Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Notice of Meeting and Meeting Agenda
Skana Water Service Committee

Friday, June 13, 2025 | **9:30 AM** | **Goldstream Conference Room, 479 Island Hwy, Victoria BC V9B 1H7**

Members of the public can view the live meeting via MS Teams link: **Click here**
Alternatively, to hear the meeting via telephone:
Call: 1-877-567-6843 and enter the Participant Code 793 019 880#

W. Korol (Chair), R. Anthony (Vice Chair), P. Brent (EA Director), M. Bentley, B. Hill

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 Agenda

3. Adoption of Minutes

3.1. 25-0720 Minutes of the Skana Water Service Committee meeting of March 4, 2025.

Recommendation: That the minutes of the Skana Water Service Committee meeting of March 4, 2025 be adopted as circulated.

Attachments: Minutes - March 4, 2025

4. Chair's Remarks

5. Presentations/Delegations

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

Delegations will have the option to participate electronically. Please complete the online application at www.crd.ca/address no later than 4:30 pm two days before the meeting and staff will respond with details.

Alternatively, you may email your comments on an agenda item to the Committee at legserv@crd.bc.ca.

6. Commission Business

6.1. 25-0650 Senior Manager's Verbal Update

Recommendation: There is no recommendation. This verbal update is for information only.

6.2. 25-0644 2024 Annual Report

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

Attachments: Staff Report: 2024 Annual Report - Cover Report

Appendix A: 2024 Annual Report

Appendix B: Statement of Operations and Reserve Balances

6.3. 25-0668 Capital Projects and Operational Update - June 2025

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

Attachments: Staff Report: Project and Operations Update - June 2025

Appendix A: Technical Memo - Tank Replacement Options Analysis

6.4. 25-0678 Capital Projects Requiring Funding - Potential Funding Options and Cost Implications

Recommendation: 1. That the petition process be initiated to borrow up to $1,100,000 over 25 years debt term to complete the capital improvement projects.
2. If the petition process is successful, that a loan authorization bylaw be advanced to the Electoral Areas Committee and Capital Regional District Board for readings and adoption; and
3. That staff complete the remaining steps required to secure the funds and begin the projects.

Attachments: Staff Report: Capital Project Funding Options and Cost Implications

Appendix A: Matrix of Elector Approval Processes

Appendix B: Draft Letter & Petition for the Skana Water System Borrowing

7. Notice(s) of Motion

8. New Business

9. Adjournment

The next meeting is Thursday, October 23, 2025 at 9:30 am.

To ensure quorum, please advise Megan MacDonald (mmmacdonald@crd.bc.ca) if you or your alternate cannot attend.

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Capital Regional District

625 Fisgard St.,
Victoria, BC V8W 1R7

Meeting Minutes

Skana Water Service Committee

Tuesday, March 4, 2025 **9:30 AM** **Goldstream Conference Room**
479 Island Hwy
Victoria BC V9B 1H7

PRESENT:
P. Brent (EA Director), R. Anthony, M. Bentley, B. Hill (EP), W. Korol

Staff: T. Robbins, Chief Administrative Officer; A. Fraser, General Manager, Infrastructure and Water Services; Jason Dales, Senior Manager, Wastewater Infrastructure Operations; D. Robson, Manager, Saanich Peninsula Gulf Island Operations; J. Kelly, Manger, Capital Projects; C. Moch, Manager, Water Quality; Marlene Lagoa, Manager, Legislative Services and Deputy Corporate Officer; Denise Dionne, Manager, Business Support Services; Megan MacDonald, Legislative Services Coordinator (Recorder)

EP – Electronic Participation

The meeting was called to order at 9:30 am.

1. Territorial Acknowledgement

D. Robson provided a Territorial Acknowledgement.

2. Election of Chair

D. Robson called for nominations for the position of Chair of the Skana Water Service Committee for 2025.

R. Anthony nominated W. Korol. W. Korol accepted the nomination.

D. Robson called for nominations a second and third time.

Hearing no further nominations, D. Robson declared Warren Korol the Chair of the Skana Water Service Committee for 2025 by acclamation.

3. Election of Vice Chair

The Chair called for nominations for the position of Vice Chair of the Skana Water Service Committee for 2025.

M. Bentley nominated R. Anthony. R. Anthony accepted the nomination.

The Chair called for nominations a second and third time.

Hearing no further nominations, the Chair declared Robert Anthony the Vice Chair of the Skana Water Service Committee for 2025 by acclamation.

4. Approval of Agenda

MOVED by P. Brent, SECONDED by R. Anthony,
That the agenda be approved as amended with the addition of the following items:
- 10.1. Operational Communication and Notification Policy
- 10.2. Water Conservation Policy
- 10.3. History of Leaks and Calculation of Rolling Averages
CARRIED

5. Adoption of Minutes

5.1. 25-0226 Minutes of the Skana Water Service Committee Meeting of October 31, 2024

MOVED by W. Korol, SECONDED by P. Brent,
That the minutes of the Skana Water Service Committee meeting of October 31, 2024 be adopted.

MOVED by W. Korol, SECONDED by R. Anthony,
That the minutes be amended by attaching the Chairs Remarks.
CARRIED

MOVED by W. Korol, SECONDED by R. Anthony,
That the minutes be amended by removing the following sentence from Item 4. "Director Brent suggested that the committee could hold an informal meeting with the community, similar to other small water systems, to keep the water system users informed." and replacing it with "The Committee requested Infrastructure and Water Services (IWS) hold a community engagement meeting. Director Brent offered to set up an informal meeting with the community and one IWS staff member attending either virtually or in person."
CARRIED

MOVED by W. Korol, SECONDED by R. Anthony,
That the minutes be amended by removing the following bullet from Item 6. "The Committee wants a minimum of three water conservation signs installed in the community." and replacing it with "The Committee advised more than one sign is needed, possibly up to three, to reach all members of the system."
CARRIED

MOVED by W. Korol, SECONDED by R. Anthony,
That the minutes be amended by adding the following to the end of the last sentence under Item 7.1. Project 24-02 Storage Tank Options Assessment "and this is not followed consistently and will be followed more consistently in future."

MOVED by P. Brent, SECONDED by W. Korol,
That the minutes be amended by removing the following sentence from Item 7.1. Decommissioning Unused Wells "A right-of-way is in place for CRD-owned wells."
CARRIED

MOVED by W. Korol, SECONDED by R. Anthony,
That the minutes be amended by adding the following sentence to the end of the first paragraph on Item 7.3."The Committee requested that the budget more clearly state the date the estimated year end totals were calculated."
CARRIED

The question was called on the main motion as amended.

That the minutes of the Skana Water Service Commtitee meeting of October 31, 2024 be adopted as amended.
CARRIED

6. Chair's Remarks

The Chair thanked staff for being present at the meeting and working towards the shared goal of a safe and reliable water service for all users.

7. Presentations/Delegations

There were no presentations or delegations.

8. Commission Business

8.1. 25-0228 Senior Manager's Verbal Update

A. Fraser presented Item 7.1. and provided information related to upcoming Water Conservation Bylaw amendments, water conservation signage, communication tools and emergency notification procedures.

Discussion ensued regarding:
- approval procedure for bylaw amendments
- water shortage concerns
- financial implications of purchasing additional water to support the system
- request for more restrictive water conservation in the service area

MOVED by W. Korol, SECONDED by R. Anthony,
That Committee members will provide feedback to the Electoral Area Director on the proposed Water Conservation Bylaw Amendment by Tuesday March 11, 2025, and that the Chair will consider registering as a delegation to the Electoral Areas Committee when this Bylaw is considered.
CARRIED

Discussion continued regarding:
- proposed water conservation signage on Waugh Road
- a grant received by the CRD provides funding for the installation of one sign
- potential for additional signage funding in the Capital Plan for next year

MOVED by W. Korol, SECONDED by P. Brent,
That the committee request the intersection of Georgina Point Road and Waugh Road be investigated as a possible sign location.
CARRIED

8.2. 25-0215 Capital Projects and Operational Update - March 2025

J. Kelly and D. Robson presented item 7.2. for information.

Discussion ensued regarding:
- potential for refurbishment of the existing water storage tanks
- clarification on the various options for storage tank replacement
- water colour and quality during periods of high consumption
- process to obtain funding for required capital works
- community consultation opportunities and consent requirements for borrowing once the project scope is finalized

MOVED by W. Korol, SECONDED by P. Brent,
Regarding the storage tank options assessment for final issue, the Skana Water Service Committee requests that:
1. A definitive statement be included on the refurbishment of existing water storage tanks;
2. Wording is clarified to talk about the difference in volume/capacity between large single tank and the two other options;
3. The life cycle analysis be reconsidered for differences in capital, installation and transportation costs of the tanks on different replacement frequencies; and
4. Staff report back on the funding mechanism, electoral consent options and schedule for the work at the June meeting.
CARRIED

9. Notice(s) of Motion

There were no notice(s) of motion.

10. New Business

10.1. Operational Communication and Notification Policy

Committee members developed a suggested Operational Communication and Notifications Policy to improve system specific information to users of the water service. The Chair introduced the suggested Policy.

The Chief Administrative Officer clarified that the Committee does not have authority to develop or approve CRD policies. System specific policies would be a challenge administratively and concerns were raised about privacy legislation and the management of personal information.

Discussion ensued regarding:
- limitations of the Public Alert Notification System (PANS)
- methods of delivering notification
- notification procedures, including community notices and door to door delivery
- water conservation efforts and applicable fines for bylaw infractions
- standard operating procedures during drought
- staff capacity while balancing multiple projects and timelines

MOVED by W. Korol, SECONDED by R. Anthony,
The Skana Water Service Committee request that staff provide a report that outlines the operational implementation options and associated costs that address the desired outcomes of the suggested Operational Communication and Notifications Policy.
CARRIED

10.2. Water Conservation Policy

Committee members developed a suggested Skana Water Conservation Policy to improve water conservation efforts in the service area. The Chair introduced the suggested policy and clarified that system specific restrictions are being requested due to elevated concerns.

A. Fraser requested that committee members review the Water Conservation Bylaw Amendment and make recommendations to the Electoral Areas Committee for consideration.

10.3. History of Leaks and Calculation of Rolling Averages

The Chair spoke to recent leaks during a cold weather event and rolling averages of water quality testing. He noted the importance of educating owners that water meters and valves should not be altered.

Discussion ensued regarding:
- procedure for determining possible water leaks
- accessibility of the water shut off valve to residents
- difficulty finding water shut-off valves during snow
- disinfection byproducts and seasonal fluctuations
- water quality testing frequency and regulations

11. Adjournment

MOVED by R. Anthony, SECONDED by P. Brent,
That the Skana Water Service Committee Meeting of March 4, 2025 be adjourned at 12:12 pm.
CARRIED

_____
Chair

_____
Recorder

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REPORT TO SKANA WATER SERVICE COMMITTEE
MEETING OF FRIDAY, JUNE 13, 2025

SUBJECT **2024 Annual Report - Cover Report**

ISSUE SUMMARY

Per the *Drinking Water Protection Act*, a water supplier must prepare and make public, within 6 months of the end of the calendar year, an annual report. The Annual Report provides a summary of the Skana Water Service for 2024.

BACKGROUND

The Skana Water System is located on the north side of Mayne Island in the Southern Gulf Islands Electoral Area and provides drinking water to approximately 52 single family equivalents. Capital Regional District (CRD) is responsible for the operation and maintenance of the system and the overall quality of the drinking water provided to customers in the Skana Water System.

