complete grant reporting, as outlined in existing agreements.

22. Other Contributions – No
23. Internal Contributions
    - Brett Avenue Trestle and Lochside Regional Trail Enhancement (capital reserves, etc.) $11,777.00
    - Swan Lake Trestle and Lochside Regional Trail Enhancement (capital reserves, etc.) $2,097,707.00

<u>Section 4: Program Objectives (Questions 24 – 29 same for both applications/projects)</u>

24. Productivity and Economic Growth: Describe the measurable economic benefits of the project in the community.

    The measurable economic benefits of the project to the region include:
    - Active Transportation projects create more jobs than vehicle-only projects, as demonstrated by Heidi Garrett-Peltier's research on "Pedestrian and Bicycle Infrastructure: A National Study of Employment Impacts', Political Economy Research Institute, University of Massachusetts, Amherst, June 2011. Specifically, active transportation projects create 7.8 to 8.4 direct and indirect employment for each million dollars in investment, versus 6.07 direct and indirect employment for each million dollars spent on vehicle-only projects. The Brett Avenue Trestle and Lochside Regional Trail Enhancement project would result in 33 jobs within the region during construction of the project, and the Swan Lake Trestle and Lochside Regional Trail Enhancement project would result in 67 jobs within the region during construction of the project.
    - Job creation through environmental assessments, design and construction, labor and material supply.
    - Cost savings to residents through increased active transportation trips for work or shopping, and fewer vehicle trips reducing demand for gas.
    - Increased retail sales due to increased appeal and ease of trail use to access commercial businesses at Saanich Uptown Centre.
    - Increase to transit revenues due to enhanced multi-modal connection to transit hub.

25. Productivity and Economic Growth: Describe the non-measurable economic benefits of the project in the community.
    - The Capital Region is a key tourism destination within British Columbia. The CRD regional trail network connects the BC Ferries terminal at Swartz Bay on Vancouver Island with the District of Sannich Uptown Centre (along the Lochside Regional Trail). The Lochside Regional Trail is a key attraction for cycling trips from Sidney, North Saanich, Central Saanich, and Saanich and links with the Galloping Goose Regional Trail at Saanich Uptown Centre. The Galloping Goose links users with Victoria, as well as the western communities of View Royal, Langford, Colwood, Metchosin, and Sooke. The Lochside Regional Trail (Saanich Spur) links to Elk/Beaver Lake Regional Park, Bear Hill Regional Park, and multiple Saanich community parks.
    - Many people from the lower mainland come to ride the CRD regional trails and stay within the Capital Region while visiting. Enhancements to this section of the Lochside will improve

the experience of active tourism travelers and will potentially increase active tourism overall.

- Enhancements to this section of the Lochside, so close to the Saanich Uptown Centre, provide the potential for increased cycling tourism from the rest of Canada and the United States.
- Economic benefits are also tied to local businesses (as the Lochside Regional Trail links the business hubs of Saanich Uptown Center and Saanich Shopping Centre at McKenzie Avenue.

26. Cleaner Environment: Describe the environmental benefits of the project.
    - Calculated GHG reduction - calculations based on Regional Trail use volumes and projected volumes (33,580 kg CO2e/yr).
    - The CRD Regional Growth Strategy identifies a mode share target of 42% of all trips made by walking, cycling and transit. The project is critical to helping achieve this objective.
    - An environmental protection plan with best management practices will be developed once detailed plans have been proposed for the Brett Avenue and Swan Lake Trestle replacements, and will follow regulatory requirements and environmental permits when working in close proximity to water.
    - Opportunities exist to collaborate with local nature sanctuary groups interested in creek restoration, replanting, invasive species removal, and interpretive signage.

27. Cleaner Environment: What environmentally sustainable considerations have been incorporated into the project?
    - Environmental protection best management practices and a detailed environmental protection plan will be developed for the detailed design and construction phases.
    - Environmental considerations will reflect findings and recommendations provided in the Lochside Trail Trestles at Brett Avenue and Swan Lake Environmental Review. Regulatory requirements include, but are not limited to, conducting a rare species/ecosystem assessment, requesting an exemption from SDPA (District of Saanich), submitting Section 11 notification, submitting DFO and BC Scientific Fish Collection permits, and conducting pre-clearing activities based on outcomes of nesting survey. Additional environmental protection measures to be undertaken during construction may include: erosion and sediment control, spill prevention and response, creosote management, and protecting identified ecosystem features. Ecological improvement options could also include: invasive species removal and planting of native species, and including bird habitat on trestle structures.
    - Trail lighting will only be included on specific sections to cause less disturbance in ecologically sensitive areas. Low intensity reflective lights will be used on the Brett Avenue Trestle.
    - Through the CRD procurement process, request for proposals will request proponents include environmentally friendly ideas, suggestions, and solutions where possible.
    - Existing paved trail surface will be maintained where feasible on the trail.
    - Low carbon emitting vehicles will be given preference when securing contractors.

28. Strong Cities and Communities: Describe the community health, social, and cultural benefits of the project.
    - The project supports the intensification of urban mixed-use development at the Saanich Uptown Centre as planned for in Saanich's Uptown-Douglas Area Plan and CRD's Regional Growth Strategy. The project promotes the concept of "safe and complete communities' in CRD's Regional Growth Strategy including: multiple modes of mobility can be used to, from and within the community; places of work, shopping, learning, recreation and parks and green space can easily be accessed by walking and cycling.
    - The project will improve accessibility to all trail users, and will benefit vulnerable populations in the region by improving active transportation accessibility, safety and user comfort. Widening the trail and trestle will increase the desired operating space for pedestrians and cyclists that incorporate space for mobility devices, strollers, side-by-side travel and passing for all ages and abilities, particularly youth, seniors, and persons with disabilities. The increased safety of the trail facility will benefit new cyclists who feel uncomfortable riding on-street.
    - Cultural benefits of encouraging active transportation mobility choice can be realized from the enhanced trail facility
    - Lighting will improve safety and perceived personal security.
    - The CRD is developing an equity lens in partnership with the Community Social Planning Council that focuses on reviewing gender imbalance on the CRD regional trail network. The equity lens will be applied to the project.

29. Strong Cities and Communities: Describe how the project will advance the long-term goals and vision of the community as identified in applicable community plans. Include a copy of relevant sections.
    - The project supports sustainability goas in several existing local, regional, and provincial plans:

      - The project supports the following goals in the BC's South Island Transportation Strategy: ensure sustainable options for a variety of travel modes; strengthen connections between travel modes and improve connections between communities; improve the safety and reliability of the transportation network; and support and encourage active transportation options.
      - The project meets or exceeds the active transportation facility design specifications in BC's Active Transportation Design Guide.
      - The project supports the goals in the CRD's Regional Growth Strategy and Regional Transportation Plan to improve multi-modal connectivity and mobility and to create exceptional environments for walking and cycling.
      - The project is consistent with the policies in the CRD's Regional Trails Management Plan for trail widening, separating and lighting to support active transportation, improve safety and enhance accessibility and with the goals in the Regional Parks Strategic Plan. 2012 – 2021 to provide recreation and active transportation routes. Also identified as a priority in the renewed Regional Parks and Trails Strategic Plan (2022-2032), Climate Action and Resiliency Action 4-1b (plan for an implement priority regional trail enhancement and expansion projects).

- The project supports the separate use pathway with lighting design recommendations in the CRD's Regional Trail Widening Study.
- The project aligns with CRD's Asset Management Strategy that aims for sustainable service delivery and resiliency in infrastructure renewal.
- The project aligns with the goals in the District of Saanich's Active Transportation Plan to build a culture for active transportation, observe a significant shift to active transportation modes, improve safety for active transportation, and create more connections and places for walking and cycling.

Section 5: Program Criteria

30. Large in Scale: Describe how the size, scale and/or benefits of the project is large in relation to the size of the community.
    - The CRD Regional Trails system connects Capital Regional communities and facilitates access to key destinations within and beyond the region.
    - The CRD Regional Trails system spans municipal boundaries and serve as off-street greenway corridors for both active transportation and recreation.
    - The network facilitates active, healthy lifestyles for people of all ages and abilities.
    - The project is located adjacent to Swan Lake Christmas Hill Nature Sanctuary and Swan Lake Park. Environmental restoration measures are proposed by Swan Lake Christmas Hill Nature Sanctuary in collaboration with the Lochside Regional Trail and Brett Avenue Trestle Enhancement Project.
    - The project area is the busiest section of the regional trail used by approximately 2,000 users per day in peak times for active transportation, recreation, and tourism. 20-year user volume projections include a projected increase of 2.5% per year, reaching approximately 3,500 users per day by 2040. Approximately 80% of trail users are cyclists and 20% are pedestrians. Trail issues include: high use volumes, high speed differentials between user types, lack of safety and personal security, conflicts at intersections, poor trail etiquette, and emerging mobility technology. The separated use pathway with lighting design is based on the best practices for active transportation and accessibility and aims to address these issues.

31. What is the population of the community (making the application)?
    - 415,451

32. What is the population that will be directly served by this project?
    - 394,000

33. Regional in Impact: Describe the degree to which this project supports interjurisdictional collaboration and coordination.
    - The trail corridor is owned by the BC Transportation Financing Authority and is managed by the BC Ministry of Transportation and Infrastructure. The trail is operated by the Capital

Regional District through a Lease Agreement. The entirety of the project is within the District of Saanich. All jurisdictions will require collaboration in order to see success.

- The Capital Regional District Board identifies this project as a Regional Priority.
- Coordination with the District of Saanich for relevant project permits, as well as collaboration with the District of Saanich to align project goals with objectives in the District of Saanich's Active Transportation Plan (to build a culture for active transportation, observe a significant shift to active transportation modes, improve safety for active transportation, and create more connections and places for walking and cycling).
- Environmental restoration and interpretation efforts with Swan Lake Christmas Hill Nature Sanctuary.

34. Does this project involve partnership? If yes, identify parties and their roles.
    - Informal partnerships include the Ministry of Transportation and Infrastructure.

35. Regional in Impact: Describe the degree the project benefits more than one community, is identified as regional priority, and/or is regional in scope.
    - At the October 13, 2021 Board meeting, the CRD Board motion was passed "That staff be directed to actively develop partnerships and pursue grant funding opportunities, including submission to the federal Active Transportation Fund, to support implementation of the separated use pathway design with lighting"
    - At its February 10, 2021 meeting, the CRD Board directed staff to expedite public engagement on the proposed separated use pathway design, lighting and implementation priorities, including consideration of low-intensity lighting in the trail segment adjacent to Swan Lake, aiming for balance between wildlife and public safety considerations. The Board further directed that public engagement and detailed designs be expedited, with a view toward having a shovel-ready project.
    - The project is consistent with the policies in the CRD's Regional Trails Management Plan for trail widening, separating and lighting to support active transportation, improve safety and enhance accessibility and with the goals in the Regional Parks Strategic Plan. 2012 – 2021 to provide recreation and active transportation routes. Also identified as a priority in the renewed Regional Parks and Trails Strategic Plan (2022-2032), Climate Action and Resiliency Action 4-1b (plan for an implement priority regional trail enhancement and expansion projects).
    - The project is aligned to the CRD Board Strategic Priority to "plan for and deliver an effective, long-term multi-modal transportation system and to increase use of public transit, walking and cycling" and to a CRD Board Transportation Priority for active transportation to create a connected and consistent regional trail network.
    - The project aligns with the goals in the District of Saanich's Active Transportation Plan to build a culture for active transportation, observe a significant shift to active transportation modes, improve safety for active transportation, and create more connections and places for walking and cycling.

36. Innovation: Describe any innovative component(s) of the project.

Energy efficient LED lights will be used. Although solar lighting was investigated, it is not a viable solution for the setting due to existing tree canopy and slope aspect of the trail corridor.

37. Describe what research, planning, testing, technology, or methodology supports the approach that will be used, and the additional risks associated with using this innovation.

    Efforts will be made to make sure installation is appropriate and provides the intended illumination benefits while mitigating any possible negative impacts on the surrounding area. Energy efficient LED "warm colour" sources will be investigated for use with dimming, time of day and motion detection capability. Designs will be economical and concise with respect to light output and light control, energy consumption, longevity, maintenance, installation and replacement.

38. Innovation: Describe the relative benefit of the innovative process, method or technology over existing practice.

    Consideration was given to solar light and dimming systems, but were deemed not suitable due to the challenges associated with solar exposure along the regional trail and associated capital costs and limited benefit with respect to power bill savings.

Section 6: Project Planning and Benefits

39. How do you manage your infrastructure assets?
    - The CRD's 2019 Corporate Asset Management Strategy outlines how the CRD will apply an integrated approach, evidence-based decision-making, and life-cycle management to renew infrastructure and determine appropriate levels of service for regional trails.
    - The CRD's asset management policy outlines key asset management objectives, principles and governance to promote sustainable service delivery. The policy establishes seven asset management principles, developed in alignment with industry standards, best practices and organizational values, and include: service delivery and community, decision-making, sustainability, risk and resiliency, financial strategy, transparency, and continual improvement.
    - The 2019 Regional Parks Sustainable Service Delivery Plan Report Card provides a summary of the condition of regional trail assess and a snapshot of the services' financial state to help inform future asset renewal programs and to define appropriate levels of service delivery.
    - CRD staff plan, implement, operate and maintain the regional trail infrastructure to provide an appropriate duty of care and deliver the regional trails service to visitors.
    - Regional Parks follows the Asset Management BC Framework, which recognizes that asset management, and the best practices that support asset management, must be scalable to community size and capacity. The framework is supported by the ISO 55000 Standard for Asset Management.
    - All major regional trail assets are stored in an asset registry, with key information such as install date, expected life, physical and functional condition ratings, criticality rating and risk valuations, ownership and primary user information, level of service, replacement value and an 80-year renewal profile. Key performance indicators per asset category are updated annually.
    - The CRD manages assets by first understanding the demand and defining the appropriate level of service. Infrastructure assets are managed at a level to meet the defined level of

service. With limited resources available, the CRD identifies critical assets by completing criticality assessments. Additionally, the CRD identifies associated hazards, threats, and vulnerabilities through a risk management methodology to further help prioritize resources.

- Long-term financial planning uses the asset registry, criticality rating, and renewal profile to inform the 10-year Capital Program, 5-year Capital Plan, and 1-year Capital Projects List.

40. Does your local government have a long-term financial plan? Yes
    - How long-term is your financial plan (in years) – 5-year Capital Plan
    - How does the financial plan relate to an AM plan, Capital Works plan, OCP, or any other strategic community or corporate plans?
        i. The financial plan links to the CRD Corporate Asset Management Strategy, and is used as the pathway to sustainable, resilient, and adaptive service delivery.
        ii. The Regional Parks and Trails Strategic Plan (2022-2032) links to the CRD's Corporate Asset Management Strategy.
        iii. The 2019 Regional Parks Sustainable Service Delivery Plan Report Card provides a summary of the condition of regional trail assess and a snapshot of the services' financial state to help inform future asset renewal programs and to define appropriate levels of service delivery.
41. Describe how operation and maintenance will be funded over the lifecycle of the infrastructure subject to this application.
    The CRD currently operates and maintains the Regional Trails and Trestles using staff and dedicated Parks Operational Funding. The improvements will not have an impact on the current operational model. Annually, the CRD budget planning process, through service planning and budget planning, determines service levels, including specific actions, targets, and non-financial resources, required to achieve Board, corporate and core service priorities. Through budget planning, the financial resources required to achieve identified service levels and capital investment requirements are specified.
42. What portion (%) of infrastructure replacement for this project will be funded through current financial revenues? 100%
43. For the Asset Class subject to this application – is there an asset inventory/registry?
    - Brett Trestle (2018) - Yes
    - Swan Trestle (2018) - Yes
    - Lochside Trail (2020) - Yes
44. For the Asset Class subject to this application – has a condition assessment been completed?
    - Brett (2018) – Yes (Options Analysis for the Swan Lake and Brett Avenue Trestles Report)
    - Swan (2018) – Yes (Options Analysis for the Swan Lake and Brett Avenue Trestles Report)
    - Lochside Trail (2020) – Yes (Conceptual design feasibility was based on constraints identified in the corridor - slope, encumbrances, tree removal, maintenance activities, etc.).
45. For the Asset Class subject to this application – is there an asset management plan?
    - Brett - Yes
    - Swan - Yes
    - Lochside Trail – Yes
46. Additional comments for AM questions listed above? Yes

- The 2022-2032 Regional Parks and Trails Strategic Plan identifies the following priority action (4-3c: develop and implement an asset management plan for regional parks and trails that achieves critical infrastructure life cycle renewal, is well planned, managed, and funded, is consistent with legislative requirements and receives First Nations input.
- The Regional Parks Sustainable Service Delivery Plan report cards provide a snapshot of key infrastructure renewal facts and analytics to enable informed decision-making.

47. What effects will the proposed project have on service levels and how will these be measured?
    - Brett Trestle and Lochside Trail Enhancement will allow greater volumes of traffic based on current trail count analysis at peak periods. Use count volumes will continue to be measured using trail counters. The current volume of traffic sees 2,000 users a day for this section of trail. This data will become more accurate as the CRD installs and adopts new Eco-Counter data.
    - Swan Trestle and Lochside Trail Enhancement will allow greater volumes of traffic based on current trail count analysis at peak periods. Use count volumes will continue to be measured using trail counters. The current volume of traffic sees 2,000 users a day for this section of trail. This data will become more accurate as the CRD installs and adopts new Eco-Counter data.
    - Trail widening and lighting will allow greater volumes of traffic based on current trail count analysis at peak periods. Use count volumes will continue to be measured using trail counters. The current volume of traffic sees 2,000 users a day for this section of trail. This data will become more accurate as the CRD installs and adopts new Eco-Counter data.

48. Describe the long-term financial plan in place for renewal or replacement of the asset subject to this application.

- 10-year Capital Program looks at renewal profiles for like-for-like replacement, highlights financial and resource pressure points, and outlines strategies to reduce pressures. Renewal profiles and critical infrastructure definitions are re-confirmed annually. The program also includes life-cycle planning, maintenance program considerations, and condition assessments.

- 5-year Capital Plan looks at procurement strategies and grant opportunities to fund project ready initiatives.

- The Regional Parks Sustainable Service Delivery Plan report cards provide a snapshot of key infrastructure renewal facts and analytics to enable informed decision-making.

<u>Section 7: Community Service Demands (Questions 24 – 29 same for both applications/projects)</u>

49. Explain how community demands were used to identify the size and scope of project components and/or establish the appropriate service levels provided by the project.
    - The 2022-32 Regional Parks and Trails Strategic Plan identifies this project as a priority. It also identifies asset management to maintain critical infrastructure in good or better condition.
    - The Regional Trail Management Plan (2016) provided direction to conduct a comparative study to assess the engineering feasibility and cost/benefits of widening and separating the

urban portions of the Galloping Goose and Lochside regional trails and to study whether to install lighting along the corridors. The Capital Regional District (CRD) retained consultant services in 2019 to conduct the CRD Regional Trails Widening Study (2020). The Report was received by the Regional Parks Committee at its meeting of January 27, 2021.

- At the February 10, 2021 meeting, the CRD Board directed staff to expedite public engagement on the proposed separated use pathway design, lighting and implementation priorities, including consideration of low-intensity lighting in the trail segment adjacent to Swan Lake, aiming for balance between wildlife and public safety considerations. The Board further directed that public engagement and detailed designs be expedited, with a view toward having a shovel-ready project. Staff delivered an engagement process in spring 2021 for the Regional Trails Widening and Lighting Project that included opportunities for public, government and First Nations input and involvement, and that complied with COVID-19 safety protocols. Feedback highlights strong support for the separated use pathway design, proposed lighting scheme, and the priority sequence for implementation. Staff have also actively pursued partnerships with provincial and municipal agencies to determine funding options and to advance the project. At the October 13, 2021 Board meeting, the CRD Board motion was passed "That staff be directed to actively develop partnerships and pursue grant funding opportunities, including submission to the federal Active Transportation Fund, to support implementation of the separated use pathway design with lighting"
- Public engagement: In 2020, CRD conducted an online survey to seek public feedback about the proposed separated use pathway with lighting and the priority areas for implementation. In total, 1,784 online surveys were completed. The majority of respondents support or strongly support the separated use pathway design (90%) and lighting (87%).
- Stakeholder engagement: CRD and MOTI held meetings and interviews were held with organizations having direct interest in the project, including City of Victoria, District of Saanich, Swan Lake and Christmas Hill Nature Sanctuary, to determine mutual goals, project synergies, and partnership opportunities.
- First Nations engagement: Letters were sent in 2020 and 2022 to the following First Nations with Traditional Territory in the Project area seeking input on the separated use pathway with lighting: Songhees, Esquimalt, Paquachin, and the WSANEC Leadership Council. Responses from the First Nations indicates interest in understanding any archaeological and environmental implications, in having cultural monitors present during land altering activities, and in any economic development opportunities arising from the project.

50. Explain how resources are recovered and reused in this project.
    - The existing regional trail and alignment along the existing rail corridor will continue to be utilised. The existing paved trail will remain, while the widening will be added to the footprint in order to reduce the overall environmental impacts.

51. What considerations have been or will be applied to protect the environment and/or reduce the demand on natural capital/resources?
    - Keep the scope of the project within the existing rail corridor in order to remain on previously disturbed soils.

- A detailed environmental protection plan will be developed for the design and construction phases.
- An environmental impact assessment will be conducted prior to construction in order to determine if there are any areas of concern.
- A Section 11 notification will be submitted.
- Nesting surveys will be conducted.
- Work will occur within fish windows.
- Disturbance footprint will be minimized by reusing the existing alignment and rail corridor.

52. How has this project considered climate risk and what considerations (climate mitigation and/or adaptation) have been considered and integrated into this project to make it more climate resilient.
    - By widening the existing regional trail and trestles, the anticipated environmental benefits of trail widening and separating are improved air quality through reduction of vehicle traffic, through increased active transportation capacity and choice, and connecting active transportation network to the planned Mobility Hub at Saanich Uptown Centre.
    - Replacing the existing trestles boards soaked in creosote will be remove these boards from wet areas
    - A new trestle will require far less maintenance reducing the carbon footprint by staff.
    - The replacement trestle will be designed with the current climate data which will result in a far more resilient structure.

53. What, if any, regulatory requirements, or standards apply to this project? How will the infrastructure and/or service provided by this project affect these requirements?
    - The CSA-S6-14 Canadian Highway Design Bridge Code (CHBDC) will apply to the project. The new trestles will be designed to the latest standards.
    - Saanich Permitting. All applicable permits will be obtained prior to construction.
    - Heritage Conservation Act may apply to this project. A CRD Heritage Site information review will be conducted. This form is reviewed by an archeologist and if deemed necessary an archeologist will be present on site in case any archeological site are found.
    - BC Ministry of Transportation and Infrastructure Highway Specifications for Highway Construction as well as permits and agreements. CRD currently has an agreement with the Ministry of Transportation and Infrastructure to operate the regional trail and trestles, additional permits for traffic management will be acquired before constructions. Construction will follow all specifications from the 202 Standard Specification for Highway Construction.

54. Benefits of the project (why is the project needed and how it achieves this)?
    - The project aims to improve active transportation accessibility and mobility choice in the Capital Region by widening a 1280/625 m section of existing 3-4 m wide multi-use trail (established in 2001) and existing trestle (built in 1915/1917) to create a 6.5 m wide separated use pathway with lighting. Rebuilding the trestle is critical for the continued operation of the regional trail network. Increasing active transportation accessibility and mobility choice is needed to reduce greenhouse gas emissions from vehicle transportation in the region. Reducing GHGs by improving active transportation mobility choice aligns with

the CRD's Climate Action Strategy, Regional Growth Strategy, Regional Transportation Plan, and Regional Parks and Trails Strategic Plan, as well as with the Province of BC's South Island Transportation Strategy and District of Saanich's Active Transportation Plan.

- The project aims to improve trail safety, user quality and comfort and increase overall capacity on the busiest section of regional trail within the Capital Region. Widening the trail and trestle will increase the desired operating space for pedestrians and cyclists that incorporate space for mobility devices, strollers, side-by-side travel and passing for all ages and abilities, particularly youth, seniors and persons with disabilities. The Project will benefit people who feel their personal safety is at risk when using the trail during periods of darkness by installing lighting along the trail corridor. A widened and separated trail facility will accommodate projected population growth in the region, as well as a cultural trend towards active modes of transportation and micro-mobility devices.
- The project aims to improve public safety by rebuilding the x year old trestle that has been identified as approaching end of life. The project addresses critical infrastructure renewal as part of asset management best practices.
- Other benefits of the project include: job creation; enhanced active transportation access to a regionally significant commercial centre and mobility hub; environmental restoration opportunities; reducing stigma towards those who may not afford a personal vehicle; promoting health and well-being benefits from active modes of travel; promoting climate action .

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Meters
0 50 100 150
Projection: UTM ZONE 10N NAD 83

Lochside Regional Trail and Brett Ave Trestle Enhancement Project

Capital Region, Saanich, British Columbia

Switch Bridge
Major Road
Local Road
Creek
Lake
Park / Protected Area

Outside Project Footprint
Galloping Goose Regional Trail
Lochside Regional Trail

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.

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Meters
0 50 100 150
Projection: UTM ZONE 10N NAD 83

Lochside Regional Trail and Swan Lake Trestle Enhancement Project

Capital Region, Saanich, British Columbia

Major Road
Local Road
Creek
Lake
Park / Protected Area
Outside Project Footprint
Lochside Regional Trail

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REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **Bylaw No. 4502, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022"**

ISSUE SUMMARY

The Bylaw 3854 "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012" participants have requested that the fire dispatch cost apportionment historically based on population be amended to apportion costs by chargeable events related to call volume. This will fairly distribute costs based on activity consistent with the approach used by the fire dispatch contractor to bill for services.

BACKGROUND

In 2021, the Capital Regional District (CRD) undertook a request for proposal (RFP) process on behalf of the Bylaw 3854 participants to secure fire dispatch services consistent with the procurement policy. Saanich Fire Dispatch was the successful proponent and the seamless transition to the new provider was completed on December 7, 2021. The change in providers realized a collective cost savings of approximately $200,000 for the remaining participants and ensured that the service would be NG911 compliant.

Saanich Fire Dispatch invoices their clients based on chargeable call volume events. This process has been the norm for contracted fire dispatch services in BC. The CRD historically apportioned costs for delivery of fire dispatch services for the Bylaw participants by allocation on a population basis. This approach did not accurately reflect the actual use of fire dispatch services by the individual fire departments. Some services were paying more for less activity than other participants, as they may request additional services from the fire dispatch provider such as non-emergent bylaw or other service notifications, to meet their community needs.

The proposed budget will be projected based on the previous full year's chargeable call volume events. This will provide a consistent and actual activity-based level of measurement and predictability.

In June 2021, during discussions with elected officials representing fire dispatch participants, it was requested that CRD bring forward a bylaw amendment (Appendix A) to change the fire dispatch cost apportionment to allocate costs by chargeable events related to call volume. This would fairly distribute costs based on actual service use by the individual participants.

ALTERNATIVES

Alternative 1

1) That Bylaw No. 4502, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022", be read a first, second, and third time;
2) That Bylaw No. 4502 be referred to participants for approval, and if approved by two-thirds of participants, be referred to the Inspector of Municipalities.

Alternative 2
That the Bylaw No. 4502, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022" report be referred back to staff for further information.

IMPLICATIONS

Financial Implications
With the change of fire dispatch service provider in December 2021, participant charges for service decreased by approximately 40% for subsequent years and would remain significantly less than was historically requisitioned for the fire dispatch service prior to 2022. The table below demonstrates the differences in cost allocations by chargeable call volume events versus the historical population-based allocation:

Requisition by Participant, apportioned by population - Current

Participipant	2021 Population*		Requisition	Requisition - Projection				
	Population	Population %	2022	2023	2024	2025	2026	2027
SSI	12,276	26.3%	74,842	76,211	78,145	80,134	82,177	84,643
SGI	5,261	11.3%	32,074	32,661	33,490	34,342	35,218	36,274
JDF	5,756	12.4%	35,092	35,734	36,641	37,573	38,531	39,687
Metchosin	5,186	11.1%	31,617	32,195	33,012	33,852	34,716	35,757
Highlands	2,582	5.5%	15,741	16,029	16,436	16,854	17,284	17,803
Sooke	15,539	33.3%	94,735	96,468	98,916	101,433	104,020	107,141
Total	**46,600**	**100.0%**	**284,101**	**289,299**	**296,639**	**304,189**	**311,947**	**321,305**

2021 estimated population data provided by the CRD Regional Planning.

Requisition by Participant, apportioned by call volume - Proposed

Participipant	2020 Call Volume*		Requisition	Requisition - Projection				
	Call Volume	Volume %	2022	2023	2024	2025	2026	2027
SSI	686	22.2%	63,113	64,268	65,898	67,576	69,299	71,378
SGI	524	17.0%	48,209	49,091	50,336	51,618	52,934	54,522
JDF	452	14.6%	41,585	42,346	43,420	44,525	45,661	47,030
Metchosin	441	14.3%	40,573	41,315	42,363	43,441	44,549	45,886
Highlands	134	4.3%	12,328	12,554	12,872	13,200	13,537	13,943
Sooke	851	27.6%	78,293	79,726	81,749	83,829	85,967	88,546
Total	**3,088**	**100.0%**	**284,101**	**289,299**	**296,639**	**304,189**	**311,947**	**321,305**

**** 2020 call volumes are used to apportion requisition. Actual call volumes will vary with gradual increases expected.***

Requisition Variances - Proposed vs Current

Participipant	% Variance for Cost Apportionment*	Requisition	Requisition - Projection				
		2022	2023	2024	2025	2026	2027
SSI	-4%	(11,729)	(11,943)	(12,246)	(12,558)	(12,878)	(13,265)
SGI	6%	16,135	16,430	16,847	17,276	17,716	18,248
JDF	2%	6,493	6,612	6,779	6,952	7,129	7,343
Metchosin	3%	8,956	9,120	9,351	9,589	9,834	10,129
Highlands	-1%	(3,413)	(3,476)	(3,564)	(3,655)	(3,748)	(3,860)
Sooke	-6%	(16,442)	(16,742)	(17,167)	(17,604)	(18,053)	(18,595)
Total	-	-	-	-	-	-	-

****Green is paying less and yellow is paying more under proposed vs current***

Service Delivery Implications
Changes to cost apportionment will not impact service delivery, though will allow participants to pursue the addition of optional services from Saanich Fire Dispatch without negatively impacting the cost apportionment for other participants. The effective date of the change will be January 1, 2023.

CONCLUSION

As requested by the Bylaw participants, staff have projected the cost apportionment for fire dispatch services on a chargeable call volume event basis and present the necessary bylaw amendment to facilitate the transition to the new allocation to begin in the 2023 budget if approved.

RECOMMENDATION

1) That Bylaw No. 4502, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022", be read a first, second, and third time;
2) That Bylaw No. 4502 be referred to participants for approval, and if approved by two-thirds of participants, be referred to the Inspector of Municipalities.

Submitted by:	Shawn Carby, CD, BHSc, MAL, Senior Manager, Protective Services
Concurrence:	Nelson Chan, MBA, CPA, CMA, Chief Financial Officer
Concurrence:	Steven Carey, Acting General Manager Corporate Services
Concurrence:	Kevin Lorette, P. Eng., MBA, Acting Chief Administrative Officer

ATTACHMENT

Appendix A: Bylaw No. 4502, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022"

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4502

****

A BYLAW TO AMEND THE COST APPORTIONMENT OF "THE EMERGENCY COMMUNICATION DISPATCH SERVICE ESTABLISHMENT BYLAW NO. 1" (BYLAW NO. 3854)

****

WHEREAS:

A. The Capital Regional District operates an emergency communication dispatch service for the areas of the District of Highlands, the District of Metchosin, the District of Sooke, and the Salt Spring Island, Southern Gulf Islands, and the Juan de Fuca Electoral Areas;

B. The participants wish to change the cost apportionment to reflect actual service usage by the individual participants versus apportionment by population and the participants may amend the service by two-thirds consent of the participants and approval of the Inspector of Municipalities;

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

1. Bylaw No. 3854, "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012" is hereby amended as follows, effective January 1, 2023:
   (a) By amending section 5 to state:

   The net annual cost attributable to this service shall be apportioned among the participating municipalities and electoral areas on the basis of their usage as indicated by call volume. Call volume, for the purpose of this section, is the number of calls for service attributed to the individual participant as determined annually by the Capital Regional District. The annual call volume will be determined for budgeting purposes using the last full year's call statistics as recorded by the dispatch service provider.

2. This Bylaw may be cited for all purposes as "Emergency Communication Dispatch Service Establishment Bylaw No. 1, 2012, Amendment Bylaw No. 2, 2022".

READ A FIRST TIME THIS	day of	20
READ A SECOND TIME THIS	day of	20
READ A THIRD TIME THIS	day of	20
CONSENTED TO BY TWO-THIRDS OF PARTICIPANTS THIS	day of	20
APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS	day of	20
ADOPTED THIS	day of	20

CHAIR

CORPORATE OFFICER

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REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **Bylaw No. 4507: Salt Spring Island Local Community Commission – Revision**

ISSUE SUMMARY

To revise Bylaw No. 4507 to clarify the process for by-elections during a mid-term vacancy.

BACKGROUND

On July 13, 2022, Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022", was read three times. A Local Community Commission (LCC) bylaw may establish a different manner of holding elections than that set out in the *Local Government Act (LGA)*. Section 9 of the Bylaw permits Board selection of the by-election method, including voting by mail only, appointment after a nomination period, or by standard *LGA* election provisions. The intention of including these provisions was to avoid a costly by-election by allowing other options to fill short-term vacancies.

As part of the legislative process, the bylaw was sent to the Inspector of Municipalities for review. CRD staff raised concerns of a public delegate on the ability to appoint during by-elections and engaged on whether the voting by mail provision would be acceptable.

Given the lack of clarity on a mid-term appointment versus election of commissioners, the Province recommended a bylaw revision to avoid any issue. For voting by mail, Provincial staff recommended CRD make a risk assessment whether to revise, as the Inspector may require clarifying language and reference to specific Part 3 LGA sections. If the Inspector were to require an amendment, the bylaw would not be approved in time to proceed to referendum at the time of the General Local Election.

Given the primary focus of the upcoming referendum is a governance change, not alternative by-election provisions, staff recommend removing section 9 to avoid any potential delays in Inspector approval. If desired in future, the Regional Board may pass an amending bylaw for elector consideration.

ALTERNATIVES

Alternative 1

1. That third reading of Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022", be rescinded;
2. That Bylaw No. 4507 be amended as follows:
    a. That section 8 be amended to read "The local community shall elect commissioners at the end of each four year term in accordance with the manner provided in Part 3 [*Electors and Elections*] of the *Local Government Act*."
    b. That section 9 be deleted in its entirety and that all subsequent sections be renumbered in numerical order;
    c. That the renumbered section 23 be amended to replace the reference words "section 23" after the words "by the methods set out in" with the words "section 22".
3. That Bylaw No. 4507 be read a third time as amended;
4. That Bylaw No. 4507 as amended be referred to the Inspector of Municipalities; and

5. That the July 13, 2022 resolutions approving proceeding by elector assent by referendum, appointing the Chief Election Officer, setting the referendum question, and setting the dates of general voting, and approving the synopsis of Bylaw No. 4507, be affirmed as applying to Bylaw No. 4507, as amended.

Alternative 2
The Capital Regional District Board direct staff to request Inspector of Municipalities review of Bylaw No. 4507 without amendment.

IMPLICATIONS

While election method may be altered, given the Inspector's discretion to approve or deny and a lack of judicial or legislative guidance, it is unknown the extent to which this may be done. Default election provisions are suitable and by-election expenses only occur if a by-election is necessary.

Should CRD proceed as-is, Bylaw No. 4507 may be rejected by the Inspector. If it is approved by the Inspector and electors, defending a legal challenge would be a financial burden on the SSI EA and defeat the cost-saving purpose of the provisions, even if CRD were successful.

CONCLUSION

Removing section 9 and continuing to referendum is recommended.

RECOMMENDATION

1. That third reading of Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022", be rescinded;
2. That Bylaw No. 4507 be amended as follows:
    a. That section 8 be amended to read "The local community shall elect commissioners at the end of each four year term in accordance with the manner provided in Part 3 [*Electors and Elections*] of the *Local Government Act*."
    b. That section 9 be deleted in its entirety and that all subsequent sections be renumbered in numerical order;
    c. That the renumbered section 23 be amended to replace the reference words "section 23" after the words "by the methods set out in" with the words "section 22".
3. That Bylaw No. 4507 be read a third time as amended;
4. That revised Bylaw No. 4507 as amended be referred to the Inspector of Municipalities; and
5. That the July 13, 2022 resolutions approving proceeding by elector assent by referendum, appointing the Chief Election Officer, setting the referendum question, and setting the dates of general voting, and approving the synopsis of Bylaw No. 4507, be affirmed as applying to Bylaw No. 4507, as amended.

Submitted by:	Kristen Morley, JD, General Manager, Corporate Services
Concurrence:	Karla Campbell, MBA, BPA, Senior Manager, Salt Spring Island Electoral Area
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Bylaw No. 4507, "Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022" (as amended)
Appendix B: Bylaw No. 4507 (Redlined)

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4507

****

A BYLAW TO ESTABLISH A LOCAL COMMUNITY COMMISSION FOR SALT SPRING ISLAND

****

WHEREAS:

A. Salt Spring Island Electoral Area has a number of local, sub-regional, and island-wide services;

B. Under the *Local Government Act*, RSBC 2015 c 1, a regional district may establish, by bylaw, one or more local communities to be administered by local community commission, provided the electors in the area of the local community assent to the creation of the commission;

C. The Capital Regional District Board wishes to establish a local community commission for Salt Spring Island, with the scope of authority as set out in this bylaw and such other bylaws as adopted from time to time;

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

CREATION OF LOCAL COMMUNITY COMMISSION

1. A local community is hereby established, to be known as "Salt Spring Island", and a local community commission is hereby established, to be known as the "Salt Spring Island Local Community Commission" (hereinafter the "Commission").

BOUNDARIES

2. The boundaries of the Salt Spring Island local community are those of the Salt Spring Island Electoral Area.

SCOPE OF AUTHORITY

3. Subject to the policies and procedures of the Regional Board and limitations in its bylaws and the *Local Government Act*, the Commission may oversee and exercise powers and duties as set out by bylaw in relation to the following Salt Spring Island services:

    (a) Economic development as set out in Bylaw No. 1824, "Economic Development Commission Establishing Bylaw No. 1, 1990", as it relates to Salt Spring Island;

    (b) Wastewater disposal set out in Bylaw No. 2118, "Salt Spring Island Liquid Waste Disposal Additional Local Service Establishment Bylaw No. 1, 1993";

    (c) Community parks service continued under Bylaw No. 4149, "Salt Spring Island Community Parks Services Conversion Bylaw No. 1, 2017";

    (d) Community recreation service continued under Bylaw No. 4151, "Salt Spring Island Community Recreation Services Conversion Bylaw No. 1, 2017";

    (e) Indoor swimming pool service in Bylaw No. 3206, "Salt Spring Indoor Swimming Pool Facility Service Establishment Bylaw No. 1, 2004";

(f) Community parks and recreation facilities in Bylaw No. 2422, “Salt Spring Island Parks and Recreation Facilities Local Service Establishment Bylaw No. 1, 1996”;

(g) The Salt Spring Island Small Craft Harbour Facilities local service set out in Bylaw No. 2730, “Small Craft Harbour Facilities (Salt Spring Island) Local Service Establishment Bylaw No. 1, 1999”;

(h) Transportation service established under Bylaw No. 3438, “Salt Spring Island Community Transit and Transportation Service Establishment Bylaw No. 1, 2007”;

(i) Street lighting under Bylaw No. 3746, “Salt Spring Island Street Lighting Service Establishment Bylaw No. 1, 2011”;

(j) The issuance of grants-in-aid for Salt Spring Island initiatives under Supplementary Letters Patent Division XIX, OIC 1013/1977, subject always to the restriction on assistance to business under the *Local Government Act*;

(k) Determination of compensation for livestock injury by dogs under Bylaw No. 4418, “Livestock Injury Compensation Service (Salt Spring Island) Bylaw No. 1, 2021”;

(l) The arts contribution service set out in Bylaw No. 3116, “Salt Spring Island Arts Contribution Service Establishing Bylaw No. 1, 2003”;

(m) The Salt Spring Island Public Library local service set out in Bylaw No. 2725, “Salt Spring Island Public Library Local Service Area Establishment Bylaw No. 1, 1999”;

(n) The Salt Spring Island Search and Rescue contribution as set out in Bylaw No. 3494, "Salt Spring Island Search and Rescue Service Establishment Bylaw, 2007”;

ADVISORY COMMITTEES

4. The Commission may create advisory bodies, subject to prior approval of the Regional Board.

LOCAL COMMUNITY COMMISSION & ELECTORAL AREA DIRECTOR

5. The Electoral Area Director may consult with the Commission on matters of local importance, but is not bound by that advice or direction. The Commission cannot restrict the Electoral Area Director’s decision-making authority at the Regional Board.

ELIGIBILITY

6. To be eligible for election as a commissioner, individuals must be eligible as a director under the *Local Government Act.*

COMPOSITION & TERM

7. The Commission shall have the following number of voting members, each having one vote:
   (a) The Salt Spring Island Electoral Area Director; and
   (b) Four individuals qualified in accordance with this bylaw to act as commissioners.

8. The local community shall elect commissioners at the end of each four year term in accordance with the manner provided in Part 3 [*Electors and Elections*] of the *Local Government Act*.

9. Commissioners are not permitted to appoint an alternate to act in their absence.

REMUNERATION AND EXPENSES

10. Commissioners shall receive an annual stipend or payment per meeting, and shall be reimbursed for necessary expenses incurred in the course of carrying out Commission business, as per applicable CRD Board policies.

DEATH, RESIGNATION, DISQUALIFICATION AND TERMINATION

11. A commissioner's appointment ends on the end of election term; resignation; death; incapacity; or ceasing to be qualified as a commissioner.