RECOMMENDATION

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

Submitted by:	Jason Dales, B. SC., WD IV, Senior Manager, Wastewater Infrastructure Operations
Submitted by:	Joseph Marr, P. Eng., Senior Manager, Infrastructure Engineering & Planning
Submitted by:	Varinia Somosan, CPA, CGA, Senior Manager, Financial Services / Deputy CFO
Concurrence:	Glenn Harris, Ph.D., R.P.Bio., Acting General Manager, Parks, Recreation and Environmental Services
Concurrence:	Alicia Fraser, P. Eng., General Manager, Infrastructure and Water Services

ATTACHMENT(S)

Appendix A: 2024 Annual Report
Appendix B: 2024 Statement of Operations and Reserve Balances

Skana Water System

2024 Annual Report

CRD | Drinking Water

Introduction

This report provides a summary of the Skana Water Service for 2024 and includes a description of the service, summary of the water supply, demand and production, drinking water quality, operations highlights, capital project updates and financial report.

Service Description

The community of Skana is a rural residential development located on the north side of Mayne Island in the Southern Gulf Islands Electoral Area, originally serviced by a private water utility. In 2003, the service converted to the Capital Regional District (CRD). The Skana Water Service (Figure 1) is made up of 73 parcels encompassing a total area of approximately 19 hectares. Of the 73 parcels, 52 were customers of the water system in 2024.

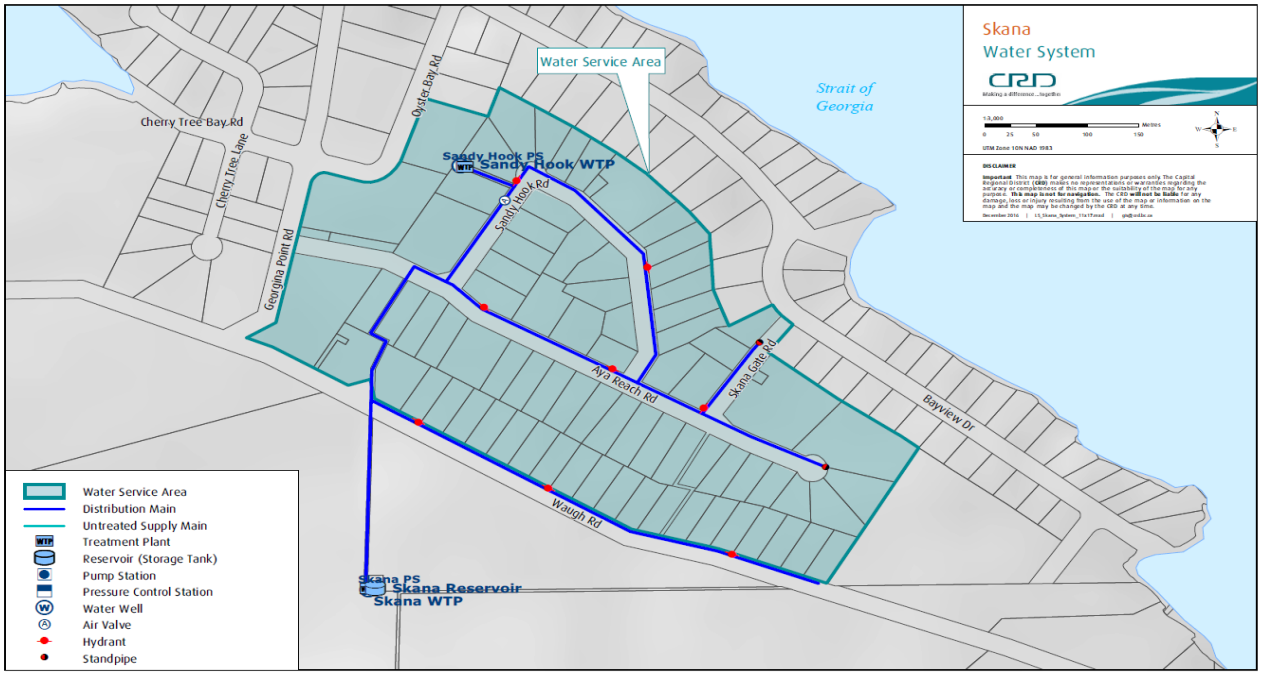


Figure 1: Map of Skana Water System

The Skana water system is primarily comprised of:

- Two groundwater wells, related pumping and control equipment and buildings (Production Wells #8 and Well #13).
- Disinfection process equipment (ultraviolet light and chlorine at each well).
- Two steel storage tanks (total volume is 91 cubic meters).
- Distribution system (approx.1,970 meters of water mains).

- Other water system assets: 52 service connections and meters, eight flushing hydrants, two flushing standpipes, 15 gate valves, one air release valve, Supervisory Control and Data Acquisition (SCADA) system and auxiliary generator.

Water Supply

Groundwater supply monthly water levels are highlighted for 2024 in Figure 2. Resource water level recorded for March is lower due to high water system demands primarily due to leaks. Aquifer water levels were typical for the remainder of the year.

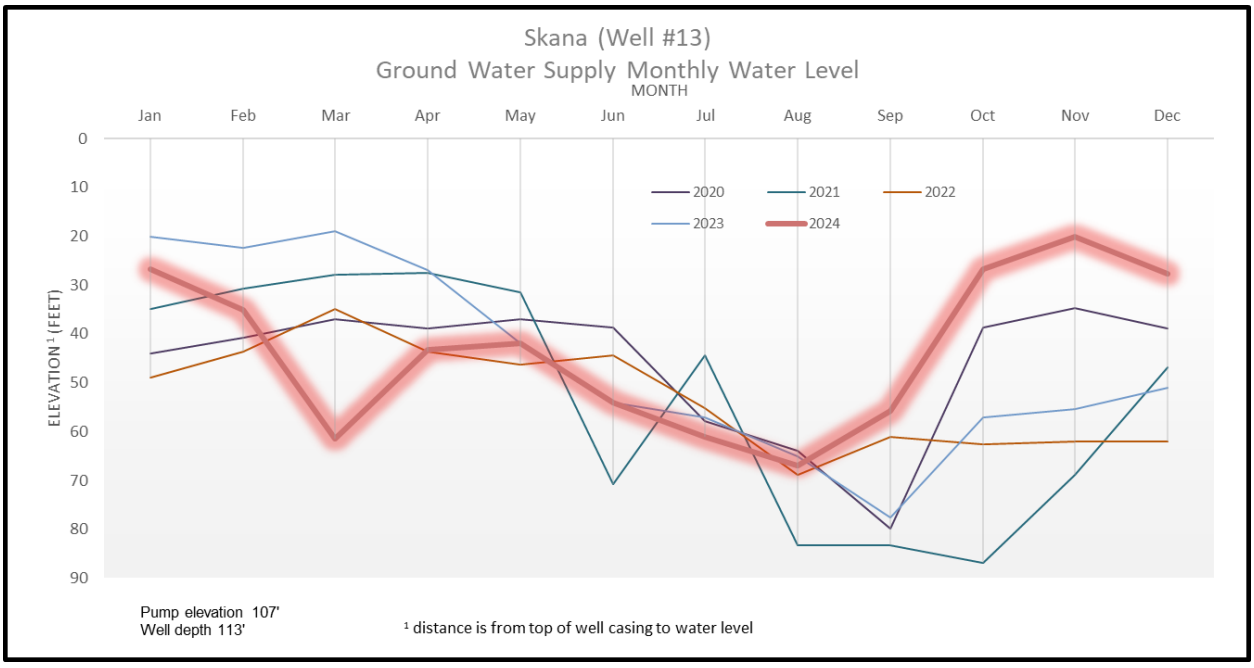


Figure 2: Skana Well #13 Groundwater Supply Monthly Water Level

Water Production and Demand

Referring to Figure 3; 3,727 cubic meters of water were extracted (water production) from the groundwater source (Well #13 and Well #8) in 2024; a 1% decrease from the previous year and a 16% decrease from the five-year average. Water demand (customer water billing) for the service totaled 2903 cubic meters of water; a 2% decrease from the previous year and a 13% decrease from the five-year average.

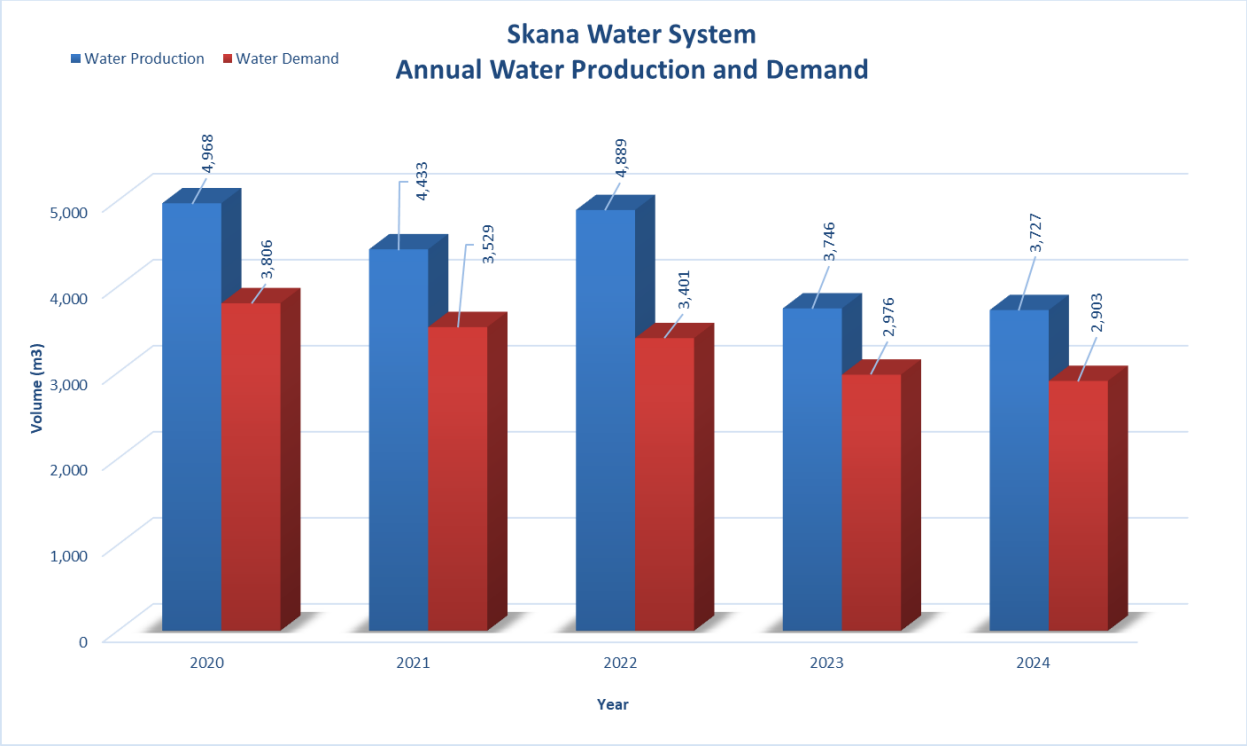


Figure 3: Skana Water Service Annual Water Production and Demand

The difference between annual water production and annual customer water demand is referred to as non-revenue water and can include water system leaks, water system maintenance and operational use (e.g. water main flushing, filter system backwashing), potential unauthorized use and fire-fighting use.

The 2024 non-revenue water (824 cubic meters) represents approximately 22% of the total water production for the service area. However, approximately 600 cubic meters is attributed to operational use resulting in a non-revenue water volume of approximately 224 cubic meters or 6.0%.

Figure 4 below illustrates the monthly water production for 2024 along with the historical water production information. The monthly water production trends are typical for small water systems such as the Skana water system. However, water production in early 2024 was abnormally higher because of water system leak that was located and repaired.