12. Resignation is effective on receipt of written notice of resignation to the Regional District's Corporate Officer.

ABSENCES

13. If a commissioner is absent for more than four consecutive regularly scheduled commission meetings or 60 consecutive days, subject to leave of the Regional Board or illness or injury, the commissioner may be removed by the Regional Board.

CONDUCT OF MEETINGS AND QUORUM

14. A quorum of the Commission is a majority of its members.

15. Regular meetings shall be held once per month at a time and date set by resolution of the Commission, in consultation with Regional District staff.

16. The Commission shall observe at its meetings the procedural rules set out in Bylaw No. 3828, "Capital Regional District Board Procedures Bylaw, 2012" (the "CRD Procedures Bylaw").

17. Each Commissioner shall have one vote.

18. The rules, policies, procedures and bylaws which govern the Regional Board shall apply to the Commission where applicable.

19. All meetings of the Commission must be held in a public facility and must be open to the public. Meetings may be closed, where authorized by law.

20. The Commission may meet by electronic means, where the requirements in the CRD Procedures Bylaw are met.

21. If, as a result of members of the Commission declaring a conflict of interest in relation to a matter, and as a consequence, there is no longer a quorum of members of the Commission to decide on a particular issue, the issue shall be referred to the Regional Board for a decision.

ANNUAL MEETING & OFFICERS

22. On or before the last day of January of each year, the Commission shall hold an annual meeting (the "Annual Meeting") for the purpose of electing a Chair and Vice-Chair from among its number, to hold such office until the next Annual Meeting. Voting shall be by show of hands, or, if a secret ballot is requested by a member present, by secret ballot.

23. In the event of a vacancy of an officer, the Commission may, by the methods set out in section 22, select another commissioner to fill the vacant officer role until the next Annual Meeting.

RECORD KEEPING

24. The Commission shall comply with all public record keeping requirements under the *Community Charter*, *Local Government Act*, and other applicable legislation.

CITATION

25. This bylaw may be cited for all purposes as “Salt Spring Island Local Community Commission Establishment Bylaw No. 1, 2022".

READ A FIRST TIME THIS	13th	day of	July	2022
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APPROVED BY ELECTOR ASSENT THIS	th	day of		20__
APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS	th	day of		20__
ADOPTED THIS	th	day of		20__

CHAIR

CORPORATE OFFICER

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4507

****

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~~9. In the event of a vacancy before the end of a commissioner's term, the Regional Board may choose one of the following methods to fill the vacancy, considering the cost of a formal election to the local service area and the length of time before a general voting day:~~

~~(a) A by-election in accordance with the *Local Government Act*;~~

~~(b) Voting by mail, to the exclusion of an in-person general voting opportunity;~~

~~(c) After a 30 day public advertisement period soliciting public interest, and on considering recommendations of the local community commission, appointment by the Regional Board of a qualified individual for the remainder of the vacated term.~~

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~~10.~~9. Commissioners are not permitted to appoint an alternate to act in their absence.

REMUNERATION AND EXPENSES

~~11.~~10. Commissioners shall receive an annual stipend or payment per meeting, and shall be reimbursed for necessary expenses incurred in the course of carrying out Commission business, as per applicable CRD Board policies.

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~~12.~~11. A commissioner's appointment ends on the end of election term; resignation; death; incapacity; or ceasing to be qualified as a commissioner.

~~13.~~12. Resignation is effective on receipt of written notice of resignation to the Regional District's Corporate Officer.

ABSENCES

~~14.~~13. If a commissioner is absent for more than four consecutive regularly scheduled commission meetings or 60 consecutive days, subject to leave of the Regional Board or illness or injury, the commissioner may be removed by the Regional Board.

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CHAIR

CORPORATE OFFICER

Making a difference...together

REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **Island View Beach Regional Park – Drainage Ditch Study**

ISSUE SUMMARY

To report back on the results of a drainage ditch study for Island View Beach Regional Park.

BACKGROUND

At its October 27, 2021 meeting, the Regional Parks Committee received a staff report providing an update on the delivery of the annual Mosquito Population Management and Control Program (control program) at Island View Beach Regional Park (IVBRP). The control program is a partnership with the District of Central Saanich (Central Saanich), the Tsawout First Nation and the Capital Regional District (CRD). The CRD covers control program costs for IVBRP.

The October 2021 staff report noted that the flapper gate on the Tsawout First Nation lands was not working properly in 2021 due to a log jam, which allowed seawater to flood the Tsawout salt marsh through its system of drainage ditches. Concurrently, in 2021, there was an increase in reported nuisance mosquitos in and around IVBRP. On September 21, 2021, Central Saanich sent a letter to the CRD Board stating that Council passed a motion at its September 20 meeting requesting the CRD contribute $15,000 towards a feasibility study for the replacement of the Tsawout flapper gate.

The Central Saanich letter also stated that “the management of Island View Beach ditches resulted in (a) situation which did not adequately control and abate mosquito breeding in the engineered ditches within the Regional Park” and it tied the inflow and infiltration of sea water into the IVBRP ditch system to the condition of the Tsawout First Nation flapper gate.

As a result, staff recommended to the Regional Parks Committee that $15,000 be allocated to the District of Central Saanich towards the feasibility study and that staff undertake a study of the IVBRP drainage ditch system and share the results with Central Saanich and the Tsawout First Nation. The recommendation was approved at the November 10, 2021 CRD Board meeting.

The CRD subsequently made $15,000 of funding available to Central Saanich to apply towards the Tsawout First Nation flapper gate replacement feasibility study. Staff also proceeded to award a contract to GreatPacific Engineering & Environment (GreatPacific) to undertake the IVBRP drainage ditch study (Appendix A).

CRD staff identified that the purpose of the study was to characterize and assess the drainage ditch system and to provide advice on maintaining the system over the next 10 to 20 years to maintain its functionality, while also taking into account climate change and key park values.

The project timelines necessitated GreatPacific to complete a compressed field work program during April 2022. GreatPacific’s final report (June 30, 2022) recognizes that the collected data and observations provide a snapshot in time of park conditions. The report conclusions identify that there are opportunities to improve the ditch network to reduce standing water and drainage; that the Central Saanich tidal gate located in IVBRP does not consistently prevent seawater from

entering the ditching network; that regrading of specific areas of the ditching system would prevent some isolated ponding at low tides; and that some vegetation management would benefit accessibility and reduce restrictions within the ditching system. Additionally, it was noted that the adjacent Tsawout lands include some large inundated areas containing saline water and that some overland flow was observed between the two ditching systems during periods of high tides.

The GreatPacific report also noted that based on a time period over the next 20 years, sea level rise is predicted to be in the order of 0.15 m, which could pose an incremental reduction in the hydraulic performance of the drainage system under its existing configuration/size. Changes to the ditch system function and associated ditch maintenance have the potential to change the existing wetland ecology, including for species at risk. The report advises that the potential effects of future actions should be assessed and evaluated as part of the decision-making process.

IMPLICATIONS

Operational Implications

CRD staff have been implementing recommendations in the GreatPacific report as a part of the annual ditch maintenance activities (Appendix B). As of mid-July, 168 hours of staff time have been spent on removing logs, debris and vegetation blocking ditch sections, cutting back overhanging branches, and clearing one side of the ditches to increase access for mosquito control contractor staff. In August, staff will utilize heavy equipment to complete the ditch clearing activities. Completion of the 2022 ditch maintenance program will require a second round of vegetation management before the end of the growing season. It is estimated that over 300 hours of staff time will be spent on IVBRP ditch maintenance activities in 2022.

Duka Environmental Services (Duka) has prepared a summary document of the 2022 mosquito control program (Appendix C). The document includes a graphic portraying the total volumes of VectoBac applied annually for each of the partners between 2019 and 2021. The total volume of VectoBac required at IVBRP has ranged from 10 to 25% of the total treatments required for all three partner areas. The nuisance mosquito *Aedes dorsalis* develops in saltwater habitats, the predominant habitat of the Tsawout First Nation salt marsh. The majority of adult mosquitos collected at IVBRP and adjacent properties over the past several years has been *Aedes dorsalis*, but the predominant species of mosquito larvae collected at IVBRP is *Aedes sticticus*. The data indicates that based on the predominant habitat type and areal extent, the *Aedes dorsalis* mosquito primarily originates from the Tsawout salt marsh.

Intergovernmental Implications

The CRD prioritizes maintenance of good relationships with adjacent landowners. It regularly works with Central Saanich and the Tsawout First Nation to address nuisance mosquitos and to maintain the drainage ditch system. The CRD will collaborate with Central Saanich and the Tsawout First Nation to address priority action items in the GreatPacific report.

Alignment with Existing Plans & Strategies

IVBRP operates under a 1989 management plan that provides direction on maintaining the ditch system and the mosquito control program. A planning process was undertaken between 2011 and 2017 to update the 1989 management plan. During the management planning process, the CRD Board approved policy direction to monitor the effectiveness of the control program and the ditches in reducing mosquito habitat and to assess their impact on the coastal wetland habitat.

Financial Implications

Costs for the annual mosquito control program, contracted ditch monitoring/reporting activities and yearly ditch maintenance by staff and contractors is included in the CRD's Regional Park core budget. Costs for implementing any approved actions arising out of the GreatPacific drainage ditch study will be considered during annual budgeting and capital planning cycles.

Environmental & Climate Implications

IVBRP is home to several species at risk. These species have developed to exploit the characteristics of a dune ecosystem and natural coastal wetland. As inundation by saltwater has been reduced over the years by ditching and drainage, the ecosystem now supports freshwater wetland species. Any changes to the ditch system function and ongoing maintenance may affect ecosystem functions and associated species. An environmental assessment will be needed to fully understand the implications of any proposed changes.

CONCLUSION

In November 2021, the CRD Board approved a recommendation to provide $15,000 towards a feasibility study to replace the Tsawout First Nation flapper gate, to undertake a study of the IVBPR drainage ditch system and report back on it, and to share the results with the District of Central Saanich and the Tsawout First Nation. The CRD provided the requested funding to the District of Central Saanich for the feasibility study and staff contracted with GreatPacific to assess the IVBRP drainage ditch system. The GreatPacific report characterizes and assesses the ditch system and provides management advice for maintaining its functionality over the next 10 to 20 years. The report has been provided to the District of Central Saanich and Tsawout First Nation, and the CRD will work with these partners to address priority actions identified in the report. CRD staff will spend more than 300 hours at IVBRP in 2022 completing ditch maintenance activities.

RECOMMENDATION

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

Submitted by:	Mike MacIntyre, Manager, Planning & Development, Regional Parks
Concurrence:	Larisa Hutcheson, General Manager, Parks & Environmental Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: GreatPacific Engineering & Environment – 2022 IVBRP Drainage Ditch Study
Appendix B: CRD Regional Parks – 2022 IVBRP Drainage Ditch Maintenance Activities
Appendix C: Duka Environmental Services – 2022 IVBRP Summary of Conditions

GREATPACIFIC
ENGINEERING & ENVIRONMENT

DRAINAGE DITCH ASSESSMENT

Island View Beach Regional Park

June 30, 2022

Prepared For:
Capital Region District
490 Atkins Avenue
Victoria, BC V9B 2Z8

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Victoria, BC V9B 3S6
Phone: 778.433.2672
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gpinfo@greatpacific.ca

Disclaimer

GreatPacific Consulting Ltd. (GPC) has prepared this Report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professional current practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this Report. No other warranty and/or guarantee, whether expressed or implied is made, with respect to the Report, the Information, or any part thereof.

This Report has been prepared for the specific project and/or site, design objective, development and purposes described to GPC by the Client. The factual data, interpretations and recommendations pertain to a specific project as described in this Report and are not applicable to any other project or site location. GPC accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, marine, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

Except as agreed to in writing by GPC and our Client or as required by law; or to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by the Client and no other party without the express written consent of GPC and payment of compensation for that consent."

Report Prepared By:

Brandon Powers, P.Eng. (ON)
Civil Engineer

Reviewed By,

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
J. R. CLARKE
39072
2022-07-18
Permit to Practice #1000737

Jason Clarke, P.Eng.
Director

GREATPACIFIC
ENGINEERING & ENVIRONMENT

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Appendix 1 Drawings C000 – C002

Appendix 2 Site Photos

Appendix 3 Aerial Photo (circa 1920's)

1 Introduction

GreatPacific Consulting Ltd. (GreatPacific) was retained by the Capital Region District (the CRD) to complete an assessment of the drainage infrastructure located at Island View Beach Regional Park (the Park; Figure 1) located in the District of Central Saanich in the Greater Victoria Area.

In addition to this drainage study, GreatPacific was also required to complete an assessment of the coastal berm located along the shoreline of the Park. The results of the berm assessment are detailed under separate cover entitled *Coastal Berm Assessment– Island View Beach Regional Park* (GreatPacific, May 2022). It is noted that facets of the drainage network and the coastal berm are interrelated, and the reader is directed to both reports for a fuller understanding of the infrastructure assessment completed by GreatPacific.

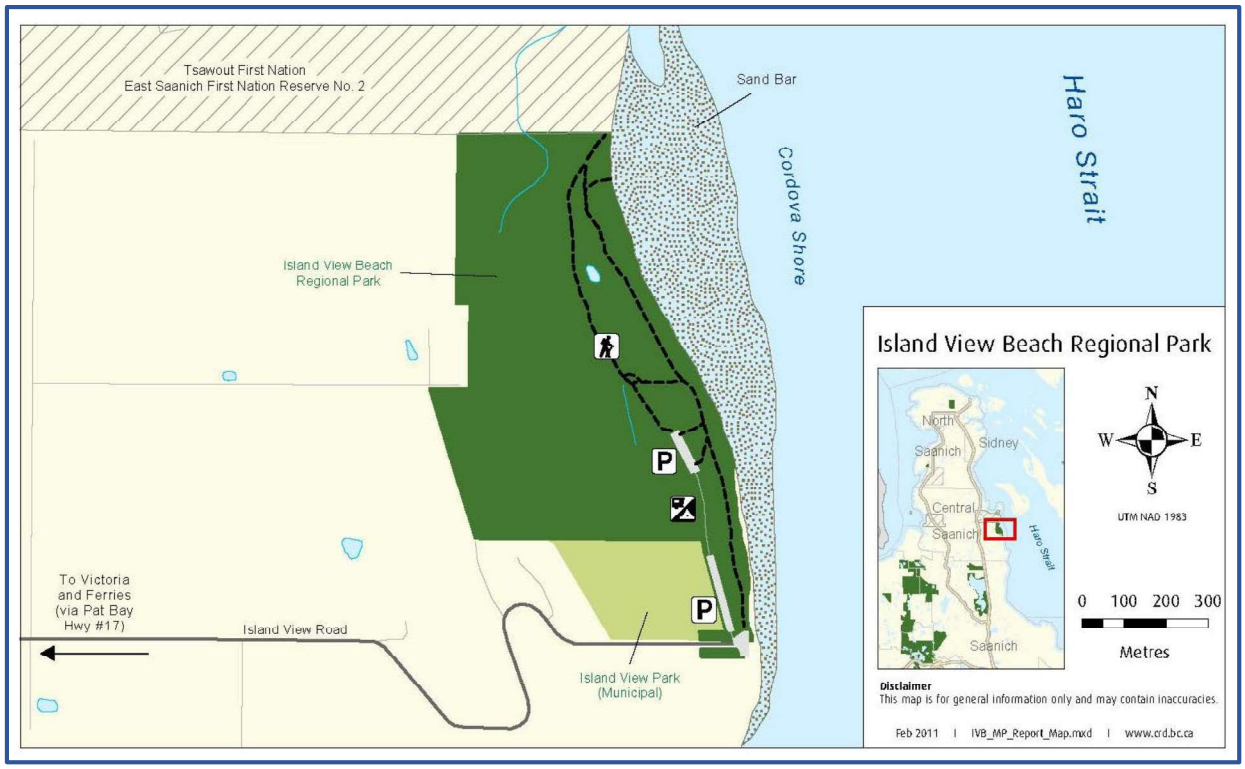


Figure 1 Island View Beach Regional Park – Context Map

2 Background

The Park is a well utilized public recreational area administered and operated by the CRD which also contains of a variety of ecologically valuable spaces, and a series of trails in addition to other Park amenities such as a campground, picnic areas, and marine shoreline.

The Park is a low lying area, partially protected from coastal flooding by an elevated coastal berm. The park also contains a series of drainage ditches intended to drain the Park lands through a tidal gate structure located in the berm. Offshore of the tidal gate, the drainage network discharges through a culvert and second tidal gate at the culvert terminus to the marine environment of Haro Strait.

The ditching system is understood to have been completed circa 1930's, although earlier ditching systems existed in the area including ditching within the adjacent Tsawout First Nation (Tsawout) (refer to Appendix A for air photo circa 1920's showing ditching on Tsawout Lands.). The modern adjacent Tsawout ditching system is not directly connected to the Park's ditching system, and is intended to convey water from the Tsawout lands northward to the marine environment through another tidal gate.

An ongoing issue in the vicinity of the Park has been nuisance mosquitos. A mosquito management plan is implemented within the Park to attempt to manage these insects. Known to thrive in areas of stagnant water, large numbers of mosquitos may be indicative of drainage issues.

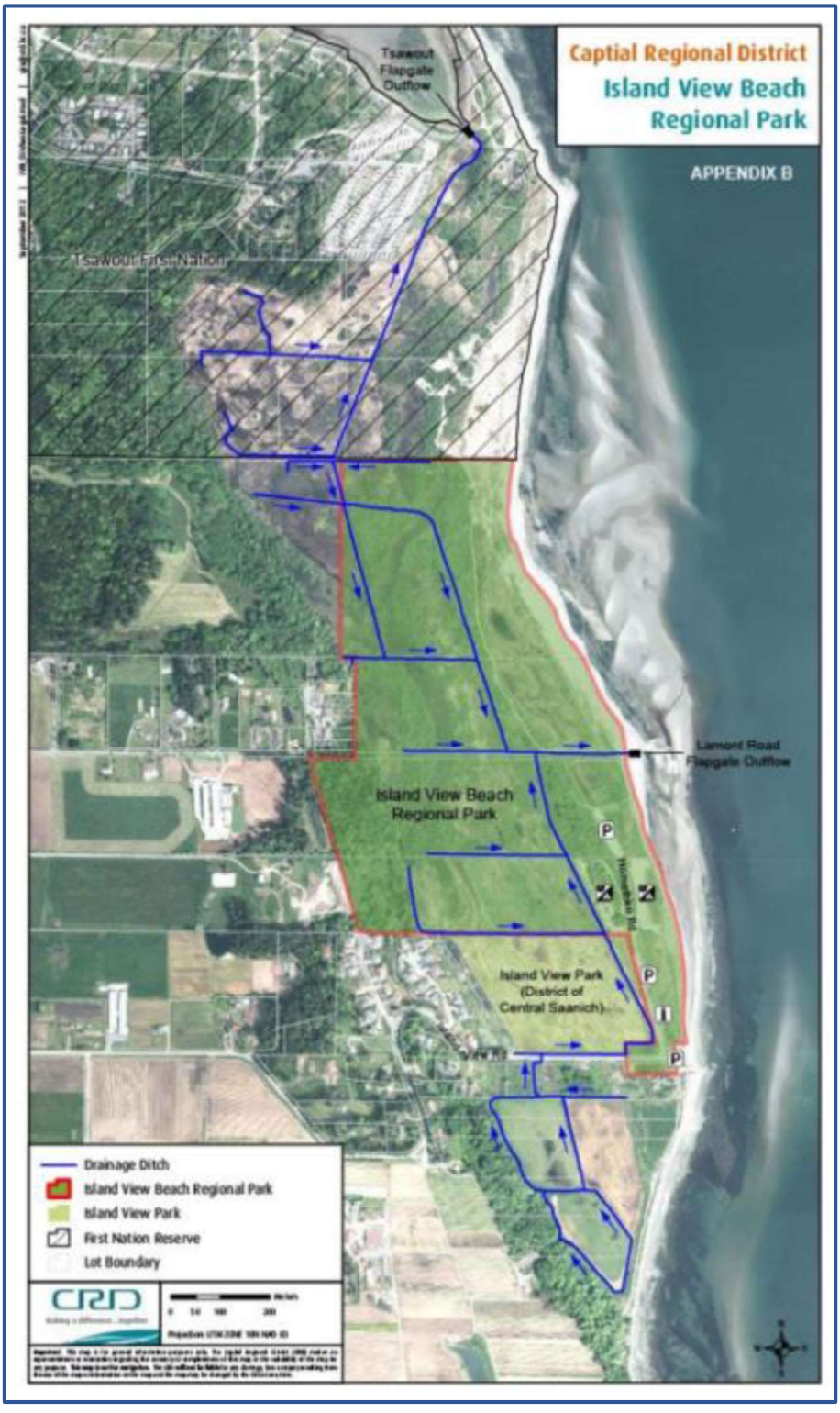


Figure 2 Island View Beach Regional Park – General Configuration of Ditch Drainage System

3 Study Purpose

This study was focussed on the ditch drainage system, of which the following objectives were established:

1. To characterize the drainage system and the key components influencing its functionality (e.g. hydrological, biophysical, structural).
2. Complete a condition assessment and identify factors that could affect future performance
3. Provide advice for maintaining the system for its intended purpose of adequate drainage and flood prevention over the next 10 to 20 years
4. Consider a variety of factors as part of the overall assessment such as government regulatory directives, CRD's sustainable service delivery model, ecological function, climate change, reduction of nuisance mosquitos, park visitor user experience, and relationships with adjacent land owners.

4 Previous Studies

There have been several previous studies directed towards understanding various aspects of the ecological and hydrotechnical characteristics of the Park. This study is intended to supplement previous work, and to provide an updated assessment of the drainage conditions.

A multitude of historical information was reviewed as part of this study. Some of the most pertinent previously completed studies are listed below:

- Hydrologic and Hydrogeologic Site Assessment (Lowen Hydrogeology Consulting Ltd., March 2012)
- Island View Ditch System – CRD Parks Lands (Aquatex Scientific Consulting Ltd., Feb 22, 2013)
- Island View Beach Ditch Maintenance– CRD Parks Lands (Aquatex Scientific Consulting Ltd., Apr 25, 2013)
- Island View Beach Ditch Maintenance– CRD Parks Lands (Aquatex Scientific Consulting Ltd., June 7, 2018)
- Hydrology Characterization of Island View Beach Saltmarsh (Camosun College 208B Project Report, Spring 2013)
- Island View Beach Regional Park Site Visit and Coastal Berm Review (Golder Associates Ltd., January 2013)

The above reports contained useful information and data relating to the hydrotechnical characteristics of the Park. Data and information from the above reports supplemented additional site information collected directly by GreatPacific.

5 Field Investigation Scope

A field investigation was completed to gather pertinent information and data which informed the drainage assessment. Tasks included:

- Topographic survey of the ditch elevations;
- Drilling of shallow monitoring wells in select locations to monitor groundwater water levels;
- Monitoring of water levels within the ditch network to evaluate ditch water elevation levels to tide levels;
- Salinity measurements within the ditch network, at other surface water areas in the Park, and at groundwater monitoring wells;
- Visual inspection of drainage conditions and categorization of observed deficiencies.

Due to the condensed nature of the timeline for this project, field work was completed on an expedited basis, resulting in data being collected over a timeline of a just a few weeks. It is common for these studies to incorporate a substantially longer period of field data collection to further qualify and quantify the hydrotechnical regime of these lands. Of particular value would be the collection of data capturing seasonally variant weather and precipitation conditions in combination with the range of tidal cycles.

6 Results and Discussion

6.1.1 Drainage Survey

6.1.1.1 Ditch System

A topographic survey of accessible areas of the ditch system was completed utilizing a Real-Time Kinematic (RTK) survey instrument on April 22, 2022. The collected data from this survey was supplemented by topographic data previously collected by Andy Blaine Consulting (2011) provided by the CRD.

Based on the topographic survey collected by GreatPacific, there were several areas of poorly graded ditch, where invert/ center of ditch elevations did not exhibit a positive downhill grade towards the outlet.[1] As a result; when downstream sections of the ditch are fully drained, upstream segments would be left with isolated sections of ponded water. These sections would be unable to drain via surface runoff, and would either remain stagnant, or would infiltrate into the underlying substrates. Evaluation of infiltrative capacity within the ditch cross section exceeded the scope of this program. The extent of the surveyed ditches, and profiles of each ditch are presented in Drawings C000 to C002 (Appendix 1).

It was noted that the ditching system was frequently inundated. The main channel (Ditch 5) was inundated at all observed times during the field investigation, which occurred during a time period which was generally absent of significant periods of precipitation. Photos within Appendix 2 illustrate observed conditions.

[1] It is noted that while evaluation based on surveyed inverts provides appropriate insight into ditch conveyance, better accuracy and qualification of flow capacity would be ascertained were the ditch to be surveyed/ evaluated in the dry, which is not currently feasible due to the inflow of tidal waters spoken to in other sections of this report.

Reverse flow (i.e., downstream to upstream, or east to west), was observed during rising tide conditions in the main channel. Flow was directly observed to be entering the ditch from offshore, presumably through the Park's tidal gate structure, which resulted in tidal waters entering the ditch from offshore. Access to the tidal gate for visual inspection could not be arranged during the short duration of this study.

Overgrowth in and around the ditch prevented access to the ditching system in multiple areas, and as such, these areas were unable to be evaluated. Also, in many areas, vegetation and debris within the flow channel was observed to presents an impedance to ditch hydraulics. Areas of substantial overgrowth precluding assessment are summarized in Drawing C000 (Appendix 1)) and within the site photos (Appendix 2).

It is also noteworthy that certain areas of the ditching system contained substantial quantities of sediments, silts, etc. This was most significant in the ditching networks at the southern extremity of the Park.

6.1.1.2 Other Park Lands

During field operations, it was noted that multiple areas of the Park were inundated and did not demonstrate positive drainage connectivity to the ditch system. Some of these areas consisted of substantial surface water area. Poor surface water drainage connectivity from these ponded areas to the drainage ditches may contribute to these areas acting as stagnation ponds suitable for certain mosquito breeding. Refer to Appendix B for photos of these conditions.

Ultimately these areas may be able to drain through the underlying ground substrates and into the drainage ditching system under proper drainage conditions. This is further discussed in Section 6.1.2

6.1.1.3 External Lands

Although outside of the scope of this project, it was noted that hydraulic linkages exist to adjacent properties which impact the overall water regime and characteristics of the Park.

At the northwest of the property, the Park's ditch system conveys water through private property in an area colloquially known as "Puckle Farm". It is noted that this is a low-lying area which appears to have substantial standing water for extended periods of time (evidenced by historic imagery).

Additionally, and perhaps more significantly, is the interconnection of water systems between the Park and the adjacent Tsawout lands. Although it was understood that there is no direct connectivity (i.e., open ditches) between the Tsawout and Park ditching systems, overland flow was observed during the field program from the inundated Tsawout lands (adjacent to the Tsawout ditch) into the Park's ditches at the northern Park boundary (Refer to Photo 23 in Appendix 2). The areal extent of the Tsawout lands draining towards the Park was not evaluated.

It was also understood that the current tidal gate structure at the mouth of the Tsawout ditch network was in a state of malfunction, allowing the Tsawout ditches to flood with seawater. Field observations indicated that during high tide conditions, the Tsawout Nation ditches overtop, flooding adjacent lands,

and spilling over into the Park lands. Groundwater flow pathways may also exist between the flooded lands / ditches on Tsawout lands and the adjacent CRD ditches. High salinity measurements in the ditches near the boundary of the Park and Tsawout lands also indicated hydraulic connectivity of the Tsawout lands and Park ditches (discussed in Section 6.1.3), and seawater intrusion.

6.1.2 Groundwater and Surface Water Level Monitoring

Water levels in select locations for both groundwater and surface waters of the ditch system were monitored utilizing level loggers (Hobo Loggers U20-001-04-02/ U20-001-01-07) placed within perforated monitoring wells. One monitoring well was placed immediately upstream of the CRD tidal gate chamber in the coastal berm (maintained by Central Saanich), and seven groundwater monitoring wells were installed throughout the Park. An onsite logger of atmospheric pressure was installed to provide for barometric correction of all installed level loggers. shows the locations of monitoring equipment. shows the observed variation in water level elevation and corresponding tide heights, both relative to geodetic datum (CGVD28) [2].

[2] It is noted that the precise correlation between Geodetic (CGVD28) and local Chart Datum at this location is unknown. For practical purposes, tidal data evaluated within this report is taken from the Sidney tidal predications. (Sidney (07260) (tides.gc.ca)). In Sidney, the conversation from Geodetic to Chart datum is +2.129 based on Benchmark 16-198: 53C9501, which is located approximately 8 km from the Park's ditch outlet.

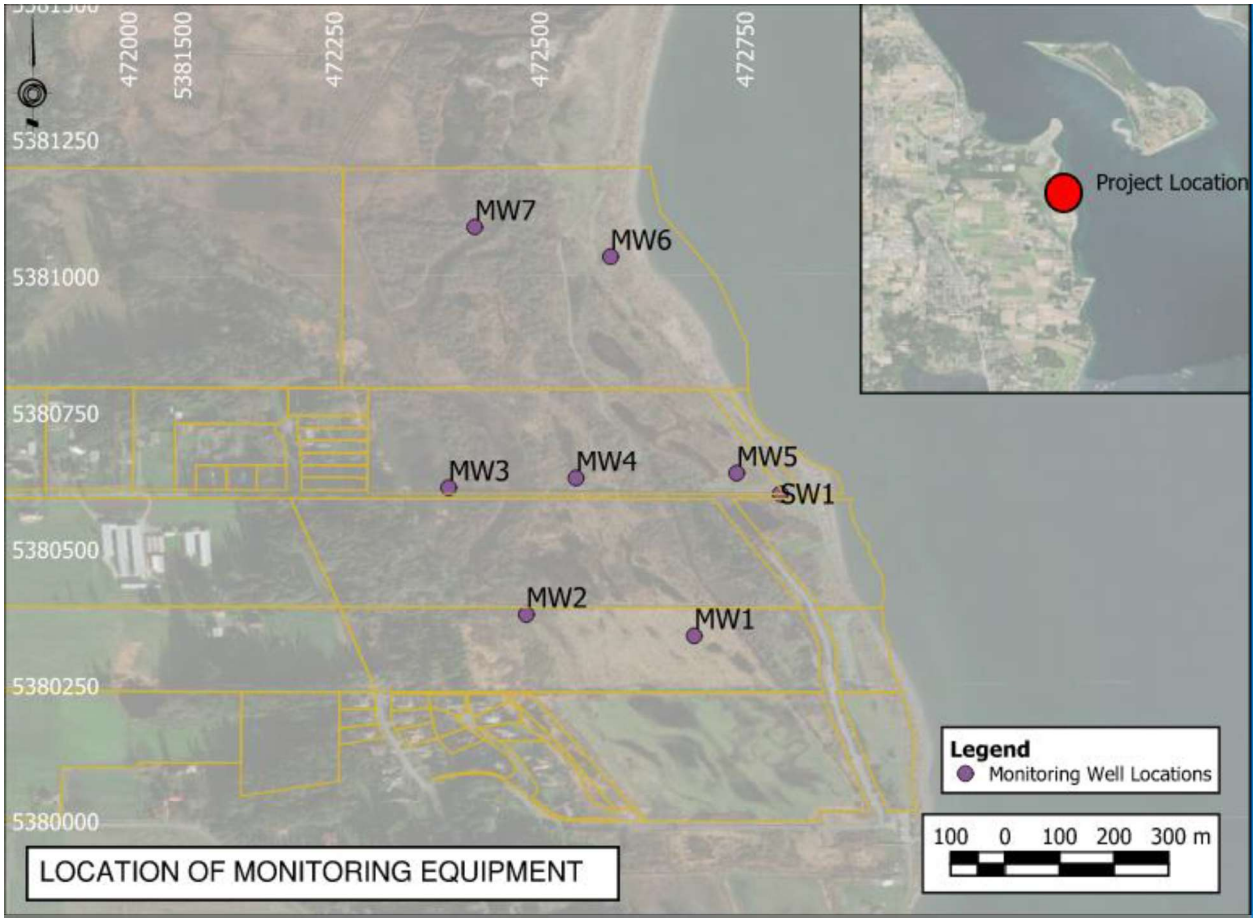


Figure 3 Location of Monitoring Equipment

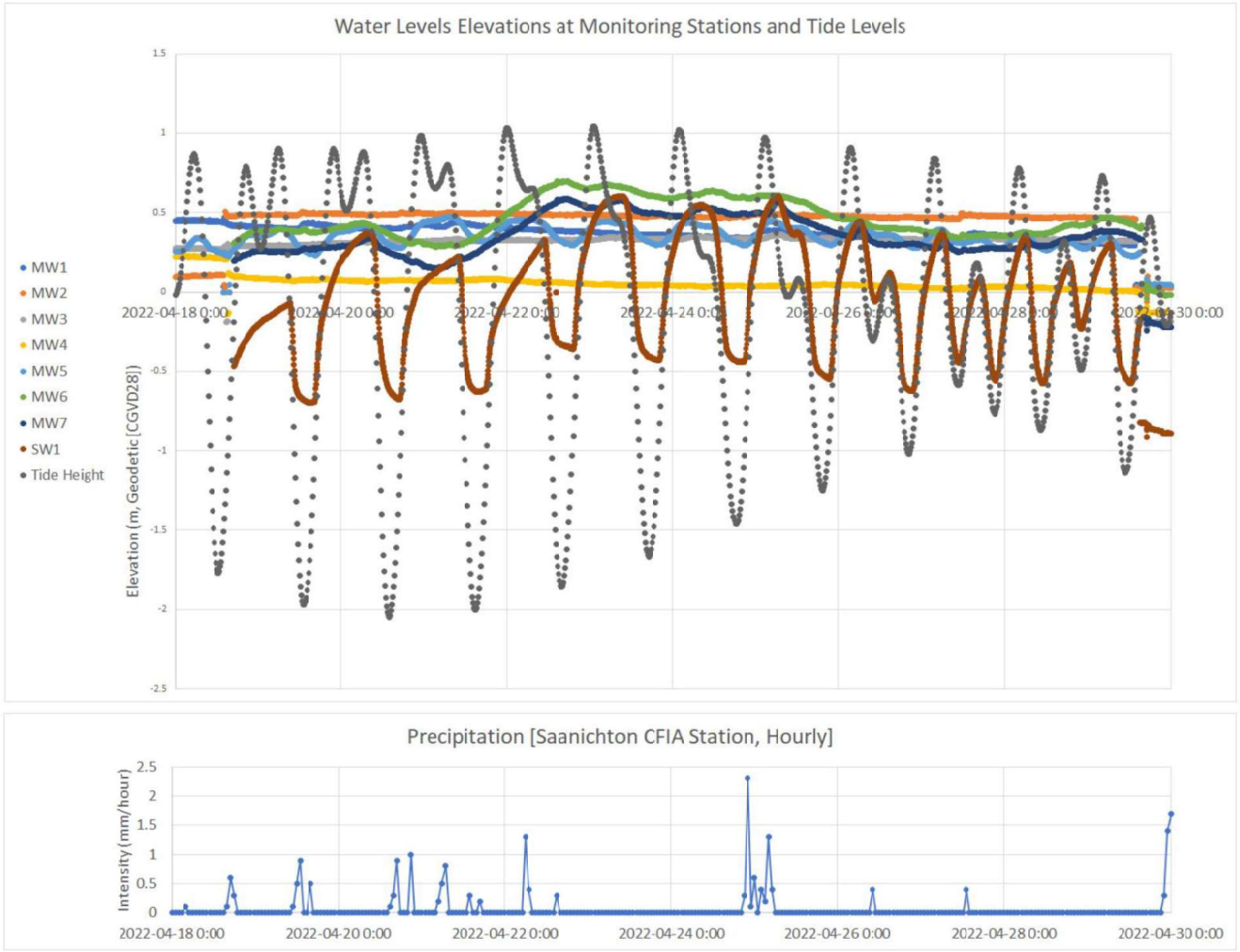


Figure 4 Observed Water Level Elevations at Monitoring Points

Surface Water:

The level logger SW1 monitored water levels in the ditch near the Park's tidal gate between April 18, 2022 and April 29, 2022. It was noted that the levels within the ditch varied in a diurnal pattern, corresponding to the daily tidal pattern. The daily fluctuation of ditch level reached as high as 110 cm crest-to-trough over a single tide cycle. Salinity levels confirmed that the rising water levels were caused by ingress of seawater and not fresh water accumulating behind a closed gate (See section 6.1.3). This water level variation and corresponding salinity suggests that the water levels in the ditch are in direct response to the tide gate allowing the ingress of seawater into the ditch system. During the monitoring period, GreatPacific field staff observed and documented discernable flow moving upstream from the outfall culvert inland into the ditch system during a rising tide.

The maximum elevation of water at SW1 (the surface water monitoring well near the outlet through the coastal berm) was approximately 0.51 m geodetic, which occurred shortly after a tide height of 1.04 m geodetic (3.16 Chart Datum). The peak water level within the ditch was lower than the peak tide level suggesting that the tidal gate/ outfall culvert partially restricts ingress of seawater, while still allowing large quantities through. Also notable is that when observing the geodetic elevations of water level at SW1 is that the troughs of the logged data do not return to the same elevation over the course of the study period. This suggested that the ditching is unable, in some cases, to fully drain the accumulated water over the course of a tide cycle.

The highest observed ditch water level (0.51 m geodetic) was higher than some of the surveyed top of bank elevations of the ditching. Assuming the water level was reached throughout the ditching system, it is possible that ditch banks in some areas may be overtopped as a result of seawater ingress, although this was not directly observed in the field. The highest tides occur during the summer and winter solstices and tides could be as much as 0.4 m higher than tides experienced during the monitoring period (excluding storm surge and based on a Large Tide Higher High Water level of 3.5 m CD, or 1.4 m geodetic). Accordingly, higher tides could further impede drainage resulting in transient overtopping of the upstream ditches.

Groundwater:

Based on visual interpretation of the measurements presented in , groundwater level monitors installed throughout the Park indicated variable levels of correlation between groundwater levels and tide levels. MW5 and MW 7 experienced the highest correlation of tidal influence. MW1, MW2 and MW4 demonstrated little to no correlation, while MW3 and MW6 demonstrated more moderated influence from tidal cycles.

Of note was the correlation between MW7 and SW1. MW7 was placed very near to Ditch 10, and the rising of MW7 in congruence (both in time and peak height) with the rising of SW1 peaks indicated that the groundwater level was affected by the rising water of the ditch system, and as such, seawater ingress was occurring in further upstream reaches of the ditches.

Overall groundwater levels from the monitoring wells were observed to be higher than the ditch bottom elevations across most of the ditching system. This suggested that the groundwater in the vicinity of the ditching will gradually discharge into the ditches when the ditch water level is lower than the nearby groundwater level. The zone of effective influence of the ditching (i.e. the areal extent of adjacent groundwater that the ditches are able to influence) is dependant on multiple factors including the hydraulic conductivity/transmissivity of the substrate material, determination of which was beyond the scope of this investigation.

The process of groundwater draining into the ditching system may play an important role in the reduction of standing water in areas without direct surface connectivity to the ditching system. When the water surface elevation in the ditch is below groundwater level, groundwater may discharge into the ditch, allowing overlying ponded surface water to infiltrate into the substrates. If the water levels in the ditch are too full due to segments of the ditch filling with seawater, this may prevent the discharge of groundwater to the ditches, and in turn preclude infiltration of ponded surface water into the substrates.

6.1.3 Groundwater and Surface Water Salinity

Salinity measurements of groundwater and surface water were conducted at select locations throughout the Park. These measurements were collected in-situ using a multi-sensor Pro DSS YSI Sonde throughout the ditch system, at the installed groundwater monitoring wells, and at select additional locations where surface water expressions were evident, and where additional shallow boreholes were cored to groundwater. Salinity readings for surface water and groundwater is presented in Figure 3 below. In summary, the following observations were found:

- For context, the salinity of nearby ambient seawater was measured to be 29.85 Sal/ PSU
- Salinity measurements within the ditch system ranged from 0.22 SAL/PSU to 29.49 SAL/PSU**.**
- With the exception of SW1 on rising tide**,** the ditch water salinity was highest in the northwest of the Park (close to Tsawout lands), and decreased towards the south.[4]
- Surface water salinity in offline ponding (i.e., surface water not part of the ditches) was substantially lower than the salinity within the ditches. Salinity in “non-ditch” surface water ranged from 0.15 to 0.64 SAL/PSU.
- Groundwater salinity ranged from 0.5 to 11.06. The highest value of 11.06 SAL/PSU was a significant deviation from the mean (2.6 SAL/PSU across 13 measurements), and was located in the northwest of the Park (near Tsawout lands).
- High salinity water (in excess of 20 SAL/PSU) was found within the Tsawout ditches and inundated areas on the Tsawout lands at the Park boundary.

[4] Salinity measurements within a ditch were taken on rising tides on April 29th (15:30, ~0.0 m tide height [Geodetic]), and May 3rd (15:30 to 16:40, ~-1.1 m to -0.7 m tide height [Geodetic]). Only one ditch salinity reading was taken on April 29th, at the surface water monitoring station SW1, which produced a reading of 29.49 SAL/PSU. A subsequent reading in the ditch near this location provided a reading of 4.45 SAL/PSU. It is believed that is effect may be due to tide levels at which measurements were taken, or that salt wedging may have played a factor.

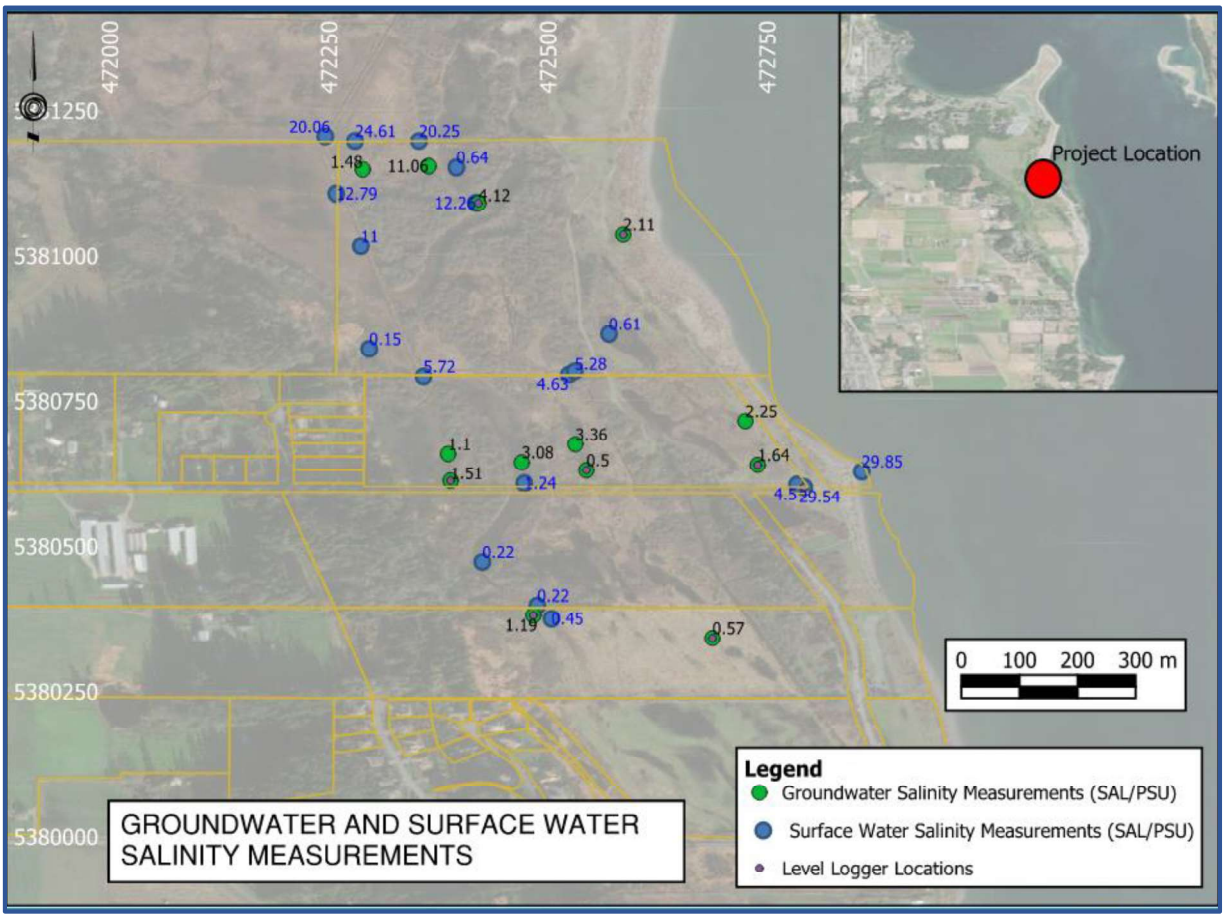


Figure 5 Salinity Measurements of Groundwater and Surface Water

The saline water encountered within the ditching system, generally exceeded groundwater and other disconnected surface ponding, suggesting that marine-origin saline water is entering the ditches. The higher salinity waters recorded within the northwest indicated that in addition to the observed ingress of seawater into the ditching from the malfunctioning tide gate at Island View Beach, seawater ingress is also occurring from the Tsawout ditching network, and adjacent Tsawout flooded lands. These observations were supplemented by field observations of active drainage from the inundated Tsawout lands into the Park ditch during the field program.

The overall observations (high salinity groundwater and surface water in the north of the site, with decreasing salinity trending southwards) correlated with data previously collected in the 2013 Camosun College Study; "*Hydrology Characterization of Island View Beach Saltmarsh"*. The Camosun study by others did not observe as high salinity water near the Central Saanich Tidal Gate during flood tide/high tide conditions, however a minor increase in salinity was observed near this tide gate under the high

tide condition. This suggested that the CRD tidal gate may have functioned more effectively at the time of the 2013 data collection.

It is important to consider the density difference between fresh water and sea water. Not only is sea water more salty, it is heavier than fresh water. This is important because when seawater is introduced into fresh water, it sinks and will settle into the lowest depressions. For example, if seawater is allowed to flood inland, it may do so very quickly, within a few hours during one tide cycle. When the tide drops and allows water to drain seaward, the upper layer of waters in the ditches is what is transported most effectively. Since fresh water "floats" over seawater, assuming no significant mixing, the upper layer of fresh water may drain out, but the deeper saline water may remain inland. It may take weeks or months to mix and drain saline water from just one short term sea water flood event. Later in the summer, when fresh water runoff dries up, what may be left behind in the low lying depressions is the deeper, saline water. This is the type of water tolerated by salt water mosquitos.

7 Ecological Context

The intention of this report has not been to provide a detailed ecological investigation of the ecosystems and interactions in this area, rather, the focus of this report is on drainage. Notwithstanding this, it is recognized that the drainage regime could have significant effects to the ecological systems within the Park. The subsections below provide an ecological context for drainage management.

7.1 Geomorphic Setting

Golder provided a geomorphic setting of the park in their 2013 report to CRD (Golder 2013). In summary, the park is situated on the western shore of Haro Straight. The shoreline of the park is part of a littoral system that transports sediments from eroding coastal bluffs south of the park, northward to Cordova Spit. Winds in Haro Strait are typically from the southeast in winter, which drives the transport of sands and gravels northward.

The natural shoreline formed from a balance of tidal water levels, waves and sediment supply. The position of the shoreline likely developed from a spit that was initiated near the source of the sediment supply (south of the park) and elongated northward as these sediments were dragged by wind and wave energies. As the spit advanced northward (to present location of Cordova Spit) it would have gradually enclosed a low lying area between the steeper upland slope and the shoreline, creating a wetland. The wetland would have been forced to drain further and further northward towards the tip of the spit.

Coastal dunes form behind the shoreline where wave transport of sands and gravels decreases and onshore wind transport of sand dominates. The accumulation of driftwood at the shoreline would have helped trap wind-blown sands on shore, enabling plants to establish and aiding in the dune formation.

7.2 General Habitat

Island View Beach Park is located within the Cordova Shore, a unique coastal landscape composed of rich intertidal and subtidal marine areas including a sandspit, dunes, eroding bluffs, coastal wetlands and rock outcrops. This area supports species at risk, as well as abundant marine bird and shellfish

populations. The Cordova Shore is part of the Sidney Channel Important Bird Area (IBA) and is recognized internationally for its diverse bird populations (Raincoast Applied Ecology, 2010).

Island View Beach is dominated by dune, coastal marsh and old field habitats (CRD, n.d (a)). The dune habitat dominates the foreshore at Island View Beach, however most of the park is low lying wetland and fields. Under the current drainage regime at Island View Beach most of the landscape is wet meadow habitat. Wet meadows occur on the land between shallow marshes and upland areas and often have high plant diversity (CRD, n.d.(a)).

7.3 Unique Biological Features

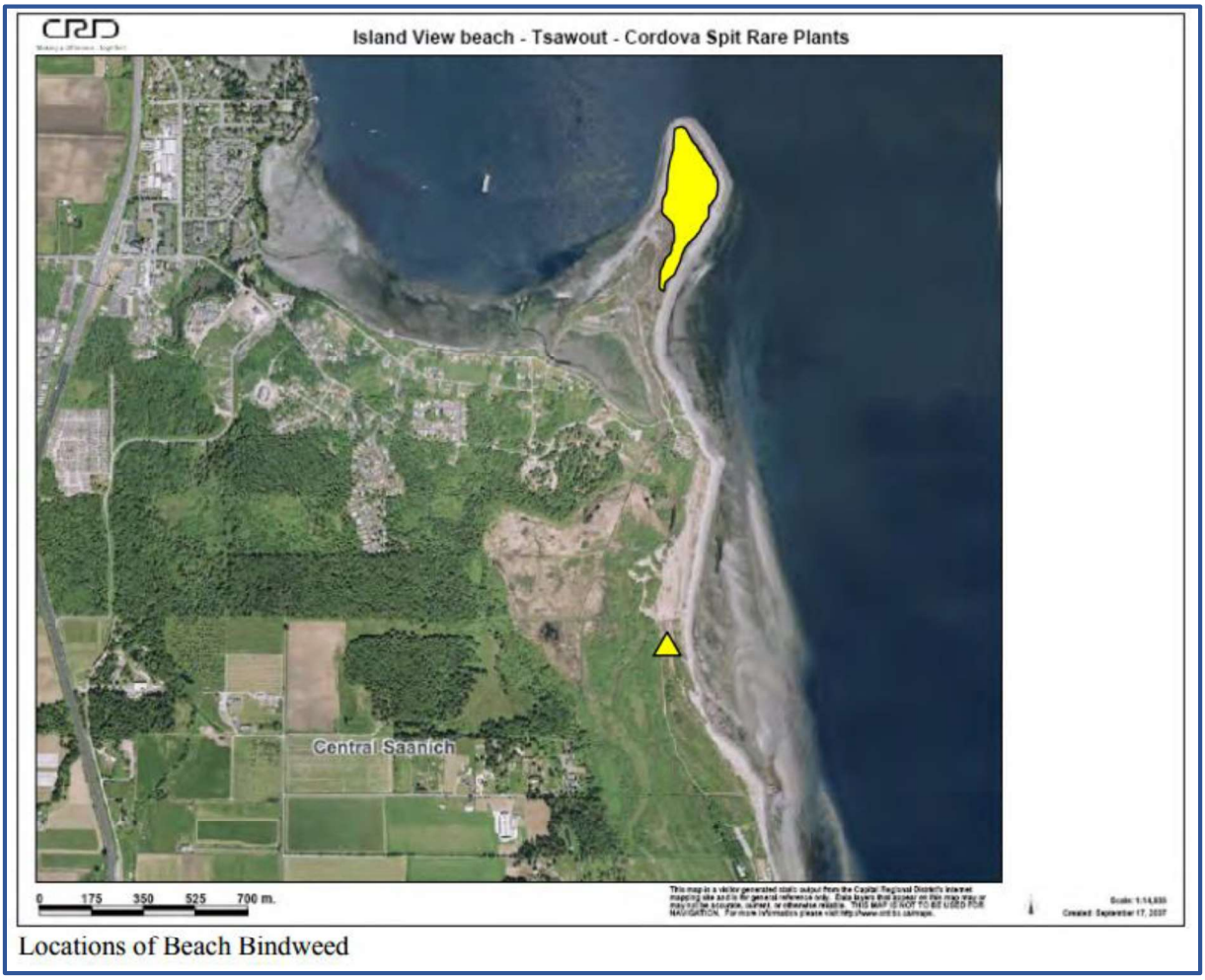
Island View Beach Park supports a complex of habitats that are in limited supply across the region. These habitats are important for rare species and species at risk, and a wide range of resident and migratory species (CRD, n.d. (b)). Species at risk documented at Island View Beach and surrounding areas are identified in Table 1.

Table 1 Species at Risk Confirmed within Island View Beach Park Boundaries and/or in Adjacent Habitat (current or historic).

Common Name	Scientific Name	Habitat Type	Provincial Status (CDC[1])	Federal Status (COSEWIC[2])
Plants				
Beach Bindweed	*Calystegia soldanella*	Coastal Sand	Blue	
Black Knotweed	*Polygonun paronychia*	Coastal Sand	Blue	
Contorted-pod Evening-primrose	*Camissonia contorta*	Coastal Sand	Red	Endangered
Yellow Sand-verbena	*Abronia latifolia*	Coastal Sand	Blue	
Invertebrates				
Common Ringlet	*Coenonympha tullia insulana*	Moist Meadow	Red	
Georgia Basin Bog Spider	*Gnaphosa Snohomish*	Wetland	Red	Special Concern
Sand-verbena Moth	*Copablepharonfuscum*	Coastal Sand	Red	Endangered
Western Branded Skipper	*Hesperia colorada oregonia*	Dry meadow	Red	Endangered
Birds				
Barn Swallow	*Hirundo rustica*	Generalist	Blue	Threatened
Common Nighthawk	*Chordeiles minor*	Coastal Sand	Yellow	Threatened
Great Blue Heron.	*Ardea herodias fannini*	Generalist	Blue	Special Concern
Short-eared Owl	*Asion flammeus*	Moist Meadow	Blue	Threatened
Other Vertebrates				
Red-legged Frog	*Rana aurora*	Wetland	Blue	Special Concern

Reference: BC CDC (2022), Raincoast Applied Ecology 2010.
1. CDC – British Columbia Conservation Data Center
2. COSEWIC – Committee on the Status of Endangered Wildlife in Canada

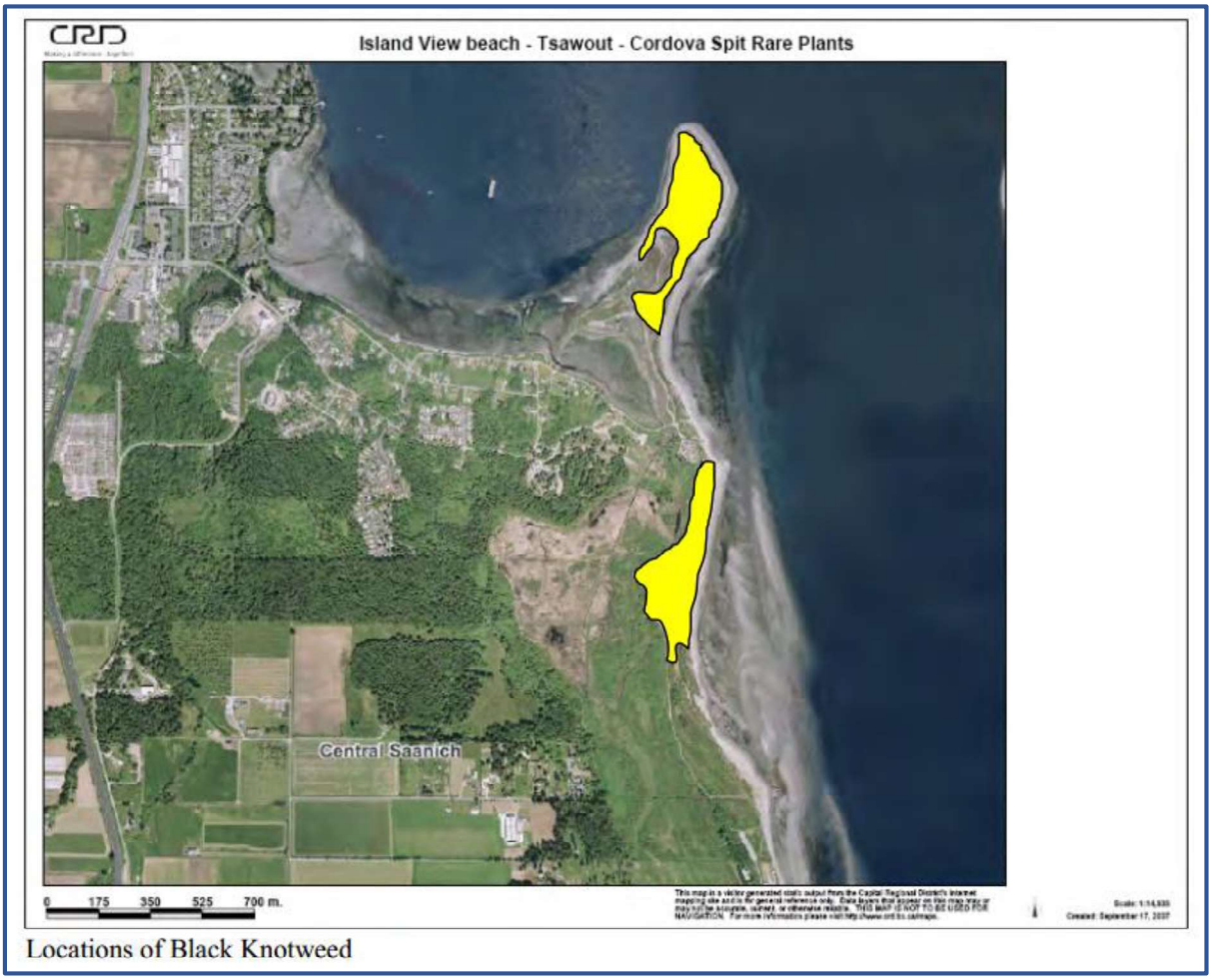
Beach bindweed (beach morning glory) is a sprawling, long-lived perennial plant found on sand beaches and dunes (Raincoast Applied Ecology, 2010). The documented locations of beach bindweed at Island View Beach are illustrated in Figure 6.



Locations of Beach Bindweed

Figure 6 Locations of Beach Bindweed at Island View Beach (Raincoast Applied Ecology, 2010)

Black knotweed (Polygonum paronychia): long-lived low shrub is a characteristic species in dunes both in Georgia Basin and west coast (Raincoast Applied Ecology, 2010). The documented locations of black knotweed at Island View Beach are illustrated in Figure 7.



Locations of Black Knotweed

Figure 7 Locations of Black Knotweed at Island View Beach (Raincoast Applied Ecology, 2010)

Contorted – pod evening -primrose (*Camissonia contorta*) is a plant found on open, dry, sandy sites. Within the Province it is restricted to seven small patches on the coastal sand dunes of Southern Vancouver Island and Savary Island. There is one small population of contorted pod evening primrose documented on Island View Beach (CRD, n.d.(c)). The location is illustrated in Figure 8.

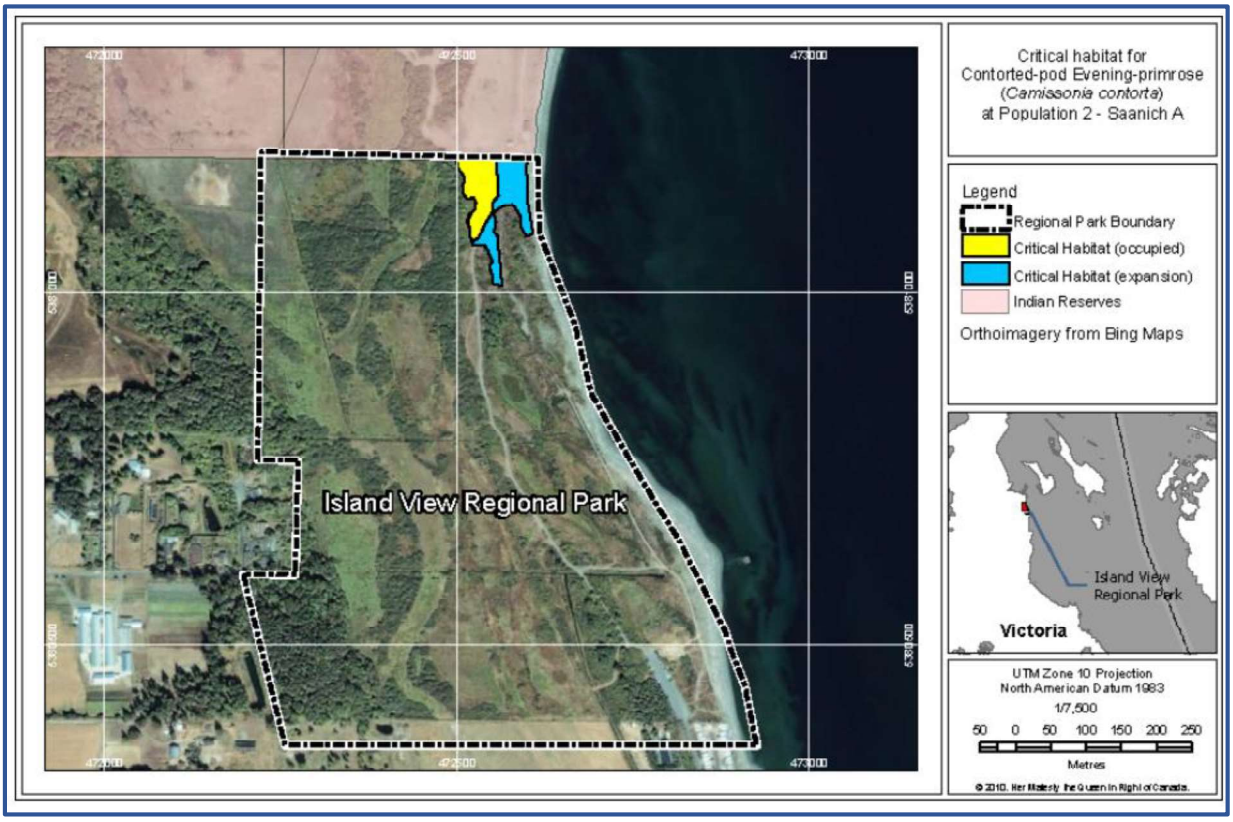
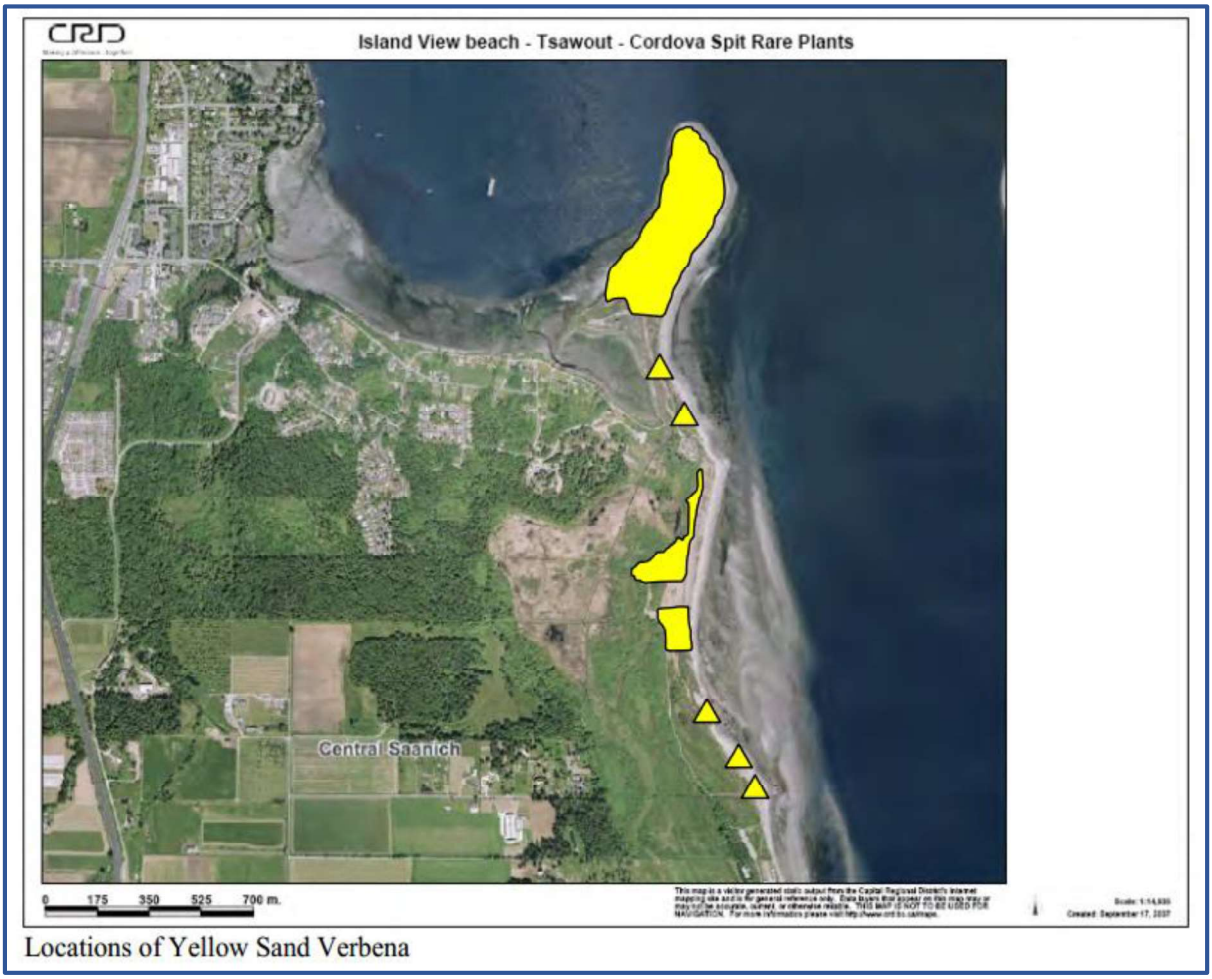


Figure 8 Locations of Contorted-pod Evening Primrose at Island View Beach (Parks Canada 2011)

Yellow sand verbena is a plant that is important for the survival of the sand-verbena moth. Only coastal sand features, such as dunes, beaches and spits along the Pacific Coast support this plant (CRD, n.d.(c)). The sand- verbena moth is dependent on the yellow sand verbena for several life stages. Adult moths feed on the nectar and lay eggs on the flowers (CRD, n.d.(c)). Documented locations of yellow sand verbena at Island View Beach are illustrated in Figure 9.



Locations of Yellow Sand Verbena

Figure 9 Locations of Yellow Sand Verbena at Island View Beach (Raincoast Applied Ecology, 2010)

Invertebrates, birds and other vertebrates identified in Table 1 were historically observed at Island View Beach or adjacent habitats (Raincoast Applied Ecology, 2010). These species are mobile and mapped locations have not been identified for Island View Beach.

7.4 Nuisance Mosquitos

Mosquitos can be a nuisance in that their bites are irritating, and they can transmit disease. Mosquitos also provide food sources for many birds, fish, amphibians and other species. To provide context for how drainage effects mosquito populations, two specialists in mosquito biology and management were contacted, Ms. Cheryl Phippen and Mr. Curtis Fediuk. There is also an Integrated Pest Management Plan for Central Saanich, CRD and Tsawout First Nation that is implemented for controlling mosquito populations (Duca 2021).

1. Over 10 different species of mosquitos have been found at Island View Beach due to the range of water salinities present. Salt water tolerant mosquitos are the most aggressive biters.

2. Mosquitos prefer stagnant, standing water, with no flow, and prefer water depths of less than 0.3 m (1 ft).
3. There were noticeable reductions in the need to deploy VectoBac® (because of fewer mosquito larvae) after ditch cleanings in 2011, 2017.
4. When woody debris was lodged in the Tsawout flag gate, the wetland was flooded to a greater degree and more VectoBac® was needed.
5. The salt tolerant mosquito *Aedes dorsalis* can lay eggs on moist soil near water, the eggs will remain viable for many years, triggered by a flood event to hatch.
6. The salt tolerant mosquito can tolerate salinities of full strength seawater.

The offline ponded waters within the Park during this field program were generally found to be non-saline.[5] Given this finding, these areas of fresh water may not be the worst offenders contributing to the issue of the most aggressive, salt tolerant, nuisance mosquitos.

Salinity measurements along the boundary of the inundated Tsawout lands indicated a large area of high salinity water, which may be well suited to the propagation of salt tolerant mosquitos. It is speculated that the flooded Tsawout lands may be a significant source of saline water and contributor to nuisance mosquitos, as evidenced by mosquito larvae counts and associated higher levels of VectoBac® that has been applied to that area by the mosquito management contractor (pers comm Fediuk 2022).

7.5 Linkages With Drainage

Drainage management is a multifaceted topic, which in some cases requires a balance of interests between different disciplines and stakeholders. Certain approaches which may be ecologically beneficial may have detrimental effects on other aspect. For example, the presence of vegetation within the channels may provide ecological benefits such as augmenting aquatic habitat, providing shade to reduce algae and grasses growth, and providing water quality improvements via sedimentation and filtration caused by slower flow. These ecological benefits may compromise efficient and effective drainage, leading to other unintended problems.

The specific unique biological features and associated plant species at risk described above are primarily associated with the coastal sand dune ecosystem along the shoreline. These locations are generally not located directly within the inland ditching system nor closely associated with inland wetland areas. Changes to the landscape of the park, including the drainage management may have the potential to affect the coastal sand dune ecosystem if interactions and linkages with the open ocean coastal processes along the foreshore are changed.

Prior to non-indigenous settlement, modification of the landscape (ditching, berming, farming) and creation of the park, inland areas may have functioned more dominantly as a coastal wetland rather

[5] The limitation of this observation needs to be recognized in that salinity measurements of offline pools were taken on a single day given the scope and compressed schedule of the field program. It is recognized that this provides a snapshot in time, which may not be representative of conditions across seasons, tide cycles or other temporally variable parameters.

than a freshwater wetland. Historic photos reported large inland areas having been inundated by high ocean water levels from combined tide and storm surge (Friends of Island View Beach 2022). A natural coastal wetland relies on episodic flooding by saltwater plus tidally induced variation in water levels to create the unique conditions suitable for coastal wetland flora and fauna (Golder 2013). Since the start of modifications to the landscape over a century ago, including the installation of drainage ditching, coastal wetland areas have likely been primarily converted to freshwater wetlands and or non flooded ground. In consideration of species at risk that are associated with the present day wetland habitats, namely the northern red-legged frog and the Georgia basin bog spider, neither species was reported to be tolerant of saline conditions (Environment Canada 2016; Environment and Climate Change Canada 2021); therefore seawater intrusion inland, into the existing wetland habitats, potentially poses a threat to these species.

Changes to the ditch system function and associated ditch maintenance activities (e.g. new, reduced or increased maintenance practices) have the potential to change the existing species assemblage that presently occupy the park area. To fully understand the implications of proposed actions, an assessment of potential environmental effects should be conducted.

8 Climate Change Sea Level Rise and Seismic Events

The Park will be affected by climate change, and in particular sea level rise given that some inland areas are below present day high water sea levels. Over the next 20 years, relative sea level rise was estimated to be 0.15 m (AECOM 2015) for the Victoria coastline, including Island View Beach. The future extreme high water sea levels for the Victoria coastline were estimated to be 3.25 m, 3.69 m, and 4.58 m GD for the years 2050, 2100 and 2200 respectively (AECOM 2015).

Seismic events can also affect the flood risk of upland areas. Earthquakes can cause liquefaction of ground substrates, causing subsidence of the ground, which if the shoreline, or portions of the shoreline of the Park suddenly drop as a result of a locally based earthquake, this could pose a flood risk to the Park. Also, tsunamis can be generated from earthquakes and can travel great distances, affecting areas several hundreds of km away. A report prepared for the CRD presented potential tsunami scenarios where Island View Beach Park lands could be inundated with 2 m to 4 m of water depth (Associated *et al* 2021).

As a long-term planning decision, the CRD in conjunction with its partners, will need to determine whether the management strategy will be to continue to attempt to protect this area from inundation, or to allow nature to run its course which may result in more frequent inundation of the Park lands and associated effects (eg. Alteration/elimination of habitats and species to those tolerant of higher salinities, greater numbers of salt tolerant mosquitos). Sea level rise is further discussed under separate cover within the coastal berm assessment completed by GreatPacific.

9 Summary Conclusions

Island View Beach Regional Park is host to a complex hydrodynamic system which has been investigated, in part, by other previous studies. The conclusions derived from this study of the drainage network include the following:

- The drainage network demonstrated deficiencies and there are opportunities for improvement to reduce standing water and improve drainage conveyance from the low-lying Park areas to the marine environment.
- The tide gate located within the coastal berm at Island View Beach was not functioning effectively to prevent substantial quantities of seawater from entering the ditching network.
- The grading of the ditch network was not positively sloped downhill from all upstream areas to the ditch's outfall. This condition will result in hydraulically isolated (ponded) areas of the ditch when downstream areas are drained. In the current condition (non-functional tide gate at Island View Beach), dependant on tide heights, certain (but not all) areas may be prevented from becoming hydraulically isolated due to the daily inflow and outflow of tidal water.
- The ditches exhibited substantial areas of vegetation overgrowth and debris extending into the channel, preventing accessibility, and resulting in restrictions to hydraulic ditch conveyance capacity.
- Adjacent to the site, on the Tsawout lands, is a large, inundated area containing saline water. The Park ditches had indirect connectivity to portions of these areas as observed by overland flow from the Tsawout Lands into the Park. Furthermore, the high salinity values of water in the Park's ditching immediately adjacent to the Tsawout lands corresponds to the high salinity values also observed within the Tsawout ditching.
- There were multiple areas of the Park (and external lands i.e. Puckle Farm) which do not exhibit positive drainage connectivity to the Park ditching system. It may be the case that these areas infiltrate into the substrates and eventually discharge into the Park's ditch system as groundwater when the ditch is in a low water state.
- Due to the heavier nature of seawater over freshwater, seawater intrusion inland will tend to occupy the lowest lying areas and may take a prolonged period of time to evacuate the salts. The saline waters are linked to the most aggressive biting mosquito species.
- Based on a time period over the next 20 years, sea level rise was predicted to be on the order of 0.15 m, which could pose an incremental reduction in hydraulic performance of the drainage system under its existing configuration/size.
- Changes to the ditch system function and associated ditch maintenance, whether it be new practices, increased frequency or reduced efforts or actions, have the potential to change the existing wetland ecology, including Species At Risk.

10 Management Advice

With the objective of maintaining the functionality of the drainage system to provide effective drainage of the Park lands, the following items are presented for consideration by the CRD, in conjunction with

their partners in drainage management for the Park (e.g. District of Central Saanich, Tsawout First Nation, other stakeholders). It is recognized that the responsibility for addressing drainage involves multiple organizations, and as such remedial actions would likely require communications amongst multiple interest groups. Also, new actions have the potential to affect the ecology within the park, and the potential effects of future actions should be assessed and evaluated. The items below are generally presented in a suggested order of priority.

1. Improve the effectiveness and reliability of the tidal gate at Island View Beach Park such that it precludes the ingress of seawater into the ditching system. To accomplish this, consideration of the following potential aspects should be given:
    a. A change to the type or frequency of routine maintenance activities may be needed
    b. The gate may be damaged and repairs to the gate may be needed
    c. There may be excessive debris transported downstream by the ditch system that is fouling the tidal gate and preventing it from sealing
    d. The style and/or installed configuration of the current tidal gate may have inherent issues and alternative devices should be considered.
2. Preclude ingress of seawater from the Tsawout lands into the Park ditches via the repair/ replacement of the Tsawout tidal gate.
3. Improve the conveyance of waters within the ditch and provide for access along the full ditch network to facilitate effective maintenance and to allow for future monitoring / assessment of the system. This could be achieved by removing dense overgrowth, vegetation and/or debris from within the conveyance area of the ditch, as well as areas along at one side of the ditch bank. This could likely be implemented in spot locations balanced with an objective of causing minimal disturbance and maintaining as much vegetation as practicable. A phased, incremental approach of addressing the most severely restricted areas first should also be considered.
4. If, subsequent to the above, unwanted ponding is occurring in hydraulically isolated areas of the ditching system, the ditch inverts could be reconditioned/regraded such that positive (downhill) conveyance is provided to the ditch outlet, such that reverse grades and/or unwanted ponding within the ditch is avoided.
5. In the event that large areas of unwanted surface water ponding (offline of the ditches) remain without direct connectivity to the ditching system, and there are adverse issues with these areas (e.g. high mosquito production), consider the installation of additional lateral ditches and/or a tile drainage system to drawdown standing surface water in these areas.

11 Potential Future Activities

Additional studies could be completed to further describe and document the water and drainage regime with greater precision. The following future activities are offered for consideration as they would lead to a more informed understanding of the factors affecting the park drainage infrastructure and ecology within the park. This is intended to be a list of options that could be completed as budgets allow.

1. Investigate technologies (alternatives to the existing tidal gate) for effectively preventing seawater intrusion into the ditching system and complete a more detailed assessment of the existing flap gate.
2. Collect drainage system data over an extended period of time to further qualify and quantify the hydrotechnical regime of these lands. Collect data to capture seasonally variant weather and precipitation conditions in combination with the range of tidal cycles.
3. Survey and evaluate the infiltrative capacity of the ditches to drain surface waters. Extend this study into the dry season to improve understanding of flow capacity.
4. Evaluate the areal extent of the Tsawout lands draining towards the park, hydraulic linkages, and seawater intrusion, and compare before and after results in relation to the condition of the tidal gate on Tsawout lands.
5. Monitor and evaluate the ingress of seawater through the Park tidal gate into the ditch system during a rising tide, and ability of ditching system to fully drain the accumulated water over the course of a tidal cycle. Compare before and after results in relation to the condition of the tidal gate/outfall culvert.
6. Monitor and evaluate if/how high tides may impede drainage resulting in transient overtopping of the upstream ditches.
7. Characterize the zone of effective influence of the ditching (i.e. the areal extent of adjacent groundwater that the ditches are able to influence), taking into account multiple factors including the hydraulic conductivity/transmissivity of the substrate material.
8. Collect data on salinity measurements in low-laying, non-draining ditch depressions to document whether seawater is trapped in these sections of ditches, and correlate to saltwater mosquito habitat.
9. Investigate if a correlation exists between the presence of *Aedes dorsalis* saltwater mosquitos and areas of high salinity measurements, particularly along the boundary of the inundated Tsawout lands and other areas near the Park tidal gate.
10. Undertake an environmental assessment to identify and evaluate the potential effects of a changed ditch management regime on Species at Risk identified in the park, and on current ecosystem function and species assemblages.

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Personal Communications:

Curtis Fediuk. 2022. President. Duca Environmental Services Ltd.

Cheryl Phippen, 2022. Field Coordinator. BWP Consulting Inc.

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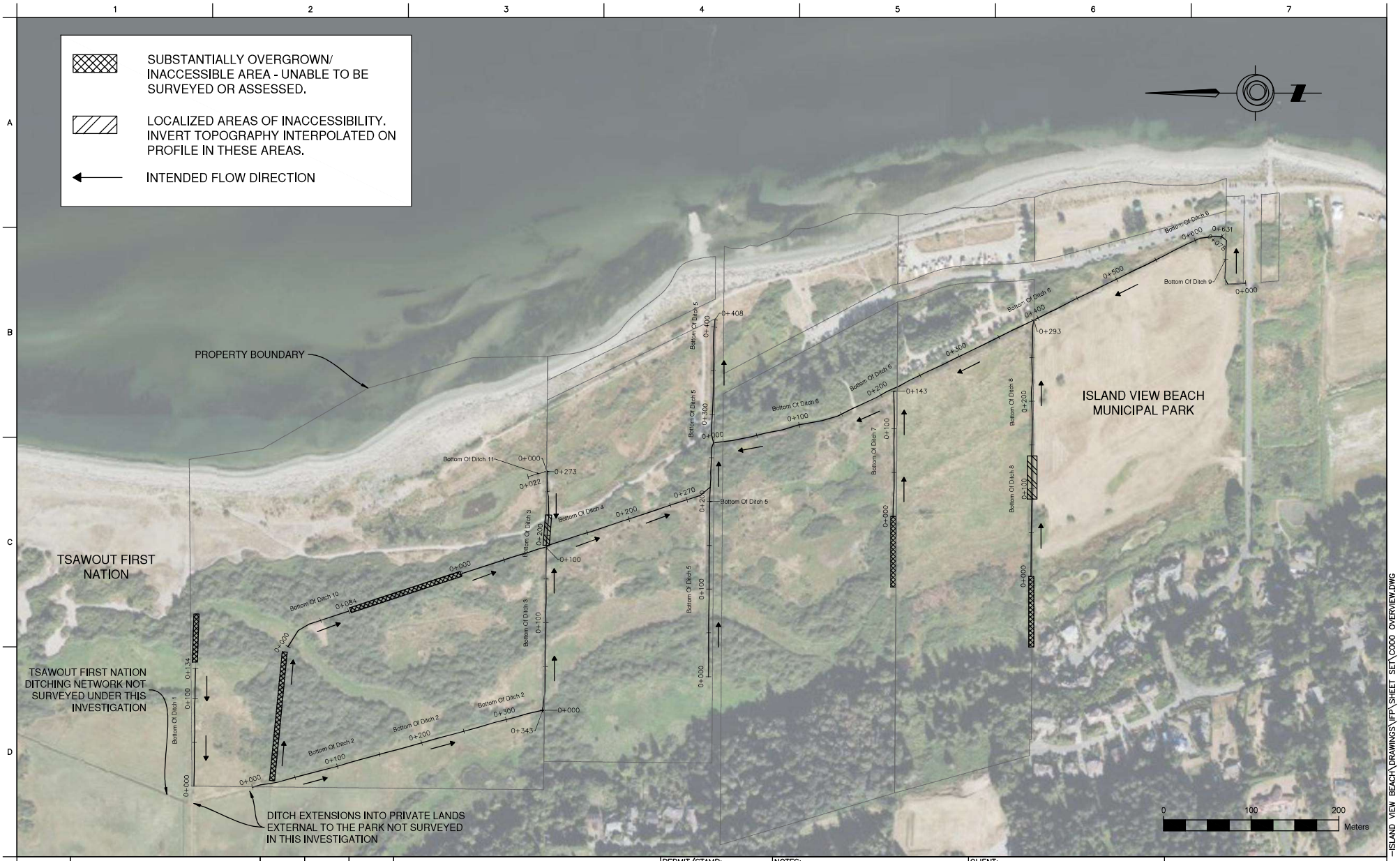
Appendix 1 Drawings C000 – C002



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2. ALL ELEVATIONS MEASURED IN METERS FROM GEODETIC (CGVD 28) DATUM.