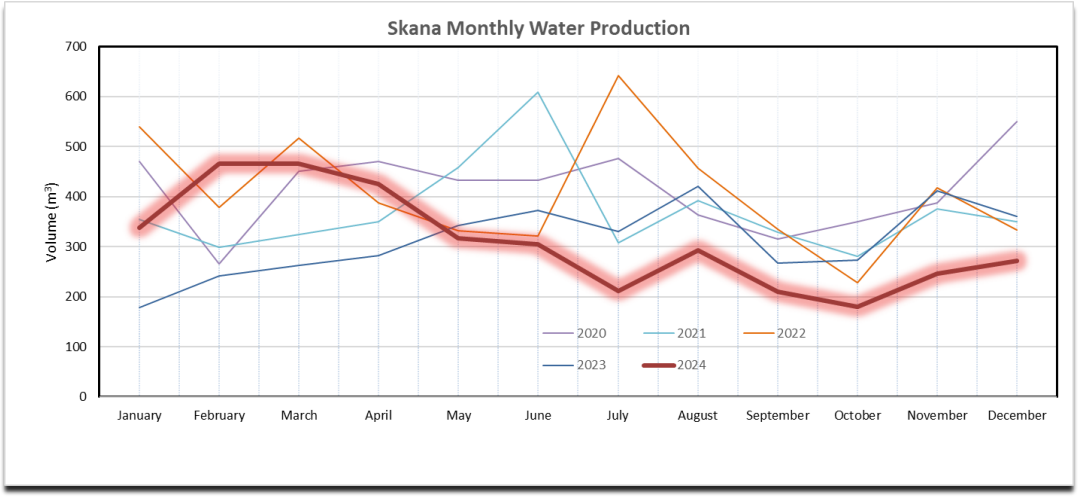


Figure 4: Skana Water Service Monthly Water Production.

Drinking Water Quality

Staff completed the water quality monitoring program at Skana based on regulatory requirements and system specific risks. Samples were collected at regular frequencies from the raw water, at the treatment plant as well as from several sampling stations in the distribution system. The samples were shipped for various analyses to the CRD's Water Quality Lab or to external laboratories for special analyses such as disinfection by-products or metals.

The water system generally supplied drinking water of good quality to the community in 2024. The main source Well #13 ran low during the peak of summer/fall and backup Well #8 had to supplement the source supply. A positive find was that the water quality supplied by Well #8 improved with higher usage. Since the decommissioning of several abandoned wells in the area, both supply wells have not recorded a bacteria positive test again. This is a notable improvement but there were still indicators of surface water influence. The raw water from Well #13 experienced again elevated iron and manganese concentrations during periods with rapid aquifer recharge.

During the wet season, disinfection by-product (DBP) concentrations in the distribution system came close but did not exceed the maximum acceptable concentration (MAC) listed in the Guidelines for Canadian Drinking Water Quality (GCDWQ). The rolling annual average concentration of DBP was below the health limit MAC.

The data below provides a summary of the water quality characteristics in 2024:

Raw Water:

- Well #13, the primary source, and Well #8, the backup and supplemental well, were both free of any indicator bacteria in 2024.
- While Well #13 supplied mostly water with turbidity levels well under 1 Nephelometric Turbidity Unit (NTU), in December and April it recorded turbidity levels of up to 1.5 NTU. This again is linked to rainfall and runoff events and therefore evidence of surface water influence.
- During the summer, source supply was supplemented with water from Well #8, the utility's backup water source. Water from Well #8 consistently supplied raw water with turbidity levels of less than 1 NTU.
- The median raw water turbidity was 0.48 NTU. This was slightly lower than in previous years.
- The raw water was hard (hardness 81.5 mg/L $CaCO_3$).
- The total organic carbon (TOC) concentration in the raw water ranged from 1.1 to 4.1 mg/L with the higher concentrations recorded in the winter during rainy periods. Episodes of high TOC have the potential for high disinfection by-product concentrations. TOC levels of 4.1 mg/L are also not typical for a true groundwater source and therefore evidence of surface water influence.

Treated Water:

- The treated water was safe to drink with no *E. coli* or total coliform bacteria positive test results.
- The median treated water turbidity was 0.50 NTU. In December, the treated water turbidity leaving the treatment plant slightly exceeded the 1 NTU threshold due to increased raw water turbidity. The sampling station on Skana Gate Road regularly registered elevated turbidity throughout the year. This was due to accumulation effects at this dead-end pipe section and should be addressed by regular spot flushes.
- The disinfection by-product total trihalomethanes (TTHM) were consistently below the MAC of 100 µg/L at the Skana Gate Road and the Waugh Road sampling location. In February, the TTHM concentrations came very close to the MAC (99 µg/L) and the HAA concentrations slightly exceeded the MAC of 80 µg/L with 89 µg/L at Skana Gate Road due to the higher

organic load in the raw water during rapid aquifer recharge periods. But the annual rolling average of the HAA concentrations of 34.6 µg/L was well below the MAC in 2024.

- In February, the iron and aluminum concentrations in the treated water leaving the treatment plant, and in the distribution system on Skana Gate Road. were above the aesthetic limit in the GCDWQ, and manganese concentrations even over the MAC. Elevated iron concentrations persisted in the distribution system into May possibly leading to water discolouration. However, no customer complaints about discolored water were received. Spot flushing in strategic locations in the distribution system during the winter/spring period would be adequate to prevent MAC exceedances through accumulation.
- In December and February, the treated water had a high colour ratings which was linked to the higher iron and manganese concentrations during this period.
- The free chlorine residual concentrations ranged from 0.04 to 1.76 mg/L with a median of 0.69 mg/L in the distribution system indicating satisfactory secondary disinfection.

Table 1 and 2 below provide a summary of the 2024 raw and treated water test results.

Water quality data collected from this drinking water system can be reviewed on the CRD website:

https://www.crd.bc.ca/about/data/drinking-water-quality-reports

Operational Highlights

The following is a summary of the major operational issues that were addressed by CRD Infrastructure and Water Services staff:

- Well #8 chlorine dosing pump corrective maintenance. Additionally, the electrical contactor, motor starter and flex conduit also required corrective maintenance.
- Emergency response to a report of dirty water by a resident. It was determined that the hydrant/standpipe annual preventative maintenance likely caused sediment within the distribution system to be disturbed causing the dirty water event. In further review of this event, it has become evident that the current water distribution system preventative maintenance program is not effective enough to remove sediment buildup. A more robust water system flushing program is being considered.
- Water service leak repair at Aya Reach Road.
- Emergency water delivery due to drought conditions on September 4, September 6 and September 9. A total of 42 cubic meters was delivered to allow Well #13 and Well #8 to recover.
- Water tanks drained, cleaned and visually inspected on November 19, 2024. The tank was last cleaned and inspected in 2021. Interior tank observations indicated a heavy number of carbuncles and corrosion in 2021 and similar findings during the most recent inspection.
- Corrective maintenance of the chlorine analyzer system. The chlorine probe required replacement primarily due to age and the requirement for greater accuracy reading.

Capital Projects Update

The Capital Projects that were in progress or completed in 2024 include:

- Storage Tank Options Assessment – CRD commenced updating the options assessment for the replacement of the Skana water storage tanks.

Financial Report

Please refer to the attached 2024 Statement of Operations and Reserve Balances.

Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), interest on savings (interest earnings), transfer from the Operating Reserve Fund, and miscellaneous revenue such as late payment charges (other revenue).

Expenses include all the costs of providing the service. General Government Services include budget preparation, financial management, utility billing and risk management services. CRD Labour and Operating Costs include CRD staff time as well as the costs of equipment, tools, and vehicles. Debt servicing costs are interest and principal payments on long term debt. Other Expenses include all other costs to administer and operate the water system, including insurance, supplies, water testing and electricity.

The difference between Revenue and Expenses is reported as Net revenue (expenses). Any transfers to or from capital or reserve funds for the service (Transfers to own funds) are deducted from this amount and it is then added to any surplus or deficit carry forward from the prior year, yielding an Accumulated Surplus (or deficit). In alignment with Local Government Act Section 374 (11), any deficit must be carried forward and included in next year's financial plan.

For questions related to this Annual Report please email IWSAdministration@crd.bc.ca

Table 1

Table 1: 2024 Summary of Raw Water Test Results, Skana Water System										
PARAMETER		**2024 ANALYTICAL RESULTS**				**CANADIAN GUIDELINES**	**2014-2023 ANALYTICAL RESULTS**			
Parameter	Units of	Annual	Samples	Range				Samples	Range	
Name	Measure	Median	Analyzed	Minimum	Maximum	≤ = Less than or equal to	Median	Analyzed	Minimum	Maximum
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness as $CaCO_3$	mg/L	**81.5**	4	66.2	93.8	No Guideline Required	87.4	31	27.5	114
Colour, True	TCU	**6.5**	20	< 2	21		< 2	32	1.3	13
Turbidity	NTU	**0.475**	20	0.2	1.5		0.565	104	0.1	70
Water Temperature	deg C	**11.1**	37	9.6	13.1		7	254	5.1	21.3
pH	pH units	**7.35**	2	6.9	7.8	AO pH 7.0 -10.5	7.22	23	6.6	8.12
Total Organic Carbon	mg/L	**2.4**	4	1.1	4.1		2.35	30	1.2	6.09
Metals										
Aluminum	ug/L as Al	**16.1**	4	< 3	54.2	2900 MAC / 100 OG	11	32	< 3	110
Antimony	ug/L as Sb	**< 0.5**	4	< 0.5	< 0.5	6 MAC	< 0.5	32	< 0.5	< 0.5
Arsenic	ug/L as As	**0.17**	4	0.16	0.18	10 MAC	0.19	32	0.12	0.99
Barium	ug/L as Ba	**2.1**	4	1.7	2.2	1000 MAC	2.3	32	1.3	< 9
Beryllium	ug/L as Be	**< 0.1**	4	< 0.1	< 0.1		< 0.1	32	< 0.1	< 3
Bismuth	ug/L as Bi	**< 1**	4	< 1	< 1		< 1	28	< 1	< 1
Boron	ug/L as B	**118.5**	4	64	148	5000 MAC	123.5	32	< 50	345
Cadmium	ug/L as Cd	**< 0.01**	4	< 0.01	< 0.01	7 MAC	< 0.01	32	< 0.01	< 0.1
Calcium	mg/L as Ca	**25.8**	4	20.7	29.9	No Guideline Required	27.6	32	10.1	36
Chromium	ug/L as Cr	**< 1**	4	< 1	< 1	50 MAC	< 1	32	< 1	< 10
Cobalt	ug/L as Co	**< 0.2**	4	< 0.2	< 0.2		< 0.2	32	< 0.2	< 20
Copper	ug/L as Cu	**10.255**	4	3.51	16.7	2000 MAC / ≤ 1000 AO	< 8	32	1.48	32
Iron	ug/L as Fe	**21.25**	4	< 5	63.3	≤ 100 AO	15.8	32	< 5	464
Lead	ug/L as Pb	**1.265**	4	0.56	2.38	5 MAC	0.385	32	< 0.2	3.7
Lithium	ug/L as Li	**9.45**	4	7.3	10.6		10.35	16	7.3	15.9
Magnesium	mg/L as Mg	**4.145**	4	3.52	4.65	No Guideline Required	4.435	32	0.566	5.96
Manganese	ug/L as Mn	**12.85**	4	4.3	18.3	120 MAC / ≤ 20 AO	6	32	0.077	48.6
Molybdenum	ug/L as Mo	**< 1**	4	< 1	1		< 1	32	< 1	< 20
Nickel	ug/L as Ni	**< 1**	4	< 1	< 1		< 1	32	< 1	< 50
Potassium	mg/L as K	**0.2205**	4	0.18	0.229		0.229	32	0.093	0.348
Selenium	ug/L as Se	**< 0.1**	4	< 0.1	< 0.1	50 MAC	< 0.1	32	< 0.1	1.07
Silicon	ug/L as Si	**8650**	4	8060	8930		8395	32	6090	9210
Silver	ug/L as Ag	**< 0.02**	4	< 0.02	< 0.02	No Guideline Required	< 0.02	32	< 0.02	< 10
Sodium	mg/L as Na	**37.6**	4	27.7	50	≤ 200 AO	41.4	32	23.6	86.5
Strontium	ug/L as Sr	**69.5**	4	61.2	75.1	7000 MAC	76.15	32	53	99.7
Sulfur	mg/L as S	**7.45**	4	5.8	8.7		8.7	28	3.2	12.6
Thallium	ug/L as Tl	**0.0105**	4	< 0.01	0.011		< 0.01	28	< 0.01	< 0.05
Tin	ug/L as Sn	**< 5**	4	< 5	< 5		< 5	32	< 5	< 20
Titanium	ug/L as Ti	**< 5**	4	< 5	< 5		< 5	32	< 5	< 10
Uranium	ug/L as U	**< 0.1**	4	< 0.1	< 0.1	20 MAC	< 0.1	28	< 0.1	0.18
Vanadium	ug/L as V	**< 5**	4	< 5	< 5		< 5	32	< 5	< 10
Zinc	ug/L as Zn	**27.3**	4	14.3	40.7	≤ 5000 AO	7.5	32	< 1	198
Zirconium	ug/L as Zn	**< 0.1**	4	< 0.1	0.25		< 0.1	28	< 0.1	< 0.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	**< 1**	20	< 1	< 1		< 1	160	0	G 200
E. coli	CFU/100 mL	**< 1**	20	< 1	< 1		< 1	160	0	11
Heterotrophic bacteria, 7 day	CFU/mL	Not analyzed in 2024					10	1	10	10
Parasites										
Cryptosporidium, Total oocysts	oocysts/100 L	Last tested in 2015				Zero detection desirable	0	3	0	0
Giardia, Total cysts	cysts/100 L	Last tested in 2015				Zero detection desirable	0	3	0	0