CLIENT: CAPITAL REGIONAL DISTRICT

PROJECT NUMBER: 1039–004

ISLAND VIEW BEACH SURVEY DATA OVERVIEW

DRAWING NUMBER: C000

SCALE: 1:2000

REV: REVA

FILE: W:\1039-004-CRD -ISLAND VIEW BEACH\DRAWINGS\FPP\SHEET SET\C000 OVERVIEW.DWG

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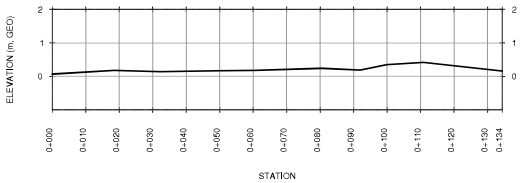

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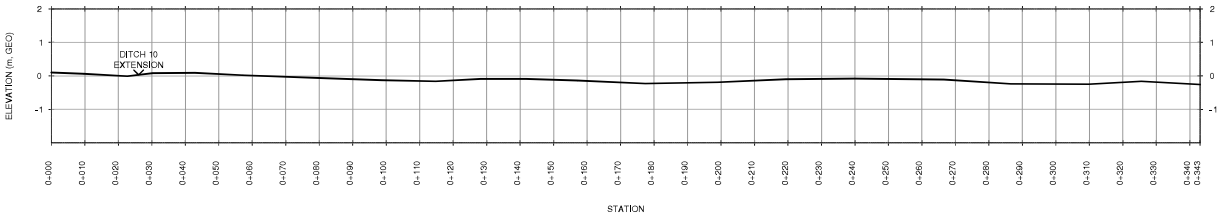

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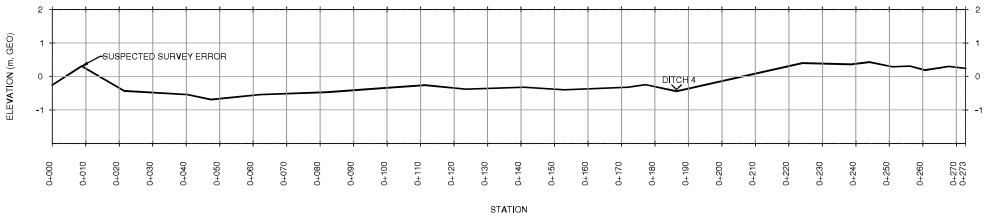

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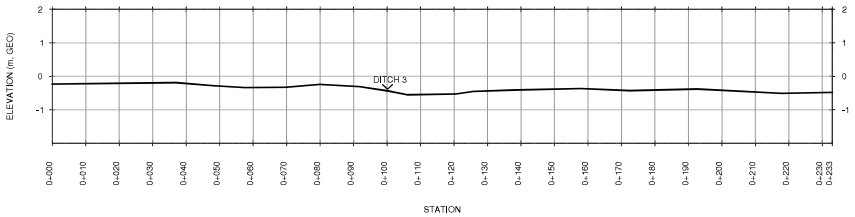

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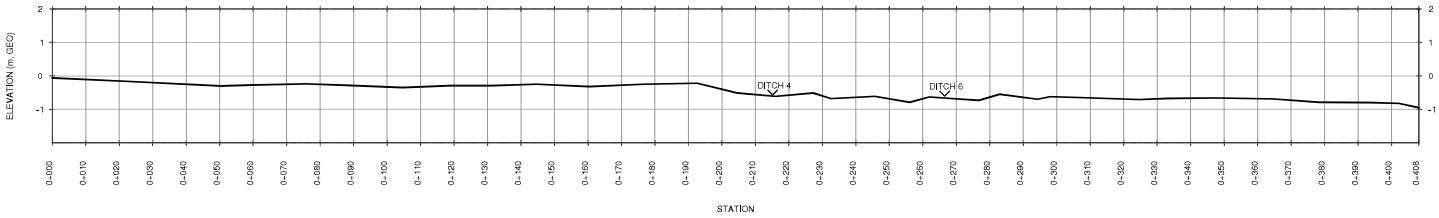

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2. ALL ELEVATIONS MEASURED IN METERS FROM GEODETIC (CGVD 28) DATUM.

CLIENT:
CAPITAL REGIONAL DISTRICT

PROJECT NUMBER: 1039–004

ISLAND VIEW BEACH
SURVEY DATA
PROFILE VIEWS 1

DRAWING NUMBER: C001

SCALE: 1:750, 10V:1H

REV: REVA

FILE: W:\1039-004-CRD -ISLAND VIEW BEACH\DRAWINGS\FP\SHEET SET\M001 PROFILE VIEWS 1.DWG

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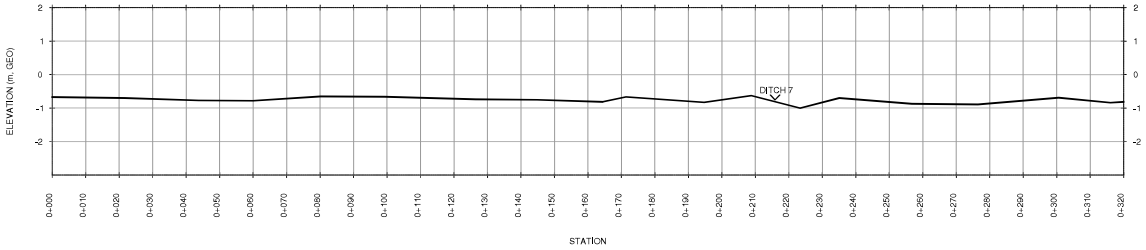

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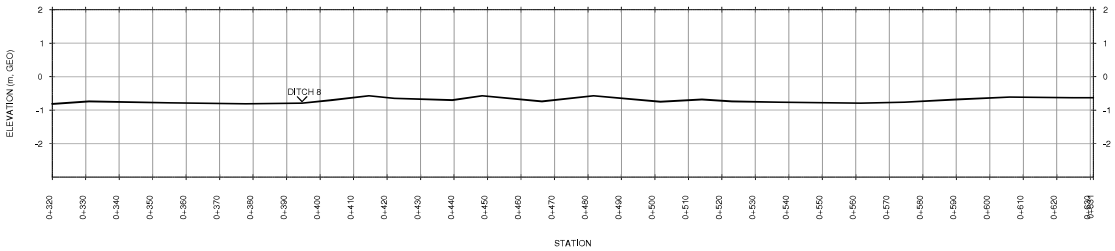

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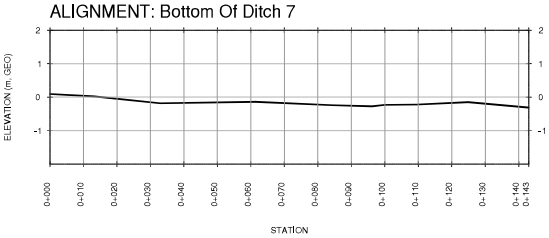

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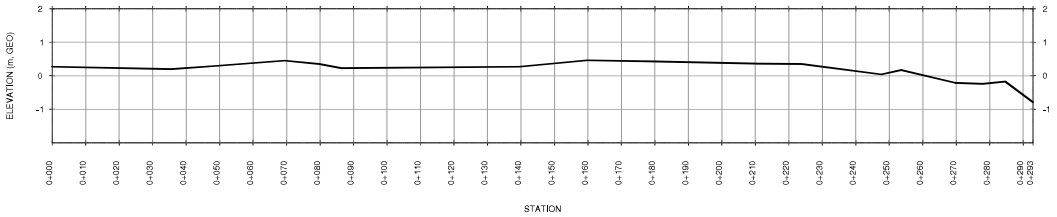

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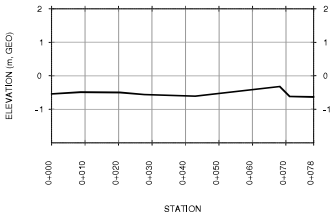

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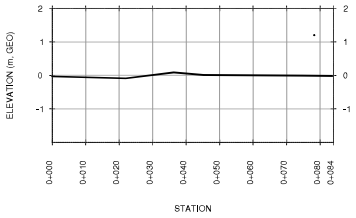

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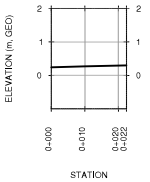

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2. ALL ELEVATIONS MEASURED IN METERS FROM GEODETIC (CGVD 28) DATUM.

CLIENT:
CAPITAL REGIONAL DISTRICT

ISLAND VIEW BEACH
SURVEY DATA – DITCHING SYSTEM
PROFILE VIEWS 2

DRAWING NUMBER: C002

PROJECT NUMBER: 1039–004

SCALE: 1:750, 10V:1H

REV: REVA

FILE: W:\1039-004-CRD -ISLAND VIEW BEACH\DRAWINGS\FP\SHEET SET\C002 PROFILE VIEWS 2.DWG

Appendix 2 Site Photos

Photo 1:

Description: Terminus of ditch network outfall. Outfall culvert terminates in an antiquated flap gate. Approximately 115 m upstream of this point, a separate tidal gate is understood to lie within a chamber in a coastal berm.

Photo 2:

Description: Inlet to storm culvert at coastal berm. Valve chamber is approximately 10 m downstream of this location.

A substantial quantity of debris is present on the inlet cage of this culvert (to approximately pipe springline) resulting in reduced hydraulic capacity.

During high/flood tide conditions, noticeable flow through the culvert from downstream to upstream (i.e. from the marine environment to upland) was observed

Photo taken on the rising limb of a low tide. Tide: ~0.55 m Chart Datum (CD)

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 1 and 2	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 3:

Description: Section of ditch line within Ditch Section 9.

Photo 4:

Description: Top of ditch bank along portion of Ditch Section 9. Top of bank is elevated above adjacent lands.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 3 and 4	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 5:

Description: View of Section 8 ditch, demonstrating generally shallow/ poorly defined swale with vegetated grasses within depression.

Photo 6:

Description: Ponded water in an up-stream segment of Section 8 ditching.

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PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
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Photo 7:

Description: Overgrowth of vegetation in along Section 5 ditch. Ponded water visible in foreground.

Photo 8:

Description: Upstream extent of Ditch 7 extending into overgrown vegetation.

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PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
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Photo 7 and 8	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 9:

Description: View of Section 6 ditching.

Photo 10:

Description: Debris obstruction within ditching at intersection of Sections 5 and 6.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
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Photo 11:

Description: Substantial ponded water without direct surface discharge linkage to ditching, located in the west of the Park between Section 5 and 7 ditches.

Photo 12:

Description: Main channel of ditch Section 6.

Long grasses are observed within the channel thalweg.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	ISLAND VIEW BEACH REGIONAL PARK
PROJECT No. 1039-004 / PREPARED BY: BP	DRAINAGE ASSESSMENT
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Photo 13:

Description: Overgrown vegetation within upstream areas of Section 5 ditch.

Photo 14:

Description: Large area of standing water located in the western segment of the Park between Section 3 and 5 ditches.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 13 and 14	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 15:

Description: Vegetative debris in the area of Section 4 ditch .

Photo 16:

Description: View of Section 4 ditching.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
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Photo 15 and 16	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 17:

Description: Debris within eastern reach of Ditch Section 3.

Photo 18:

Description: Shallow ditching with long grass growth within the further east reaches of Ditch Section 3.

Ditch appears to be intended to drain a low lying area but does not appear to effectively do so.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 17 and 18	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 19:

Description: Ditching along Ditch Section 2. Sidecasted materials shown along the ditch.

Photo 20:

Description: Looking east towards Ditch 10 extension near the intersection with Ditch 2. Overgrowth precluded inspection.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 19 and 20	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 21:

Description: Inundated Tsawout lands (at left) in relation to Ditch 1 (at right)

Direct drainage connectivity was observed between the inundated area and Ditch 1, although the extent/contributary area draining to the ditch was not ascertained.

Photo 22:

Description: Looking northwest towards Tsawout lands from Ditch 1. Significant extend of inundation is observable.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	ISLAND VIEW BEACH REGIONAL PARK
PROJECT No. 1039-004 / PREPARED BY: BP	DRAINAGE ASSESSMENT
DATE: 2022-05-13 / REVIEWED BY: JC	PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03
Photo 21 and 22	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 23:

Description: Observed overland flow from the inundated Tsawout lands (left) to Ditch 1.

Photo was taken on the afternoon of April 22, during low tide conditions approximately 14.5 hours after a tidal high of 3.16 m Chart Datum (Sidney Predictions).

A subsequent visit did not observe a similar magnitude of surface drainage to the Park ditches, and it is believed that at the 3.16 m high tide, the Tsawout ditch overtopped its banks, resulting in inundation and flow to the Parks ditches.

Photo 24:

Description: Upstream reaches of Ditch 1, showing generally poor conveyance to downstream.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 23 and 24	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

Photo 25:

Description: Ditching system of Ditch Section 1.

GREATPACIFIC ENGINEERING & ENVIRONMENT	CLIENT: CRD
PROJECT NAME: IVBRP DRAINAGE ASSESSMENT	**ISLAND VIEW BEACH REGIONAL PARK**
PROJECT No. 1039-004 / PREPARED BY: BP	**DRAINAGE ASSESSMENT**
DATE: 2022-05-13 / REVIEWED BY: JC	**PHOTOS: 2022.04.14/18/22/28/30, 2022.05.03**
Photo 25	"This Figure is prepared solely for the use of our customer as specified in the accompanying report. GreatPacific Consulting Ltd. assumes no liability to any other party for any representations contained in this Figure."

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ENGINEERING & ENVIRONMENT

Appendix 3 Aerial Photo (circa 1920's)

1926

CRD Regional Parks

2022 Island View Beach Regional Park Drainage Ditch Maintenance

Status as of July 13, 2022

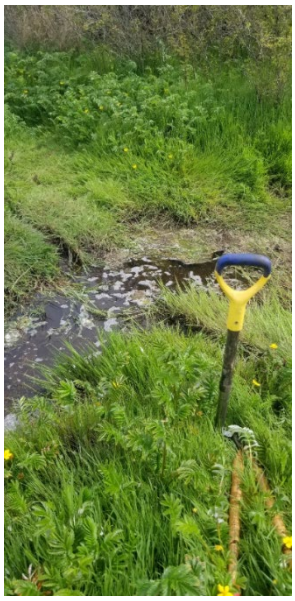
Activities:

- Ditch maintenance activities at Island View Beach Regional Park (IVBRP) began on June 7, 2022.
- As of July 13, 2022, 168 hours has been spent hand clearing ditches in sections not accessible by heavy equipment due to soft soils (see photos next page). The work being completed includes:
    - the removal of logs placed by park users to cross the ditches
    - the removal of clumps of grass and horsetail that are slowing the movement of the water through the ditches
    - cutting back branches that are overhanging the ditches
    - clearing a one-metre-wide section of vegetation adjacent to the ditches to provide full access to mosquito contractor staff; this vegetation is being piled by staff elsewhere on site
    - all work is being completed by hand using pole saws, loppers, shovels, rakes and pitch forks
- Another 42 hours is needed to complete the ditching work in areas too wet for heavy equipment.
- Another pass will be required during the growing season in order to control vegetative regrowth. This will require another 100 hours of labour.
- 310 hours of labour will be required to complete the IVBRP project.
- Observations on the condition of the drainage ditch system include:
    - Water in the ditches moving in all sections prior to the drainage work
    - No significant increase in flow after debris was removed
    - No blockages in the ditches resulting in water backing up and/or overflowing
- Aqua-Tex Scientific Consulting Ltd.'s (Aqua-Tex) annual ditch survey is scheduled for July. This survey includes two days of field work, which is summarized into a report. The CRD will receive the report in August and will begin to implement the ditch maintenance recommendations identified in the report.
- If Aqua-Tex recommends using heavy equipment to clear the ditches, a contractor will be hired to conduct this work; depending on availability this could happen as early as August.

- Duka Environmental Services Ltd. (Duka), the contractor for the annual mosquito control program, started its work at Island View Beach in late January 2022 and will continue into late October. Duka provides a monthly summary of the control program to the CRD

Before and After Photos of Ditch Clearing

Example 1



Example 2

Example 3

Example 4

Typical view of unimpeded IVBRP drainage ditch

Challenges:

- The ditch system starts on CRD land but one section of the ditch extends under a fence to private land. The photo to the right shows debris in the ditch on the private property (see also map on next page – black line indicates the location of this private property).
- Staff have observed what are believed to be stickleback fry in the ditches. This hinders further work being done in the ditches until a Section 11 permit from the Ministry of Environment and a permit from the Department of Fisheries and Oceans is obtained.

Status of IVBRP Drainage Ditch Maintenance Activities as of July 13, 2022

Ditch Colour

- Blue – completed
- Black – located on private property
- Red – not completed

Duka Environmental Services Ltd.

Central Saanich, Capital Regional District and Tsawout First Nation
Mosquito Surveillance and Control Program

Island View Beach Regional Park Summary 2022

The annual Nuisance Mosquito Surveillance and Control Program is provided for the benefit of all District of Central Saanich residents, businesses and visitors. It is a partnership between the three agencies above. The CRD control program boundaries are confined to the Island View Beach Regional Park.

The annual control program begins each January and extends through to late August and early September depending on conditions. The extent of development habitats, the magnitude of populations and the diversity of species is greatest between February and April, when water accumulations are also typically at their greatest. Larval mosquitos require non-flowing, standing waters for development. Mosquitos are able to development in salt water and freshwater habitats, and in waters with any range of salinity between these.

Mosquito development at Island View Beach (IVB) old field habitats and the adjacent Municipal Park and Tsawout First Nations salt marsh is initiated by snowmelt, precipitation and fluctuating tidal heights. The predominant habitat at the CRD IVB is temporary, variable and fluctuating water bodies created by surface water accumulations in depressions and low-lying areas located throughout the old, no longer active, farm fields. Their depths, size and persistence are affected by tidal heights, precipitation, seepage, surface water runoff and weather, including day time temperatures, humidity and winds etc. Seepage from the adjacent, western "bluff" maintains several permanent ponds and marshes along the base of this ridge. These fluctuate in response to the impacts of weather (precipitation, temperatures) on runoff and seepage.

In a typical season, these old field temporary sites have evaporated/drained by late May and early June. The more permanent ponds at the base of the bluffs tend to become reduced in size as the season progresses, but they continue to produce recurrent larval mosquito development. Extreme, or several days of precipitation can cause both temporary and permanent habitats to temporarily increase in size with a concomitant surge in larval development.

Field staff visit the Regional and Municipal parks at IVB, and the adjacent Tsawout First Nations salt marsh weekly, beginning in late January. Larval populations are monitored, samples collected for taxonomic identification and treatment/control of larvae is completed using a bio rational, bacterial larvicide (VectoBac 200G) containing *Bacillus thuringiensis* var. *israelensis*, *Serotype H-14, Strain AM 65-52*.

20619-91A Ave, Langley, B.C. Canada V1M 2X2 Tel: 1 604 881 4565 Fax: 1 866 759 5902
Email: duka@telus.net Website: www.duka.consulting

Since we cannot definitively determine the exact source of a mobile, active insect pest such as mosquitos, the magnitude, or contribution to the adult mosquito populations and localized nuisance would likely be a reflection of the predominant habitat type and its area.

The attached graph presents the total volumes of VectoBac 200G applied annually for each of the partners at island View Beach. A review of the past four seasons, 2019-2021 confirms that the total volume of treatment required at CRD IVB has ranged from 10-25% of the total treatments required for all three (partners) areas.

The great majority of adult mosquitos collected from within the boundaries of the IVB, at the Tsawout salt marsh and at adjacent properties over the past several years have been *Aedes dorsalis*. These mosquitos develop in salt water habitats, the predominant habitat of the Tsawout salt marsh. The predominant species of *Aedes* larvae collected at CRD IVB sites is *Aedes sticticus*.

I trust this provides you with the summary information you require.

Yours truly,

Curtis Fediuk BSc., RPBio.,
President

Duka Environmental Services Ltd.
19732 – 68th Avenue
Langley, B.C. V2Y 1H6

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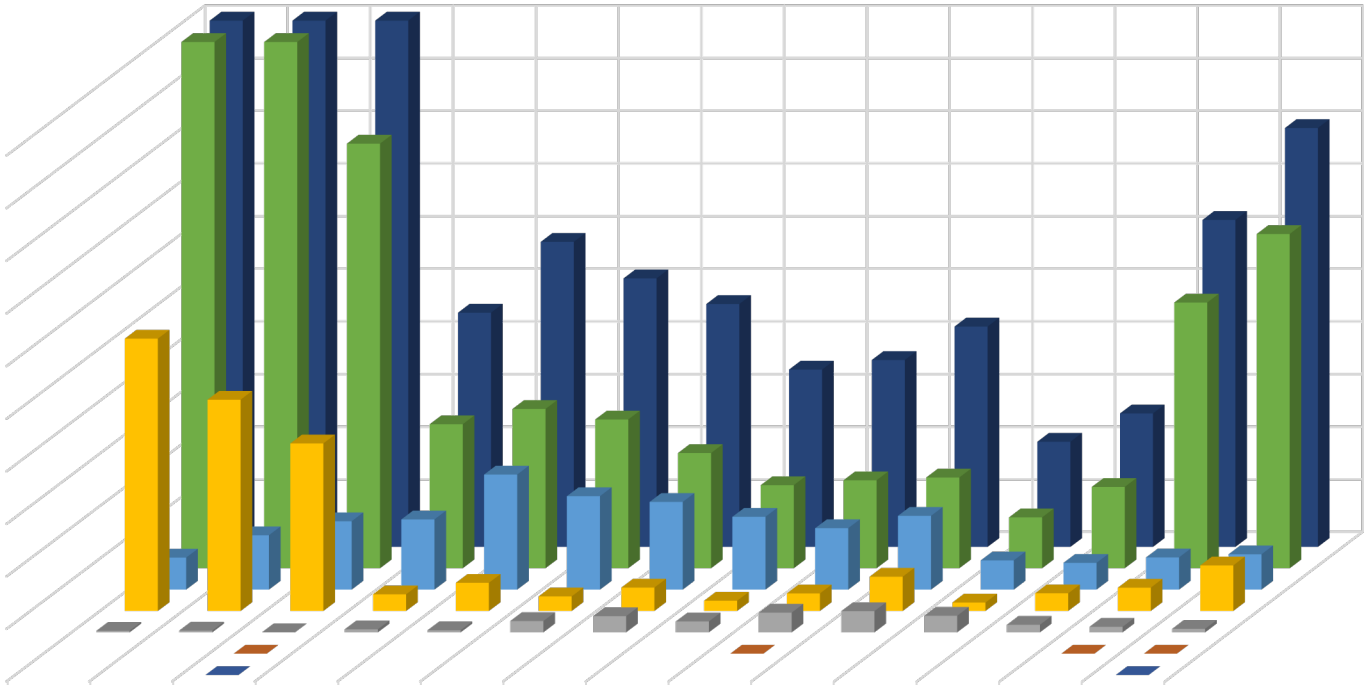
Email: duka@telus.net
Website: duka.consulting

Providing communities with safe, effective and sustainable mosquito and biting fly control services for over 35 years.

Central Saanich - Island View Beach Area - VectoBac 200G Applications
Summary 2009 - 2022 (12 July*)



	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Tsawout Flapper gate repair			XX											XX
Ditch cleaning /Maintenance			X						X				X	X
Central Saanich, sites #69 A,B	3.00	3.30	0.00	5.70	3.90	21.50	30.80	20.70	37.50	40.30	31.57	14.40	10.55	6.55
Central Saanich, sites #123	518.00	402.00	319.05	31.80	53.60	27.77	44.55	19.60	33.40	65.30	16.10	33.65	44.40	86.8
CRD, sites #66, #68	61.00	103.50	130.20	133.70	219.20	178.01	167.01	138.70	117.01	140.52	55.61	50.95	61.31	67.23
Tsawout, site #34	1063.00	1017.80	807.00	274.10	303.10	283.12	219.39	158.21	167.56	172.91	96.92	154.90	505.20	635.45
Totals	1645.00	1526.60	1256.25	445.30	579.80	510.40	461.75	337.21	355.47	419.03	200.20	253.90	621.46	796.03

Making a difference...together

REPORT TO THE JUAN DE FUCA LAND USE COMMITTEE
MEETING OF TUESDAY, JULY 19, 2022

SUBJECT **Zoning Amendment Application for Lots A-H, and J and K, District Lot 87, Renfrew District, Plan EPP31225 – Kirby Creek Road**

ISSUE SUMMARY

Property owners on Kirby Creek Road have submitted a joint application to amend Bylaw No. 2040 by rezoning the subject properties from Forestry (AF) to Rural 2 (RU2) for the purpose of agricultural activities.

BACKGROUND

The ten (10) subject properties are located on Kirby Creek Road in Shirley and include Lots A-H, and J and K in Plan EPP31225, all of which are approximately 4 hectares (ha) in area (Appendix A), and were created though a subdivision in 2015 (Plan EPP31225). Portions of the properties are located within the steep slope, sensitive ecosystems and riparian development permit areas. While the properties are located within the Shirley Fire Protection Area, they are not located within a community water service area.

Residential uses within the subdivision have become well established and a majority of the landowners are expressing an interest in pursuing agricultural activities that are aligned with the community's rural character and Official Community Plan (OCP) policies. The properties are currently zoned Forestry (AF) in Bylaw No. 2040 (Appendix B) and designated as Coastal Upland in the Shirley-Jordan River OCP, Bylaw No. 4001. Agricultural uses are not a permitted use within the AF zone. As a result, the owners of these 10 properties have submitted an application to amend Bylaw No. 2040 to change the zoning of the subject properties from Forestry (AF) to Rural 2 (RU2) for the purpose of permitting agricultural uses and farm buildings (Appendix C). Staff have prepared Bylaw No. 4464 for consideration (Appendix D).

At its meeting of February 15, 2022, the Juan de Fuca Land Use Committee recommended referral of the proposed bylaw to the Shirley/Jordan River Advisory Planning Commission (APC), CRD departments, BC Hydro, District of Sooke, Island Health, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR), FLNR - Archaeology Branch, FLNR - Water Protection Section, Ministry of Agriculture, Ministry of Transportation & Infrastructure, RCMP, Shirley Fire Department, Sooke School District #62, and Pacheedaht and T'Sou-ke First Nations. Comments have been received and are included in Appendix E.

ALTERNATIVES

Alternative 1
The Land Use Committee recommends to the Capital Regional District (CRD) Board:

1. That the referral of proposed Bylaw No. 4464, "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 155, 2022", to the Shirley/Jordan River Advisory Planning Commission, appropriate CRD departments, BC Hydro, District of Sooke, FLNR - Archaeology Branch, FLNR - Ministry of Forests, Lands, Natural Resource Operations and Rural Development, FLNR - Water Protection Section, Island Health, Ministry of Agriculture, Ministry of Transportation & Infrastructure, RCMP, Shirley Fire Department, Sooke School District #62, Pacheedaht First Nation and T'Sou-ke First Nation be approved and the comments received;
2. That proposed Bylaw No. 4464 be introduced and read a first time and read a second time; and

3. That in accordance with the provisions of section 469 of the *Local Government Act*, the Director for the Juan de Fuca Electoral Area, or Alternate Director, be delegated authority to hold a Public Hearing with respect to Bylaw No. 4464.

Alternative 2
That the CRD Board not proceed with proposed Bylaw No. 4464.

IMPLICATIONS

Legislative
The Advisory Planning Commissions (APCs) were established to make recommendations to the Land Use Committee on land use planning matters referred to them relating to Part 14 of the *Local Government Act* (*LGA*). The Shirley/Jordan River APC considered the application at its meeting on March 15, 2022.

Should the proposal proceed, a public hearing pursuant to Part 14, Division 3 of the *LGA* will be required subsequent to the amendment passing second reading by the CRD Board. Property owners within 500 m of the subject property will be sent notice of the proposed bylaw amendment and a public hearing will be advertised in the local paper and on the CRD website.

Regional Growth Strategy
Section 445 of the *LGA* requires that all bylaws adopted by a regional district board after the board has adopted a regional growth strategy (RGS) be consistent with the RGS. In accordance with CRD policy, where a zoning bylaw amendment that applies to land within the Shirley – Jordan River OCP area is consistent with the OCP, it does not proceed to the full CRD Board for a determination of consistency with the RGS. Staff are of the opinion that the proposed amendment is consistent with the policies of the Shirley – Jordan River OCP.

Referral Comments
Referrals were sent to 13 agencies and CRD departments, and to the Shirley/Jordan APC. Comments received are summarized below and included in Appendix E.

BC Hydro stated they have no issue with the proposed bylaw to rezone the ten properties.

District of Sooke stated that their interests are unaffected by the proposed bylaw amendment.

FLNR - Archaeology Branch stated that there are no known archaeological sites recorded on any of the properties and archaeological potential modelling for the area does not indicate a high potential for previously unidentified archaeological sites to be found on the subject property. Should any suspected archaeological deposits be encountered during land alterations on the property, all work must be halted and the Archaeology Branch contacted.

FLNR – Ecosystem Biologist stated that Kirby Creek Road crosses a stream that is a tributary to Kirby Creek, which is fish-bearing and that the road crossing and existing driveways were paved, and ponds created without approvals as required under the *Water Sustainability Act (WSA).* The Biologist recommended that if the ponds contain water that is coming from a groundwater source or is being diverted from a stream, or if the water held in the ponds is being used for non-domestic purposes (i.e., agricultural or livestock), a licence is required in accordance with the *WSA.* It was also recommended that the CRD offset the construction of any unauthorized ponds by planting native riparian plants around them. It was recommended unauthorized ponds not be removed since local amphibian populations may have begun using them for breeding. It was further recommended that any development on lots containing streams require a *Riparian Areas Protection Regulation (RAPR)* assessment by a Qualified Environmental Professional to determine the Streamside Protection and Enhancement Area (SPEA) where no disturbance may occur, and that property owners be reminded that any required vegetation clearing be minimized and occur outside the nesting period from March 1 to August 31 to reduce impacts on all bird

species. Any disturbances to nesting birds would be a violation of the provincial *Wildlife Act* and possibly the federal *Migratory Birds Convention Act*.

FLNR - Water Protection Section stated that of the wells drilled on the subject area lots, four are in Aquifer 606 bedrock, which is known to have a very low productivity, and in particular, to wells constructed at higher elevation. Due to the presence of a shallow overburden, the aquifer is also classified as having an overall high vulnerability to contaminants introduced at the land surface. Animal grazing areas, paddocks and locations of manure storage can be a source of nutrients, and setbacks of these contaminant sources from wells and surface water sources is required in accordance with *Health Hazard Regulation* of the *Public Health Act*. It was further stated that a tributary to Kirby Creek flows through the subject area (Lots G, H and J, as well as D-F) and that there are indications of a tributary stream on Lots D, E and F not noted on the subdivision plan. A qualified environmental professional is required to assess building plans to ensure development is compliant with the *RAPR.* Applicants are to be advised of regulatory requirements that could affect development and siting considerations. Applicants are also advised of the requirement for a water licence for surface water and for non-domestic groundwater use in accordance with the *WSA.*

Ministry of Agriculture stated Ministry staff support the rezoning application given that, if approved, agriculture and farm buildings will be permitted on the subject properties.

Ministry of Transportation & Infrastructure stated no objection to the proposed rezoning.

Pacheedaht First Nation provided verbal confirmation that the Nation's interests are unaffected by this application.

RCMP stated that they have no comments to add to this application.

Shirley Fire Department stated that they have no concerns.

The Shirley/Jordan River APC met on March 15, 2022, to consider the application, with approximately eleven members of the public in attendance. The Shirley/Jordan River APC moved the following motion:

> **MOVED** by Fiona McDannold, **SECONDED** by Emily Anderson that the APC recommends to the LUC that it supports the rezoning application.
>
> **CARRIED**

Land Use

The Shirley-Jordan River OCP, Bylaw No. 4001, designates the subject properties as Coastal Upland. The primary use for the Coastal Upland policy area is to support the continued use of these lands for forestry. Single-family residential and agriculture are also supported in this designation provided the density does not exceed one parcel per 4 ha and one dwelling per parcel. The AF zone permits silviculture and residential uses reflective of the historical use of the lands as working forests. The RU2 zone is considered consistent with the uses and density supported by the Coastal Upland designation and allows for the scale of agricultural activities desired by the applicants. The RU2 zone permits agriculture, farm buildings and residential uses. Density is restricted through a minimum lot size of 4 ha, and an allowance of one dwelling and one suite per parcel (Appendix C). This is in keeping with the density permitted by the AF zone. The RU2 zone incorporates specific definitions for the proposed uses, as follows:

> *Agriculture* means the growing, rearing, producing or harvesting agricultural crops or livestock; apiculture; horticulture; silviculture; the use and storage of associated farm machinery, implements and agricultural supplies; includes the ancillary sale, storage and processing on a parcel of the primary products harvested, reared or produced on that parcel; excludes intensive agriculture, intensive agriculture – medical marihuana, licenced cannabis production

pursuant to the Cannabis Act, kennels, aquaculture, growing of mushrooms within a building and the permanent confinement of livestock or animals of any kind within a building.

Farm Building means a structure which does not contain a residential occupancy and is: i) associated with and located on land devoted to the practice of farming; and ii) used essentially for the housing of agricultural crops or equipment or livestock including storage and processing of agricultural products produced on site; but excludes abattoirs, indoor equestrian riding arenas, and buildings for the permanent confinement of livestock or animals of any kind.

Past proposals to amend the AF zone to permit agriculture have been considered by the CRD Board. Bylaw No. 4179 proposed to add agriculture as a permitted use on all lands zoned AF, but was withdrawn in 2018 in favour of considering zoning amendments to allow agriculture on a case-by-case basis. A site specific rezoning of a split zoned Rural A and AF parcel in Shirley to a new Rural 2 (RU2) zone was completed in 2019 (Bylaw No. 4259). Staff consider the RU2 zone appropriate for properties in the 4 ha range that have been removed from forestry programs, have established rural residential uses, and wish to conduct agricultural activities.

Procedures and Future Development
The proposed bylaw was sent to 13 agencies and CRD departments, and to the Shirley/Jordan River APC. The comments received have been reviewed by staff in conjunction with proposed Bylaw No. 4464.

Staff note that the Ministry of Transportation and Infrastructure approves subdivision layout and road construction and that the CRD has no jurisdiction to require works around road culverts or within the road right-of-way. In addition, there are existing frameworks in place that address development and land alteration adjacent to watercourses, including provincial regulation and local government permitting.

The RU2 zone requires agricultural setbacks, however, additional setbacks stated in provincial regulation would also apply. Land alteration and building construction in areas that are designated as development permit areas will require a development permit, which may also require a professional report prior to issuance, and in particular, development within a riparian development permit area would require a *RAPR* report and approval through the provincial Riparian Areas Regulation Notification System (RARNS). Additional tools such as performance securities may be used to ensure that restoration requirements and buffer areas around wetlands or watercourses are appropriately maintained.

Property owners are advised of requirements under the *WSA* for water licensing*;* requirements under the *Environmental Management Act: Code of Practice for Agricultural Environmental Management* for setbacks; recommendations that native plant species be planted and maintained around any existing unauthorized ponds; as well as requirements of the *Public Health Act* for setbacks, permits for drinking water and sewerage.

Based on the information provided by the applicant, referral comments received and the policies of the Shirley – Jordan River OCP, staff recommend that proposed Bylaw No. 4464 be introduced, read a first and a second time, and that a public hearing be held.

CONCLUSION

The purpose of this zoning bylaw amendment application is to rezone ten (10) subject properties on Kirby Creek Road from the Forestry (AF) zone to the Rural 2 (RU2) zone for the purpose of permitting agriculture and farm buildings. Staff have prepared proposed Bylaw No. 4464 and recommend receipt of referral comments, first and second reading, and advancement to public hearing.

RECOMMENDATION

Alternative 1
The Land Use Committee recommends to the Capital Regional District (CRD) Board:

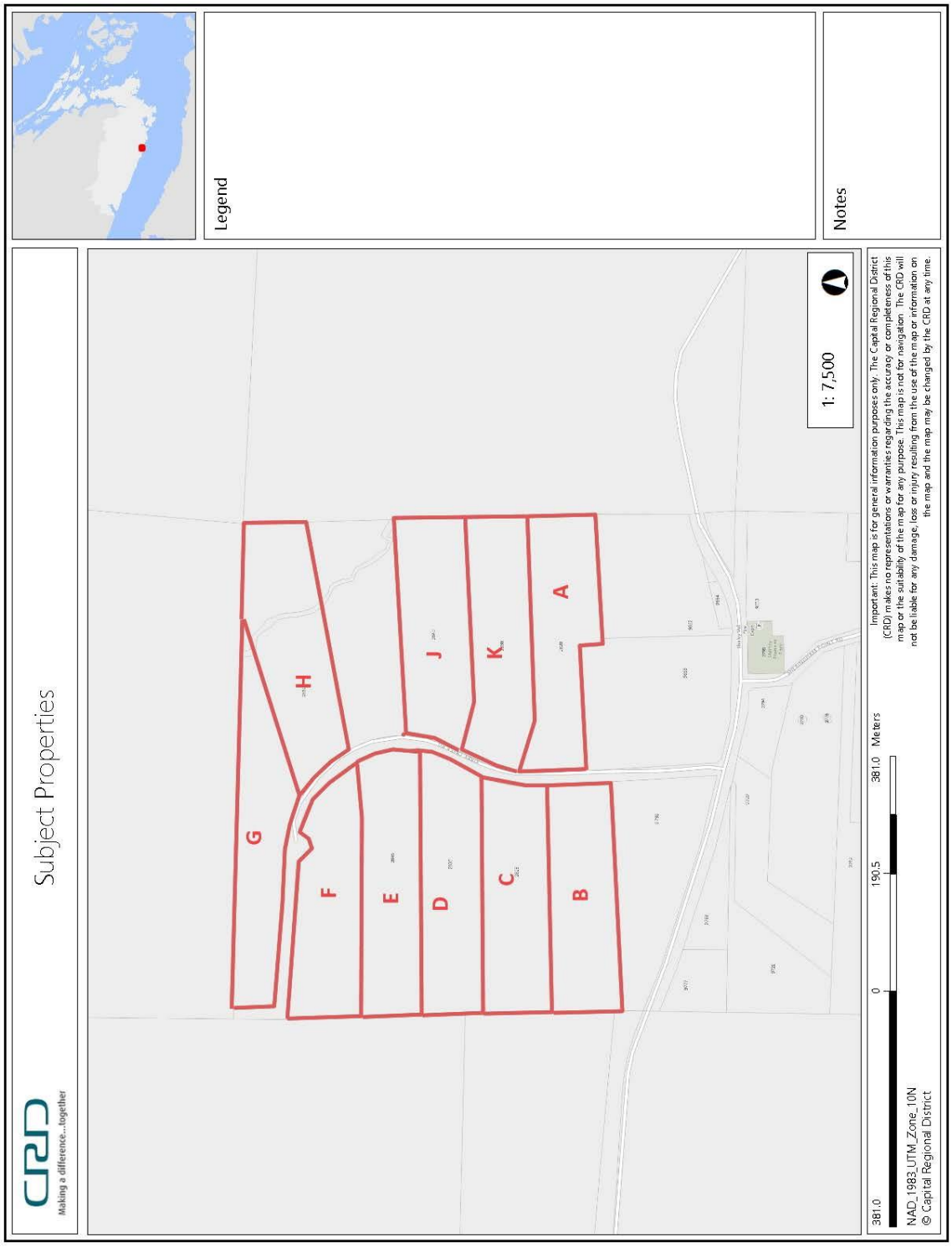
1. That the referral of proposed Bylaw No. 4464, "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 155, 2022", to the Shirley/Jordan River Advisory Planning Commission, appropriate CRD departments, BC Hydro, District of Sooke, FLNR - Archaeology Branch, FLNR - Ministry of Forests, Lands, Natural Resource Operations and Rural Development, FLNR - Water Protection Section, Island Health, Ministry of Agriculture, Ministry of Transportation & Infrastructure, RCMP, Shirley Fire Department, Sooke School District #62, Pacheedaht First Nation and T'Sou-ke First Nation be approved and the comments received.
2. That proposed Bylaw No. 4464 be introduced and read a first time and read a second time; and;
3. That in accordance with the provisions of section 469 of the *Local Government Act*, the Director for the Juan de Fuca Electoral Area, or Alternate Director, be delegated authority to hold a Public Hearing with respect to Bylaw No. 4464.

Submitted by:	Iain Lawrence, RPP,MCIP, Senior Manager, Juan de Fuca Community Planning
Concurrence:	Kevin Lorette, P.Eng., MBA, Acting Chief Administrative Officer

ATTACHMENTS

Appendix A: Subject Properties
Appendix B: Current Zoning – Forestry AF Zone
Appendix C: Proposed Zoning – Rural RU2 Zone
Appendix D: Proposed Bylaw No. 4464
Appendix E: Referral Comments

Appendix A: Subject Properties



Appendix B: Current Zoning - Forestry AF Zone

Schedule "A" of Capital Regional District Bylaw No. 2040
Juan de Fuca Land Use Bylaw

3.0 ***FORESTRY ZONE - AF***

3.01 **Permitted Uses**

In addition to the uses permitted by Section 4.15 of Part 1 of this Bylaw, the following uses and no others shall be permitted in the Forestry AF Zone:

(a) Silviculture except within 300m of a highway;
(b) Offices, mechanical shops, fuel storage, and storage buildings accessory to mining or silviculture;
(c) One-family dwelling;
(d) Home Based Business Categories One, Two and Three; *Bylaw 3705*
(e) Two Boarders or lodgers;
(f) Secondary Suite pursuant to Part 1, Subsection 4.19; *Bylaw 3849*
(g) Detached Accessory Suite pursuant to Part 1, Subsection 4.20. *Bylaw 3849*

3.02 **Minimum Parcel Size for Subdivision Purposes** — The minimum lot size is 4ha;

3.03 **Density** — One one-family dwelling per lot is permitted.

One secondary suite or one detached accessory suite per lot is permitted. *Bylaw 3849*

3.04 **Height** — Maximum height shall be 11m.

3.05 **Lot Coverage** — Maximum lot coverage shall be 10 percent.

3.06 **Maximum Size of for Residential Buildings** — Provided applicants having either met the *Sewerage System Regulation* (e.g., a filing) or acceptance by VIHA via referral. *Bylaw 3705*

(i) On lots of less than 1ha in area, residential buildings and structures shall not exceed a Floor Area Ratio of 0.45 or a Total Floor Area of 418m², whichever is less;
(ii) On lots of 1ha or more in size, residential buildings and structures shall not exceed a Floor Area Ratio of 0.45.

3.07 **Yard Requirements** — For all structures, the front, side, rear and flanking yards shall be a minimum of 15m. *Bylaw 3849*

Appendix C: Proposed Zoning - Rural 2 RU2 Zone

3A.0 RURAL 2 ZONE – RU2

Bylaw 4259

3A.01 Permitted Principal Uses & Buildings

In addition to the uses permitted by Section 4.15 of Part 1 of this Bylaw, the following uses and no others shall be permitted by the Rural 2 RU2 Zone:

(a) Agriculture;
(b) Farm Buildings on Farms;
(c) Residential;
(d) One-family Dwelling.

3A.02 Permitted Accessory Uses

(a) Accessory buildings and structures ancillary to a permitted use pursuant to Part 1, section 4.01;
(b) Secondary Suite pursuant to Part 1, Subsection 4.19;
(c) Detached Accessory Suite pursuant to Part 1, Subsection 4.20;
(d) Home Based Business Categories One, Two and Three;
(e) Two Boarders or Lodgers;
(f) One recreation vehicle may be permitted in conjunction with a permitted residential use on a lot, which may be used but not rented for the temporary accommodation of guests or visitors;
(g) Composting of waste generated on-site.

3A.03 Minimum Parcel Size for Subdivision Purposes

(a) The minimum lot size is 4 ha.

3A.04 Density

(a) One one-family dwelling per lot is permitted.
(b) One secondary suite or one detached accessory suite per lot is permitted.
(c) Farm buildings and structures shall not exceed a total floor area 1,000m^2.
(d) Residential buildings and structures shall not exceed a total floor area of 418 m^2.

3A.05 Height

(a) The maximum height of principal buildings is 11 m.

3A.06 Lot Coverage

(a) The maximum lot coverage shall be 10%.

3A.07 Yard Requirements

(a) Residential buildings and structures shall be set back a minimum of:

   a. 7.5 m from the front lot line;

   b. 6 m from side lot lines;

   c. 10 m from the rear lot line; and

   d. 6 m CTS from flanking lot lines.

(b) Except for grazing of livestock and growing of agricultural crops, agricultural uses and farm buildings shall be set back a minimum of:

   a. 30 m from the front lot line;

   b. 15 m from side, rear and flanking lot lines.

3A.08 Watercourse Setbacks

(a) Agricultural uses and farm buildings and structures shall be a minimum of 15 m from the natural boundary of a watercourse.

3A.09 Definitions

(a) For the purpose of the RURAL 2 zone – RU2, the following definitions apply:

Agriculture means the growing, rearing, producing or harvesting agricultural crops or livestock; apiculture; horticulture; silviculture; the use and storage of associated farm machinery, implements and agricultural supplies; includes the ancillary sale, storage and processing on a parcel of the primary products harvested, reared or produced on that parcel; excludes intensive agriculture, intensive agriculture – medical marihuana, licenced cannabis production pursuant to the *Cannabis Act*, kennels, aquaculture, growing of mushrooms within a building and the permanent confinement of livestock or animals of any kind within a building.

Farm Building means a structure which does not contain a residential occupancy and is: i) associated with and located on land devoted to the practice of farming; and ii) used essentially for the housing of agricultural crops or equipment or livestock including storage and processing of agricultural products produced on site; but excludes abattoirs, indoor equestrian riding arenas, and buildings for the permanent confinement of livestock or animals of any kind.

Appendix D: Proposed Bylaw No. 4464

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4464

****

A BYLAW TO AMEND BYLAW NO. 2040, THE "JUAN DE FUCA LAND USE BYLAW, 1992"

****

The Capital Regional District Board, in open meeting assembled, enacts as follows:

1. Bylaw No. 2040 being the "Juan de Fuca Land Use Bylaw, 1992" is hereby amended as follows:

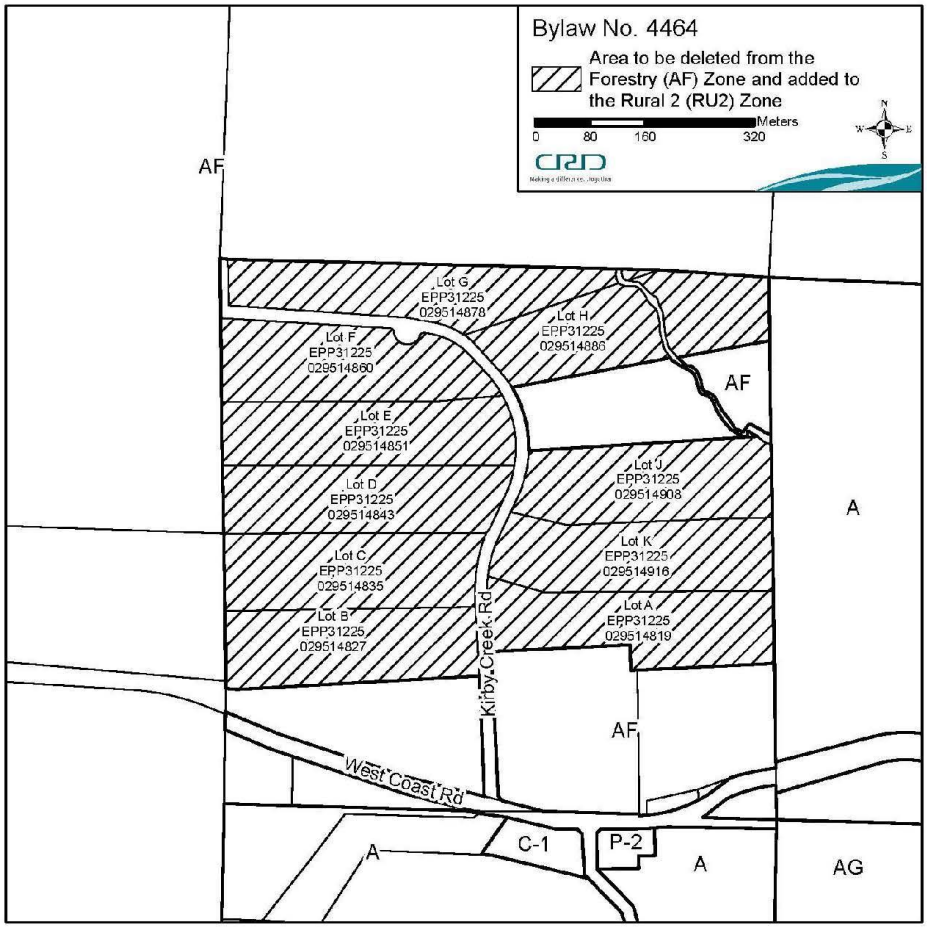
A. SCHEDULE B, Map No. 3 – SHIRLEY JORDAN RIVER ZONING MAP

(a) By deleting

Lot A, District Lot 87, Renfrew District, Plan EPP31225
Lot B, District Lot 87, Renfrew District, Plan EPP31225
Lot C, District Lot 87, Renfrew District, Plan EPP31225
Lot D, District Lot 87, Renfrew District, Plan EPP31225
Lot E, District Lot 87, Renfrew District, Plan EPP31225
Lot F, District Lot 87, Renfrew District, Plan EPP31225
Lot G, District Lot 87, Renfrew District, Plan EPP31225
Lot H, District Lot 87, Renfrew District, Plan EPP31225
Lot J, District Lot 87, Renfrew District, Plan EPP31225
Lot K, District Lot 87, Renfrew District, Plan EPP31225

from the Forestry (AF) zone and adding to the Rural 2 (RU2) zone, as shown on Plan No. 1.

Plan No. 1 of Bylaw No. 4464, an amendment to Bylaw No. 2040



2. This bylaw may be cited as "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 155, 2022".

READ A FIRST TIME THIS	day of	, 2022.
READ A SECOND TIME THIS	day of	, 2022.
READ A THIRD TIME THIS	day of	, 2022.
ADOPTED THIS	day of	, 2022.

CHAIR CORPORATE OFFICER

Appendix E: Referral Comments

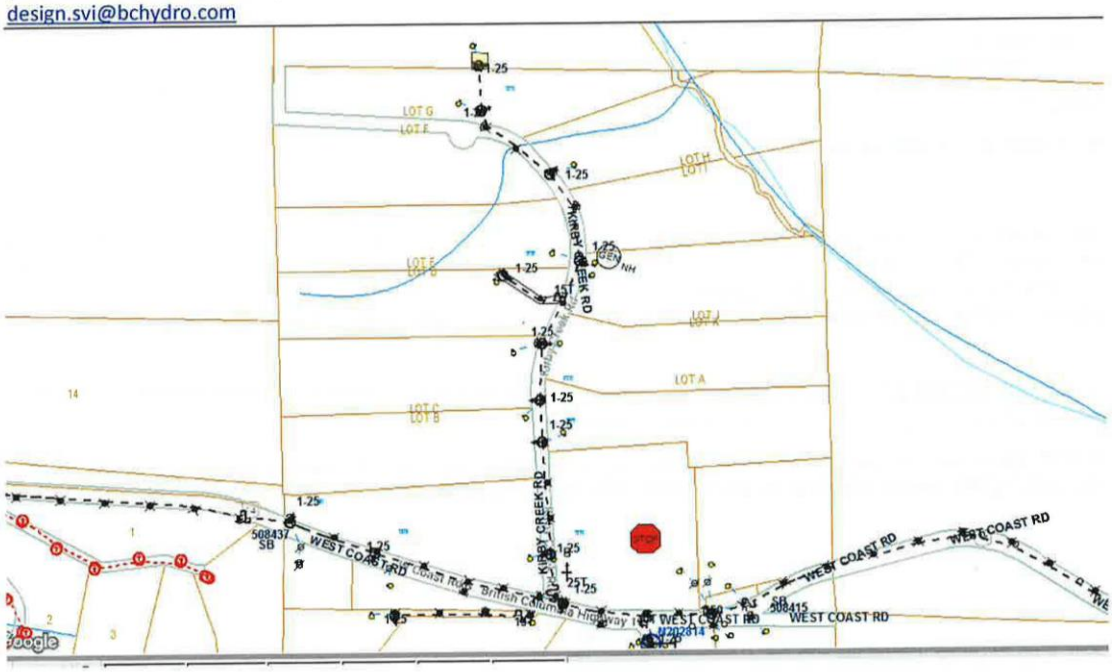
Wendy Miller

To: Wendy Miller
Subject: [External] RE: Zoning Amendment Application RZ000275 - CRD Referral (Kirby Creek Road - Shirley)
Attachments: REFFERAL-FORM-AGENCIES-RZ000275.pdf; PPS-JDF-2022-02-15-RZ000275-Referral-LUC-Report.pdf

From: Mann, Elaine [mailto:Elaine.Mann@bchydro.com]
Sent: Tuesday, March 08, 2022 7:56 AM
To: Wendy Miller <wmiller@crd.bc.ca>
Cc: Reidy, Drew <Drew.Reidy@bchydro.com>; Design, SVI <design.svi@bchydro.com>
Subject: FW: [External] RE: Zoning Amendment Application RZ000275 - CRD Referral (Kirby Creek Road - Shirley)

Hi Wendy

Property Rights do not have issue with the Proposed Bylaw No. 4464 to amend Bylaw No. 2040 to rezone ten 4 ha properties property on Kirby Creek Road from the Forestry (AF) zone to the Rural 2 (RU2) zone for the purpose of permitting agriculture and farm buildings. If Distribution Design in Victoria have any issue/comments they will provide you with a response under separate cover. If you wish to follow up with that office, please contact them at email design.svi@bchydro.com



Elaine Mann | Property Coordinator, Property Rights Services

BC Hydro
400 Madsen Road, 2nd Floor
Nanaimo, BC V9R 5M3

P 250-755-7169
E elaine.mann@bchydro.com

bchydro.com

Smart about power in all we do.

District of Sooke

2205 Otter Point Road, Sooke, British Columbia, Canada V9Z 1J2
Phone: 250-642-1634 Fax: 250-642-0541 Email: info@sooke.ca Website: www.sooke.ca

CRD Rezoning Application Referral to District of Sooke Planning Department

Wednesday, March 2, 2022

DOS File No.: CRD Referral

Juan de Fuca Community Planning
3-7450 Butler Road
Sooke, BC V9Z 1V1

Via Email: wmiller@crd.bc.ca

Dear Iain Lawrence, RPP, MCIP, Manager, Juan de Fuca Community Planning

Re: Referral Comments on rezoning application to amend Bylaw No. 2040 for Lots A-H and J and K, District Lot 87, Renfrew District, Plan EPP31225 – Kirby Creek Road from Forestry (AF) to Rural 2 (RU2) for the purposes of permitting agricultural uses and farm buildings.

Upon review of the proposed bylaw amendment to Bylaw No. 2040, Planning staff have determined that the District of Sooke's interest are unaffected by the proposed bylaw amendment RZ000275.

Thank you for providing the opportunity to comment on the proposed rezoning application.

If you have any further questions, please do not hesitate to contact me at the email provided below.

Yours Truly,

Kasha Janota-Bzowska, Planner I
Planning and Development Department
2205 Otter Point Road
Sooke, BC, V9Z 1J2

Email: kjanotabzowska@sooke.ca
Web: www.sooke.ca

CC: Matthew Pawlow, RPP, MCIP, Director of Planning and Development Services

From: Cooper, Diana FLNR:EX
To: Wendy Miller
Subject: RE: Zoning Amendment Application RZ000275 - CRD Referral (Kirby Creek Road - Shirley)
Date: Tuesday, March 08, 2022 3:03:25 PM
Attachments: image002.png
image003.png

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Hello Wendy,

Apologies for the delay. The information inbox is overflowing!

Thank you for your referral regarding a zoning amendment for the following properties:
LOT A DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514819;
LOT B DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514827;
LOT C DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514835;
LOT D DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514843;
LOT E DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514851;
LOT F DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514860;
LOT G DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514878;
LOT H DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514886;
LOT J DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514908; and
LOT K DISTRICT LOT 87 RENFREW DISTRICT PLAN EPP31225, PID 029514916.

Please review the screenshot of the properties below (outlined in yellow) and notify me immediately if it does not represent the properties that are listed in your referral.

Results of Provincial Archaeological Inventory Search

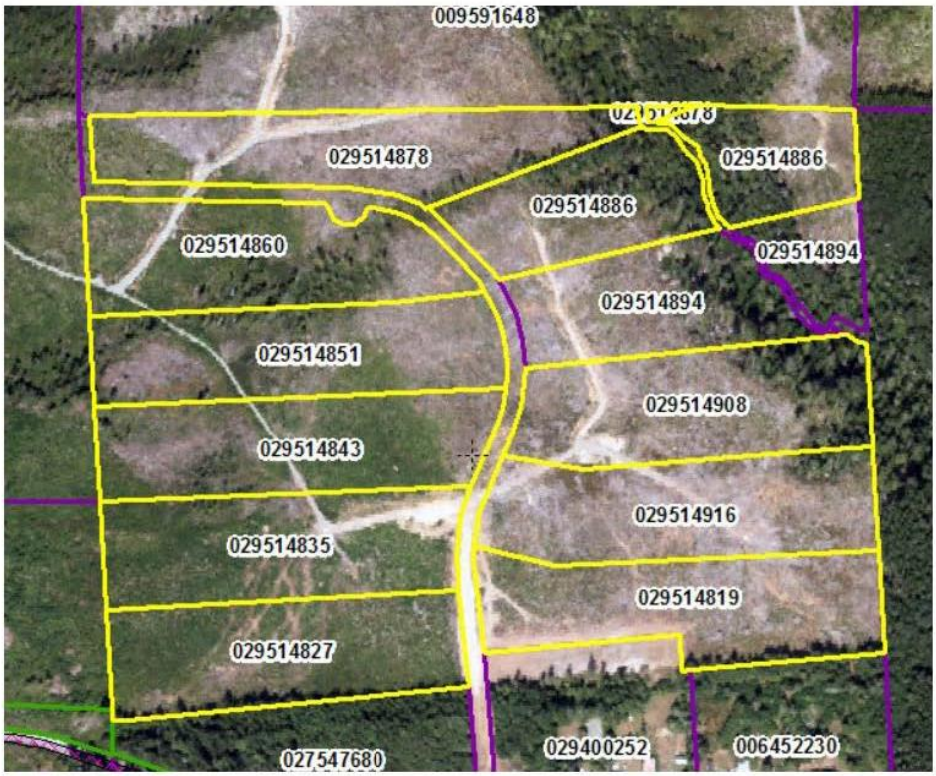
According to Provincial records, there are no known archaeological sites recorded on any of the properties.

Archaeological potential modelling for the area does not indicate a high potential for previously unidentified archaeological sites to be found on the subject properties.

Archaeology Branch Advice

The Archaeology Branch does not identify a need for archaeological study or Provincial heritage permit(s) at the time of this information request.

Please notify all individuals (e.g., owners, developers, equipment operators) involved in land-altering activities (e.g., home renovations, property redevelopment, landscaping, service installation) that if archaeological material is encountered during development, they **must stop all activities immediately** and contact the Archaeology Branch for direction at 250-953-3334.



Please note that subject lot boundaries (yellow) indicated on the enclosed screenshot are based on information obtained by the Archaeology Branch on the date of this communication and may be subject to error or change.

Diana Cooper
Archaeologist/Archaeological Information Administrator
Archaeology Branch|Minsstry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: (250) 953-3343|Email: diana.cooper@gov.bc.ca |Website www.gov.bc.ca/archaeology

RESPONSE SUMMARY – REZONING APPLICATION RZ000275

_X_ Interest Affected by Proposal for Reasons Outlined Below

___ Interest Unaffected by Proposal

Comments:

The Ministry of Forests, Lands, Natural Resource Operations and Rural development, Water Protection Section, has received a referral with respect to proposed land-use change of the subject area (lots A-H, and lots J and K, District Lot 87, Renfrew District, Plan EPP31225 – Kirby Creek Road).

Of the wells drilled on the subject area lots, four are in Aquifer 606 bedrock with depths ranging from 104 to 256 m and yields from 0.25 to 8 US gallons per minute (US GPM), and six are in overlying unconsolidated materials with depths from 17 to 29 m and yields from 2 to 10 US GPM. Aquifer 606 (AQ606 Fact Sheet: https://apps.nrs.gov.bc.ca/gwells/aquifers/606) consists of fractured volcanic bedrock, known to have a very low productivity, in particular in wells constructed at higher elevation. The median depth of bedrock wells registered in the Groundwater Wells database (GWELLS https://apps.nrs.gov.bc.ca/gwells) within 1 km of this site is 39 m, ranging from 17 m to 256 m, and 50% of wells are greater than 60 m deep.

As this area does not have a local water service provider, the applicants should be advised that a water licence (for surface water or for non-domestic groundwater use) is required under the *Water Sustainability Act* (https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/14015). Information about water application requirements and process can be found here: https://portal.nrs.gov.bc.ca/web/client/-/water-licence-application.

A tributary to Kirby Creek flows through the subject area (lots G, H an d J as well as lots D, E and F). There is no water allocation restriction on Kirby Creek. For more information on water licensing and rights refer to: https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights. A groundwater license for domestic use on a single lot is not required for domestic parcels serviced by individual wells.

Due to the presence of a shallow overburden, the aquifer is also classified as having an overall high vulnerability to contaminants introduced at the land surface. Intrinsic vulnerability mapping (https://catalogue.data.gov.bc.ca/dataset/drastic-aquifer-intrinsic-vulnerability) indicates that aquifer vulnerability to contamination in the area of the subject parcel may be moderate. Animal grazing areas, paddocks and locations of manure storage can be a source of nutrient and bacterial contamination of surface and groundwater sources, therefore adequate (minimum 30 m) setbacks of these contaminant source from wells and surface water sources is required (in accordance with *Public Health Act*, Health Hazard Regulation https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/216_2011), and agricultural best practices (Code of Practice for Agricultural Environmental Management) https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/8_2019) to reduce runoff of contaminants are recommended to be employed.

The subdivision map identified the boundaries of riparian features on lots G & H. In addition, there are indications of a tributary (ephemeral?) stream on lots D, E and F not noted on the subdivision plan. Development plans should clearly map and identify all water course and the applicants should be advised of regulatory requirements that could affect the development and siting considerations. The site and lot design should identify access considerations to minimize disturbance of the riparian areas, including adequate building site setbacks from the riparian boundaries. For example, it is not clear how landowners of proposed lots G & H would access the portion of the lot on the opposite side of the wetland or stream, without interference with or alteration of the riparian area. A qualified environmental professional is required to assess building

plans to ensure development is compliant with the Riparian Areas Protection Regulation (more information at: https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/fish/aquatic-habitat-management/riparian-areas-regulation) and related local bylaws.

No additional concerns are noted with respect to the proposed bylaw.

David van Everdingen	Regional Hydrogeologist
Signed	Title
February 18, 2022	Ministry of Forests, Lands, Natural Resource Operations & Rural Development Water Protection
Date	Agency

Response Summary – Rezoning Application RZ000275

Response from the Ministry of Forests, Lands, Natural Resource Operations, and Rural Development

✓ **Interest Affected by Proposal for Reasons Outlined Below**

Comments:

We have reviewed the application to rezone ten 4-ha properties on Kirby Creek Road from Forestry to Rural 2 to permit agriculture and farm buildings. It appears that there has been significant development since sometime between 2012 and 2015 when Kirby Creek Road and associated driveways were paved, and ponds were created. It also appears that Kirby Creek Road crosses a stream that is a tributary to Kirby Creek, which is fish-bearing. Based on our records, neither the Kirby Creek Road crossing over the tributary to Kirby Creek, nor the 3+ constructed ponds received approval under the *Water Sustainability Act,* indicating that unauthorized construction has occurred. Based on these findings, we recommend the following:

- If the ponds contain water that is coming from a groundwater source or is being diverted from a stream, or if the water held in the ponds is being used for non-domestic purposes (i.e., agricultural or livestock), a Use Approval or License is required under the *Water Sustainability Act.* Landowners should be aware of these requirements and can find more information at https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/water-licences-approvals.
- The CRD offset the construction of any unauthorized ponds by planting native riparian plants around them. It is not recommended to remove unauthorized ponds since local amphibian populations may have begun using the ponds for breeding.
- Any development on lots containing streams (i.e., Kirby Creek tributaries) require a *Riparian Areas Protection Regulation* (RAPR) assessment by a Qualified Environmental Professional to determine the Streamside Protection and Enhancement Area (SPEA) where no disturbance can occur.
- Property owners should be reminded any required vegetation clearing be minimized and occur outside the nesting period from March 1 to August 31 to reduce impacts on all bird species. Any disturbances to nesting birds would be a violation of the provincial *Wildlife Act* and possibly the federal *Migratory Birds Convention Act*.

Please let me know if you have any questions or concerns about the recommendations above.

Sincerely,

Emily Upham-Mills, M.Sc., R.P.Bio.

Ecosystems Biologist
West Coast Region
Ministry of Forests, Lands and Natural Resource Operations and Rural Development
2080 Labieux Road
Nanaimo BC V9T 6J9
ph: 250-736-6974
Email: Emily.Upham-Mills@gov.bc.ca

March 10, 2022

Iain Lawrence
Manager of Community Planning
Capital Regional District

Sent by email

Dear Iain:

Re: File RZ000275 – Rezoning Application for ten 4 ha properties on Kirby Creek Road – The Subject Properties

Thank you for providing the opportunity for the Ministry of Agriculture, Food and Fisheries (Ministry) to comment on File RZ000275 that proposes to rezone ten 4 ha properties to permit agricultural uses and farm buildings. From an agricultural perspective, the Ministry offers the following comments:

- The Subject Properties are not located within the Agricultural Land Reserve (ALR) nor do they border on land in the ALR.

- The Subject Properties are currently zoned Forestry (AF) in the Juan de Fuca Land Use Bylaw, 1992. The AF zone does not allow agriculture as either a permitted use or an accessory use. The applicants propose to rezone the Subject Properties to the Rural 2 (RU2) zone which allows agriculture and farm buildings as permitted uses.

- Ministry staff support the rezoning application given that, if approved, agriculture and farm buildings will be permitted on the Subject Properties.

Please contact Ministry staff if you have any questions regarding the above comments.

Thank you for the opportunity to provide comments from an agricultural perspective with respect to this file.

Ministry of Agriculture, Food and Fisheries **Extension and Support Services Branch**
Mailing Address:
PO Box 9120, Stn Prov Gov
Victoria, BC V8W 9B4

Sincerely,

Reed Bailey
Land Use Planner
778-698-3455
Reed.Bailey@gov.bc.ca

Emily Carmichael
Regional Agrologist
778 666-2437
Emily.Carmichael@gov.bc.ca

Cc: Shannon Lambie, Regional Planner – Agricultural Land Commission

Our file: 2022-01056
Your file: RZ000275
Date: March 1, 2022

BRITISH COLUMBIA | Ministry of Transportation and Infrastructure

Juan de Fuca Planning
3-7450 Butler Road
Sooke, BC V9Z 1N1

Attn: Ian Lawrence, Manager

The Ministry of Transportation and Infrastructure has received and reviewed your referral of February 16, 2022 to amend Bylaw No. 2040 to rezone ten 4 ha properties property on Kirby Creek Road from the Forestry (AF) zone to the Rural 2 (RU2) zone for the purpose of permitting agriculture and farm buildings. The property does not fall within Section 52 of the Transportation Act and will not require Ministry of Transportation and Infrastructure formal approval.

The Ministry has no objections to the proposed rezoning.

Thank you for the opportunity to comment. If you or the proponent has any questions, please contact Jennifer Dyer at 778-576-1109.

Sincerely,

Jennifer Dyer
Development Services Officer
Vancouver Island District – Saanich

Ministry of Transportation and Infrastructure
Vancouver Island District
Mailing Address:
District Office Address:
2100 Labieux Road
Nanaimo, BC V1J 6M7
Area Office Locations:
4460 Chatterton Way
Saanich, BC V8X 5J2

From: Sinden, Brett
To: Wendy Miller
Cc: Shaw, Kevin
Subject: RE: Zoning Amendment Application RZ000275 - CRD Referral (Kirby Creek Road - Shirley)
Date: Wednesday, February 16, 2022 12:08:04 PM

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Good afternoon Wendy.

Sooke RCMP have no comments to add to this application.

Additionally, could you please add Sgt Kevin Shaw as the contact for Sooke RCMP. He is the acting detachment commander while I am away at an assignment at our district office. He is cc'd here.

Thanks.

Brett

S/Sgt Brett SINDEN
Detachment Commander
Sooke RCMP
250-642-5241 extension 2227

From: Marty Gilbertson
To: Wendy Miller
Subject: Re: Zoning Amendment Application RZ000275 - CRD Referral (Kirby Creek Road - Shirley)
Date: Tuesday, March 08, 2022 4:20:17 PM

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

In regards to the zoning change on the property on Kirby Creek road the Fire Department has no concerns with this change.Makes sense on 10 acre lots for the owners to be able to use the land to its full potential.

Making a difference...together

Minutes of a Meeting of the Shirley/Jordan River Advisory Planning Commission Held March 15, 2022 at Juan de Fuca Local Area Services Building, 3-7450 Butler Road, Otter Point, BC

PRESENT: Fiona McDannold (Chair), Emily Anderson, Vivi Curutchet, Melody Kimmel
Staff: Iain Lawrence, Senior Manager, JdF Local Area Services (EP); Wendy Miller, Recorder (EP)
ABSENT: Blair Hughes
PUBLIC: Approximately 7 (EP); 4 in-person

EP – Electronic Participation

The meeting was called to order at 7:05 pm.

1. **Elections**
   Iain Lawrence called for nominations for the position of Chair of the Shirley/Jordan River APC for 2022 and Fiona McDannold's name was put forward. Iain Lawrence called two further times for nominations and, as there were none, Fiona McDannold was acclaimed Chair.

   Fiona McDannold called for nominations for the position of Vice Chair of the Shirley/Jordan River APC for 2022 and Melody Kimmel's name was put forward. Fiona McDannold called two further times for nominations and, as there were none, Melody Kimmel was acclaimed Vice Chair.

2. **Approval of the Agenda**

   MOVED by Vivi Curutchet, **SECONDED** Emily Anderson by that the agenda be approved. **CARRIED**

3. **Approval of the Supplementary Agenda**

   MOVED by Melody Kimmel, **SECONDED** by Emily Anderson that the supplementary agenda be approved. **CARRIED**

4. **Adoption of the Minutes of June 7, 2021**

   MOVED by Melody Kimmel, **SECONDED** by Vivi Curutchet that the minutes of June 7, 2021, be adopted. **CARRIED**

5. **Planner's Report**
   No report.

6. **Zoning Amendment Application**
   a) **RZ000275 - Lots A-H, and J and K, District Lot 87, Renfrew District, Plan EPP31225 (Kirby Creek Road)**
      Iain Lawrence spoke to the staff report for a joint application to rezone the subject properties from Forestry (AF) to Rural 2 (RU2). It was advised that the Juan de Fuca Land Use Committee (LUC) directed referral of the application to the Shirley/Jordan River APC at its meeting of February 15, 2022.

PPSS-35010459-2695

Iain Lawrence highlighted the subject properties and outlined the RU2 zone. It was advised that the RU2 zone requires that agricultural uses and farm buildings/structures be a minimum of 15 m from the natural boundary of a watercourse and that the RU2 zone provides definitions for Agriculture and Farm Building that are specific to the zone.

Iain Lawrence responded to questions from the APC advising that:
- the RU2 zone was created for the rezoning of a split zoned Rural A and AF parcel on Invermuir Road in Shirley in 2019
- the Invermuir Road property is large and would have been able accommodate a sizable indoor equestrian riding arena
- a proposal in Otter Point is currently being considered to permit an equestrian riding facility under a new agriculture zone
- the primary applicant sought out other 4 ha property owners interested in rezoning
- one of the 4 ha properties in the subdivision is not part of the rezoning application and will remain zoned AF with the current list of permitted uses.
- the 15 m setback from the natural boundary of a watercourse required by the RU2 zone is in keeping with the provincial agricultural setbacks from watercourses
- the Official Community Plan Development Permit Area designations include a 30 m assessment area on both sides of a stream/watercourse that applies to any removal of vegetation or other site alteration
- sewerage/septic capacity is confirmed by a certified Wastewater Operator and approved by Island Health and verified through the building permit process
- agricultural runoff is regulated by the Ministry of Agriculture

A member of the public stated that there are existing dwellings in the subject application area without approved septic and that non-compliance has been reported to the CRD.

Iain Lawrence stated that he will contact CRD Bylaw Enforcement regarding the report of non-compliance.

Applicants stated:
- rainwater is being captured for domestic use by some property owners
- property owners are interested in small stock livestock keeping and not large commercial agricultural pursuits

MOVED by Fiona McDannold, **SECONDED** by Emily Anderson that the APC recommends to the LUC that it supports the rezoning application.

CARRIED

7. Adjournment

The meeting adjourned at 7:30 pm.

_____
Chair

PPSS-35010459-2695

Making a difference...together

REPORT TO THE JUAN DE FUCA LAND USE COMMITTEE
MEETING OF TUESDAY, JULY 19, 2022

SUBJECT **Comprehensive Community Development Plan Amendment Application for Blocks D and E, District Lots 751 and 911, Renfrew District, Plan EPC2056 (Crown Lease #927321)**

ISSUE SUMMARY

The applicant proposes to rezone the subject property from Marine (M) to a new Commercial Marina (CM-1) zone in order to permit a commercial marina, community use services, food service establishments and retail establishments. An area of foreshore fill in proximity to sea caves is proposed to be zoned as a new Heritage Conservation (HC) zone to protect the integrity of the caves and access to them.

BACKGROUND

The subject property includes the surface of the water and breakwater fill areas within Crown Lease #927321, and is located adjacent to 17110 Parkinson Road in Port Renfrew (Appendices A and B). The property is designated as Marine Protection (M) under Bylaw No. 3109, Schedule 'A', and is currently zoned Marine (M) under Bylaw No. 3109, Schedule 'B' (Appendix C). The property is adjacent to Community Residential – One (CR-1) zoned land to the south and southeast, Tourist Commercial – One (TC-1) zoned land to the southwest, and the waters of Port San Juan, which are zoned M, to the north, west and east.

The area was included in the Port Renfrew Water Supply Local Service Area under Bylaw No. 4442 on December 8, 2021. The adjacent upland property is within the Port Renfrew Fire Protection Local Service Area; however, the lease area that is the subject of this application currently remains outside the fire protection area.

The subject property was initially granted status as a Licence of Occupation area by the Province on February 25, 2016. Temporary Use Permit TP000008 was then issued by the CRD Board on June 28, 2016, to authorize a 60-slip commercial marina, offices, food services, fuel sales, recreation, boat trailer parking and boat storage. The Permit renewal was authorized by the CRD Board on July 10, 2019, and will expire on July 24, 2022. The Provincial Licence of Occupation area has recently been resurveyed and registered as a Crown Lease area.

Staff have drafted Bylaw No. 4473 (Appendix D) in response to the owner's application to rezone the marina lease area in order to allow the marina to continue to operate upon expiry of the temporary use permit.

At its meeting of February 15, 2022, the Juan de Fuca Land Use Committee recommended referral of the proposed bylaw to a Public Information Meeting, CRD departments, BC Hydro, Cowichan Valley Regional District, Department of Fisheries and Oceans, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR), FLNR - Archaeology Branch, Island Health, Ministry of Transportation & Infrastructure, Pacheedaht First Nation, RCMP, and Sooke School District #62. Comments have been received and are included in Appendix E.

ALTERNATIVES

Alternative 1
The Land Use Committee recommends to the Capital Regional District (CRD) Board:

1. That the referral of proposed Bylaw No. 4473, "Comprehensive Community Development Plan for Port Renfrew, Bylaw No. 1, 2003, Amendment Bylaw No. 14, 2022", to a Public Information Meeting, CRD departments, BC Hydro, Cowichan Valley Regional District, Department of Fisheries and Oceans, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR), FLNR - Archaeology Branch, Island Health, Ministry of Transportation & Infrastructure, Pacheedaht First Nation, RCMP, and Sooke School District #62 be approved and the comments received;
2. That proposed Bylaw No. 4473 be introduced and read a first time and read a second time; and
3. That in accordance with the provisions of section 469 of the *Local Government Act*, the Director for the Juan de Fuca Electoral Area, or Alternate Director, be delegated authority to hold a Public Hearing with respect to Bylaw No. 4473.

Alternative 2
That the CRD Board not proceed with proposed Bylaw No. 4473.

IMPLICATIONS

Legislative
The Advisory Planning Commissions (APCs) were established to make recommendations to the Land Use Committee on land use planning matters referred to them relating to Part 14 of the *Local Government Act* (*LGA*). At the present time, there is no active APC for Port Renfrew; therefore, a Public Information Meeting was held in person and via video and tele-conference.

Should the proposal proceed, a public hearing pursuant to Part 14, Division 3 of the *LGA* will be required subsequent to the amendment passing second reading by the CRD Board. Property owners within 500 m of the subject property will be sent notice of the proposed bylaw amendment and a public hearing will be advertised in the local paper and on the CRD website.

Regional Growth Strategy
Section 445 of the *LGA* requires that all bylaws adopted by a regional district board after the board has adopted a Regional Growth Strategy (RGS) be consistent with the RGS. In accordance with CRD policy, where a zoning bylaw amendment that applies to land within the Port Renfrew Comprehensive Community Development Plan area is consistent with the Plan, it does not proceed to the Planning and Protective Services Committee and the CRD Board for a determination of consistency with the RGS. The proposed zoning amendment is consistent with the policies of the Plan.

Referral Comments
Referrals were sent to 13 agencies and CRD departments, and to a Public Information Meeting. Comments received are summarized below and included in Appendix E.

CRD Building Inspection advised that an open gazebo had been approved in 2016, but has since been altered to that of a fully enclosed restaurant. The building should either be returned to an open gazebo or permits obtained upon completion of the rezoning to allow the alterations. Approvals for services to new buildings for water, sewage and stormwater will required prior to the issuance of building permits.

CRD Integrated Water Services advised that community piped water can be supplied to the lease area by the CRD. They further advised that a value of 13 single-family equivalents (SFEs) has been assigned to the property by agreement and that this is to be monitored by a water meter. As a condition to further development, the owners are to provide a water service application and development site plan.

CRD Protective Services recommended that the zoning amendment be held at third reading until a Fire Service Area amendment process is substantially complete. The process would evaluate code compliance, infrastructure improvements and fire department capacity.

Department of Fisheries and Oceans (DFO) advised that they would not provide detailed comments on the rezoning application, but recommended that land use planning processes consider establishing regulations to meet environmental conservation and protection objectives related to freshwater and marine fish habitat.

FLNR - Archaeology Branch advised that previously recorded archaeological site DdSc-24 is located on the foreshore area within the lease area and that the waterfront location of the area increases the potential for unknown/unrecorded archaeological deposits to exist in the area. The registered site is recorded as a burial cave and is protected under the *Heritage Conservation Act* and must not be damaged or altered without a Provincial heritage permit. Any land activity planned in the vicinity of the site, or of any other site in proximity to the lease area, would also require a Provincial permit.

FLNR – Authorizations (West Coast Region) stated that the rezoning will align with the Province's issuance of the lease for a Commercial Marina and that they had no further comment. During a follow-up conversation between Ministry and CRD staff on May 19, 2022, Ministry staff advised that environmental and archaeological considerations had been part of an extensive approval review process that included both the applicant and First Nations. FLNR staff advised that concerns related to marina infrastructure and operations, environmental conditions or to archaeological sites in proximity to the marina should be brought to the attention of the Resource Manager for enforcement action by the Province.

Ministry of Transportation & Infrastructure stated the rezoning does not require formal approval, but that the applicant is required to apply for a commercial access permit.

Pacheedaht First Nation representatives and JdF Planning staff met on April 1, 2022, to discuss the proposed zoning amendment for a commercial marina. Concerns raised at that time related to the roles that various government agencies play in regulating the marine environment, archaeological sites and grey water discharge. At a follow-up meeting on May 26, 2022, CRD staff relayed information obtained from FLNR advising that issues related to the marina infrastructure and operations, the marine environment, and archaeological sites should be referred directly to the Provincial Resource Manager. In order to protect archaeological features immediately adjacent to the lease area, as well as access to them, a new land use zone was suggested as a potential solution. Formal comment from Pacheedaht on this specific application has not been received as of the writing of this report. Any comments received prior to July 19, 2022, will be brought to the Land Use Committee at that time.

RCMP stated that they have no position on this application.

A Public Information Meeting was held at the Juan de Fuca Local Area Services Building and via video and tele-conference on March 7, 2022, to consider the application. Approximately five members of the public attended in-person and sixteen members of the public attended via electronic participation.

Members of the public asked questions and raised concerns regarding environmental impacts of the marina infrastructure and operations on the surrounding marine environment, septic disposal, water consumption, the scale of the existing food service facility in relation to the temporary use permit, and the siting and condition of fuel services for the facility.

Land Use
Schedule 'A' of the Comprehensive Community Development Plan for Port Renfrew, Bylaw No. 3109, designates the subject property, which is defined by Crown Lease #927321, as Marine Protection (M). The Marine Protection designation does not support log booming operations, and is silent on other maritime uses. The subject property is currently zoned Marine (M) under Schedule 'B' of Bylaw No. 3109, which only permits private boat docks.

The proposed uses in the Commercial Marina (CM-1) zone include commercial marina, community use services such as government services, food service establishments and retail establishments. These uses are currently authorized under Temporary Use Permit TP000008. The Permit will expire on July 24, 2022, and there is no option to renew the permit for another term.

Construction of the breakwater and dock facilities was approved by the Province through the issuance of the original Licence of Occupation. At that time, the Province required detailed environmental assessments that led to the present location and configuration of the breakwater structures. The marina provides a year-round safe harbour and plays an important economic role for the surrounding community.

Construction of a picnic shelter and the siting of portable washrooms and marina office were permitted under the existing temporary use permit. Modifications to the picnic shelter have been made without a building permit and are to be brought into compliance with the *BC Building Code* in accordance with comments from CRD Building Inspection and Protective Services. The applicant wishes to keep the existing structure and has agreed to provide building inspection staff with a code analysis, detailing any requirements for bringing them into compliance. However, in order to issue building permits, the use must first be permitted under the land use bylaw.

The lease area is currently located outside the Port Renfrew Fire Protection Local Service Area. Inclusion of the parcel in the service area requires a service area bylaw amendment, which would be subject to confirmation from Protective Services that hazards have been identified and that the required resources can be put in place to provide service to the area. The process to review and amend the service area bylaw is currently underway in consultation with the applicant.

CRD staff have had several conversations with representatives of Pacheedaht First Nation regarding the proposal to rezone the marina lease area. Pacheedaht have expressed ongoing concern regarding environmental conditions associated with marina operations and with the location of the marina breakwater structures. Approval of the breakwater location was the subject of the Provincial lease application process and any concerns related to the marine environment are the jurisdiction of the federal and provincial governments.

Pacheedaht expressed additional concern regarding the status of buildings associated with the marina operation and with the impact of the marina on adjacent sea caves that hold significant cultural and archaeological importance to the Nation. This includes potential impact to the cave feature at registered archaeological site DdSc-24, also known as Cave 3. A second cave (Cave 2) is located in close proximity to registered archaeological site DdSc-24. Cave 2 is considered to have high archaeological potential and is of significant importance to Pacheedaht.

CRD staff and Pacheedaht representatives have discussed the option of including a new Heritage Conservation (HC) zone to cover an area of foreshore fill to the north of the caves (Appendix D). The intent of the Heritage Conservation zone is to protect Caves 2 and 3, and to provide access to Cave 3 by Pacheedaht for cultural purposes. Proposed permitted uses are limited to *heritage conservation*, which is defined as, "the conservation of lands that have been identified as an area requiring protection or access for cultural or heritage purposes." At this time, Pacheedaht have not provided formal support for this proposal; however, the application of such a zone is the only means available to the CRD to provide additional protection to the lease area, which is otherwise regulated by the Province.

With regards to environmental impacts of the marina infrastructure and operations, FLNR staff confirmed that an extensive review was conducted during the lease application process, and that concerns related to current impacts should be brought to the attention of the Resource Manager for investigation and action by the Province.

Based on the information provided by the applicant, referral comments received and confirmation from FLNR that it has issued the lease for commercial marina purposes having considered potential environmental and archaeological impacts, staff recommend receipt of referral comments, that proposed Bylaw No. 4473 be read a first and second time, and that a public hearing with respect to the bylaw be held.