Table 2

Table 2: 2024 Summary of Treated Water Test Results, Skana Water System										
PARAMETER	**2024 ANALYTICAL RESULTS**					**CANADIAN GUIDELINES**	**2014-2023 ANALYTICAL RESULTS**			
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum	Range Maximum	≤ = Less than or equal to	Median	Samples Analyzed	Range Minimum	Range Maximum
ND means Not Detected by analytical method used										
Physical Parameters										
Hardness	mg/L as CaCO3	**82.3**	8	67	93.5		84.5	56	27	107
Colour, True	TCU	**5**	30	< 2	28		< 2	48	< 2	10
pH	pH units	**6.9**	2	6.7	7.1	AO pH 7.0 -10.5	7	15	7	8.1
Turbidity	NTU	**0.5**	31	0.2	15		0.55	211	0	40
Total Organic Carbon	mg/L	**2**	2	2	2		1.75	50	0	5
Water Temperature	deg C	**11.05**	162	5.7	17.6		7.5	1665	1	23.5
Microbial Parameters										
Indicator Bacteria										
Coliform, Total	CFU/100 mL	**<1**	55	<1	<1	0 MAC	< 1	425	0	99
E. coli	CFU/100 mL	**< 1**	55	< 1	< 1	0 MAC	< 1	425	0	10
Hetero. Plate Count, 7 day	CFU/1 mL	**6255**	2	510	12000	No Guideline Required	< 10	45	< 10	15000
Disinfectants										
Disinfectants										
Chlorine, Free Residual	mg/L as Cl2	**0.69**	164	0.04	1.76		0.76	1684	0.04	4.8
Chlorine, Total Residual	mg/L as Cl2	Not analyzed in 2024					0.79	1004	0.1	5.9
Disinfection By-Products										
Disnfection Byproducts										
Bromodichloromethane	ug/L	**17.0**	8	15.0	23.0		20	8	12	29
Bromoform	ug/L	**17.0**	8	15.0	23.0		< 1	69	< 0.1	1.71
Chloroform	ug/L	**45.5**	8	26.0	82.0		61.5	8	15	120
Chlorodibromomethane	ug/L	**5.1**	8	1.4	9.8		5.1	8	1.6	7.5
Total Trihalomethanes	ug/L	**73.0**	8	52.0	99.0	100 MAC	72	69	23.1	190
Haloacetic Acids (HAAs)										
HAA5	ug/L	**21**	4	7.4	89	80 MAC	20	15	7.7	140
Metals										
Aluminum	ug/L as Al	**10.5**	8	< 3	161	2900 MAC / 100 OG	19.7	57	< 3	164
Antimony	ug/L as Sb	**< 0.5**	8	< 0.5	< 0.5	6 MAC	< 0.5	57	< 0.5	< 0.5
Arsenic	ug/L as As	**0.16**	8	0.14	0.57	10 MAC	0.18	57	< 0.1	0.97
Barium	ug/L as Ba	**2**	8	1.6	4.6	1000 MAC	2.3	57	1.1	< 9
Beryllium	ug/L as Be	**< 0.1**	8	< 0.1	< 0.1		< 0.1	57	< 0.1	< 3
Bismuth	ug/L as Bi	**< 1**	8	< 1	< 1		< 1	55	< 1	< 1
Boron	ug/L as B	**140**	8	67	167	5000 MAC	124	57	53	507
Cadmium	ug/L as Cd	**< 0.01**	8	< 0.01	0.01	7 MAC	< 0.01	57	< 0.01	< 0.1
Calcium	mg/L as Ca	**26.1**	8	20.9	30	No Guideline Required	26.7	57	9.8	34.3
Chromium	ug/L as Cr	**< 1**	8	< 1	< 1	50 MAC	< 1	57	< 1	< 10
Cobalt	ug/L as Co	**< 0.2**	8	< 0.2	0.3		< 0.2	57	< 0.2	< 20
Copper	ug/L as Cu	**13**	8	5.76	66.6	2000 MAC / ≤ 1000 AO	7.58	57	3.48	118
Iron	ug/L as Fe	**32.5**	8	9	1190	≤ 100 AO	54.4	57	14.3	607
Lead	ug/L as Pb	**1.09**	8	0.2	4.44	5 MAC	0.37	57	< 0.2	29
Lithium	ug/L as Li	**9.6**	8	7.4	11.2		9.95	32	7.4	15.9
Magnesium	mg/L as Mg	**4.11**	8	3.61	4.5	No Guideline Required	4.24	57	0.55	5.15
Manganese	ug/L as Mn	**6**	8	1.7	344	120 MAC / ≤ 20 AO	3.4	57	< 0.004	42.9
Molybdenum	ug/L as Mo	**<1**	8	<1	1.1		< 1	57	< 1	< 20
Nickel	ug/L as Ni	**< 1**	8	< 1	2.3		< 1	57	< 1	< 50
Potassium	mg/L as K	**0.2125**	8	0.193	0.253		0.235	57	0.162	0.409
Selenium	ug/L as Se	**<0.1**	8	<0.1	<0.1	50 MAC	< 0.1	57	< 0.1	0.564
Silicon	ug/L as Si	**8480**	8	7610	9170		8460	57	6550	11800
Silver	ug/L as Ag	**< 0.02**	8	< 0.02	< 0.02	No Guideline Required	< 0.02	57	< 0.02	< 10
Sodium	mg/L as Na	**40.3**	8	30.5	56.5	≤ 200 AO	42.7	57	28.2	87.4
Strontium	ug/L as Sr	**72.1**	8	63.5	81.4	7000 MAC	72.7	57	53.5	89.7
Sulphur	mg/L as S	**7.5**	8	5.6	8.6		8.5	55	3.1	12.8
Thallium	ug/L as Tl	**<0.01**	8	<0.01	0.043		< 0.01	55	< 0.01	< 0.05
Tin	ug/L as Sn	**<5**	8	<5	<5		< 5	57	< 5	< 20
Titanium	ug/L as Ti	**<5**	8	<5	6.2		< 5	57	< 5	31
Uranium	ug/L as U	**< 0.1**	8	< 0.1	0.12	20 MAC	< 0.1	55	< 0.1	0.18
Vanadium	ug/L as V	**< 5**	8	< 5	< 5		< 5	57	< 5	< 10
Zinc	ug/L as Zn	**24.45**	8	7.7	208	≤ 5000 AO	11.5	57	< 5	521
Zirconium	ug/L	**< 0.1**	8	< 0.1	0.63		< 0.1	55	< 0.1	< 0.5

CAPITAL REGIONAL DISTRICT

SKANA WATER
Statement of Operations (Unaudited)
For the Year Ended December 31, 2024

	2024	2023
Revenue		
Transfers from Government	26,580	25,680
User Charges	65,394	61,256
Other revenue from own sources:		
Interest Earnings	55	173
Transfer from Operating Reserve	6,000	-
Recovery from Claim Reimbursement	3,900	-
Other Revenue	195	343
Total Revenue	**102,124**	**87,452**
Expenses		
General Government Services	2,920	2,550
Contract for Services	2,226	2,043
CRD Labour and Operating costs	60,037	41,706
Other Expenses	19,304	14,308
Total Expenses	**84,487**	**60,607**
Net revenue (expenses)	17,637	26,845
Transfers to own funds:		
Capital Reserve Fund	17,637	17,845
Operating Reserve Fund	-	9,000
Annual surplus/(deficit)	-	-
Accumulated surplus/(deficit), beginning of year	-	-
Accumulated surplus/(deficit), end of year	$ -	-

CAPITAL REGIONAL DISTRICT

SKANA WATER
Statement of Reserve Balances (Unaudited)
For the Year Ended December 31, 2024

	Capital Reserve	
	2024	**2023**
Beginning Balance	30,088	11,638
Transfer from Operating Budget	17,637	17,845
Transfer from Completed Capital Projects	1,185	-
Transfer to Capital Projects	(20,000)	-
Interest Income	1,241	605
Ending Balance	30,151	30,088

	Operating Reserve	
	2024	**2023**
Beginning Balance	15,572	6,092
Transfer from Operating Budget	-	9,000
Transfer to Operating Budget	(6,000)	-
Interest Income	739	480
Ending Balance	10,311	15,572

Making a difference...together

REPORT TO SKANA WATER SERVICE COMMITTEE
MEETING OF FRIDAY, JUNE 13, 2025

SUBJECT **Capital Projects and Operational Update - June 2025**

ISSUE SUMMARY

To provide the Skana Water Service Committee with capital project status reports and operational updates.

BACKGROUND

The Skana Water System is located on the north side of Mayne Island in the Southern Gulf Islands Electoral Area and provides drinking water to approximately 52 customers. Capital Regional District (CRD) Infrastructure and Water Services is responsible for the overall operation of the water system. The design and construction of water system facilities are overseen by the CRD Infrastructure, Planning and Engineering and Infrastructure Water Operations divisions. The day-to-day operations and maintenance is currently being performed by CRD Infrastructure Operations. The quality of drinking water provided to customers in the Skana Water System is overseen by the CRD Water Quality division.

Capital Project Update

17-03 | Alternative Approval / Petition Process

Project Description: Conduct public consultation and complete an Alternative Approval Process (AAP) or petition to assess public willingness to utilize debt to fund necessary capital upgrades for the water service.

Project Rationale: Multiple projects including well upgrades and storage tank replacement are deemed necessary for the water service and Capital Reserves are insufficient to cover the capital costs.

With several unsuccessful grant funding attempts, an AAP or petition is proposed to obtain approval to take on debt to fund projects that are critical for the water service.

Project Update and Milestones:

- The Commission was updated at the February 2025 Commission Meeting regarding the recent recommendations and cost estimates for the Skana water tank replacements, which would be the largest capital expenditure on the Capital Plan. Staff advised they would follow up in the June Commission meeting to discuss next steps in either the AAP or Petition process.
- Separate staff report is proposed outlining staff recommendation for obtaining public approval to secure debt funding.

17-04 | Well #8 Upgrade

Project Description: Conduct well improvements including new well liner, replacement of well seal and Supervisory Control and Data Acquisition (SCADA) automation; relocate first customer service line to achieve proper chlorine contact time.

Project Rationale: An inspection of Well #8 identified several deficiencies. Most recommended improvements were carried out in 2018 including the installation of a new well liner, replacement of the well seal, and steel casing. Relocation of the first customer's service line was completed in July 2022. The remaining scope is related to SCADA automation and staff are reviewing the scope and available funding into the first quarter (Q1) of 2025.

Project Update and Milestones:

Milestone	Completion Date
SCADA Automation – Prelim Budget to inform Petition	Q2 2025
Project planning phase	Completed
Relocation of the first customer service line is being evaluated on delivery through CRD staff or contracted services	Completed
Service line replacement and well improvements	Completed

24-01 | Source Water Surveillance

Project Description: Design and install new well surveillance and water monitoring systems. 2024 funding is for initial assessment only.

Project Rationale: To provide operational flexibility and increased monitoring that will improve operational awareness and the ability to analyze trends. The improvements can also be used to improve response times related to water supply issues.

Project Update and Milestones:

Milestone	Completion Date
Preliminary Estimate to inform Petition	Q2 2025
Project Planning Initiated	May 31, 2024
Funding Approved	March 2024

24-02 | Storage Tank Options Assessment

Project Description: Conduct an engineering assessment on options available for replacement of the Skana Water storage tanks. The assessment is to include material options and associated costing, as well as a high-level assessment on installation feasibility.

Project Rationale: Prior to proceeding with tank replacement, a revised options assessment has been proposed to better inform on the potential options and cost implications prior to proceeding to an alternative approval process (AAP) to secure debt for this replacement project.

Project Update and Milestones:

- Associated Engineering (B.C.) Ltd. have submitted their final draft of the Storage Tank Options Analysis Memo, which recommends replacement with two 46 cubic meter (m^3) shop-fabricated welded steel tanks with epoxy coatings. The preliminary cost estimate for this improvement was estimated at $940,000.
- Comments from the February Commission Meeting were taken and incorporated into the final version of the Storage Tank Options Analysis Memo which has been attached as Appendix A for information.

Milestone	Completion Date
Tank Replacement Options Analysis Memo - Final	April 2025
Tank Replacement Options Analysis Memo - Final Draft	February 2025
Engineering Consultant Site Visit	Q4 2024
Engineering Consultant Scope Approved	Q3 2024
Project Planning Initiated	May 31, 2024
Funding Approved	March 2024

Operational Update

This is an operational update reporting period from February through April 2025.

- Emergency response due to high water system demand and dropping water storage tank levels. Emergency leak detection response procedures were initiated. Several properties were identified to have significant leaks likely caused by a cold weather event. Some properties were not appropriately winterized causing undue risk to the water system.
- Preparations and planning commenced for the water system flushing activities. Scheduling of the work is proposed during quarter two (May/June).
- Well #8 spring startup and readiness completed which included water quality sampling and analysis.
- Ongoing operational support and training for the contract operator CMG services.

RECOMMENDATION

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

Submitted by:	Dan Robson, A.ScT., Manager, Saanich Peninsula and Gulf Islands Operations
Submitted by:	Jared Kelly, P.Eng., Manager, Capital Projects
Concurrence:	Joseph Marr, P.Eng., Senior Manager, Infrastructure Planning and Engineering
Concurrence:	Jason Dales, B.Sc., WD IV., Senior Manager, Wastewater Infrastructure Operations
Concurrence:	Alicia Fraser, P.Eng., General Manager, Infrastructure and Water Services

ATTACHMENTS: Appendix A – Technical Memo: Skana Water Service Tank Replacement Options Analysis

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

TECHNICAL MEMORANDUM

Capital Regional District
Mayne Island

Skana Water Service
Tank Replacement Options Analysis

APRIL 2025

TABLE OF CONTENTS

1 ISSUE

The Skana Water System is a small water system located on Mayne Island, operated by the Capital Regional District (CRD). The Skana Water System consists of two groundwater wells (Wells 8 and 13) and two treatment facilities (Skana and Sandy Hook), one for each well to chlorinate the groundwater.

Skana water treatment plant feeds a set of two gravity storage tanks which provide water at pressure, via distribution pipe. The existing horizontal cylindrical welded steel tanks have been identified as having significant corrosion. They are at the end of their 40-year lifetime and are not believed to meet post disaster seismic design requirements. Consideration of options for their replacement is required.

2 BACKGROUND

2.1 Existing System

The Skana Water System is located on Mayne Island, serving homes on Waugh Road, Aya Reach Road, Skana Road, and Sandy Hook Road, near Lighthouse Point, generally on the north of the Island. The system is served by Skana water treatment plant and tanks which are located south of Waugh Road, as well as by Sandy Hook water treatment plant, northwest of Sandy Hook Road, as illustrated in **Figure 2-1**. The system currently serves approximately 53 parcels, with a current capacity of 45.3 m³ per tank, 91 m³ in total. The system has the ability to be developed up to a maximum of 73 parcels.

The tanks are located at an approximate elevation of 50 m. By gravity, a series of 100 mm PVC pipes supply water at a residual pressure reported to be up to 350 kPa (50 psi), to parcels along Waugh Road, Aya Reach Road, and Sandy Hook Road, at an approximate elevation of 20 m. The location of the existing Skana water system tanks is suitable for gravity storage tanks, and is accessible from Waugh Road, for ease of maintenance and operation requirements. The tanks were constructed in the 1970s and are constructed as horizontal steel cylinders, each supported on two concrete saddles. Tank 1 is shown in **Figure 2-2** with the second tank out of view behind it.

Figure 2-1 Skana Water Service Area

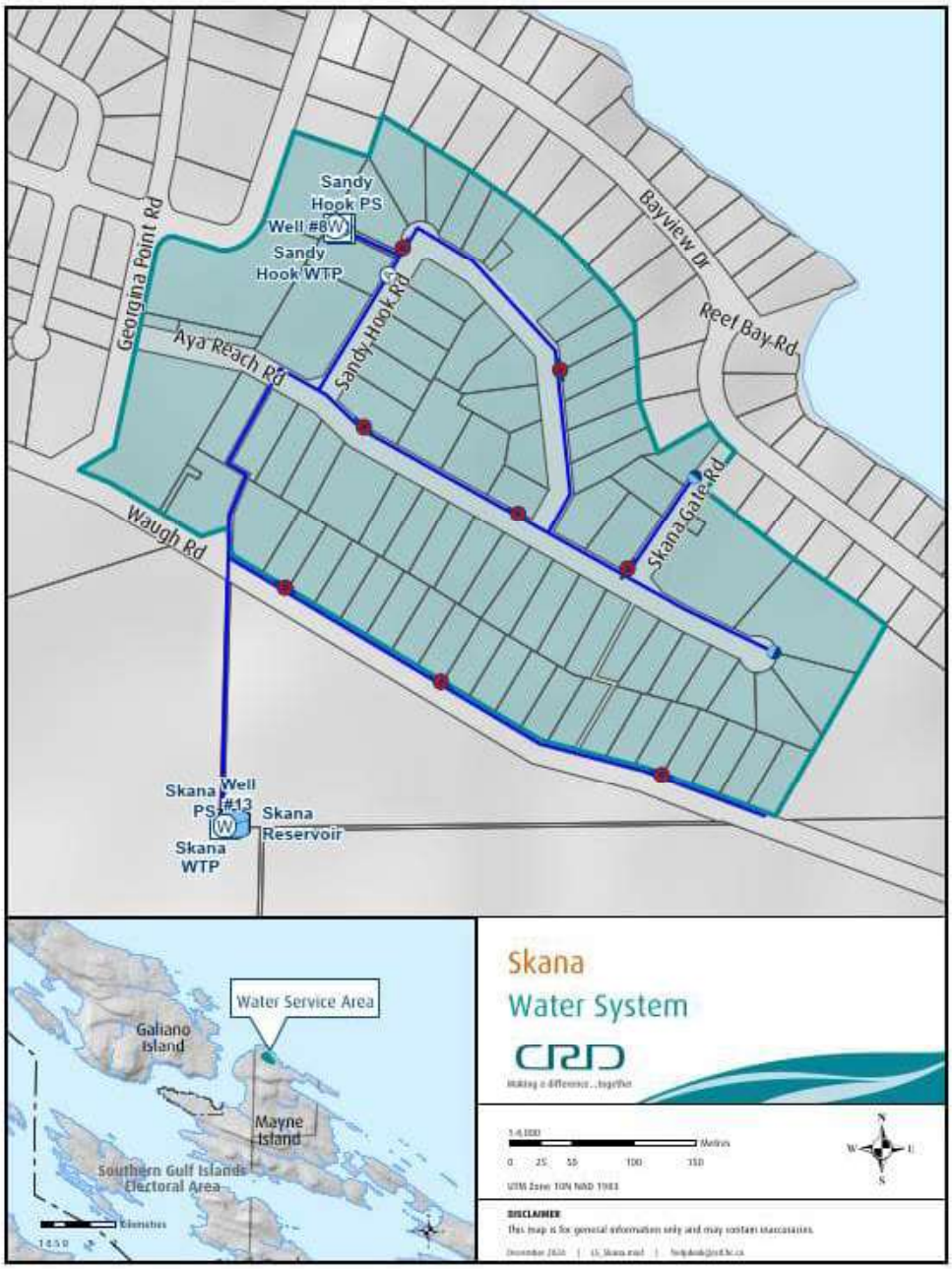


Figure 2-2 Skana Water Storage Tanks

Associated observed the concrete saddles for Tank 1 (closest tank in **Figure 2-2**) to have settled and sitting at an angle 0.4° to 2.7° off of level. The tank walls are understood to be 6 mm thick based on measurements written on the outer tank wall as well as a 2016 assessment report.

The tanks contain low- and high-level float switches, which are used to control the production of water. The level switch wires are routed in the same raceway as the PVC pipe, as illustrated in **Figure 2-2**.

The Water Treatment Plant is located on the same site, adjacent to the tanks. Single phase power is provided to the water treatment plant from a pole mounted transformer adjacent to the treatment plant building.

To understand the operation of the system, relevant background information was collected from the CRD and a site visit was conducted on 7 November 2024. Annotated photographs taken during the site visit are included in **Appendix B**. Background information reviewed included:

- Record Drawings
- Skana water system annual report (2023)
- Assessment of System Tanks, conducted by Stantec (2016)
- SCADA system overview

3 STAKEHOLDERS

The primary stakeholders for the tank replacement are stakeholders are property owners and residents within the service area boundary including customers whose potable water is supplied from the system. Other stakeholders include the Capital Regional District Infrastructure & Water Services (IWS) who own, operate and maintain the system.

4 OBJECTIVE

The objective of this memorandum is to review available information and recommend next steps for the future water storage needs of the Skana water system.

5 TECHNICAL REVIEW OF SYSTEM

5.1 Tank Sizing

Replacement tanks for the Skana Water System should be designed in accordance with the BC Ministry of Health's 2023 Design Guidelines for Drinking Water Systems in British Columbia (Guidelines). Mayne Island Trust Land Use Bylaw No. 146 was also considered, but the provincial guidelines provide the most comprehensive direction for reservoir design. Use of these recently introduced guidelines will be beneficial for obtaining the required Permit to Construct Waterworks, from Island Health Authority, at the completion of the tank design.

Sizing the tanks to include fire storage presents a problem for the Skana system. The demand on the system is typically low relative to the larger volume of water which would be required for fire storage. Fire storage would therefore result in high water age, and present water quality challenges. A comparison of storage volume with and without fire storage is presented in **Table 5-1**.