CONCLUSION

The purpose of this zoning bylaw amendment application is to rezone the subject property in Port Renfrew from Marine (M) to a new Commercial Marina (CM-1) zone for the purposes of permitting a commercial marina, community use services, food service establishments and retail establishments upon the expiry of Temporary Use Permit TP000008. In addition to the application of the new CM-1 zone, staff recommend that a new Heritage Conservation (HC) zone be applied to the fill area between two sea caves and the natural boundary of the sea within the lease area to address concerns expressed by Pacheedaht First Nation representatives regarding protection of the caves and ongoing access to them. Staff have prepared proposed Bylaw No. 4473 and recommend receipt of referral comments, first and second reading, and advancement to public hearing.

RECOMMENDATION

Alternative 1
The Land Use Committee recommends to the Capital Regional District (CRD) Board:

1. That the referral of proposed Bylaw No. 4473, "Juan de Fuca Land Use Bylaw, 1992, Amendment Bylaw No. 155, 2022", to Public Information Meeting, CRD departments, BC Hydro, Cowichan Valley Regional District, Department of Fisheries and Oceans, Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNR), FLNR - Archaeology Branch, Island Health, Ministry of Transportation & Infrastructure, Pacheedaht First Nation, RCMP, and Sooke School District #62 be approved and the comments received.
2. That proposed Bylaw No. 4473 be introduced and read a first time and read a second time; and;
3. That in accordance with the provisions of section 469 of the *Local Government Act*, the Director for the Juan de Fuca Electoral Area, or Alternate Director, be delegated authority to hold a Public Hearing with respect to Bylaw No. 4473.

Submitted by:	Iain Lawrence, RPP,MCIP, Senior Manager, Juan de Fuca Local Area Services
Concurrence:	Kevin Lorette, P.Eng., MBA, General Manager, Planning & Protective Services
Concurrence:	Robert Lapham, RPP, MCIP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Context Map
Appendix B: Subject Property Map
Appendix C: Current Zoning – Marine (M) Zone
Appendix D: Proposed Bylaw No. 4473
Appendix E: Referral Comments

Appendix A: Context Map

Appendix B: Subject Property Map

Appendix C: Current Zoning – Marine Zone

Schedule "B" of
Capital Regional District Bylaw No. 3109

SECTION 27 M (Marine) Zone

Permitted Uses

1. The following uses and no others are permitted in this zone:

   a) Private boat docks.

Appendix D: Proposed Bylaw No. 4473

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4473

****

A BYLAW TO AMEND BYLAW NO. 3109,
THE "COMPREHENSIVE COMMUNITY PLAN FOR PORT RENFREW, BYLAW NO. 1, 2003"

****

The Capital Regional District Board, in open meeting assembled, enacts as follows:

1. Bylaw No. 3109 being the "Comprehensive Community Plan for Port Renfrew, Bylaw No. 1, 2003" is hereby amended:

A. SCHEDULE B, PART 1, SECTION 1 DEFINITIONS

a) By adding a new definition for "COMMERCIAL MARINA" before the words "COMMUNITY SEWAGE SYSTEM" as follows:

COMMERCIAL MARINA means a facility providing moorage for commercial vessels and private pleasure craft, as well as offices, fuel sales, boat trailer parking and boat storage.

b) By adding a new definition for "HERITAGE CONSERVATION" before the words "HOME BASED BUSINESS" as follows:

HERITAGE CONSERVATION means the conservation of lands that have been identified as an area requiring protection or access for cultural or heritage purposes.

B. SCHEDULE B, PART IV – ZONES

a) By inserting a new "CM-1 (Commercial Marina)" zone, after Section 27, to be read as follows:

SECTION 27A CM-1 (Commercial Marina) Zone

Permitted Uses

1. The following uses and no others are permitted in this zone:
   a) Commercial marina;
   b) Community use services;
   c) Food service establishments;
   d) Retail establishments.
2. The following accessory uses and buildings are permitted in this zone:
   a) Any buildings or structures accessory to any of the above listed uses.

Regulations

3. On a parcel of land located in this zone:

   Height

   a) No principal building or structure shall exceed 9.75 metres in height.
   b) No accessory building or structure shall exceed 6 metres in height.

b) By inserting a new "HC (Heritage Conservation)" zone, after Section 27, to be read as follows:

SECTION 28 HC (Heritage Conservation) Zone

Purpose

The intent of this zone is to protect archaeologically and culturally significant features and access to those features.

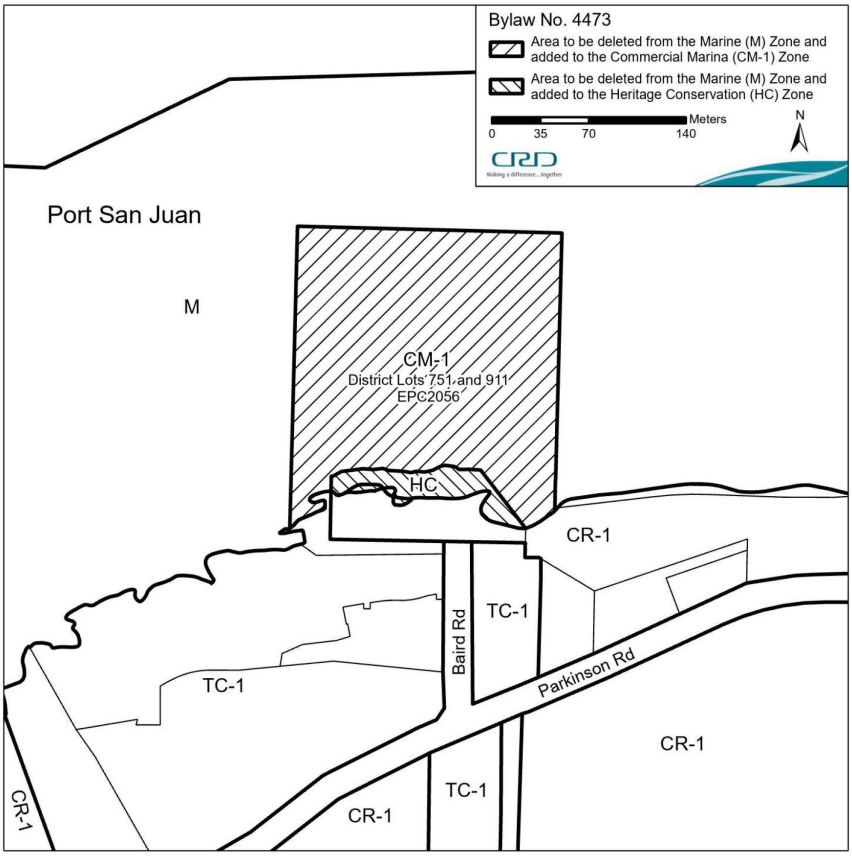
Permitted Uses

1. The following uses and no others are permitted in this zone:
   a) Heritage conservation

C. SCHEDULE B, MAP NO. 3 – ZONING

a) By deleting Blocks D and E, District Lots 751 and 911, Renfrew District, Plan EPC2056, Lease #927321, from the Marine (M) zone and adding said Lease area to the CM-1 (Commercial Marina) and HC (Heritage Conservation) zones, as shown on Plan No. 1, attached to and forming part of this bylaw.

Plan No. 1 of Bylaw 4473, an amendment to Bylaw No. 3109



2. This bylaw may be cited as Bylaw No. 4473, "Comprehensive Community Development Plan for Port Renfrew, Bylaw No. 1, 2003, Amendment Bylaw No. 14, 2022".

READ A FIRST TIME THIS ____ DAY OF _____ 2022

READ A SECOND TIME THIS ____ DAY OF _____ 2022

READ A THIRD TIME THIS ____ DAY OF _____ 2022

ADOPTED THIS ____ DAY OF _____ 2022

_____ _____

CHAIR CORPORATE OFFICER

Appendix E: Referral Comments

From:	Wendy Miller
To:	Wendy Miller
Subject:	Comprehensive Community Development Plan Amendment Application RZ000276 - Referral (Crown Lease #927321)
Date:	Friday, April 22, 2022 11:42:00 AM

From: Mike Taylor
Sent: Friday, April 08, 2022 4:25 PM
To: Wendy Miller <wmiller@crd.bc.ca>; Iain Lawrence <ilawrence@crd.bc.ca>
Subject: RE: Comprehensive Community Development Plan Amendment Application RZ000276 - Referral (Crown Lease #927321)

Hello, Iain and Wendy. I am sorry this is very late. I have reviewed the file and completed a site visit on March 15, 2022. My comments are as follows.

-The only concern for existing buildings, that I am aware of, are for the gazebo on the jetty and the shipping containers converted to washrooms. The open gazebo was approved in 2016 with a building permit, however, it has since been altered to that of a fully enclosed restaurant. This building should be returned to that of an open gazebo or, following completion of rezoning to authorize the use, permit approvals are necessary to allow the alterations. Permit approvals will also be necessary for the shipping containers altered for use as washrooms. Permit applications for these buildings will be required to include the involvement of Registered Professionals.

-There are currently several 219 Covenants addressing geotechnical matters on these sites. Further geotechnical reports and covenants will likely be required to address concerns for flooding, land slippage, erosion, subsidence and possible debris and mud flows.

-Approvals for services to new buildings will, of course, be required prior to the issuance of building permits. This will include water, sewerage and storm water.

-I am aware that fire protection is also being reviewed.

Please let me know, Iain, if additional information is needed at this time.
Thank you.
Mike

Memo

TO: Iain Lawrence, Manager, Juan de Fuca Local Area Planning

FROM: Joseph Marr, Manager, Water Distribution Engineering and Planning

CRD FILE: 3360-20-PRENW-22-002

DATE: March 16, 2022

SUBJECT: **COMPREHENSIVE COMMUNITY DEVELOPMENT PLAN AMENDMENT APPLICATION FOR BLOCKS D AND E, DISTRICT LOTS 751 AND 911, RENFREW DISTRICT, PLAN EPC2056 (CROWN LEASE #927321)**

Thank you for your Comprehensive Community Development Plan Amendment received February 16, 2022, which requests that we examine the above referenced proposal with regard to the water supply regulations and policies of the Capital Regional District (CRD) Integrated Water Services as established for the Port Renfrew Utility Service Committee (PRUSC).

Community piped water can be supplied to this property by the CRD.

The CRD will require the following:

1) The Owner(s) shall provide a water service application and a development site plan indicating any existing and proposed buildings.

2) The Owner(s) provide engineering design drawings for the development showing proposed water servicing and hydrant locations, associated design brief, and confirms domestic and fire flows and pressures.

3) The Owner(s) comply with all other relevant bylaws and applicable codes for servicing (CRD land use approvals, Building code, MOTI etc.).

4) A Single Family Equivalent (SFE) value for the property shall also be calculated and provided to the CRD for review. There is a currently a limit on the property of 13 SFE's by agreement.

5) A new water meter shall be installed at the cost of the owner and monitored to confirm SFE's.

6) The Owner(s) pays all applicable connection fees, including parcel taxes and user fees as required.

This memo is for the purpose of providing you with information regarding services available from CRDIWS, and should not be construed as either approval or rejection of the proposed zoning amendment application.

IWSS-1714139953-4716

These conditions are valid for 180 days from date of writing. However, if at any time there is a change in legislation, regulations or CRD Bylaws, which would cause any of the above conditions to be non-conforming, then the CRD reserves the right to revise any or all of the conditions accordingly, at any time during the 180 day period.

Yours truly,

Joseph Marr, P.Eng.
Manager, Water Distribution Engineering and Planning
Infrastructure Engineering
Integrated Water Services

Jm:eu

cc: Ian Jesney, Senior Manager, Infrastructure Engineering

IWSS-1714139953-4716

From:	Jonathan Reimer
To:	Wendy Miller
Cc:	Chris Vrabel; wtoulmin@telus.net; Iain Lawrence; Shawn Carby
Subject:	RE: Comprehensive Community Development Plan Amendment Application RZ000276 - Referral (Marina/Crown Lease - Port Renfrew)
Date:	Friday, March 25, 2022 9:26:32 AM

Protective Services recommends that rezoning bylaw be held at third reading until a Fire Service Area amendment process is substantially complete, as verified by Manager, Electoral Area Fire and Emergency Programs. This Fire Service Area amendment process will evaluate code compliance, infrastructure improvements, and fire department capacity.

Jonathan Reimer
Manager, Electoral Area Fire and Emergency Programs
Protective Services | Capital Regional District
625 Fisgard St, Victoria BC V8W 2S6
T: 250-360-3137 | C: 250-415-1695

For emergencies, contact the CRD Duty Officer at 250-360-3223 or eocreports@crd.bc.ca

From: Wendy Miller
Sent: Wednesday, February 16, 2022 2:49 PM
To: Jonathan Reimer <jreimer@crd.bc.ca>
Cc: Chris Vrabel <CVrabel@crd.bc.ca>; wtoulmin@telus.net
Subject: Comprehensive Community Development Plan Amendment Application RZ000276 - Referral (Marina/Crown Lease - Port Renfrew)

Good Afternoon,

At its meeting of February 15, 2022, the Juan de Fuca Land Use Committee (LUC) directed referral of proposed Bylaw No. 4473.

Proposed Bylaw No. 4473 would rezone the subject property in Port Renfrew from the Marine (M) zone to a new Commercial Marine (CM-1) zone for the purpose of permitting a commercial marina, community use services, food service establishments and retail establishments.

I attach the staff report considered by the LUC at its February meeting.

Referral comments are summarized in the staff report to the LUC; the actual comments received are inserted verbatim into the staff report as an appendix.

Comment is requested by March 17, 2022.

Thank you,

Wendy Miller
Administrative Clerk | JDF Community Planning | **250.642.8100**
JDF Local Area Services Building | Capital Regional District
3 – 7450 Butler Road, Sooke, BC V9Z 1N1

From: FPP.PAC.Enquiries / Renseignements.PPP.PAC (DFO/MPO)
To: Wendy Miller
Subject: FFHPP Response: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew)
Date: Wednesday, February 16, 2022 3:58:49 PM

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Hi Wendy,

Thank you for contacting the Fish and Fish Habitat Protection Program (the Program) of Fisheries and Oceans Canada (DFO) regarding the above headlined Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew).

The conservation and protection of Canada's marine and freshwater resources is a top priority for Fisheries and Oceans Canada (DFO). DFO's Fish and Fish Habitat Protection Program (FFHPP) helps conserve and protect fish and fish habitat and restore fish habitat for future generations. The FFHPP administers and ensures compliance for development projects taking place in and around fish habitat, under the *Fisheries Act* and relevant provisions of the *Species at Risk Act*.

DFO's FFHPP is not providing detailed comments on the Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew). However, DFO recommends that land use planning processes consider establishing clear environmental conservation and protection objectives that are reflected in designation of environmentally sensitive areas, setback requirements, stormwater retention/detention requirements, land use restrictions and bylaws (e.g., tree removal). Protection of freshwater and marine resources provides long-term benefits to fish and fish habitat, as well as to the public, by regulating water quality and quantity, providing for stream channel and foreshore stability, and increasing resiliency to climate change impacts.

If you have any further questions about DFO's role in municipal planning processes, please feel free to direct future enquiries to EnquiriesPacific@DFO-mpo.gc.ca.

I hope that the information I have provided is helpful and thank you for the opportunity to provide input.

Kindly,

Stephen Tessovitch (he/him)
Referrals and Client Services Coordinator
Regional Coordination
Fish & Fish Habitat Protection Program
Ecosystems Management Branch
Fisheries and Oceans Canada....><((((º>º
E-mail: *Xpac.EnquiriesPacific@dfo-mpo.gc.ca*

From: Wendy Miller <wmiller@crd.bc.ca>
Sent: Wednesday, February 16, 2022 2:58 PM
To: PAC FPP / PPP PAC (DFO/MPO) <DFO.PACFPP-PPPPAC.MPO@dfo-mpo.gc.ca>
Subject: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD

From:	Cooper, Diana FLNR:EX
To:	Wendy Miller
Subject:	RE: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew)
Date:	Thursday, March 10, 2022 8:20:14 AM
Attachments:	image002.png image003.png

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Hello Wendy,

Thank you for your referral regarding Proposed Bylaw No. 4473, which would rezone Blocks D and E, District Lots 751 and 911, Renfrew District Plan EPC2056 (Crown Lease #927321) in Port Renfrew from the Marine (M) zone to a new Commercial Marine (CM-1) zone for the purpose of permitting a commercial marina, community use services, food service establishments and retail establishments. Please review the screenshot of the area below (outlined in yellow) and notify me immediately if it does not represent the area listed in your information request.

Results of Provincial Archaeological Inventory Search

According to Provincial records, previously recorded archaeological site **DdSc-24** is located on the foreshore area (see screenshot below).

Given the subsurface nature of most archaeological deposits, boundaries of archaeological sites are difficult to determine without subsurface testing. Therefore, any mapped boundaries are approximate, and it is possible that the site is more or less extensive than currently mapped.

The waterfront/water location of the area proposed for rezoning also increases the potential for unknown/unrecorded archaeological deposits to exist in this area.

Archaeology Branch Advice

DdSc-24 is recorded as a cave burial. The site is protected under the *Heritage Conservation Act* (HCA) and must not be damaged or altered without a Provincial heritage permit issued by the Archaeology Branch.

If land-altering activities are planned in the vicinity of the protected archaeological site (red area shown in the screenshot below), a Provincial heritage permit is required. Permit applications are available on the Archaeology Branch website. Completing a permit application usually requires archaeological expertise, and an archaeological impact assessment (AIA) may be required before a permit can be issued. Most applicants will therefore engage an eligible consulting archaeologist to review proposed activities, verify archaeological records, and work with the Archaeology Branch on the applicant's behalf to identify permit requirements, prepare permit application(s), and conduct any required archaeological study.

If land-altering activities are planned outside of the archaeological site (red area shown in the

screenshot below), a Provincial heritage permit may not be required prior to commencement of those activities. However, there is high potential for other unidentified archaeological sites to exist within the proposed development area, and a Provincial heritage permit will be required if archaeological deposits are exposed and/or impacted during land-altering activities.

Unpermitted damage or alteration of a protected archaeological site is a contravention of the HCA and requires that land-altering activities be halted until the contravention has been investigated and permit requirements have been established. This can result in significant project delays.

Therefore, the Archaeology Branch strongly recommends engaging an eligible consulting archaeologist prior to any land-altering activities. The archaeologist will review the proposed activities, verify archaeological records, and possibly conduct a walk-over and/or an archaeological impact assessment (AIA) of the project area to determine whether the proposed activities are likely to damage or alter any unrecorded portions of the protected archaeological site, or other unidentified archaeological deposits.

Please notify all individuals involved in land-altering activities (e.g., owners, developers, equipment operators) that if archaeological material is encountered during development, they **must stop all activities immediately** and contact the Archaeology Branch for direction at 250-953-3334.

If there are no plans for land altering activities on the property, no action is required at this time.

Rationale and Supplemental Information

- A protected archaeological site is located within the proposed development area, and there is high potential for previously unidentified portions of the site or for other unknown/unrecorded archaeological deposits to extend to other parts of the development area.
- Archaeological sites are protected under the *Heritage Conservation Act* and must not be damaged or altered without a Provincial heritage permit issued by the Archaeology Branch. This protection applies even when archaeological sites are previously unidentified or disturbed.
- If a permit is required, be advised that the permit application and issuance process takes approximately 8-12 weeks; the permit application process includes referral to First Nations and subsequent engagement.
- The Archaeology Branch must consider numerous factors (e.g., proposed activities and potential impacts to the archaeological site[s]) when determining whether to issue a permit and under what terms and conditions.
- The Archaeology Branch has the authority to require a person to obtain an archaeological impact assessment, at the person's expense, in certain circumstances, as set out in the *Heritage Conservation Act*.
- Occupying an existing dwelling or building without any land alteration does not require a Provincial heritage permit.

How to Find an Eligible Consulting Archaeologist

An eligible consulting archaeologist is one who can hold a Provincial heritage permit to conduct archaeological studies. To verify an archaeologist's eligibility, ask an archaeologist if he or she can hold a permit in your area, or contact the Archaeology Branch (250-953-3334) to verify an archaeologist's eligibility. Consulting archaeologists are listed on the BC Association of Professional

Archaeologists website (www.bcapa.ca) and in local directories.

Questions?

For questions about the archaeological permitting and assessment process, please contact the Archaeology Branch at 250-953-3334 or archaeology@gov.bc.ca .

For more general information, visit the Archaeology Branch website at www.gov.bc.ca/archaeology.

Kind regards,

Diana

Please note that subject lot boundaries (yellow) and archaeological site boundaries (red) indicated on the enclosed screenshot are based on information obtained by the Archaeology Branch on the date of this communication and may be subject to error or change. Archaeological site boundaries may not be identical to actual site extent.

Diana Cooper
Archaeologist/Archaeological Information Administrator
Archaeology Branch|Minsstry of Forests, Lands, Natural Resource Operations and Rural Development
Phone: (250) 953-3343|Email: diana.cooper@gov.bc.ca |Website www.gov.bc.ca/archaeology

---

From: Wendy Miller <wmiller@crd.bc.ca>
Sent: February 16, 2022 2:38 PM
To: Roden, Jacqueline FLNR:EX <Jacqueline.Roden@gov.bc.ca>; Arch Data Request FLNR:EX <ArchDataRequest@gov.bc.ca>; Harvey, Mark FLNR:EX <Mark.Harvey@gov.bc.ca>; South Island District Office, Forests FLNR:EX <Forests.SouthIslandDistrictOffice@gov.bc.ca>
Subject: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew)

[EXTERNAL] This email came from an external source. Only open attachments or links that you are expecting from a known sender.

Good Afternoon,

Please find attached a referral form and staff report with proposed Bylaw No. 4473 for zoning amendment application RZ000276.

Proposed Bylaw No. 4473 would rezone the subject property in Port Renfrew from the Marine (M) zone to a new Commercial Marine (CM-1) zone for the purpose of permitting a commercial marina, community use services, food service establishments and retail establishments.

As noted in the staff report, we are requesting comment from:

FLNRORD – Arch Branch
FLNRORD – Crown Lands
FLNRORD – Rural Development
MOE - Environmental Protection and Sustainability

Comment is requested by March 17, 2022,

RESPONSE SUMMARY – REZONING APPLICATION RZ000276

X Interest Affected by Proposal for Reasons Outlined Below

___ Interest Unaffected by Proposal

Comments:

The affect is positive in nature. The rezoning will align with the Provinces issuance of the lease for Commercial A Marina (Land File 0122104, Disposition Transaction ID 927321). No Further Comments.

Jesse Hopps Digitally signed by Jesse Hopps Date: 2022.03.10 11:14:33 -08'00'

Signed

Sr. Authorization Specialist
Title

Date

FLNR - Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Agency

Our file: 2022-01135
Your file: RZ000276
Date: March 3, 2022

BRITISH COLUMBIA | Ministry of Transportation and Infrastructure

Juan de Fuca Planning
3-7450 Butler Road
Sooke, BC V9Z 1N1

Attn: Ian Lawrence, Manager

The Ministry of Transportation and Infrastructure has received and reviewed your referral of February 16, 2022, to rezone the subject property (Blocks D and E, District Lots 751 and 911, Renfrew District, Plan EPC2056 (Crown Lease #927321)) from Marine (M) to a new Commercial Marina (CM-1) zone in order to permit a commercial marina, community use services, food service establishments and retail establishments. The property does not fall within Section 52 of the Transportation Act and will not require Ministry of Transportation and Infrastructure formal approval.

The Ministry has the following comments at this time:

1. As per Section 62 of the Transportation Act, the applicant is required to apply to the Ministry of Transportation and Infrastructure for a 'Commercial Access' permit.

   Permits can be applied for online here:
   https://www2.gov.bc.ca/gov/content/transportation/funding-engagement-permits/permits

Thank you for the opportunity to comment. If you or the proponent has any questions, please contact Jennifer Dyer at 778-576-1109.

Sincerely,

Jennifer Dyer
Development Services Officer
Vancouver Island District – Saanich

Ministry of Transportation and Infrastructure
Vancouver Island District
Mailing Address:
District Office Address:
2100 Labieux Road
Nanaimo, BC V1J 6M7
Area Office Locations:
4460 Chatterton Way
Saanich, BC V8X 5J2

From: Shaw, Kevin
To: Wendy Miller
Subject: RE: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew)
Date: Wednesday, February 16, 2022 6:21:08 PM

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Hi Wendy.
The RCMP has no position on this application.

Kevin.

Sent from my Bell Samsung device over Canada's largest network.

-------- Original message --------
From: Wendy Miller <wmiller@crd.bc.ca>
Date: 2022-02-16 3:46 p.m. (GMT-08:00)
To: "Shaw, Kevin" <Kevin.R.Shaw@rcmp-grc.gc.ca>
Subject: FW: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew)

Hello,

I forward at Brett Sinden's request.

Thank you,

Wendy

From: Wendy Miller
Sent: Wednesday, February 16, 2022 2:32 PM
To: 'brett.sinden@rcmp-grc.gc.ca' <brett.sinden@rcmp-grc.gc.ca>
Subject: Comprehensive Community Development Plan Amendment Application RZ000276 - CRD Referral (Marina/Crown Lease - Port Renfrew)

Good Afternoon,

Please find attached a referral form and staff report with proposed Bylaw No. 4473 for zoning amendment application RZ000276.

Proposed Bylaw No. 4473 would rezone the subject property in Port Renfrew from the Marine (M) zone to a new Commercial Marine (CM-1) zone for the purpose of permitting a commercial marina, community use services, food service establishments and retail establishments.

Making a difference...together

Notes from a Public Information Meeting
Held March 7, 2022 at the Juan de Fuca Local Area Services Building
3 – 7450 Butler Road, Otter Point, BC

SUBJECT: **Comprehensive Community Development Plan Amendment Application for Blocks D and E, District Lots 751 and 911, Renfrew District, Plan EPC2056 (Crown Lease #927321)**

PRESENT: Director Mike Hicks
Staff: Iain Lawrence, Senior Manager, JdF Local Area Services (EP);
Wendy Miller, Recorder

EP – Electronic Participation

PUBLIC: Approximately 16 EP; 5 in-person

The meeting was called to order at 6:00 pm.

Director Hicks thanked everyone for coming and advised that public information meetings are normally overseen by staff and that he will be leaving this meeting at 6:30 pm to attend another meeting.

Director Hicks turned the meeting over to Iain Lawrence.

Iain Lawrence provided a Territorial Acknowledgment and advised that the Juan de Fuca Land Use Committee (LUC) directed referral of the application to a public information meeting at its meeting of February 15, 2022.

Iain Lawrence highlighted the subject property and advised that:
- the subject property was granted status as a Licence of Occupation area by the Province on February 25, 2016
- the Province has recently transferred the Licence of Occupation to a Crown Lease for the subject property
- as part of the environmental review during the Licence approval process, the original marina site was shifted to the west side of the existing breakwater

Iain Lawrence highlighted the marina site plan and outlined the uses permitted by Temporary Use Permit TP000008, which expires on July 24, 2022.

Iain Lawrence outlined Bylaw No. 4473, which would create the proposed new CM-1 zone, and advised that three submissions were received in response to the notice of public information meeting. The submissions include comments regarding temporary use building permits, public process, environmental impact, fire protection, water provision, and fuel storage. The submissions will be included in a staff report when the proposal is considered next by the LUC.

Iain Lawrence reported that:
- a building permit was issued for a picnic shelter
- the food truck has received a permit from Island Health
- a liquor license has been issued by the provincial Liquor and Cannabis Regulation Branch
- the marina is now located within the Port Renfrew water service area

- the applicant has applied to be included in the Port Renfrew fire protection service area
- the proposal has been referred to CRD Protective Services and to the Port Renfrew Fire Chief for review

Iain Lawrence confirmed that the application representatives were present.

Director Hicks stated:
- the applicant was required to provide a water tower prior to the property being included in the water service area
- the water tower has been provided and will add capacity to the fire protection area
- the marina area will be serviced by a hydrant

Iain Lawrence responded to a question from the public confirming that the CM-1 zone would permit Community Use Services as defined by Bylaw No. 3109. Iain Lawrence read aloud the definition. Proposals for community use services requested by the public would need to be directed to the property owner.

A representative responded to a question from the public advising that public facilities, such as washrooms, are open during business hours.

Sienna Hamilton, Port Renfrew, requested comment on the:
- environmental assessment referenced in the staff report for the proposal
- assessment's findings relative to San Juan River and sediment flow
- assessment's findings relative to eel grass

Iain Lawrence reported that the Province required the assessment in 2016 as part of its process of issuing the Licence of Occupation in an area of its jurisdiction.

A representative added that the assessment was required as part of the management plan submission to the Ministry of Forests, Lands and Natural Resource Operations and Rural Development. The management plan included an independent environmental impact assessment, as well as an archeological review. The management plan was referred out by the Province to various government bodies including the Department of Fisheries and Oceans.

Iain Lawrence stated that questions related to San Juan River and eel grass habitat should be directed to the Province as the authority that issued the Licence of Occupation.

Clayton Barbon, Port Renfrew, requested comment on sewage treatment.

The representatives stated that:
- sewage treatment is being considered on a different property located adjacent the marina site
- sewage treatment would add to the overall capacity for the community
- holding tanks are currently used to collect grey/black water in the interim
- water consumption has been reduced by not permitting showers although shower facilities exist at the marina
- the food service uses disposal items to further reduce water consumption

Iain Lawrence stated that a rezoning application has not been received the referenced adjacent property.

Janice Hiles, Port Renfrew:
- the temporary use permit permitted a picnic shelter and food truck
- food service/structures have exceeded the scale permitted by the temporary use permit
- Bylaw No. 4266 was adopted and establishes environmental protection areas
- questioned if Bylaw No. 4266 affects structures constructed before the adoption of Bylaw No. 4266
- existing structures include a fuel tank
- should the proposed zoning be approved, permanent status would be granted without sewer, water or fire protection

Iain Lawrence stated that:
- new structures for proposed permitted uses would require building permits, as would any changes to existing buildings and structures that have been altered beyond what was approved in a building permit
- sewerage would be addressed through the building permit process
- Bylaw No. 4266 would not affect structures constructed before the adoption of the bylaw
- Bylaw No. 4266 establishes a Shoreline Protection Development Permit Area and includes all land lying 15 m upland of the natural boundary of the ocean
- alteration/construction within that DPA can require environmental and/or geotechnical assessment
- the Province regulates fuel tanks

Director Hicks left the meeting at 6:30 pm.

The representatives stated that:
- the Province also has environmental protection requirements
- at the time of construction, existing structures met flood construction levels
- the fuel tank is double-walled to capture any potential leaks
- mitigating technology is in place to control fuel release from the tank

Iain Lawrence reported that the proposal will be considered next at a meeting of the LUC. To receive notice of that meeting, interest can be emailed to jdfinfo@crd.bc.ca. There is also opportunity to subscribe on the CRD website to receive notice of when an LUC agenda is posted to the web.

The meeting adjourned at 6:32 pm.

Public Information Meeting Notes
March 7, 2022 **4**

From: Lynne
To: Wendy Miller
Subject: RZ000276 Plan EPC2056 Port Renfrew comments and questions
Date: Friday, March 04, 2022 2:56:02 PM

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Onsite Parking
Restaurant : 1 stall for every 3 seats is required in our OCP. In addition parking for 60 boat slips, boat trailers, retail customers and staff is required. Where will these be located in the CM-1 zone proposed?

Water and Septic
Where is the VIHA approved septic system for the Marina located now and what upgrades are needed for additional buildings? In 2018 the system was for 3-5 years of development.
When will the Marina be required to legally hook up to PR water? Will water be "trucked" in until that is completed? Will PGM be paying a separate hook up fee for CM1 zone? How will the user fee be established with all these proposed additional services?

Public Access
Confirmation as agreed at the last public meeting in 2018 that a public trail/ path from Baird staircase to Lot 64 staircase remain open to public. The staircase off Baird has been closed and needs repairs.
Signage and adequate barrier is needed to restrict unauthorized motor vehicle access from PGM to frontage road in Lower Beach camp.

What plans are in place for additional refuse at our transfer station.

Who is responsible if there is contamination in the bay from the Marina, restaurant & bathrooms?

Will commitments made by PGM be upheld if the Marina is sold or changes names again?

Lynne Conlin

Janice Hiles

[redacted]

[redacted]

In regards to the Public information meeting for RZ000276, comprehensive community plan amendment Application.

I would first like to state that the Information in the newspaper states that the purpose of the meeting is to rezone, to permit a commercial marina. Mike Hicks has stated on line that the application is for the marina, restaurant and fuel supply only.

So let's first be clear neither of these statements is entirely true.

The rezone allows:

A) a commercial marina
B) community use services
C) food service establishments
D) retail establishments
E) Any buildings or structures accessory to any of the listed uses.

I would like to bring forward these inconsistencies before I begin.

I have many concerns with changing the temporary permit into a complete permanent rezone.

1) Currently this property has no fire coverage. Yet there exists on this proposed piece of property a large fuel storage tank and gas running along the docks to a fueling station. This proposal states that beyond the restaurant, retail establishments could be created and community services, it seems wrong that this can be encouraged when this property is not within the Port Renfrew fire District.
2) The area of this rezone is a flood risk and a tsunami risk. I would like to see the CRD emergency Managements response to this concern. Once again there is a large fuel tank in this risk zone.
3) There has been reference to a very outdated Marine protection area based on our very outdated Bylaw 3109(the OCP). No reference has been given to bylaw 4266 and the marine protection it brings in. This bylaw was adopted in September of 2019 I do not understand why the rezone does not have to abide by these new environmental regulations.
4) The marina area currently has only a temporary sewage removal system. You are proposing the possibility of more buildings and businesses but have supplied no permanent sewage disposal.
5) The access to this marina is very steep and has little or no barriers stopping someone from going into the ocean it seems wrong to expand uses before safe access is looked at.
6) Although this parcel has been accepted into the Port Renfrew water district I do not believe at this time that it is hooked up properly.

7) Although I see that expanded use of this property is proposed I do not see any allocation for housing for staff. As there is currently no available housing in Renfrew I question how staff would be available for the possible increased uses of this property.
8) Each time Port Renfrew expands more pressure is put on the one way bridges through town. I think MOTI needs to look at overall traffic.

I understand that there is pressure to push this rezone forward because the current Temporary Permit is running out.

I know that this restaurant that originally started as a food truck with a picnic table cover has expanded and expanded all while having only a temporary permit. It is a full scale licensed restaurant now. Just because over the last 12 years they have created and changed this property as they saw fit does not mean it has to be accepted as is. The concept of build it and beg forgiveness later is not necessarily what is best for this or any community.

In breaking out this portion of a rezone we are not looking at the overall impact the complete rezone will have on the community. We are not able to consider drainage, sewer, traffic congestion, road safety, and amenities to the community.

This rezone could leave us with property commercially zoned without proper services.

I understand the breakwater and docks were created with permits I do not believe the restaurant was.

I think it is incorrect to push this rezone through as a separate rezone from the complete package.

Janice Hiles

March 4th 2022

PPSS-35010459-2684

Public Information Meeting Notes
March 7, 2022 7

From: [redacted]
To: Wendy Miller
Cc: [redacted]
Subject: Pacific gateway marina re-zoning application meeting
Date: Monday, March 07, 2022 3:37:46 AM

CAUTION: This Email is from an EXTERNAL source. Ensure you trust this sender before clicking on any links or attachments.

Good evening
To JDF director Mike hicks
Wendy Miller JDF recording secretary
Jeff Jones patchedaht First Nations chief

First off my apologies as I cannot attend this meeting in person or by teleconference as I'm a shift worker and my work Schedualer put me on nightshifts this week.

Please ensure this email is presented and read in it's entirety to the rezoning application meeting members March 07/ 2022

1.1 opening
I'd like to open this letter by stating the following information is not only mine but a group of Port Renfrew residents whom have tasked me to ask questions on their behalf
As you may or may not be aware that in recent days several residents are " peeling back the onion skin" on the Bylaws within the JDF electoral district and information pertaining to port renfrew with a fine tooth comb, and the abundance of bylaw amendment and development applications, so to say and exposing more and more questions as they decipher the multitude of Bylaws and amendments meeting minutes new and old it's is not clearly placed within a single Port Renfrew port folio on the CRD meeting minutes web site. I have to agree, as some documents are placed in the general CRD folder, land use committee folders, Bylaw folders, port renfrew utilities, so on and so forth, it's very difficult to keep track and that's where items of importance are buried, not user friendly

2.1
Another item of importance is the lack of local community meetings, yes covid has put a snarl in the way we meet, but if you can go grocery shopping within any store utilizing covid regulations you can come to port renfrew and have a meetings with local residents.

So this item just popped into my email box was another very important question needs addressing at this meeting it's
Bylaw 4266 - this Bylaw is to basically support and put some serious teeth into the environment and development within the Port Renfrew it is to put some teeth into protecting shoreline areas within the marine protection designation area, riparian areas, and sensitive eco systems, stream and creek identification and protection, etc, etc
This Bylaw 4266 was to be implicated into our Bylaw 3109 port renfrew community plan.
However this reading and adoption of the Bylaw has somehow been put on the back burner and stove ignored since May of 2019.
It's is pertinent that before any further development permits are issued or pending permits are in place the original date of May 29, 2019 be adopted as the starting point for adoption of Bylaw 4266

3.1 the beginning
So let's begin as to why this information for the re zoning of the Gateway Marina from temporary permit TP000008 to commercial marina is being stated and answers required by residents of Port Renfrew

Port Renfrew has a Bylaw 3109 or the official community plan. An Official Community Plan is a statement of objectives and policies to guide decisions on planning and land use management, within the area of the plan, respecting the purposes of local government And to involve community input on decision making when it comes to

development

The official community plan was drafted an adoption in only one year, starting in 2003 and comes to adoption in 2004.

To say the least the official community plan is outdated, needs immediate attention and upgrading to reflect the enormous amounts of development ongoing in the plan area.

4.1
So Let's begin:
We will seek questions and requests answers on both Temporary Permits TP000008
2016 -February 25
2019 - July 10

We are talking about District lot 751, 911, plan EPC2056,

5.1
The first TP000008 was issued in February of 2016, that permit basically laid out the playing field and goal posts for the applicant to construct a marina to meet community needs, however the zoning at the time designated it as Marine 1, meaning under our 3109 official community plan - no log sort or booming grounds permits, all other uses were silent as stated in the first TP0000008 application
Within the language of the first TP000008 it also referenced various sections of the Local Government Act 492,493,495,496,497 this essentially takes our official community plan 3109 under temporary use permits the the strict regulations within and relaxes those regulations to allow development in an open forum to be freely developed by applicants to a degree

6.1
However there is two items within the first TP000008 that are binding
The first is
3-(g) in default of compliance with any of the provisions within this permit, the permit shall lapse.
The second is
7. This Permit is NOT a building permit

The applicant provided 3 maps, an over view, an closer view, a map with specific small buildings, offices and restrooms, fish processing, food services location and dock facilities

This application for a temporary use permit was approved by the land use committee and the developer got started construction

7.1
However this allowed the fox into the hen house so to say, the applicant was to begin construction of buildings not applicable or permitted in the first TP 000008 issued immediately blasting, backfilling and construction began from a simple 4 post gazebo to the enormous structure as we see it in place today
The applicant had free rein no permits or inspection from the JDF land use committee

For 3 years this grew into an enormous marine area with a large gazebo structure, washroom facilities, offices fish cleaning, food services
It became a thriving business, charter fisherman are abundant in this marina however it was in violation of its zoning regulations as it was to be no more than a private marina under current zoning. Yet it was largely ignored by those who knew of its prior zoning which was private marina and subsequently grew and expanded into what it is today

8.1
The second TP 000008 was issued in July of 2019, as the applicant failed to meet re-zoning requirements and was subject to closure so a second TP 0000008 was granted by the Land use committee

However this is we're it gets interesting as pointed out to me, by a concerned resident
The language and subsections and information within differ greatly from the original TP 00008 application from

2016, to 2019 temporary use applications

9.1
Item 3 (e) stands out first as a new addition
It reads:
3(e) that the mobile food services be operated in accordance to island health requirements for food services facilities, including permits to operate a water system.
Also
3(f) no additional structures or modifications to structures to be constructed on the said lands for use under this permit until such a time as authorized by bylaw.

3-(I) in default of compliance with any provisions of this permit, the permit shall lapse.

7. This permit is NOT a building permit

10.1
So for an over view of where this is going let's review the first TP000008 - 2016,
The applicant shows maps of basic buildings, etc
This permit is the foundation and the playing field with goal posts permanently engraved in stone

11.1
The second extension (2019) TP000008 also too has similar maps, however in the second application the first map clearly shows a large structure which is in non compliance with the original TP 2016, application, the fourth map is the same map as in the first application however there is no reference to specific structures as those structures were never intended to be constructed.

This in short has created great community animosity towards the applicant, the JDF land use board and area directors who sat back blindly and permitted construction of something completely different than in the original application TP 000008 - 2016

This is in reference to item
3.(I) in default of compliance with any provisions of this permit, the permit will lapse.

12.1 other structures
There are other multitude of other structures built within the 2019 application such as offices, retail and a washroom facility with wheelchair access,

These other structures clearly violate item
3(f) that no additional structures or modifications to structures be constructed on the lands for use under this permit, until such a time as authorized under bylaw.

The JDF land use committee knew full well that additional structures were constructed or modified within the 2019 TP extension application and sat back and let the applicant continue business as usual with enacting item:
3(I) in default of compliance with any provisions of this permit, the permit shall lapse
This is another non compliance item

13.1 washroom facilities
Which brings us to the establishment of wash room facilities

Currently onsite is a separate male and female washrooms, these are functional washrooms supplied by water (water from where?) and the waste is discharged into what?
Septic system?
Community sewer?
Holding tank?

It is being asked by community members to Please point out as to which bylaw meeting approved such facilities?
This existing facility is not mentioned in either the 2016, or 2019 TP000008 application or approved in either,

Therefore it is non conforming with the permit. An falls under item
3(f) no additional structures to be constructed or modified to existing structures
3(I) if default of compliance of the permit, the permit shall lapse

This is another non compliance item

14.1
Bylaw 4442 - expansion of the port renfrew water services area - amendments to bylaw 1747
Furthermore and this is a big item and is very suspect on how it was adopted and carried without any public consultation or amendments to the official port renfrew community bylaw plan 3901

Bylaw 4442- adopted as recently as December 08/ 2021.