In lieu of a regulatory requirement, the CRD's July 2009 Engineering Specifications and Standards Drawings summarize requirements which are applied within the Juan de Fuca (JDF) distribution system, and these were used as a basis to develop tank sizing with fire storage. Section 4.12, Reservoirs, of the standards recommends:

- Equalization storage of 25% of maximum day demand (MDD)
- Fire storage of 1,200 m^3
- Emergency storage of 50% of average day demand (ADD)

The fire storage required by the JDF standards would result in extremely long residence time within the Skana tanks and would cause water quality issues. As an alternate, we recommend typical single family home fire flow of 4000 L/min for 1.5 hours, resulting in a volume of 360 m^3, as per the Fire Underwriter's Survey, Water Supply for Public Fire Protection Guidelines. However, the existing infrastructure at Skana water treatment plant and tanks is inadequately sized to deliver flows of 4000 L/min to hydrants within the Skana system. The existing 100mm diameter piping would also present limitations for fire flow, providing higher velocities than required to the hydrants. Fire storage was not further considered at this time.

Table 5-1 Tank Volume Comparison

	With fire storage (m^3)	Without fire storage (m^3)
Equalization storage 25% of maximum day demand (16.6 x 2.5 x 0.25)	11.4	-
Fire storage	360	-
Emergency storage 50% of average day demand (16.6 x 0.25)	8.3	-
Maximum day demand (16.6 x 2.5)	-	46
Total reservoir volume	**380**	**46**

As fire storage is not to be provided, the Guidelines indicate that storage equal to MDD should be provided. Water production records indicate a 2019 – 2023 ADD of 12m³/day (source: Skana Water Production spreadsheet provided by CRD). Scaling this value for maximum likely population growth to 73 parcels at build-out of the service area provides an ADD of 16.6 m³/day. The peaking factor of 2.75 from the Guidelines is then applied to the ADD figure to estimate MDD, providing a recommended 46 m³ of storage. This is approximately 50% of the volume available in the existing tanks.

Build-out capacity can be achieved through construction of a single 46 m³ tank, or through two 23 m³ tanks. A vertical tank solution is recommended for either tank configuration. Vertical tank(s) occupy a smaller site footprint, and design of foundations for seismic and gravity loads is simpler compared to a horizontal tank.

A larger tank could also be considered in order to provide additional emergency storage beyond the amount required by the guidelines. Providing additional storage will improve the resilience of the system, for example by allowing additional time for recovery of source wells or in case repair parts need to be mobilized to the island using scheduled ferries. A significantly larger tank can result in operational challenges due to high water age. Keeping the size of the existing tanks, at 92 m³ (rounded up from 91 m³ to provide double the 46 m³ capacity) total, has been demonstrated to provide a reasonable balance of these considerations and suitable for maintaining an adequate level of service to the water system users. The service area can experience extended power outages and is situated in a remote location, so having storage beyond the Guidelines calculation of 46 m³ will be useful.

5.2 Tank Material

Tanks suitable for potable water service may be manufactured from a wide variety of materials. For field-erected tanks away from large population centres, bolted steel tank construction is common. For small-scale tanks such as those required at Skana, shop fabricated tanks are available in a wider range of materials, including various polymers, coated steel or stainless steel.

Glass-fused (bolted) steel tanks have been used for many years for many applications including reservoir and other liquid storage purposes. This type of tank can provide an economical way to combine shop coating of panels with field erection for a robust tank. Historically, depending on the corrosiveness of the stored liquid, epoxy coated steel tanks have performed satisfactorily with the service life of the epoxy coating lasting at least 30 years. Glass-fused steel tanks have also been used in many similar applications where the estimated maintenance life can extend beyond 50 years. Cathodic protection is often used as an additional measure to protect these tanks and prolong the overall service life. These tanks can be assembled on site using relatively lightweight equipment.

When the required tank size is small enough to facilitate shipping of a complete tank, it is also practical to fabricate a steel tank off site, apply factory coatings to the entire fabrication, and deliver a complete tank to site. As tank sizes exceed 3.5 to 4 metres in diameter, transportation becomes increasingly challenging. Epoxy coated steel would be a likely choice, and coating life of at least 30 years could be expected. Fabrication quality can be better controlled compared to a field-fabricated tank. A large crane is required to lift a shop fabricated tank. Manufacturing for welded steel tank(s) could likely to be completed in BC and this option is therefore less prone to concerns around shipping disruption, Canadian Dollar value fluctuation, and import tariffs.

Cross-linked polyethylene (XLPE) is a polymer with excellent mechanical properties that can be manufactured into tanks within a manufacturing facility.

The material is suitable without protection for storage of potable water or for other materials such as chemical storage and can be procured with NSF 61 certification. A carbon black additive can be added to the polymer during manufacturing to reduce the effects of UV exposure which can cause the material to become brittle over time. These tanks would absorb more solar radiation due to the black additive, resulting in higher water temperatures and requiring operational management to avoid water quality degradation. The mechanical properties of cross-linked polyethylene allow it to provide adequate performance even under seismic loading. An XLPE tank would be expected to last at least 20 years.

Stainless steel is another candidate material which offers many of the benefits of steel while being more resistant to environmental corrosion. Stainless steels are generally still susceptible to corrosion in the presence of chloride (salt), including the sodium hypochlorite which is added to the Skana water for disinfection. When tank size becomes small and the relative cost of applying coatings is more significant, this can be a good option. Stainless steel can be passivated, rapidly forming a thin layer of oxide which prevents more significant corrosion. A stainless-steel tank with proper maintenance would be expected to last more than 50 years if chloride levels are carefully managed. Stainless steel was not considered further due to the additional care required for management of chlorides.

Corrosion within a steel tank often takes place above the water line within the tank where excessive moisture exchanges with oxygen create corrosion when metal is exposed. Therefore, regular maintenance and monitoring programs to inspect for corrosion will help extend the overall service life of any metallic tank. Such programs can be performed through observation at the rooftop hatch of the tank, and a permanent access ladder can be provided to facilitate the required access. For larger tanks, two access manways should be installed at the bottom of the tank at opposite sides. This will improve the safety access from a confined space and improved ventilation.

Tank material options can be considered in more detail as the work progresses, and it is also possible to procure a tank in such a way that a contractor will propose the tank that provides the best value to the Skana system from more than one acceptable solution.

5.3 Tank Replacement

Construction of replacement tanks would result in a water system that operates in the same way as the existing system. This would require the construction of new tanks complete with foundations, piping tie-in to the 100 mm PVC inlet and outlet, and instrumentation. Since these tanks would be hydraulically similar to the existing tanks, it is not anticipated that any modifications to the treatment plant would be required.

Three options were considered for a single 92 m^3, or pair of 46 m^3 vertical tanks to accommodate the required volume: cross-linked polyethylene, glass-fused (bolted) steel and shop fabricated (welded) steel tanks. Using paired tanks will allow the CRD greater flexibility in terms of maintenance and eventual tank replacement. With concrete foundation slabs, ladders and roof hatches, the cost for these tanks is estimated in **Table 5-2**, for each material type.

Table 5-2 Class D Opinion of Probable Cost (+/- 50%)

Option	Likely capital cost	Estimated Life
One 92 m^3 glass-fused steel tank	$1,420,000	30
Twin 46 m^3 welded steel tanks	$940,000	50
Twin 46 m^3 XLPE tanks	$790,000	20

A single glass-fused steel tank of 92 m^3 provides approximately twice the required capacity. The cost of a glass-fused steel tank in this size is relatively high, and consequently glass-fused steel is not commonly used for tanks of this size unless there are significant access constraints for a site that preclude lifting of a shop fabricated tank into place. This site does not have such access constraints. Despite the operational flexibility having two tanks allows for, a single glass-fused steel tank is proposed as the smallest available size of glass-fused steel tank is 73 m^3. Two glass fused steel tanks would provide excessive volume for maintenance of suitable water quality. The cost of two glass-fused steel tanks would also be prohibitive.

Based on a welded steel tank, or tanks, with foundations, piping and instrumentation, the total installed cost is expected to be in the range of $940,000 +/- 50%.

Cross-linked polyethylene tank(s) would provide a lower up-front capital cost; however, they also have the shortest anticipated service life. To allow comparison of the tank options with different service life expectancy, a life cycle analysis was conducted, for which the findings are presented in Appendix D. This analysis indicates that for typical discount rates below about 5%, the welded steel tanks are the more cost-effective option. If a high discount rate (>5%) is used, the XLPE tanks are a better option. The capital cost factored into the life cycle analysis considers manufacture, transport and installation costs for the tank itself. Whereas the Class D Opinion of Probable Cost (Table 5-2) accounts for all direct and indirect costs related to the tank replacement. This cost breakdown is detailed in Appendix A. Therefore, the overall capital costs listed in the class D opinion of probable cost differ from the life cycle analysis.

A geotechnical investigation is recommended to be conducted at the location of the replacement tank(s), due to proximity to the adjacent slope. This is to be considered in conjunction with the design of tank foundation envelope and depth, and with consideration for seismic requirements.

It is anticipated the existing chlorine recirculation pump in Skana water treatment plant, can be re-used for tie-in to the new tank(s), and configured to the new tank(s) volume to achieve the required chlorine residual of the system.

It is recommended that the construction of the new tanks be staged to ensure a tie-in sequence that minimizes service disruptions. Initially, one existing tank will be decommissioned while the other remains in service. During this time, the new tank—or one of the two new tanks—will be constructed. Once completed, the second existing tank will be decommissioned, and service will be fully transitioned to the new tank(s).

Wired level transmitters with backup float switches can be used for the new tank(s), providing comparable information to the existing setup. A more significant upgrade to the existing control system may be appropriate at the same time, given the age of the existing controls.

5.4 Refurbishment of Existing Tanks

A detailed condition assessment was conducted in 2016, concluding that replacement tanks were required. The assessment consisted of visual observations of the inside and outside of the tank supplemented by non-destructive testing to confirm thickness of steel elements. The 2016 observations included major corrosion down the entire length of the tanks as well as severe pitting on the tanks' bottoms. It was noted that the tanks were designed and installed prior to the enactment of modern seismic requirements, and they are unlikely to perform adequately in a significant earthquake. It would be technically feasible to refurbish these tanks and upgrade seismic capacity; however, due to the complexity of such an undertaking this is not anticipated to be less expensive than a replacement. Refurbishment would include upgrading or replacing foundations, welding new steel in areas of corroded tank shell and other components, and field-applying new coatings suitable for potable water. The work would need to be conducted in stages to keep one tank in service throughout. Strict attention to quality management would be required for field welding, surface preparation, and coating application in order to achieve the desired results. Replacement is proposed as a more practical option due to the complexity of refurbishment.

6 RECOMMENDATIONS

Based on this analysis, it is recommended that the CRD proceed with design and procurement of a pair of 46 m³ shop-fabricated welded steel tanks with an epoxy coating. This option provides good operational flexibility at reasonable cost with the ability to conduct good quality control in a factory setting and minimize site disruption. Using paired tanks will allow the CRD greater flexibility in terms of ongoing operation and maintenance.

Capital Regional District
Mayne Island

CERTIFICATION PAGE

This report presents our findings regarding the Capital Regional District Mayne Island Skana Water Service Tank Replacement Options Analysis

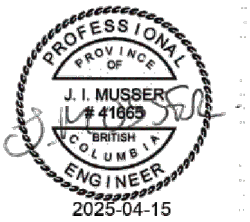
Respectfully submitted,

Associated Engineering (B.C.) Ltd.
Engineers & Geoscientists BC Permit Number 1000163

Prepared by:

Shane Duggan
Mechanical Designer

Reviewed by:



Jonathan Musser, M.A.Sc., P.Eng.
Process Engineer

SD/JM/nhd

APPENDIX A - CLASS D OPINION OF PROBABLE COST

Project #: 2021-2386-05
Client: CRD Mayne Island
Project Name: Skana Reservoir
Revision Date: 01-Apr-25
Author: SD

Capital Cost Estimate - Preliminary

Estimate Classification - Class D +/- 50%
Expected accuracy per CEABC/EGBC definition:

			92 m^3 bolted steel tank			twin 46 m^3 welded steel tanks			twin 46 m^3 XLPE tanks		
Item	**qty**		**Cost**	**Total**		**Cost**	**Total**		**Cost**	**Total**	
Mob/demob	LS		$ 30,000	$ 30,000		$ 40,000	$ 40,000		$ 40,000	$ 40,000	
Demolition	LS		$ 5,000	$ 5,000		$ 5,000	$ 5,000		$ 5,000	$ 5,000	
Site piping	LS		$ 10,000	$ 10,000		$ 20,000	$ 20,000		$ 20,000	$ 20,000	
Sitework/grading	LS		$ 10,000	$ 10,000		$ 15,000	$ 15,000		$ 15,000	$ 15,000	
	LS		$ -	$ -		$ -	$ -		$ -	$ -	
	LS		$ -	$ -		$ -	$ -		$ -	$ -	
Reservoir	LS		$ 500,000	$ 500,000		$ 250,000	$ 250,000		$ 174,000	$ 174,000	
Foundations	LS		$ 85,000	$ 85,000		$ 50,000	$ 50,000		$ 50,000	$ 50,000	
Controls	LS		$ 20,000	$ 20,000		$ 40,000	$ 40,000		$ 40,000	$ 40,000	
Subtotal				$ 660,000			$ 420,000			$ 344,000	
Geotechnical investigation				$ 25,000			$ 25,000			$ 25,000	
Engineering allowance				$ 75,000			$ 75,000			$ 75,000	
General Costs (contractor)		15%		$ 99,000			$ 63,000			$ 51,600	
Inflation		20%		$ 132,000			$ 84,000			$ 68,800	
Remoteness		25%		$ 165,000			$ 105,000			$ 86,000	
Contingency		40%		$ 264,000			$ 168,000			$ 137,600	
Total				**$ 1,420,000**			**$ 940,000**			**$ 790,000**	

Appendix A

APPENDIX B - SITE PHOTOS

Figure B-2 Exterior Base of Tank 1

Figure B-4 Flange Connection/Corrosion

Figure B-1 Tank

Figure B-3 Raceway Between Tanks

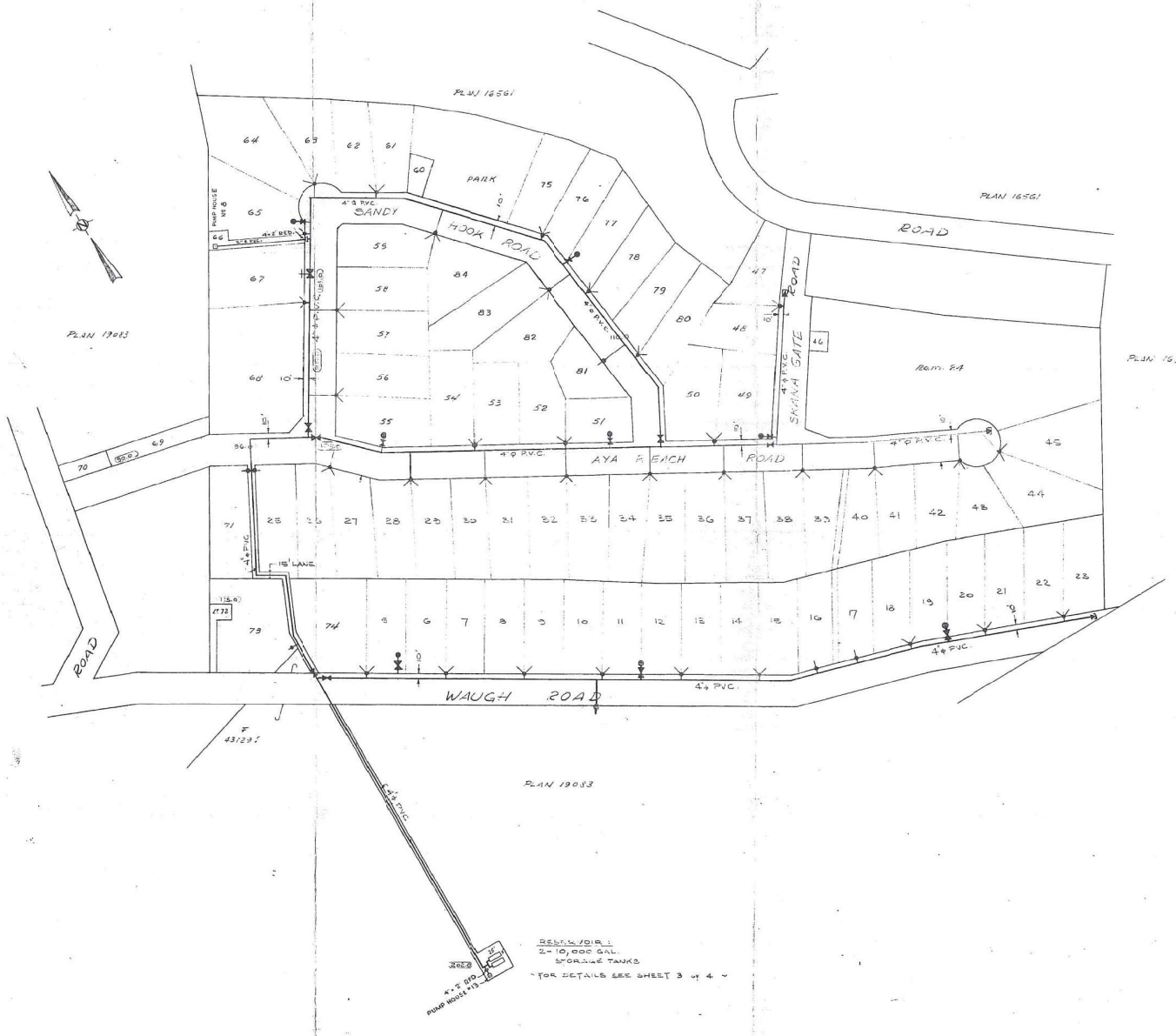
Figure B-6 Exterior Top of Tank

Figure B-8 Exterior Base of Tank 2

Figure B-5 Raceway to WTP

Figure B-7 Front of Tank 2

APPENDIX C - EXISTING INSTALLATION DOCUMENTATION



LEGEND :

- PROPOSED WATER SYSTEM
- AIR RELIEF VALVE
- GATE VALVE
- STANDARD BLOW-OFF
- HOUSE CONNECTION (TO BE INSTALLED AT REQUEST OF PROPERTY OWNER).
- FIRE HYDRANT & GATE VALVE

03/1182

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NOV 10 1976
Community Water Supply Division

NOTE :

1. ALL PIPE TO BE PVC. TYPE I, GRADE I, NORMAL IMPACT, CLASS 160 IN ACCORDANCE WITH ASTM STD. D 1784 & D 2241 AND SUITABLE FOR POTABLE WATER SUPPLY.
2. ALL MAINS TO BE STERILIZED AS PER A.W.W.A. SPECIFICATIONS C-60.-68 FOLLOWING PRESSURE TESTS.
3. ALL MAINS UNDER TRAVELLED PORTIONS OF THE ROAD ARE TO BE ENCASED IN NO-CO-RODE CARRIER PIPE.
4. ALL GATE VALVES WILL BE UNDERWRITERS & F.M. APPROVED (175 p.s.i. WATER).
5. FOR JOINT. DETAILS SEE SHEET 4 of 4.
6. ELEVATIONS SHOWN (115.0) ARE RELATED TO AN ARBITRARY BENCH MARK. TOP OF EXIST. STEEL CASING AT PUMP HOUSE #1 ELEVATION = 73.3
7. THRUST BLOCKS OF 1 CU.FT. CONCRETE POURED IN PLACE AND BEARING ON UNDISTURBED SOIL REQUIRED AT ALL HYDRANTS BLOW-OFFS, BRANCHES & DEFLECTIONS GREATER THAN 30°.
8. LOCATION OF AIR RELIEF VALVES TO BE ESTABLISHED IN FIELD.

REV #3 JAN 6/72 RELOCATE MAIN TO N. SIDE AYA BEACH ROAD
REV #2 MAR 31 1971 - RE-LOTTING
REV #1 MAR 15 1971 - RE-LOTTING & RE-LOCATION OF WELLS & WELL # PUMPHOUSE #2.

SKANA INVESTMENTS LTD.

WATER DISTRIBUTION SYSTEM

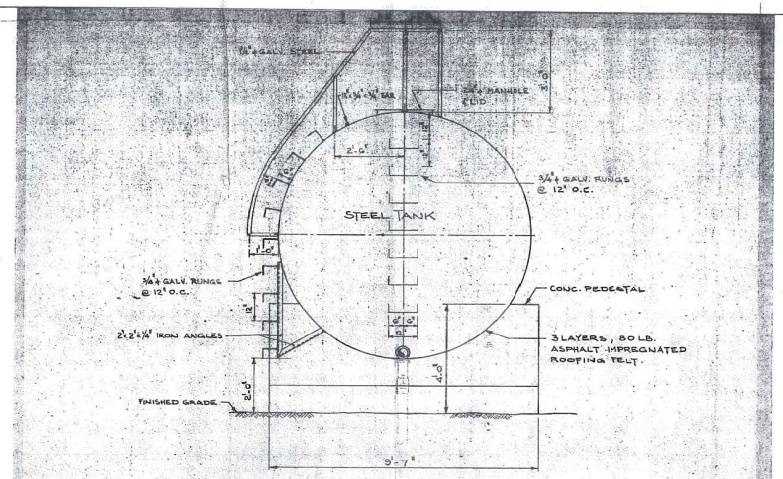
MATSON, PECK & TOPLISS

British Columbia Land Surveyors and Civil Engineers

815 COOK RD., RICHMOND PHONE 278-5674

DRAWN	SCALE	JOB No.	DWG. No.
H.Q.	1"=100' HORIZONTAL	M3107	1
CK'D	VERTICAL	W-2A	of 4
APP'D	DATE MAY 1, 70		

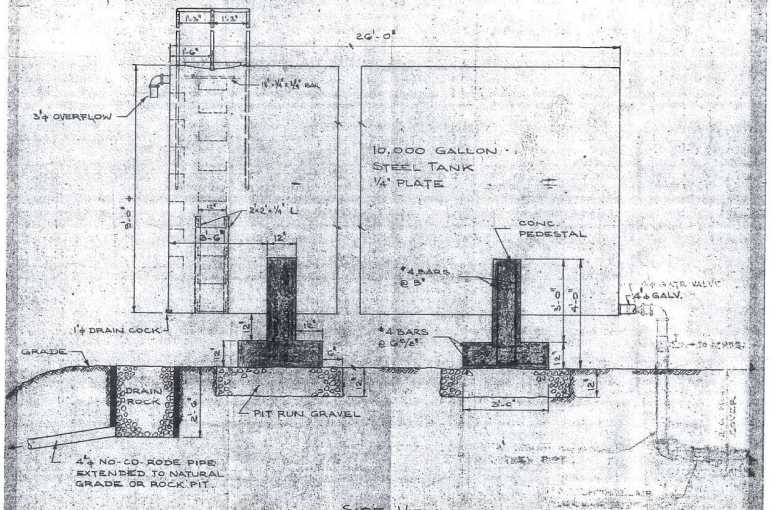
Appendix A



FRONT VIEW

NOTES:

1. OUTSIDE TANK SURFACE TO RECEIVE ONE COAT OF T/O PAINT AS MANUFACTURED BY TIDY WELDERS.
2. CONC. TO HAVE 3000 P.S.I., 28 DAY STRENGTH
3. PVC. PIPE WILL BE CLASS 160, NORMAL IMPACT.
4. ALL REINFORCING TO HAVE MIN. 1½" COVER.
5. ALL PIPE & FITTINGS TO BE 125 LB. C.I. GALV.