How this bylaw came to be:
Documents CRD district board meeting July 14 / 2021 -page 07 - subsection 8.2 - 21.535

"In July 14/2021 the CRD district board meeting" Bylaw 4442 was slipped through without proper consultation or discussion the area JDF Director, moved bylaw 4442, and presented it three times, it was seconded by alternative area director, it was unanimously passed and referred to the the JDF director for approval
Bylaw 4442 was adopted December 8 2021 and presented to the applicant (gateway marina) to officially join the newly extended Port Renfrew water supply local services area

The above mentioned information and documentation can be found in CRD district board minutes from July 14, 2021, subsection 8.2, it can be best described as a questionable deal to specifically benefit the advancement of the applicant and the pending rezoning application as we see it, and will benefit other area developers and that my friends as described by another port renfrew resident is a bunch of bullshit, and now this has come to light, many port renfrew residents felt injustice has occurred by our area director within this application
No community consultation, discussion, feedback or a Bylaw amendments included

This Bylaw must be repealed immediately and JDF area director be tasked to why the area director personally moved the bylaw 4442 for a first, second and third readings all at one time, was seconded by another alternate director and was was pushed through in alternate channels rather than proper process.
Then this bylaw was sent to the JDF area director for approval then was presented into this application for rezoning under subsection background information
Pretty questionable ethics

15.1 Pacific gateway marina: water services

Which brings us to water services to the pacific gateway location:

For years and years there has been a unlawful water connection to the port renfrew water services area. This connection is located at the end of Baird road, and services the gateway marina from the only cabin at the end of that road, for years the owner of that cabin has been providing free unmetered water which over the course of inception totals millions of gallons of community water, this is a well known item of contention within the community of port renfrew.
This unlawful water connection has never been mentioned in either the 2016, or 2019 TP 0000008 applications.
So again
2016 TP000008 is a non compliance

Only recently as December 8 2021 bylaw 4442 adopted to coverup the past unlawful water connection issues with the pacific gateway application

This is again referred to
2016 -TP application
3(g) in default of compliance with any provisions with this permit, the permit shall lapse
2019 - TP application
3(I) in default of any compliance with any provisions of this permit, the permit shall lapse

Again a serious non compliance issue with the unlawful supply of water to the pacific gateway marina

16.1 marine protection area
Let's shift focus onto the marine protection area of the official community plan bylaw 3109 port renfrew
4.2 marine protection area
A marine protection area is established 300 meters out into the San Juan harbor in all directions
The only provision currently prohibited is
4.2.1 there shall be no log booms permit to operate in this area

This is the only non permit activity, all other activities are permitted
There is no teeth in this part of the official community plan bylaw 3109

With no teeth or accountability, the applicant applied to the ministry of lands air and water to construction of a break water in water lot 751, that was approved, however significant in filling of the bay by blast rock of the old road leading from little beach to the marina occurred, this was a non compliant item and is outside of the applicants application area.

17.1 Environmental concerns:
It is without a doubt that the creating of the breakwater as it it today has altered the marine habitat in the little beach area by preventing the historic tidal flushing, what once not long ago a area in abundance of elk grasses, is now a barren mud flat devoid of most marine life,
Photographs of within TP0000008 application in 2019 show an over view of the breakwater and the bottom of the little Bay Area, only three years later the photograph on the port renfrew Facebook page provided by JDF director clearly shows in only 3 years the significance of infilling of sands and mud
Irreparable harm to the marine ecosystem.

That is why it is essential to adopt immediately Bylaw 4266 -2019 Marine Protection as an amendments to Bylaw 3109 port renfrew official community plan. This would have given teeth to a non compliance with future development permits.

18.1
Patchedaht First Nations:
There are identifying burial caves and significant archaeological sites within the applicants plan area, damage has occurred to some locations,
Theses sites are not mentioned in either the 2016 or the 2019 TP00000008 application for development permits,
They are a separate issue and are being discussed with the First Nations outside of this application
The applicant continued blasting after the fact of identifying theses archeological sites.

19.1 Finally in closing:

If an individual or applicant can simply skirt around Bylaw 3109 the official community plan and sections within the Temporary Use Permits both 2016, 2019 by utilizing the local government act subsections 492,493,495,496,497 without and ignore for the past 6 years the language within those permits creating non compliance in several sections, should the applicant be allowed to proceed with further applications? Should the applicant be permitted to receive the Rezoning as the applicant seeks?

Should the applicant be allowed to proceed when knowing full well the the buildings constructed today are not that of the original acceptance development temporary use plan 2016 ?
Did the JDF land use committee followup with inspections on construction of those buildings?
Should the applicant be allowed to continue to be non compliance with those current structures?

Should the JDF land use committee and area director and members allow the application to progress knowing full well there is non compliance in several areas within both temporary use permits,

Should the JDF land use committee permit the applicant to bylaw 4442 - port renfrew water supply local services which was adopted without consultation with committees and approved fast tracked to appease the applicant and to burry the knowledge of the unauthorized water connection that has served gateway marina for over six years,

knowing full well this is in contravention creating non compliance?
Should the applicant be permitted to proceed based upon non compliance?

Should the applicant be permitted to have washrooms onsite knowing full well that there is non compliance with new construction TO000008 -2019 septic field, holding tank, community sewer,? were permits approved, did the applicant make amendments to the TP0000008 - 2016 or 2019 for these existing washrooms?
Should the applicant be permitted to proceed based upon non compliance?

20.1
final thoughts
my personal thought is this;
This application for rezoning the gateway marina should be paused.
Why
I'll tell you why, there are significant non compliance issues when dealing with each individual situation.
First off

1. Unauthorized water connection from the cabin at the end of Baird road to the pacific gateway marina, this connection has been known by all parties including community members and is a contentious point to local residents whom pay for their water quarterly and a marina would use significant more water but who pays? Been going on since the inception of the marina and only just recently a greasy bylaw 4442 - acceptance into port renfrew water system local services was adopted without proper procedures, communication of bylaw amendments.

2. Construction of unauthorized buildings, these buildings as we see today are completely different than those that were presented in the 2016 temporary use permit TP0000008 map #3 and what is onsite today, apples to oranges difference.
Was there consultation, permits, JDF land use committee inspections ?

3. Washrooms facilities
The original washrooms were porta potties, this was because there was no water connection for washrooms.
The current washroom structure is significant and is not mentioned in either the 2016 or the 2019 temporary use permit applications, therefore is non compliant

4. Marine protection area
Within bylaw 3019 official community plan
There is a small subsection for marine protection area, the only non use not permitted is the booming if logs
This subsection on marine protection is wide open for interpretation and must be closed up by adopting Bylaw 4266 which will permit a 15 meter wide (from the high tide line and foreshore topography) a buffer strip preventing further damage not only the marine environment but sensitive ecosystems, area streams snd creeks
This bylaw has been put on the back burner since 2019 and needs to re-enacted and adopted into bylaw 3109 the official community plan

21.1
So a final thought

Did or has non compliance occur?
And is the JDF land use committee going to stand behind their written and documented compliance regulations within both the 2016 and 2019 temporary use permits as presented TP0000008
Quote
"In default of compliance with any of the provisions within this permit, the permit will lapse
Quote
That no additional structures or modifications to existing structures be constructed on the lands for a use under this permit until such a time as authorized by bylaw
Quote
This permit is NOT a building permit

So were building permits obtained for the structures as we see them today, was their inspections by JDF staff?
Meeting and bylaw amendments or variance as to the scope of the buildings as we see today?

So with everything presented in this email will it be presented as a whole, not have sections edited, blacked out or removed as to not to include the reader in all subsections.

Will the JDF land use committee and area director of the JDF electoral area stand by their bylaws?

I guess we wait and see if they JDF land use committee stand by their bylaws and language within the temporary use permits or bow to the applicant and the application and the implications of knowing full well the deficiencies as described above are not to be dealt with and the rezoning application is permitted to proceed

The residents of Port Renfrew patiently wait and see

Sincerely
I'm just the messenger

Scott Phillips
Port Renfrew resident and spokesperson for others who contributed to these questions that need to be addressed as a whole

Making a difference...together

RWSC 22-10

REPORT TO REGIONAL WATER SUPPLY COMMISSION
MEETING OF WEDNESDAY, JULY 20, 2022

SUBJECT **Bylaw No. 4509, "Capital Regional District Greater Victoria Water Supply Area Protection Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022"**

ISSUE SUMMARY

To amend Capital Regional District (CRD) Bylaw 2804, "Capital Regional District Greater Victoria Water Supply Area Protection Bylaw No. 1, 2000", to include a $500 administration fee for recreational access requests in the Leech Water Supply Area (WSA); and to update the Bylaw's Schedule A map to add the new Grant Lake land parcel and remove the Integrated Water Services (IWS) gravel pit land parcel.

BACKGROUND

At its meeting of June 15, 2022, the Regional Water Supply Commission (Commission) resolved: "That staff initiate a $500 administration fee for access to the Leech watershed" in response to a staff report on options for Greater Victoria Water Supply Area (GVWSA) recreational permit issuance and cost recovery.

Given direction to amend the Bylaw, staff propose to also update the Bylaw's Schedule A map to bring the 2022 purchased land parcel near Grant Lake under the authority of the Bylaw and to remove the IWS gravel pit land parcel which is currently this disposition process. The Grant Lake parcel falls within the Cowichan Valley Regional District, thus the CRD Bylaw will not have authority until the regional district boundaries are changed; however it avoids another amendment to the bylaw for this purpose at a later date.

ALTERNATIVES

Alternative 1
The Regional Water Supply Commission recommends to the Capital Regional District Board:

1. That Bylaw No. 4509, "Capital Regional District Greater Victoria Water Supply Area Protection Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022", be introduced and read a first, second, and a third time.

2. That Bylaw No. 4509 be adopted.

Alternative 2
That the report be referred back to staff for additional information.

IMPLICATIONS

Governance
The current bylaw has been updated only once previously in 2016 to bring the Leech WSA under bylaw protection and to accommodate agreements with First Nations and special uses in the Leech WSA. At that time, the bylaw was updated in many sections, the Schedule A map updated,

and fines increased in CRD Ticket Authorization Bylaw No. 1857.

The addition of an administrative fee for special recreational use under the GVWSA Protection Bylaw and an update of the Schedule A map to add and remove lands are considered minor changes to the Bylaw.

The GVWSA Protection Bylaw does not currently have a schedule of fees, and it is appropriate to include the new administrative fee within the bylaw itself, which already includes a $500 refundable security deposit fee. The $500 administrative fee itself is higher than typically charged for user services within the CRD. However, it is not the mandate of the Regional Water Supply Service or the mandated use of the WSA lands to provide for recreational opportunities, which supports the higher fee more in line with cost recovery for staff effort.

First Nations Implications
The bylaw amendment does not affect any access and uses of the lands by First Nations. The definition of "recreational purpose" inserted into Bylaw No. 2804 does not include traditional or cultural uses.

CONCLUSION

Bylaw No. 4509 amends "Greater Victoria Water Supply Area Regulation Bylaw No. 1, 2000" to add a $500 administrative fee for recreational access in the Leech Water Supply Area and updates the Bylaw's Schedule A map to reflect lands the Bylaw applies to.

RECOMMENDATION

The Regional Water Supply Commission recommends to the Capital Regional District Board:

1. That Bylaw No. 4509, "Capital Regional District Greater Victoria Water Supply Area Protection Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022", be introduced and read a first, second, and a third time.

2. That Bylaw No. 4509 be adopted.

Submitted by:	Annette Constabel, MSc., RPF., Senior Manager, Watershed Protection
Concurrence:	Steven N. Carey, BSc., JD, Senior Manager, Legal Services & Risk Management
Concurrence:	Ted Robbins, BSc., CTech., General Manager, Integrated Water Services
Concurrence:	Kristen Morley, JD, General Manager, Corporate Services & Corporate Officer
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Bylaw 4509, "Greater Victoria Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022" (Including Schedule A, GVWSA Map)
Appendix B: Bylaw 2804, "Greater Victoria Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022" unofficial redline showing changes.

Appendix A

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4509

****

A BYLAW TO AMEND BYLAW 2804, "CAPITAL REGIONAL DISTRICT WATER SUPPLY AREA REGULATIONS BYLAW NO. 1, 2000"

****

WHEREAS:

A. Under Bylaw No. 2804, "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000", the Regional Board set out regulations and fees applicable to the regional service's water supply area, including prohibiting general public access;

B. The Board wishes to amend Bylaw No. 2804 to institute a fee and process for recreational access requests;

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

1. Bylaw No. 2804, "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000" is amended as follows:

   a. By adding the following new definition in section 1 in correct alphabetical sequence:

      "recreational purpose" means access for the primary purpose of recreation (leisure and sport) by an organized club or association, not including traditional or cultural use access;"

   b. By amending the definition of "water supply area" in section 1 by replacing the words "Canada Trail" with "Great Trail";

   c. In Section 40:

      i. By adding subsection number "(1)" to the text in Section 40;

      ii. By adding subsection number "(2)" after subsection number "(1)" and inserting the following as Section 40(2):

         "(2) In determining approval of access and special use in 40 (1), the RWSC will consider whether the access and special use poses acceptable risk to water quality, water supply infrastructure, watershed management, and secondary natural land values (e.g. biodiversity, wildlife habitat)"

   d. After section 47 and before section 48, by inserting the heading "FEES".

   e. In Section 48:

      i. By adding subsection "(1)" to the text in Section 48.

      ii. By adding subsection number "(2)" after subsection number "(1)" and inserting the following:

         "(2) Where an applicant applies for a permit for access to the Leech Water Supply area for recreational purpose, the applicant must pay a non-refundable administration fee of $500.00."

f. By deleting the “Schedule A” map in its entirety and replacing it with the “Schedule A” map attached hereto and forming part of this bylaw.

2. This bylaw may be cited as "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000, Amendment Bylaw No. 2, 2022”.

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

APPENDIX A

Making a difference...together

Greater Victoria Water Supply Area

CRD BYLAW 2804

Schedule "A"

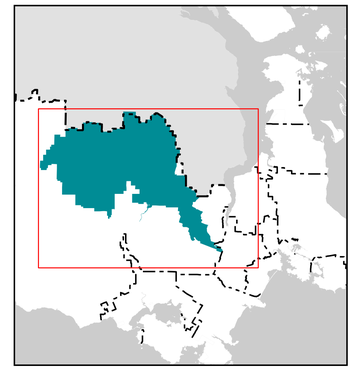
SCALE 1: 35 000

0 0.5 1 2 3 Kilometres

DISCLAIMER

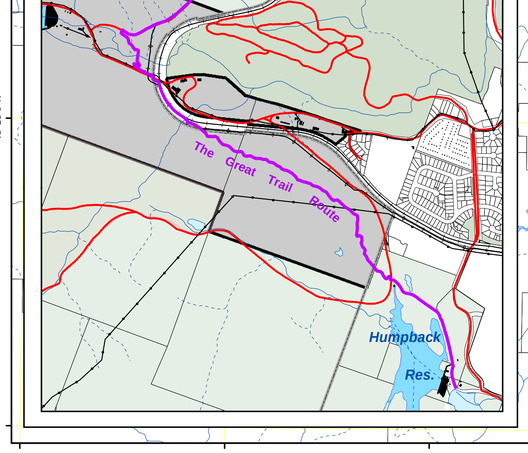
Important This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. **This map is not for navigation.** The CRD **will not be liable** 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.

gis@crd.bc.ca | ScheduleAUpdateGVWSA.mxd



Water Supply Area
Leech Water Supply Area
River/ Stream
Natural Gas Pipeline
Electric Transmission Line
Regional District Boundary
Municipal Boundary
Grid (Latitude/ Longitude)
Road
Railway
Provincial Park
Regional Park
Cadastral Fabric
Lake/ Reservoir
Ocean

Inset 1 Trans-Canada Trail Route Through GVWSA (1:14 000)



APPROXIMATE MEAN DECLINATION FOR THE CRD WATER SUPPLY AREA IN 2022

Rounded to the closest half degree

True North

Grid North 0° 30'

16°00'

Magnetic North

123°54'0"W 123°52'0"W 123°50'0"W 123°48'0"W 123°46'0"W 123°44'0"W 123°42'0"W 123°40'0"W 123°38'0"W 123°36'0"W 123°34'0"W 123°32'0"W 123°30'0"W

48°36'0"N 48°34'0"N 48°32'0"N 48°30'0"N 48°28'0"N

CAPITAL REGIONAL DISTRICT BYLAW NO. 2804

Unofficial Consolidation (Bylaws 4050, 4509)

****

GREATER VICTORIA WATER SUPPLY AREA PROTECTION BYLAW

****

WHEREAS the Capital Regional District has established a water supply service and has the authority to regulate in relation to the service;

[BL 4050]

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

1. DEFINITIONS IN THIS BYLAW

“aircraft” means any vehicle capable of deriving support in the atmosphere from reactions of the air, and includes helicopters, gliders, ultralights, rockets and unmanned aerial vehicles;

[BL 4050]

“alien species” means a species designated as a controlled alien species pursuant to the Controlled Alien Species Regulation;

[BL 4050]

“animal” means an organism other than a human;

“authorized designate” means an employee or an officer of the CRD provided with the written authority to act on another person’s behalf;

[BL 4050]

"authorized personnel" includes, peace officer, conservation officer, or person appointed or employed by the CRD as a park officer, animal control officer, bylaw enforcement officer, watershed security officer, or other authorized CRD employee;

"Board" means the Board of Directors of the Capital Regional District;

"business" means carrying on a commercial or industrial undertaking of any kind or nature or the providing of professional, personal or other services for the purpose of gain or profit;

"CRD" means the Capital Regional District;

"cycle" means a device having any number of wheels that is propelled by human power and on which a person may ride;

"emergency personnel" includes any person, group or organization responding to emergency situations in the water supply area;

[BL 4050]

“General Manager” means the General Manager of the CRD Integrated Water Services Department appointed by the Board and also any person lawfully acting in that capacity;

[BL 4050]

“Leech Water Supply Area” means the area identified as the Leech Water Supply Area on the map attached as Schedule “A” to this Bylaw;

[BL 4050]

"liquor" has the same meaning as in the Liquor Control and Licensing Act;

"motor vehicle" means a vehicle, not run on rails, that is designed to be self-propelled;

"natural feature" means any native or non-native tree, shrub, flower, grass or plant of any kind; soil, sand, gravel, rock, mineral, wood, fallen timber or other living or dead natural material;

“hunt” means to trap, chase, pursue, worry, follow after or on the trail of, search for, shoot at, stalk, lie in wait for, or to attempt, in any manner, to capture, kill or injure any wildlife whether or not the wildlife is captured, killed or injured;

[BL 4050]

“permit” means a water supply area access and use permit issued under this bylaw;

“recreational purpose” means access for the primary purpose of recreation (leisure and sport) by an organized club or association, not including traditional or cultural use access.

[BL 4509]

“Regional Water Supply Commission” means the standing committee appointed by the Board for regional water supply service purposes;

“special use” means an activity not included in the operations of the CRD, that is carried on in the water supply area by persons who are not employees or contractors of the CRD;

[BL 4050]

“traffic control device” means a sign, signal, line, meter, marking, space, barrier or device, not inconsistent with the Motor Vehicle Act, placed or erected by authority of the Board or the General Manager or a person authorized by either of them to exercise that authority;

“vehicle” means a device in, on or by which a person or thing is or may be transported or drawn on a highway, except a device designed to be moved by human power or used exclusively on stationary rails or tracks;

"vessel" means any ship or boat or any other description of vessel propelled by machinery, except a seaplane, used or designed to be used in navigation;

"water supply area" means any water catchment and non-catchment lands, including the water bodies within the boundaries, owned and managed by the Capital Regional District, as shown on the maps attached as Schedule "A", but does not include the area marked "Great Trail" shown on Schedule "A";

[BL 4050, 4509]

"watercraft" means any vessel that is not being propelled by machinery;

"weed species" means a species designated as a noxious weed pursuant to the Weed Control Regulation;

[BL 4050]

"wildlife" means any native or non-native mammal, bird, insect, reptile, fish or other indigenous creature.

ENFORCEMENT POWERS

2. All authorized personnel may enforce this bylaw in the course of their duties.

3. Any authorized personnel may order a person who does anything contrary to this bylaw to leave water supply area immediately, or within a period of time specified by the authorized personnel, and every person so ordered shall comply with the order and leave the water supply area immediately or within the specified time period.

4. The prohibitions in this bylaw do not apply to authorized personnel or agents of the CRD acting in the course of their authorized duties or employment.

[BL 4050]

FINES

5. A person who contravenes this bylaw commits an offence and is liable on conviction to a fine of not less than $100.00 and not more than the maximum prescribed by the *Offence Act*.

6. If a contravention of this bylaw is committed or continued on more than one day, it constitutes a separate offence for each day on which it is committed or continued.

7. A person who commits an offence under this bylaw and was previously convicted of the same offence is deemed to have committed a subsequent offence for purposes of establishing the appropriate fine.

8. The penalty imposed under section 5 shall be in addition to and not in substitution for any other penalty or remedy imposed by this bylaw or any other statute, law or regulation.

[BL 4050]

NO ENTRY

9. No person, except emergency or authorized personnel or persons with the authority of the General Manager, shall enter the water supply area.

PUBLIC CONDUCT

10. No person shall obstruct or interfere with any person or traffic lawfully using the water supply area.

11. No person shall behave in a disorderly, dangerous or abusive manner in the water supply area.

LIQUOR

12. No person shall consume or possess liquor in the water supply area except in compliance with a license issued under the *Liquor Control and Licensing Act* and authorized by permit.

[BL 4050]

SIGNS

13. The General Manager may cause to be erected signs or other devices specifying one or more areas in the water supply area where specific activities are permitted, prohibited or restricted under the authority of this bylaw.

14. Every person in the water supply area must observe and obey every prohibition and restriction announced by a sign or other device erected under section 13.

[BL 4050]

DAMAGE

15. No person shall remove, destroy or damage any natural feature, either organic or inorganic, or other CRD property of any kind, in the water supply area except as authorized by permit or with written permission of the General Manager.

16. No person shall in any way foul or pollute any land, body of water, wetland, or watercourse in the water supply area.

17. No person shall remove, destroy or damage any signs, notices, rules or regulations posted in the water supply area by and under the authority of the Regional Water Supply Commission or the General Manager.

18. No person shall molest, disturb, frighten, injure, kill, catch, trap or snare any animal in the water supply area except as permitted by provincial or federal authorities and with written permission of

the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

19. No person shall deposit any garbage, refuse, or other waste material upon the water supply area.

20. No person shall introduce or cause to be introduced to the water supply area any alien species or weed species.

21. No person shall introduce any living or non-living organic material into the water supply area except as authorized by permit or with the written permission of the General Manager.

[BL 4050]

FIRE

22. No person shall light or keep lit any fire in the water supply area except authorized personnel, other persons authorized by permit or with the written permission of the General Manager, or persons authorized by the terms of a written agreement between a First Nation and the CRD.

23. No person shall throw or place upon the ground in the water supply area any lighted match, cigar, cigarette or other burning substance.

[BL 4050]

TREES

24. No person shall cut, deface, damage or cut down any tree or carry out any logging operation or facilitate such operation in the water supply area except as authorized by permit or written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

[BL 4050]

CYCLES

25. No person shall bring or ride any cycle in the water supply area except authorized personnel.

[BL 4050]

CAMPING

26. No person shall camp or sleep overnight in the water supply area with or without a shelter of any kind, including, but not restricted to, a motor vehicle, recreational vehicle, tent, lean to, or other natural shelter, except as authorized by permit, with the written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

[BL 4050]

STORAGE

27. No person, including an owner of property adjacent to the water supply area, shall use the water supply area for storage of any kind, except as authorized by permit or with the written permission of the General Manager.

[BL 4050]

ANIMALS IN THE WATER SUPPLY AREA

28. No person shall bring in, allow animals in their custody to enter or have custody of animals in the water supply area except emergency personnel or authorized personnel acting in the course of their duties.

[BL 4050]

FIREARMS AND HUNTING

29. No person shall hunt, carry or discharge any firearm, bow or crossbow in the water supply area except authorized personnel acting in the course of their duties, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

[BL 4050]

VESSELS, WATERCRAFT AND AIRCRAFT

30. No person shall land an aircraft within the water supply area except emergency or authorized personnel, as authorized by permit or with written permission of the General Manager.

31. No person shall operate a vessel or watercraft on or within the water supply area except emergency or authorized personnel, by written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

[BL 4050]

FISHING

32. No person shall fish or take fish or attempt to take fish by any method in the water supply area, except by written permission of the General Manager, or in the Leech Water Supply Area where authorized by the terms of a written agreement between a First Nation and the CRD.

[BL 4050]

VEHICLES

33. (1) No person shall drive or propel any type of motor vehicle in the water supply area except on roadways intended and maintained for the passage of vehicles or parking lots.

(2) Emergency personnel, authorized personnel, and persons with the authority of the General Manager are exempt from this section.

(3) Vehicles parked in areas signed as “No Parking” or “No Parking Area Tow Away Zone” may be towed away immediately at the owner’s expense by order of authorized personnel. Vehicles left unattended for more than 48 hours may be towed away at the owner’s expense by order of authorized personnel.

[BL 4050]

34. (1) The General Manager may limit the maximum driving speed on any road within the water supply area by posting speed limits.

(2) No person shall operate a vehicle in the water supply area in excess of the posted speed limit.

35. (1) The General Manager or authorized personnel acting on his behalf may cause signs or other traffic control devices to be placed in the water supply area for the purposes of sections 13, 34, 43 and 44.

(2) No person shall operate a vehicle in the water supply area contrary to posted signs or traffic control devices.

COMMERCIAL SERVICES, ACTIVITIES OR DEMONSTRATIONS

36. No person shall post, paint, or distribute any advertisement, sign, placard or handbill of any kind in the water supply area.

37. No person shall operate or station in the water supply area any vehicle displaying advertising or equipped with a public address system for the purpose of advertising, demonstration or attracting attention except as authorized by permit or with the written permission of the General Manager.

[BL 4050]

CONSTRUCTION

38. No person shall build, or place any temporary structure or facilities in the water supply area except where authorized by permit or with the written permission of the General Manager.

39. No person shall build, or place any permanent structure or facilities in the water supply area except where authorized by permit.

WATER SUPPLY AREA ACCESS PERMITS

40. (1) No person shall conduct or carry on any special use or enter into or remain within the water supply area except where authorized by permit or written permission of the General Manager in accordance with this Bylaw, who will seek approval for access and special use from the Regional Water Supply Commission.

(2) In determining approval of access and special use in 40 (1), the RWSC will consider whether the access and special use poses acceptable risk to water quality, water supply infrastructure, watershed management, and secondary natural land values (e.g. biodiversity, wildlife habitat)

[BL 4509]

41. Persons who have the right under an enactment to enter into or remain within the water supply area are not excepted from the requirement in section 40 to obtain a permit.

42. Persons who have the right under an existing written agreement to carry on any special use or enter into or remain within the water supply area are excepted from the requirement in section 40 to obtain a permit unless the terms of the written agreement require the person to obtain a permit from the General Manager pursuant to this Bylaw.

43. The General Manager may close a road or roads, or a portion or all of the water supply area for reasons of safety, weather, operational concerns, road conditions and fire danger conditions by posting notices at water supply area entrances.

44. The General Manager may restrict specific activities of permit holders for reasons of safety, weather, operational concerns, road conditions and fire danger conditions by posting notices at water supply area entrances.

45. The General Manager or authorized designate may issue a permit for access and use (including special use) if all of the conditions established under Section 46 are met by the permit applicant.

46. The General Manager is hereby delegated the authority to establish the conditions respecting the issuance of permits.

47. (1) The General Manager and/or the Regional Water Supply Commission may:

(a) refuse to issue a permit to any person or group who has previously contravened this bylaw;

(b) revoke a permit if the special use is conducted in a manner which contravenes this bylaw;

[BL 4050]

FEES

48. (1) Where an applicant applies for a permit for access to the water supply area, the applicant must pay a refundable security deposit of $500.00 which will be repaid upon return of keys and other equipment owned by the Capital Regional District issued as a condition of access.

(2) Where an applicant applies for a permit for access to the Leech Water Supply area for recreational purpose, the applicant must pay a non-refundable administration fee of $500.00.

[BL 4509]

CITATION

49. This bylaw may be cited as "Capital Regional District Water Supply Area Regulations Bylaw No. 1, 2000.

READ A FIRST TIME THIS	28th	day of	June	2000
READ A SECOND TIME THIS	28th	day of	June	2000
READ A THIRD TIME THIS	28th	day of	June	2000
ADOPTED THIS	12th	day of	July	2000

CHAIR

SECRETARY

Making a difference...together

REPORT TO CAPITAL REGIONAL DISTRICT BOARD
MEETING OF WEDNESDAY, AUGUST 10, 2022

SUBJECT **Report to Supplement a Motion with Notice: Funding Request for Aboriginal Coalition to End Homelessness**

ISSUE SUMMARY

To provide additional information in support of the Capital Regional District (CRD) Board in considering a Motion with Notice: Finding Request for Aboriginal Coalition to End Homelessness (ACEH) on an ongoing basis in the amount of $150,000 per year.

BACKGROUND

The ACEH Society, first formed in 2016 and registered with the Canadian Revenue Agency in 2017, is a non-profit and registered charitable organization whose sole focus is to support Indigenous Peoples experiencing homelessness. Through building partnerships locally and Vancouver Island-wide, the ACEH works to identify and address systemic and structural barriers, share information, resources and lessons learned while also providing cultural support, connections and housing stability.

The ACEH has the following Vision:

> *"Our way is to care for all out people, from the youngest to the oldest. We are all one. Some of our people living away from home are suffering, isolated and homeless. We stand together to end homelessness."*

In August 2019, the CRD received a request from the ACEH, attached as Appendix A, seeking core operational funding of $150,000 per year for a period of three years, at which point the ACEH anticipated being able to meet their core operational costs. This item was considered by the Hospitals and Housing Committee where a motion was approved that the request for funding be referred to the 2020 CRD budget process. Funds to support the ACEH were included in the CRD Budget for the years 2020, 2021, and 2022.

In June 2022, the CRD received a request from the ACEH, attached as Appendix B, seeking financial support of $150,000 for 2023/24.

At the July 13, 2022 meeting of the CRD Board, the following Motion with Notice was considered: *"That the Capital Regional District continues to funding the Aboriginal Coalition to End Homelessness on an ongoing basis in the amount of $150,000 per year."* The Motion with Notice was subsequently referred back to staff for more information.

IMPLICATIONS

Intergovernmental Implications
Available data indicates that Indigenous Peoples disproportionately experience homelessness with the 2020 Greater Victoria Point-in-Time Count identifying that 35% of all survey respondents self-identified as Indigenous. According to the 2016 Census, Indigenous Peoples comprise a total of 4.7% of the Greater Victoria Population. The Canadian Observatory on Homelessness recognizes that Indigenous Peoples lack adequate access to stable housing and also experience

disconnected relationships with their land, family, community, culture and identities. Therefore, the research suggests that Indigenous homelessness goes beyond the lack of a physical structure and includes the need for Indigenous Peoples to "culturally, spiritually, emotionally or physically reconnect with their indigeneity or lost relationships" (Thistle 2017, 6).[1]

As an Indigenous-led organization active across Vancouver Island, but focussed on supporting Indigenous Peoples in the capital region, the ACEH works to bring together First Nations as well as those organizations serving Indigenous Peoples experiencing homelessness that are located off-reserve. Their work is centered on including the voices of the Indigenous Street Community and in listening to their immediate needs, lived experiences, structural and systemic barriers, hopes and dreams and ideas on long-term solutions. The ACEH supports the needs of Indigenous Peoples in a holistic manner working to increase their physical, mental and spiritual wellness through Indigenous teaching and worldview and within the context of taking a Housing First approach.

Social Implications
The ACEH provides a number of programs that are available to Indigenous Peoples through a dual model of care that incorporates Culturally Supportive Housing alongside decolonized harm reduction, which is built on the provision of pathways to healing from intergenerational harms that are rooted in colonial trauma. More information on the range of programs and services the ACEH provides can be found in the ACEH Annual Housing Report, attached as Appendix C.

The request for funding support will be used to enhance leadership and operational effectiveness in advancing the ACEH's strategic directions. Specifically, and if approved, the funds will be used toward the "Executive Director (ED), required administrative support through an Executive Assistant (EA) as well as costs towards operations expenses such as the annual lease cost for the Broughton Street Office/Storefront which creates space for senior administrative offices, a nursing clinic and Registered Nurse, a Counselling room and Indigenous Clinical Counselor, Outreach Team offices, Community Kitchen, Elder Mentor meeting space, and work space for a Youth Programs & Services Coordinator". These activities are identified as critical in supporting the ACEH's operations in providing wrap-around services, programming space, and a facility for cross-sectoral service provider engagement and outreach.

Financial Implications
In support of the identified activities listed through the Social Implications section of the report, the June 2022 correspondence from the ACEH identified the following funding allocation:

Table 1: CRD Funding Allocation

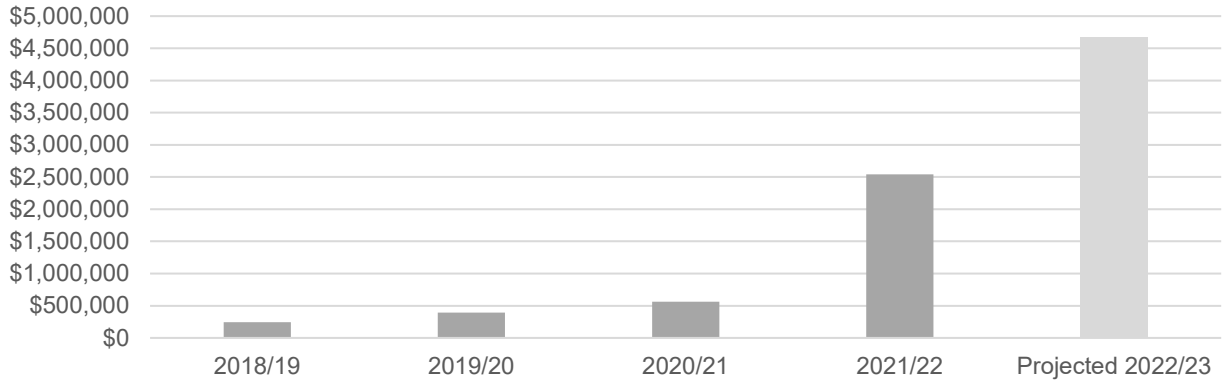
Description	Amount
Executive Director (Contribution to Salary)	$65,000
Executive Assistance (Contribution to Salary)	$45,000
Overhead Related Costs	$40,000
TOTAL	**$150,000**

[1] Thistle, J (2017) Indigenous Definition of Homelessness in Canada. Canadian Observatory of Homelessness Press.
https://www.homelesshub.ca/sites/default/files/attachments/COHIndigenousHomelessnessDefinition.pdf

Funds to support the ACEH have been drawn from CRD Service 1.224 Community Health. The approved 2022 budget for Service 1.224 included a total of $475,000 under Contracted Services in support of the Greater Victoria Coalition to End Homelessness ($325,000 including $225,000 from the CRD and $100,000 from the City of Victoria) and the ACEH ($150,000). As the original funding commitment towards the ACEH was for three years including 2020, 2021, and 2022, the requisition through Service 1.224 was anticipated to decrease by a total of $150,000 starting in 2023. However, if a commitment is made to include continued funding of the ACEH, it is expected that this will place an additional upward pressure on the overall CRD requisition starting in 2023.

The ACEH has experienced significant growth in revenue in recent years, going from a reported $242,178 in 2018/19 to a reported $2.5 million (M) in 2021/22. The ACEH's Annual Housing Report (Appendix C) identifies that the society has projected revenues of $4.7M in 2022/23 for a reported growth in revenue of 84% from 2021/22 reported figures. It should be noted that as much of this growth in revenue is tied to the operations of the programs noted in the Social Implications there are few resources available to support work associated with system transformation and collaboration.

Table 2: ACEH Annual Revenue



Another source of revenue the ACEH has available is through the Government of Canada's Reaching Home Program, which the CRD administers. The ACEH received a total of $70,791 in 2019/20, $307,527 in 2020/21 and $290,778 in 2021/22. These funds are provided in accordance with the Terms and Conditions of Reaching Home as well as the Directives as required by the Government of Canada. These funds are for specific service delivery programs and the related administrative costs required for program reporting and are not available to fund system transformation and collaboration activities associated with core operations.

Service Delivery Implications
CRD staff negotiate and enter into annual Service Agreements with the ACEH. The service agreements explicitly identify the parameters of the CRD funding contribution and detail the activities and initiatives that the funds are to be used in support of. Critically, a component included in past service agreements includes engaging Indigenous Peoples experiencing homelessness and leading systems transformation in collaboration with the Greater Victoria Coalition to End Homelessness, but specific to the needs and experiences of Indigenous Peoples.

CONCLUSION

The ACEH has been funded by the CRD through Service 1.224 Community Health for a total of three years including 2020, 2021 and 2022. As the original funding ask was for those three years, the ACEH advanced a request for $150,000 for 2023. Tied to this request for core operational funds, a Motion with Notice was advanced to allocate ongoing funds totalling $150,000 per year to the ACEH.

The ACEH plays an important role in supporting the needs of Indigenous Peoples experiencing homelessness that includes running a range of support service and housing programs as well as work associated with system transformation and collaboration. The ACEH has experienced considerable growth in revenue 2018/19 to 2021/22 with another 84% growth in revenue projected between 2021/22 and 2022/23. The bulk of these funds are to support the delivery of services and not the capacity required to engage in broader community-based efforts to support addressing the needs of Indigenous Peoples experiencing homelessness.

The CRD's funds are provided through annual service agreements that include a range of identified items that align with regional interests while also explicitly identifying their purpose in supporting senior staff and overhead costs.

RECOMMENDATION

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

Submitted by:	Don Elliott, MUP, Senior Manager, Regional Housing
Concurrence:	Kevin Lorette, P. Eng., MBA, General Manager, Planning & Protective Services
Concurrence:	Robert Lapham, MCIP, RPP, Chief Administrative Officer

ATTACHMENTS

Appendix A: Correspondence, August 6, 2019
Appendix B: Correspondence, June 9, 2022
Appendix C: 2021/2022 Annual Housing Report

APPENDIX A

ABORIGINAL COALITION TO END HOMELESSNESS
101-2860 Quadra Street
Victoria BC V8T 4E7
778-432-2234

August 6, 2019

625 Fisgard Street
Victoria, BC V8W 1R7

Dear Capital Regional District Board of Directors,

Re: Request for Support Towards Core-Operational Funds

Introduction

On behalf of the Aboriginal Coalition to End Homelessness Society (ACEH), we are requesting financial support towards our **core-operational funding needs for the next three years**. We project that within three years we will be better established financially and have the capacity to meet our core-operational costs.

In late 2015 the Greater Victoria Coalition to End Homelessness (GVCEH) Director reached out to Fran Hunt-Jinnouchi to assist the GVCEH to engage First Nations communities and to encourage Indigenous participation in addressing the disproportionate number of Indigenous people experiencing homeless in Victoria. With the creation of the ACEH this goal is well on its way to being realized and we believe is a direct result of the ACEH governance structure and community engagement processes. Currently the ACEH has broad Indigenous leadership and people with lived experience involvement yet to date, despite many attempts, our society has not been able to access core funding required like our sister organization the GVCEH has (City of Victoria, Island Health and the CRD for example). We believe we add value to their work and the organization networks in the city and that the ACEH provides a unique lens, and culturally appropriate strategies and services towards meaningful systems improvements.

Significant strides have been made since the ACEH became a BC Non-Profit Society and a Registered Charity. The ACEH has gathered critical baseline data and facilitated surveys and focus groups leading to evidence-based learning, and therefore planning and delivery to address and reduce Indigenous homelessness in our city.

Through our work and the raising of our profile, there is increasing demand of our time, resulting in our inability to be present at some important tables, and our spending too much time proposal writing to keep operations afloat to ensure there are funds for the Executive Director to do this work. Thus, we are not maximizing our time, efforts, or potential.

Consequently, we are requesting **financial support to contribute to the Executive Director's salary and the costs associated with retaining an Associate Director** to ensure the ACEH is represented at numerous important tables community-wide and to maximize our time beyond proposal/grant writing.

New Era of Relationships

The landscape is changing, whether considering the Truth & Reconciliation Commission's 94 Calls to Action or the United Nations Declaration on the Rights of Indigenous Peoples - we are in an era of building relationships, co-development, and sharing resources. The National Housing Strategy of Canada also bases its intent in the spirit of self-determination and reconciliation and encourages long term approaches and investments. That is how we see this request. As a partnership, and a long-range commitment to work together, to align our strategies and to formalize a collaborative effort overall.

As well, we believe this request aligns with the CRD Statement of Reconciliation: **"commitment alone is not enough and that action is needed** to show that the CRD is taking measurable steps towards a better relationship with Indigenous peoples." In a similar vein, the Special Task Force on First Nations Relations final report released October 10, 2018 states: "as the CRD continues to advocate for more inclusive governance models, there is an opportunity to join the emerging Indigenous economy as a partner, a customer or advocate of innovative business ventures – ones that are inherently sustainable, equitable, build understanding and tackle systemic poverty."

Three Year Financial Request I (2020/21, 2021/22, 2022/23) I $150,000 Annually

Contribution to Staffing:
Example for 2020/21: Executive Director ($50,000), Associate Director salary ($70,000), and Overhead/Administration related costs ($30,000).

It is in our ACEH Strategic Plan/Operational Plan to also access a store-front location in the downtown core where we can better provide wrap-around services within a cultural context for the Indigenous Street Community (drop-in space, cultural-ceremony room, office spaces, storage, kitchen and so on). In an environmental scan of rental spaces, those costs range between $5,000 and $7,000 per month in the downtown core. This remains a critical need and a longer-range goal of the organization. Any support in this regard would be helpful, whether it be financial support or by flagging opportunities for rental spaces for us.

In the meantime, we extend our heartfelt gratitude to the CRD for providing temporary office space on Quadra Street for our existing staff.

Conclusion

The funding will ensure the ACEH can stay actively engaged as the city works towards systems and structural improvements for Indigenous and non-Indigenous people experiencing homelessness in Victoria, and will allow us to be represented at important tables including the CAA, GVCEH Steering Committee, VCAT, and DTPS (to name a few), and to support the goal of 33% of Indigenous people having access to housing in Victoria but not only access, but housing stability. Within this context, we intend to incorporate decolonized harm reduction practice into all levels of our work, and continue the momentum in addressing violence against Indigenous women on the streets, as well as strengthen our working relationship with Vic PD.

Lastly, a Memorandum of Understanding between the ACEH and GVCEH has identified 14 initiatives to be undertaken by the two Coalitions. The focus over the next year is the creation of an Indigenous-specific Systems Improvement Map - a resource that will be helpful to many

organizations locally. With less time on proposal/grant writing we can also turn our attention to much needed prevention and work with Indigenous youth in our city.

We thank you in advance for your consideration of this request. We trust you agree that the ACEH has played a critical and significant role over the last three years.

Our four Strategic Priorities are: 1) provide Island-wide culturally appropriate housing through the use of leading-practice housing models, 2) strengthen existing programs and services through an Aboriginal worldview, 3) advocate for public policy and support for Aboriginal housing and services, and 4) secure core funding and infrastructure for operations, and adopt sound business practices for service delivery.

With Respect,

Fran Hunt-Jinnouchi
Executive Director I ACEH

Our way is to care for all our people, from the youngest to the oldest. We are all one. Some of our people living away from home are suffering, isolated, and homeless. We stand together to end homelessness.

June 9th, 2022

Fran Hunt-Jinnouchi
Executive Director
Aboriginal Coalition to End Homelessness
101-736 Broughton Street
Victoria, BC, V8W 1E1
(778) 432-2234
director@acehsociety.com

Attention: Don Elliot
Capital Regional District
625 Fisgard Street
Victoria, BC V8W 1R7

RE: Revised Scope & Deliverables for 2023-24/CRD Board of Directors

INTRODUCTION

The Aboriginal Coalition to End Homelessness (ACEH) Society's mandate and strategic directions align and/or complement those of the Capital Region District's (CRD) visionary interests in relation to housing and homelessness. The ACEH's work, although focused on serving the needs of the City's highest risk and most vulnerable in the downtown core also supports the CRD's Regional Housing Affordability Strategy centred on "the development of policies and strategies designed to promote and support a range of housing types and tenures to meet the needs of individuals of all ages, incomes, and abilities."

However, the ACEH's work is distinctive in that it focuses on meeting Indigenous needs in a holistic manner: physical, mental, emotional, and spiritual through Indigenous approaches and worldview and Housing First principles. In this context, the ACEH's emphasis on Indigenous housing and wellness priorities aligns well with the CRD's Statement on Reconciliation, which "looks to First Nations for leadership in understanding how to create new decision-making systems together on their Traditional Territories." Taken together, the ACEH's critical work on community well-being and reconciliatory housing modelling echoes both the CRD's 2019-2022 Board Priorities and the 2019-2022 Corporate Plan, which both identify "Community Wellbeing," and "First Nations Reconciliation," as strategic goals.

Consequently, the ACEH will use this funding - if approved in areas of most need - to continue to support capacity development for the organization to meet its mandate, Operations Plan objectives, and 5-Year Housing Strategy which in turn supports the broader goals of the CRD. Specifically, the requested CRD financial support for 2023-24 will be used for leadership and operations: Executive Director (ED), required administrative support through an Executive Assistant (EA) as well as costs towards operations expenses such as the annual lease cost for the Broughton Street Office / Storefront which creates space for senior administrative offices, a nursing clinic and Registered Nurse, a Counselling room and Indigenous Clinical Counselor, Outreach Team offices, Community Kitchen, Elder Mentor meeting space, and work space for a Youth Programs & Services Coordinator. These funds are critical to support the ED, EA, and the overall operations of the organization towards wrap-around services, programming space, and a facility for cross-sectoral provider engagement and outreach.

June 9th, 2022

Fran Hunt-Jinnouchi
Executive Director
Aboriginal Coalition to End Homelessness
101-736 Broughton Street
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(778) 432-2234
director@acehsociety.com

In addition to a broad range of responsibilities the Executive Director oversees, there are four capacity building areas that are of paramount importance to the ACEH's strategic directions:

- **Indigenizing housing development to meet the needs of the people we serve.** We envision an Indigenous continuum from unhoused to independent housing within the ACEH developed Dual Model of Housing Care.This entails Culturally Supportive Housing that is underpinned by a Decolonized Harm Reduction Framework. And focused on prevention and homelessness reduction. Financial projections point to 250 housing units as a solid baseline towards financial sustainability to cover core operational costs for the Society in the future, which is a housing target over the next five years contained within priorities of the 5-Year Housing Strategy.

- **Weaving in Indigenous youth housing and programming.** The goal is to create an action plan based on findings from the surveys of 69 Indigenous Youth in downtown Victoria to address their expressed needs regarding housing, programming, cultural supports, and holistic wellness needs (which includes physical, mental, emotional and spiritual supports).

- **Wrapping up research projects.** Rolling out the Culturally Supportive Housing Toolkit, Decolonized Harm Reduction Framework, Gender-Based Violence project (in partnership with the Victoria Police Department, Indigenous women, and 2SLGBTQQIA+ individuals), as well as the Canadian Institutes of Health Research in partnership with the University of Victoria to design, implement and evaluate an Indigenous Alcohol Harm Reduction Residence Program resulting in the creation of a model to be shared widely.

- **Respond to the identified needs and service gaps** through the Indigenous Systems Improvement Map Research (completed in 2021) which will include the opening of a facility (currently referred to as the Gathering Space) to provide wraparound services to the Indigenous Street Family.

These four components are intimately linked to the ACEH's 5-Year Housing Strategy and Operations Plan providing strategic direction over the next 3 to 5 years. The model for practice in these plans emphasizes Indigenous health and wellness in the downtown core. The 5-Year Housing Strategy (2023 – 2028) is geared towards homelessness prevention and reduction inclusive of youth and adults and builds on the essential characteristics that distinguish the ACEH from other service providers, which is its Dual Model of Housing Care (DMHC) with embedded decolonized harm reduction core practices. The ACEH's growing body of research has fostered strategic directions deeply rooted in evidenced based learning and the voices of the Indigenous Street Family (ISF).

June 9th, 2022

Fran Hunt-Jinnouchi
Executive Director
Aboriginal Coalition to End Homelessness
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EXECUTIVE DIRECTOR DELIVERABLES 2023-24

1) Implement the 5-Year Housing Strategy, Year one of five.

2) Complete the webinars for the Gender-Based Violence research project with an island-wide focus, finalize reporting and share findings with the Collaborative Response Network and build on the MOU and research findings with the Victoria Police Department regarding Indigenous women and 2SLGBTQQIA+ peoples.

3) Canadian Institute of Health Research: Produce the Indigenous Alcohol Harm Reduction program model as well as evaluation findings with the wrap up vetting from the ACEH Elders & Knowledge Keepers Advisory Council.

4) Decolonized Harm Reduction Framework (DHRF): Implement the Seasonally Aligned 12-month DHRF pathways to healing and recovery program incorporating lessons learned from 2022-23 pilots.

5) Culturally Supportive Housing Care Toolkit: Roll out and partnership building to develop culturally-supportive housing island-wide.

6) Represent ACEH at key community tables: For example theCAA Advisory; CAA Placement Committee; Greater Victoria Coalition to End Homelessness Steering Committee; Victoria Community Action Team (VCAT); Downtown Service Providers; Primary Care Network - Indigenous Collaborative (PNC); Homeless Individuals and Families Information System (HIFIS) Working Group; Indigenous Provincial Homelessness Steering Committee.

The ACEH Directors will be alternates at these tables when the Executive Director cannot attend.

EXECUTIVE ASSISTANT DELIVERABLES 2023-24

The Executive Assistant will be overseeing the following projects/initiatives:

1) Oversight and management of the ACEH Storefront office to provide services to the unhoused downtown population.

2) Administrative assistance to the Executive Director.

June 9th, 2022

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Executive Director
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ANNUAL BUDGET

DESCRIPTION	AMOUNT
Executive Director (contribution to salary)	$65,000
Executive Assistant (contribution to salary)	$45,000
ACEH overhead related costs	$40,000
Total	**$150,000**

Requesting 2.5% – 5 % inflationary increase if available

CONCLUSION

The overall vision of the ACEH is to provide culturally responsive services and housing focused on meeting the physical, mental, emotional, and spiritual needs of those we serve through a Decolonized Harm Reduction Framework. The ACEH has increased its annual revenue from $242K in 2018 to over $4M in 2022, demonstrating sound governance, leadership and abilities. The ACEH plans to continue to grow programming and services with a focus on pathways to healing and recovery.

Thank you in advance for your consideration and support to date which has been instrumental in helping our society be responsive to the needs of the Indigenous Street Family.

Sincerely,

Fran Hunt-Jinnouchi
Aboriginal Coalition to End Homelessness Society
Executive Director

ANNUAL HOUSING REPORT

2021
2022

PREPARED BY

Fran Hunt-Jinnouchi, Executive Director
Dr. Filip Metro Ani, Community Relations & Research Manager
Julia O'Quinn, Equity Programs & Youth Research Manager

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FORWARD

The past year was a challenging one but filled with many milestones — none more significant than learning the Aboriginal Coalition to End Homelessness (ACEH) Society received the green light for a 45-unit Culturally Supportive Housing site in Victoria West. The impacts of the pandemic are still felt by staff and the Indigenous Street Family who we serve but we have come out on the other side even stronger.

Lessons learned through our research including one-on-one surveys, story sharing, and focus groups, clearly support the impacts of our *Dual Model of Housing Care.* In particular land-based healing and the Indigenous Alcohol Harm Reduction program (IAHRP) are proving invaluable for Family Members on their healing journeys, among other decolonized harm reduction supports deeply rooted in cultural teachings and practice.

I'm very happy to present our 2nd Annual Housing Report which provides highlights specific to our housing sites and services across the housing continuum — from supporting those who are living rough on the streets or tent encampments, to those we transition into our Culturally Supportive Housing and Westshore independent housing. We raise our hands to the lək̓ʷəŋən speaking peoples who are the keepers of the traditional territory where our current Culturally Supportive Housing sites are situated. I am personally thankful to be doing this work on your territories and to have your support.

I also want to remember and never forget the two young men that we lost last year. May it continue to be a reminder of why we do this work and the critical need for our people to have a place to call home, a community of people who care about them, and supports for healing and recovery when, and if they are ready. With this I extend utmost respect and thanks to my team which has grown from 2 employees in 2016 to over 80 today in 2022.

Fran Hunt-Jinnouchi, Executive Director

BOARD OF DIRECTORS

NAME	POSITION	REPRESENTING
Chief John Powell	Chair	Mamalilikulla First Nation
Donald Kattler	Vice-Chair	Mental Health Recovery Partners, North Island
Charlayne Thornton-Joe	Secretary	City of Victoria
Gordon Gunn	Treasurer	Non-Affiliated
Guy Louie	Board Member	Nuu-Chah-Nulth Tribal Council
Julie Spiteri	Board Member	Métis Nation of Greater Victoria
Sandra Richardson	Board Member	Greater Victoria Coalition to End Homelessness Society
Ruth Young	Board Member	University of Victoria

APPROACH TO CARE

PATHWAYS TO HOUSING & HEALING

The Aboriginal Coalition provides support to the Indigenous Street Family across the housing continuum, facilitating positive flow.

UNHOUSED

- Outreach Support
- Wellness Support: Nursing, Counselling & Elder

CULTURALLY SUPPORTIVE HOUSING

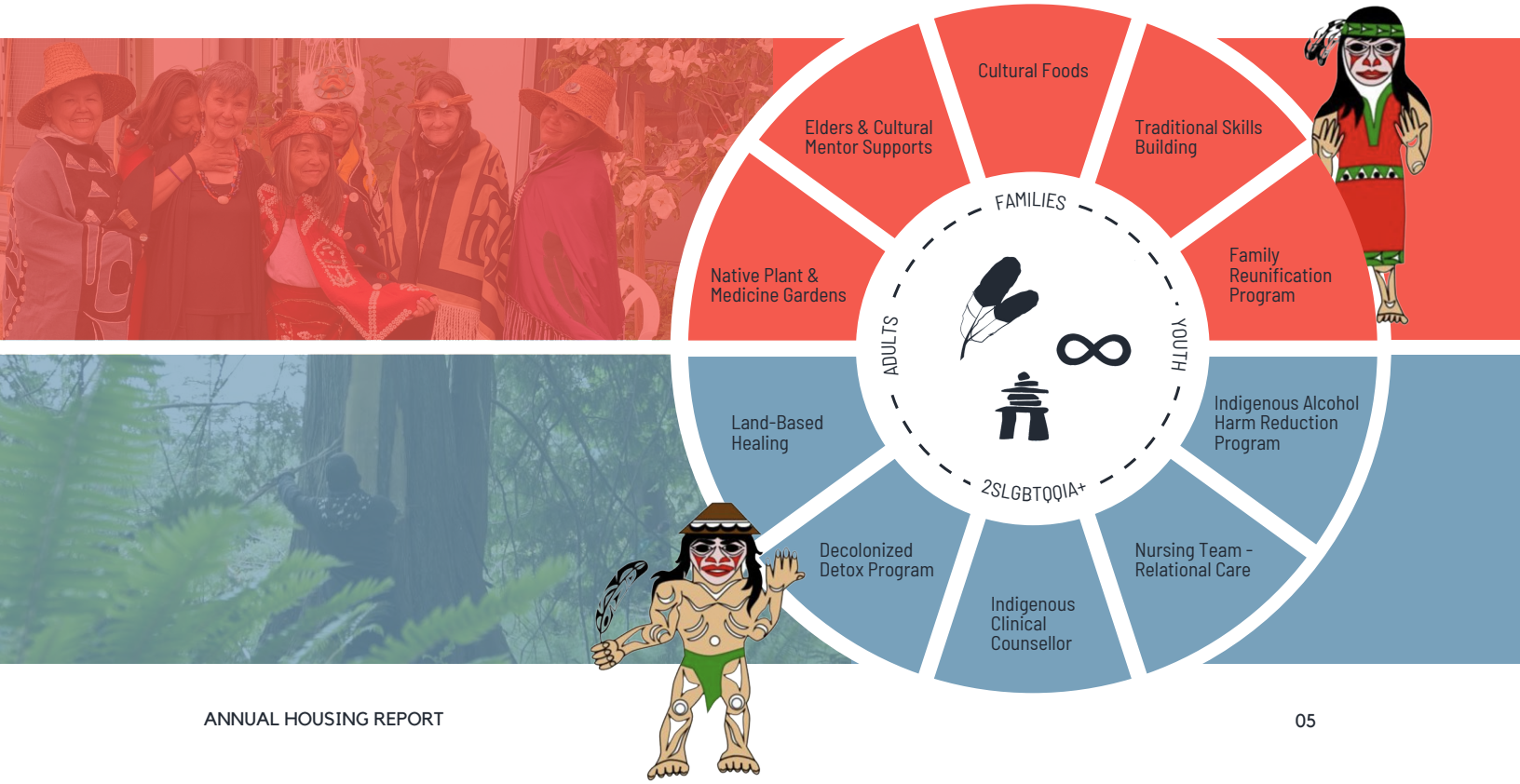
- Houses (3)
- Decolonized Harm Reduction Programs and Services

INDEPENDENT LIVING

- Housing Transitions Advocate
- Community & Life Skills Building
- Decolonized Harm Reduction Programs and Services

DUAL MODEL OF HOUSING CARE

The ACEH developed British Columbia's first Culturally Supportive Housing which operate according to its *Dual Model of Housing Care*. This approach goes beyond housing provision to provide pathways to healing from intergenerational harms rooted in colonial trauma. On-site Family Members (residents) have access to Elder support, medicine keepers, cultural mentors, native medicine gardens, traditional foods and cultural programming. To support wellness, Family Members have access to land-based healing and the Indigenous Alcohol Harm Reduction Residence program, with an at-home detox set to launch in 2022. Together the dual parts of the model strengthen identity, build community, (re)connect families, support healing, and lead to transformation for those previously unhoused.

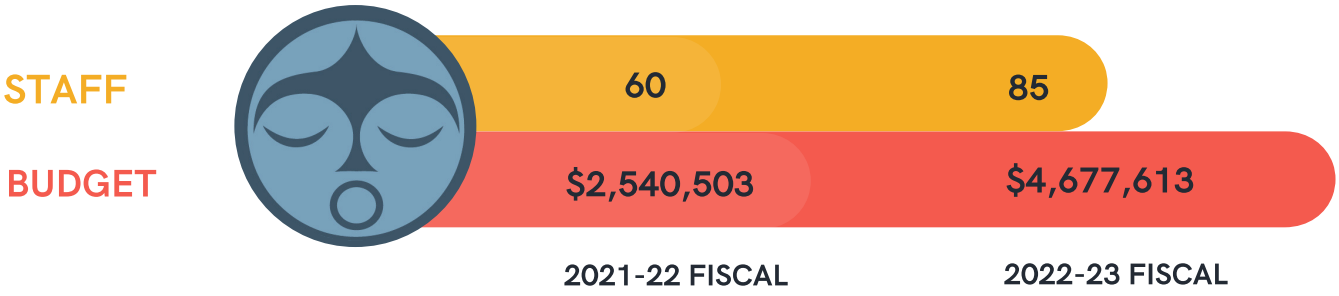


MAJOR UPDATES

DIRECTOR OF HOUSING

The ACEH is pleased to welcome Wade Hunt into the position of Housing Director. Wade brings a wealth of experience working with members of the unhoused First Nations, Métis, and Inuit (FNMI) community from his previous role as House Manager of the Culturally Supportive House (CSH). Wade will be supervising house managers, harmonizing nursing services, and coordinating the housing units at CSH and Speqəɳéutxw House. Additionally, Wade will be a presence at meetings with the larger community and interface with BC Housing to ensure that ACEH Family Members get the support required.

ORGANIZATIONAL GROWTH



STAFFING

Capacity to support the Indigenous Street Family builds through implementation of the following hiring policies:

Pursuant to S.41 of the BC Human Rights Code, preference is given to First Nations, Métis and Inuit applicants when equally qualified.

The ACEH values strength in diversity. As an inclusive employer that celebrates the gifts of its staff, we encourage 2SLGBTQQIA+ people to apply.

53% of staff have First Nations, Métis and/or Inuit ancestry

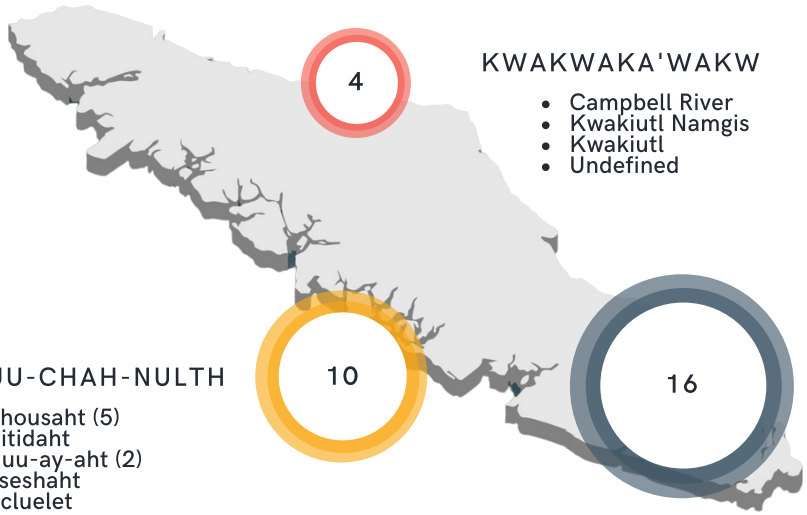
HOUSING SNAPSHOT

DEMOGRAPHICS

31
FEMALE

46
FAMILY MEMBERS

15
MALE



KWAKWAKA'WAKW

- Campbell River
- Kwakiutl Namgis
- Kwakiutl
- Undefined

NUU-CHAH-NULTH

- Ahousaht (5)
- Ditidaht
- Huu-ay-aht (2)
- Tseshaht
- Ucluelet

16

COAST SALISH

- Cowichan
- Pacheedaht
- Pauquachin (3)
- Penelakut
- Scia'new (2)
- Songhees (2)
- Tsartlip (2)
- Tsawout (3)
- Undefined

OTHER

- Alberta Cree
- Blackfoot
- Buffalo Lake (Métis)
- Cheam 1
- Cree
- Dene
- Enoch Cree
- Fort McKay
- Lake Babin
- Ojibway
- Nisga'a (2)
- Saddle Lake Cree
- Squamish
- St. Theresa Point
- Wabasseemoong

CULTURALLY SUPPORTIVE HOUSE

21 STAFF | ACCOMMODATING 11

SPEQƏŋÉUTXW HOUSE

26 STAFF | 21 UNITS, ACCOMMODATING 22

INDEPENDENT LIVING

1 STAFF | 13 SUPPORTED

FAMILY TOWNHOUSE

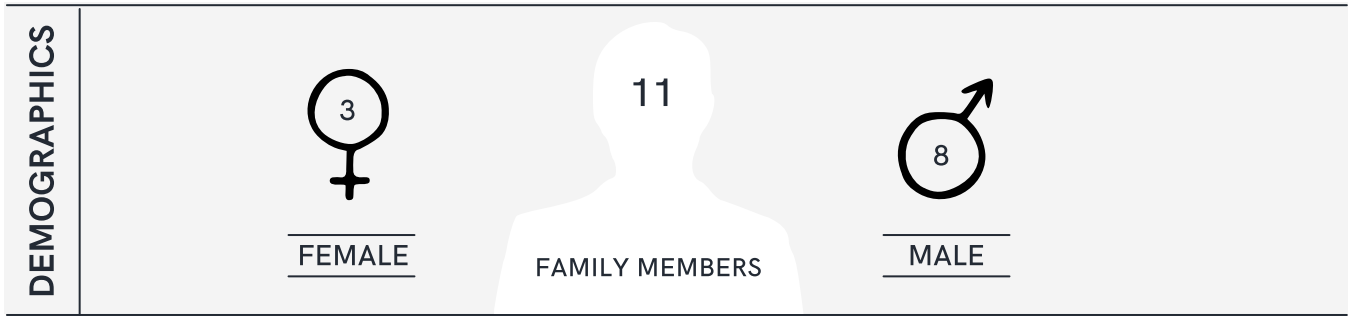
1 STAFF | 3 BD FOR FAMILY REUNIFICATION

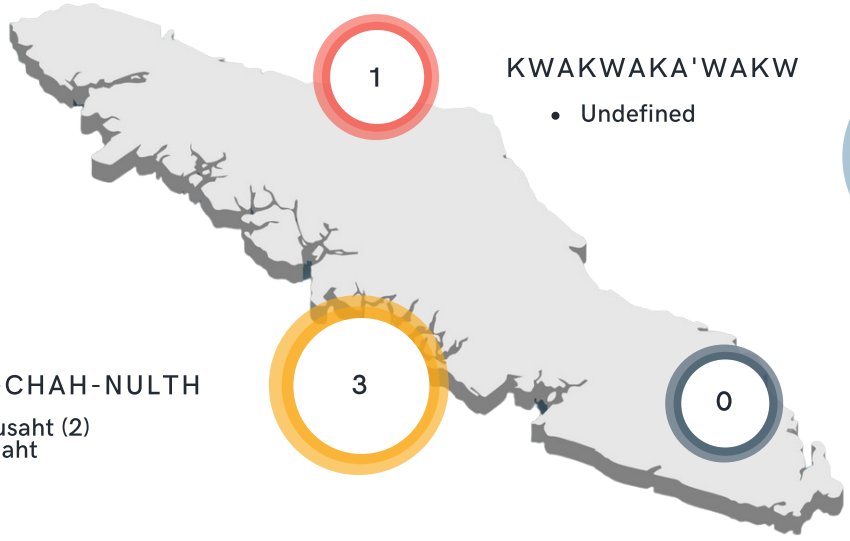
CULTURALLY SUPPORTIVE HOUSE

21 STAFF | ACCOMMODATING 11

The Culturally Supportive House continues to provide culturally responsive services in Victoria's downtown core to FNMI Family Members, including the Indigenized Alcohol Harm Reduction Program (IAHRP). This year, CSH has benefitted from more frequent opportunities for cultural mentorship in the form of a consistent Elder presence. Cultural activities such as, deer processing, brushing ceremonies, and drumming were also notable highlights for the year. Finally, the ACEH welcomes Judy Peterson as CSH's new House Manager, replacing Wade Hunt.

DEMOGRAPHICS





1

KWAKWAKA'WAKW

- Undefined

7

OTHER

- Buffalo Lake (Métis)
- Cree
- Dene
- Nisga'a (2)
- Squamish
- St. Theresa Point

NUU-CHAH-NULTH

- Ahousaht (2)
- Ditidaht

3

0

COAST SALISH

MURAL BY BEAU DICK

INDIGENOUS ALCOHOL HARM REDUCTION RESIDENCE PROGRAM

The Indigenous Alcohol Harm Reduction Residence Program (IAHRP) is available for Family Members residing at the Culturally Supportive House. It is being designed, developed and evaluated over a 3-year period with support from Dr. Bernie Pauly and Meaghan Brown at the University of Victoria's Canadian Institute for Substance Use Research.

The ACEH's Elders and Knowledge Keepers Advisory share their wisdom and guidance toward development of this culturally informed program. Knowledge exchange with partners at the University of Calgary, Alpha House, and the Aboriginal Standing Committee on Homelessness in Calgary is central to this program, toward strengthening IAHRP's in BC and Alberta.

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

Our thanks to the Canadian Institutes of Health Research (CIHR) for funding this 3-Year research project.

island health

Additional thanks to Island Health for funding a Registered Nurse for on-site program support 7 days a week.

"I didn't know who I was and I didn't have an identity, you know, so. It was helpful to be around First Nations… Elders and staff. […] It made me feel, um, some pride. I guess to get out of my other part of my different masks that I wore on the street. […] It was important to me I think, yeah, to find my voice."

SPEQƏɳÉUTXW HOUSE

26 STAFF | 21 UNITS, ACCOMMODATING 22

Speqəɳéutxw House continues to provide culturally responsive support to FNMI women through programs including therapeutic gardening, where native medicines, berry plants, and vegetables are grown annually. This ongoing opportunity to practice stewardship of the land has been very powerful. It has also provided an employment opportunity through the in-house work program, where the women are compensated for hours worked tending to the garden.

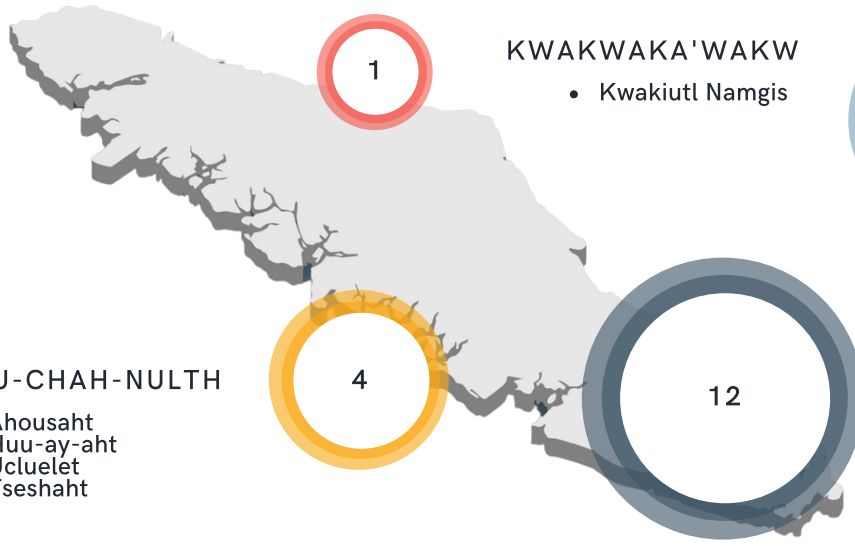
From the garden, production of ceremonial tobacco, whitebrush sage for smudge blends, and other medicine plants such as nettles, yarrow, and plantain have been used to make medicinal salves. The ACEH looks to expand its garden program to support the resiliency of Indigenous food and medicine security within the organization. Finally, the ACEH welcomes Nikki Wilkinson as Speqəɳéutxw's new House Manager, replacing Willa Harry.

DEMOGRAPHICS

22

22

FAMILY MEMBERS



1

KWAKWAKA'WAKW

- Kwakiutl Namgis

5

OTHER

- Saddle Lake Cree
- Alberta Cree
- Enoch Cree
- Wabaseemoong
- Cheam 1

4

NUU-CHAH-NULTH

- Ahousaht
- Huu-ay-aht
- Ucluelet
- Tseshaht

12

COAST SALISH

- Cowichan
- Pacheedaht
- Pauquachin
- Scia'new (2)
- Sognhees (2)
- Tsartlip
- Tsawout (3)
- Undefined

MESSAGE TO THE EXECUTIVE DIRECTOR

"I clearly remember the first time hearing you speak about SpeqƏɳéutxw… it was still 2 years away from opening at that time. Just as you always knew, and according to our data the SpeqƏɳéutxw model is very uniquely successful. While I realize that data is a small piece of the story, I want to share what I found…"

32 out of **33** women who have resided at SpeqƏɳéutxw have maintained housing after 20 months

13 women from the original intake remain housed at SpeqƏɳéutxw

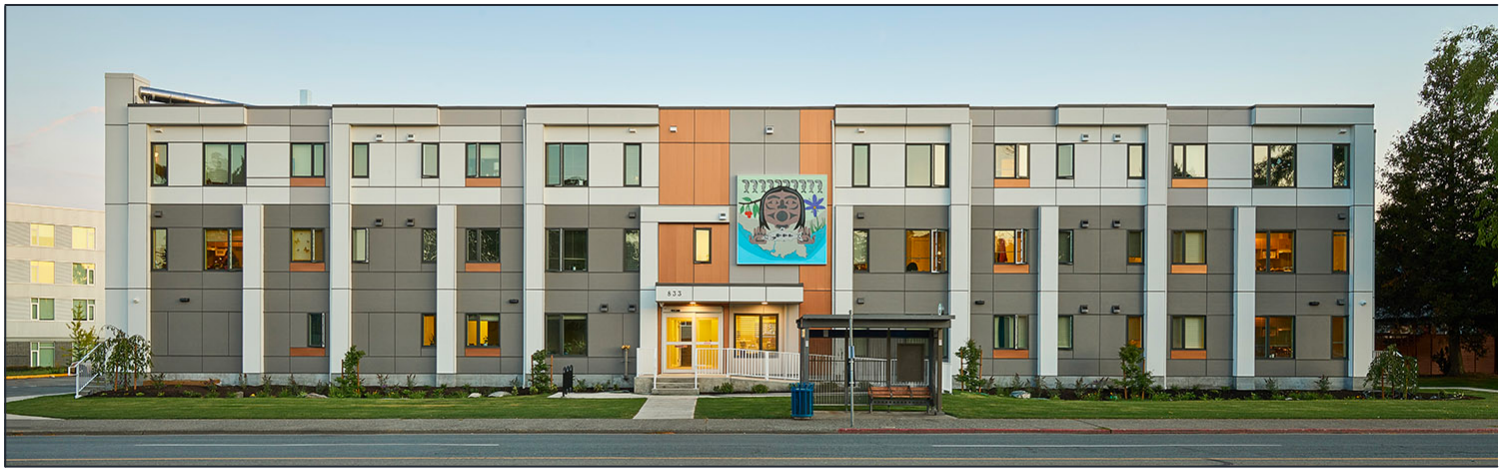
0 Evictions into homelessness

11 women from the original intake have transitioned to subsidized housing

"I want you to know that this is very special and different from what we often see in larger supportive housing sites with different models of care."

BC HOUSING

LOIS GABITOUS
Coordinated Access and Assessment Manager



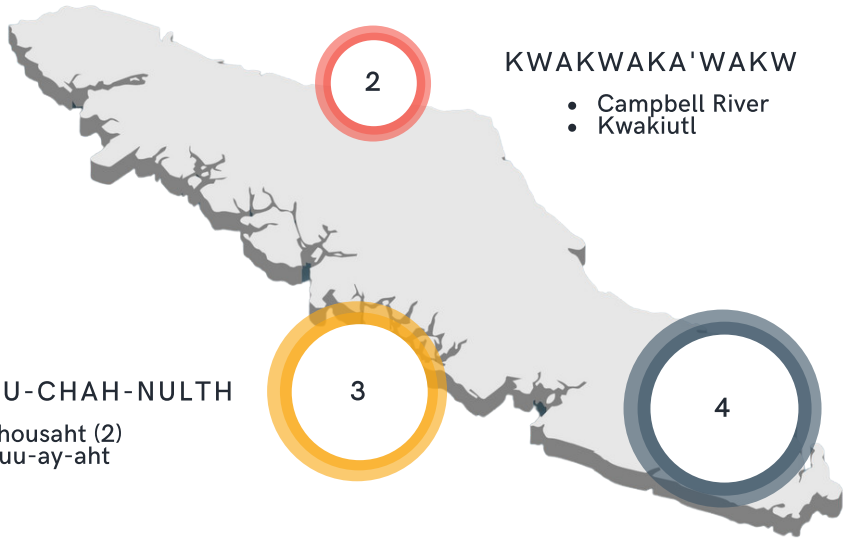
INDEPENDENT HOUSING

DEMOGRAPHICS

6
FEMALE

13
FAMILY MEMBERS

7
MALE



KWAKWAKA'WAKW

- Campbell River
- Kwakiutl

OTHER

- Blackfoot
- Fort McKay
- Lake Babin
- Ojibway

NUU-CHAH-NULTH

- Ahousaht (2)
- Huu-ay-aht

COAST SALISH

- Pauquachin (2)
- Tsartlip
- Penelakut

TRANSITION STORIES

LINDA BOUCHIER

moved into independent housing, soon after facing serious depression, as she felt isolated from her friends, resources, and the downtown core. After a few months of adjusting, Linda started to become herself again. She participated in many land-based healing camps, healing circles, and enrolled in the ACEH's Peer Training Program with perfect attendance. Linda is now happy to have a peaceful, quiet safe haven to call home.

VALERIE HENRY

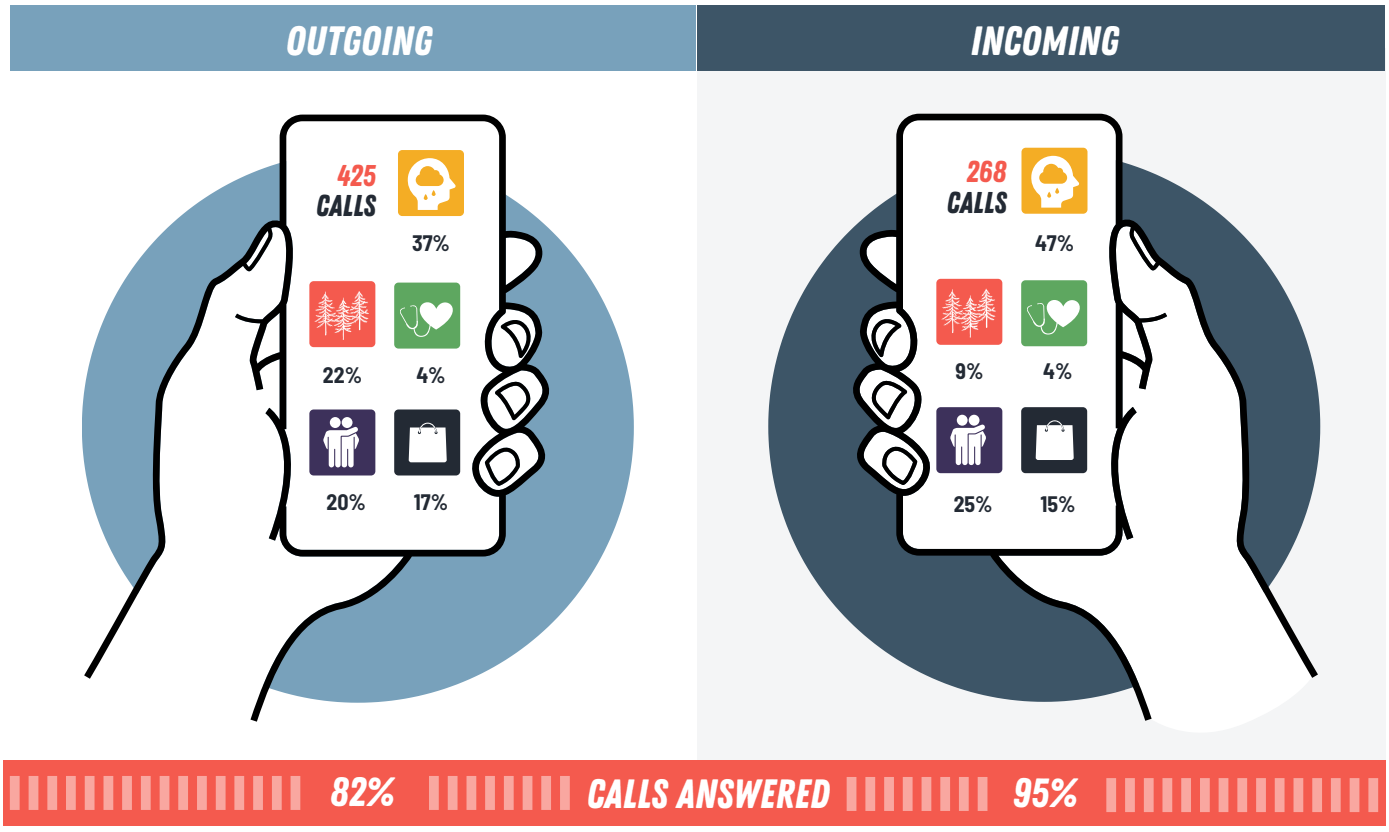
was living downtown in a small bedroom at the Mt. Tolmie hospital when she was selected to move into independent housing in the Westshore. Valerie seized the opportunity. She crafted a resume and began applying at various restaurants around Langford. She landed a full-time job working in a kitchen. She saved up some money, bought herself a vehicle so she could make sure she was able to get to and from work each day. Watching her blossom has been an inspiration!

HOUSING TRANSITION SUPPORT

The Housing Transition Advocate (HTA) supports Family Members as they move forward in the housing continuum toward independent living. This transition can present personal challenges, including isolation, for those previously unhoused or living in Culturally Supportive Housing.

The dedicated, ongoing support of the HTA during these critical junctures helps Family Members remain on their pathways to healing and recovery. Over a 9-month period she engaged in a total of 693 communications to provide support in the following ways:

MENTAL HEALTH | WELLNESS ACTIVITY | SERVICE SUPPORT | SERVICE REFERRALS | INFORMATION / ITEM DISTRIBUTION



FAMILY REUNIFICATION PROGRAM

The Family Reunification Program (FRP) provides a safe, comfortable home environment for Indigenous Street Family members to visit with their children and grandchildren in Ministry care or staying with extended family. In addition to accessing the 3-bedroom townhouse, the following supports are provided by the program coordinator: service navigation, visitation supervision as needed, house maintenance, and safety preparedness.

Through the FRP, self-identity is strengthened, intergenerational familial connection is (re)built, and Indigenous Street Family members who otherwise would be unable to connect with their children are finding a deep, lasting purpose. In its first year of operation, access to the FRP has proven to have transformational impacts, leading to harm reduction among parents and extended visitations with their children over time.

FEATURE STORY

Valma, her husband Darcy, and their 6 year old daughter Lydia, were supported by the the ACEH's Family Townhouse Program for 2 months. Today, we have successfully housed the Sampson family through Pacifica Housing into a cost effective home where their family can live, laugh, and support each other, without worry of being unhoused.

"When working with individuals impacted by the housing crisis, I've been incredibly grateful that ACEH has been able to step in and provide needed supports right away. The rate at which ACEH has grown shows just how vital they are to our community - as housing providers, as an advocacy organization, and in demonstrating what culturally safe and informed Indigenous housing can look like. In addition, their research and community-building informs so much of the work I do in Ottawa."

LAUREL COLLINS
Member of Parliament for Victoria

HOUSE OF COURAGE, OPENING FALL 2022

With support from BC Housing the ACEH will fulfill its plan to transfer Family Members living at the Culturally Supportive House to a new enhanced housing site in Victoria West. The naming of the house, House of Courage, occurred on October 18, 2021 during a gathering of local Elders who considered the character of ACEH Family Members embarking upon their journey toward healing and recovery. Elders chose this name to recognize their courage, resiliency, and bravery. Bradley Yuxwelupton Dick, who was present at the gathering of Elders, has been commissioned with developing the artwork for the new building, which will include local FNMI themes.

A blessing of the site occurred on July 29, 2021 in the presence of honoured witnesses. Joe Seward III and Joe Seward Jr. offered a welcome, as did Frank George on behalf of Songhees Nation. XULĆILUM (Fred Charlie) and TULXUMKEN (Roger Charlie) acknowledged and honoured FNMI ancestors through song and prayer. The ACEH's projected move in date is October 2022 and already local members of the community are demonstrating their support. The Market Garden, located across the street from the House of Courage, has reached out, and looks forward to welcoming their new neighbours into the community.

Based out of the House of Courage will be the city's first Indigenous-led detox program. It will be supported by the ACEH's Elders, cultural mentors, and nurses.

ADDITIONAL ACKNOWLEDGEMENTS

The Aboriginal Coalition to End Homelessness Society would like to extend its thanks to BC Housing for funding staffing and operational costs; the First Nations Health Authority for funding land-based healing and a Registered Nurse; the City of Victoria for funding frontline outreach and wellness services; the Capital Regional District for funding housewares, supplies, and basic needs; the Rotary Club of Victoria for its $10k donation to assist with furnishing the family townhouse; and the University of Victoria for a range of critical research support.