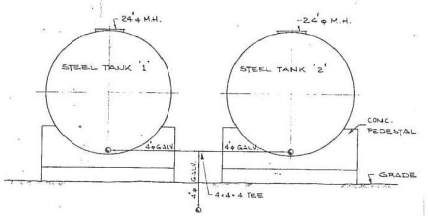


SIDE VIEW

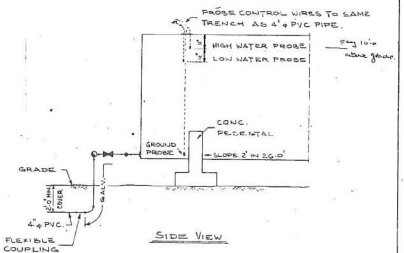
STORAGE TANK DETAILS

SCALE: ⅛" = 1'-0"

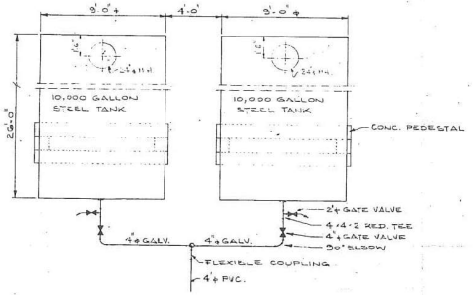
NOTE: PROBE CONTROLS TO BE INSTALLED IN ONE TANK ONLY.



FRONT VIEW



SIDE VIEW



PLAN VIEW

NOTE:

- ALL EXPOSED PIPES & FITTINGS MUST BE INSULATED WITH WEATHER-PROOFED ASBO PIPE INSULATION AS SUPPLIED BY JOHNS-MANVILLE OR APPROVED EQUAL.
- ALL PIPES & FITTINGS TO BE SCHED. 40, C.I. GALV.
- ALL GATE VALVES TO BE 125 LBS. STD. C.I. UNDERWRITERS & F.M. APPROVED.
- FOLLOWING RESERVOIR INSTALLATION, DISINFECT RESERVOIR WITH 25 ppm CHLORINE SOLUTION HELD FOR 24 HRS. MIN. CL. RESIDUAL - 10 ppm.

STORAGE TANKS - LAYOUT DETAILS

SCALE: ⅛" = 1'-0"

British Columbia Land Surveyors and Civil Engineers

SKANA INVESTMENTS LTD.

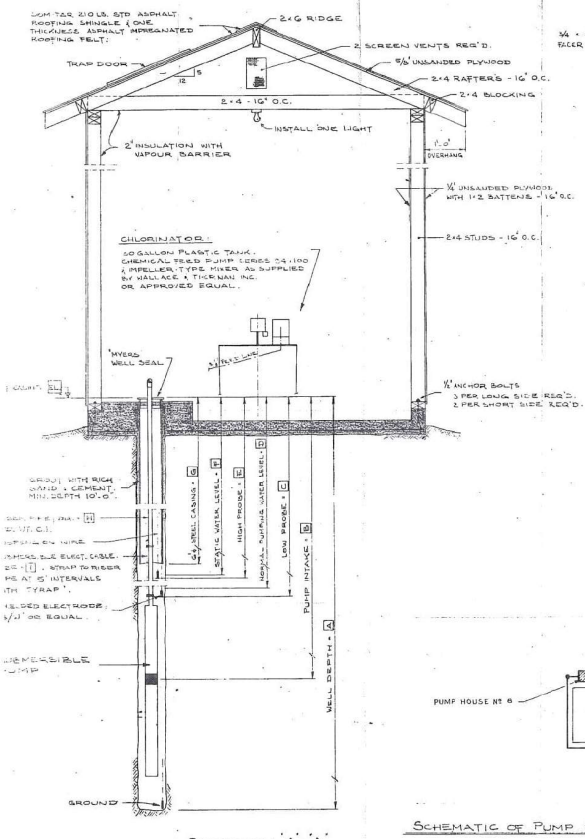
STORAGE TANK DETAILS

MATSON, PECK & TOPLISS

BIG CREEK RD., RICHMOND PHONE 278-3616

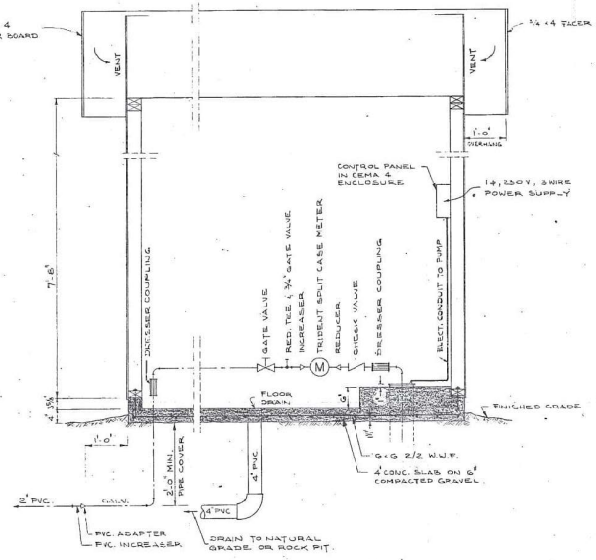
DRAWN	SCALE	JOB No.	DWG. No.
H.G.	AS SHOWN HORIZONTAL	M3107	3 of 4
CH'K'D.	VERTICAL		
APPR'D.	DATE APR. 28,70	W-2A	

Appendix A



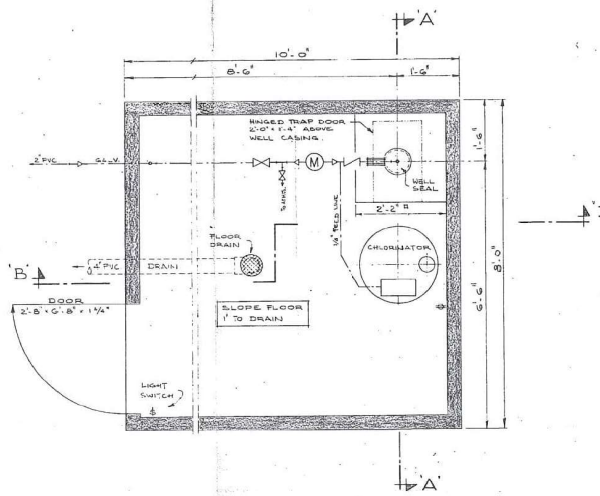
SECTION A-A

SCALE: 3/4" = 1'-0"



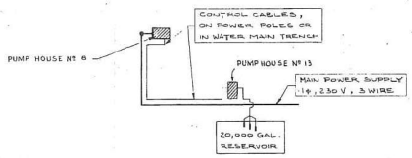
SECTION 'B-B'

SCALE: 3/4" = 1'-0"

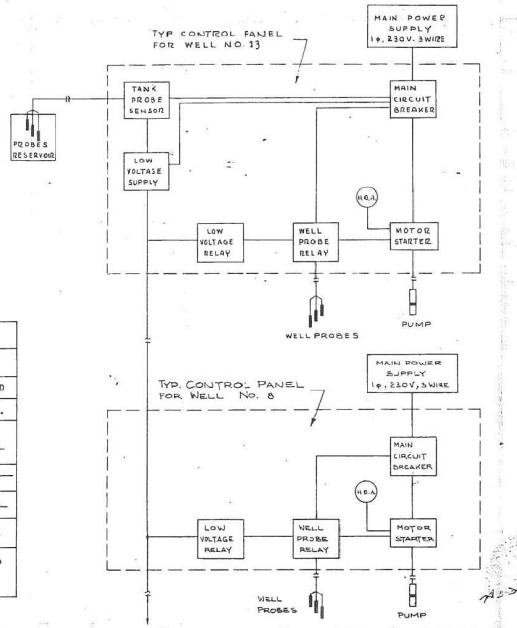


PLAN VIEW

SCALE: 3/4" = 1'-0"



SCHEMATIC OF PUMP HOUSE OPERATION - PLAN VIEW



ELECTRICAL CONTROL SCHEMATIC

NOTE :

1. ALL PIPING IN PUMPHOUSES TO BE 1" ϕ GALV. SCHEDULE 40.
2. SCREWED FITTINGS TO BE 125 LBS. CAST IRON GALV.
3. GATE VALVES TO BE UNDERWRITERS AND F.M. APPROVED WITH RISING STEM (175 p.s.i. WATER).
4. THE ELECTRICAL CONTRACTOR WILL SUPPLY SHOP DRAWINGS OF PUMP & RESERVOIR CONTROL SYSTEM FOR ENGINEERS APPROVAL PRIOR TO INSTALLATION.
5. CONCRETE TO HAVE 3000 p.s.i. 28 DAY STRENGTH.
6. ALL EXPOSED PIPE & FITTINGS TO BE COATED WITH EPOXY ENAMEL SUITABLE FOR POTABLE WATER SUPPLY.
7. ALL EXTERIOR WOODEN SURFACES TO RECEIVE ONE COAT OF C.I.L. #999 EXTERIOR PRIMER (ONE COAT OF C.I.L. EXTERIOR ACRYLIC LATEX.
8. ALL INTERIOR WOODEN SURFACES TO RECEIVE TWO COATS OF INTERIOR C.I.L. SATIN LATEX, (WHITE).

WELL NO.	WELL DATA: RATED FLOW AT DRAWDOWN	WELL DEPTH	PUMP INTAKE	LOW PROBE	PUMP LEVEL	HIGH PROBE	STATIC LEVEL	CASING	RISER PIPE	METER	MOTOR CABLE	TOP OF CASING	TANK	PUMP DATA: T.D.H.	SINGLE ϕ — 230 V PUMPS: MAKE / MODEL NO.	H.P.	FLOW	HEAD
	G.P.M.	A	B	C	D	E	F	G	H	M	I	EL.	T.W.L.				G.P.M.	FT.
~~1~~	~~4.0~~	~~165~~	~~160~~	~~150~~	~~150~~	~~30~~	~~13~~	~~420~~	~~1~~	~~5/8~~	~~14~~	~~115~~	~~202~~	~~256~~	~~Kyers 3D56-21 17 Stages~~	~~1/2~~	~~5~~	~~250~~
~~5~~	~~2.0~~	~~225~~	~~205~~	~~195~~	~~213~~	~~10~~	~~5~~	~~13~~	~~1~~	~~5/8~~	~~14~~	~~92~~	~~202~~	~~321~~	~~"Myers" 3D56-21 17 Stages~~	~~1/2~~	~~4~~	~~320~~
~~6~~	~~3.0~~	~~365~~	~~340~~	~~330~~	~~265~~	~~8~~	~~5~~	~~13~~	~~1~~	~~5/8~~	~~14~~	~~93~~	~~202~~	~~454~~	~~"Myers" SD70-21 24 Stages~~	~~3/4~~	~~4~~	~~450~~
8	4.5	215	190	180	205	25	31	4	1	5/8	14	90	202	307	"MYERS" SD70-21 24 Stages	3/4	6+	300
13	13.0	115	87	77	90	20	ARTESIAN	20':	1	5/8	14	195	202	100'	"MYERS" SD7A-21 19-STAGES	1/4	15'	100

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Rev # 3 July 19, 1971 - ADD WELL 13 - Delete 5 & 6
REV # 2 June 7, 1971 - ADD WELLS 5 & 6
REV # 1 MAR 18 1971 - DELETE WELL # 2

British Columbia Land Surveyors and Civil Engineers

SKANA INVESTMENTS LTD.

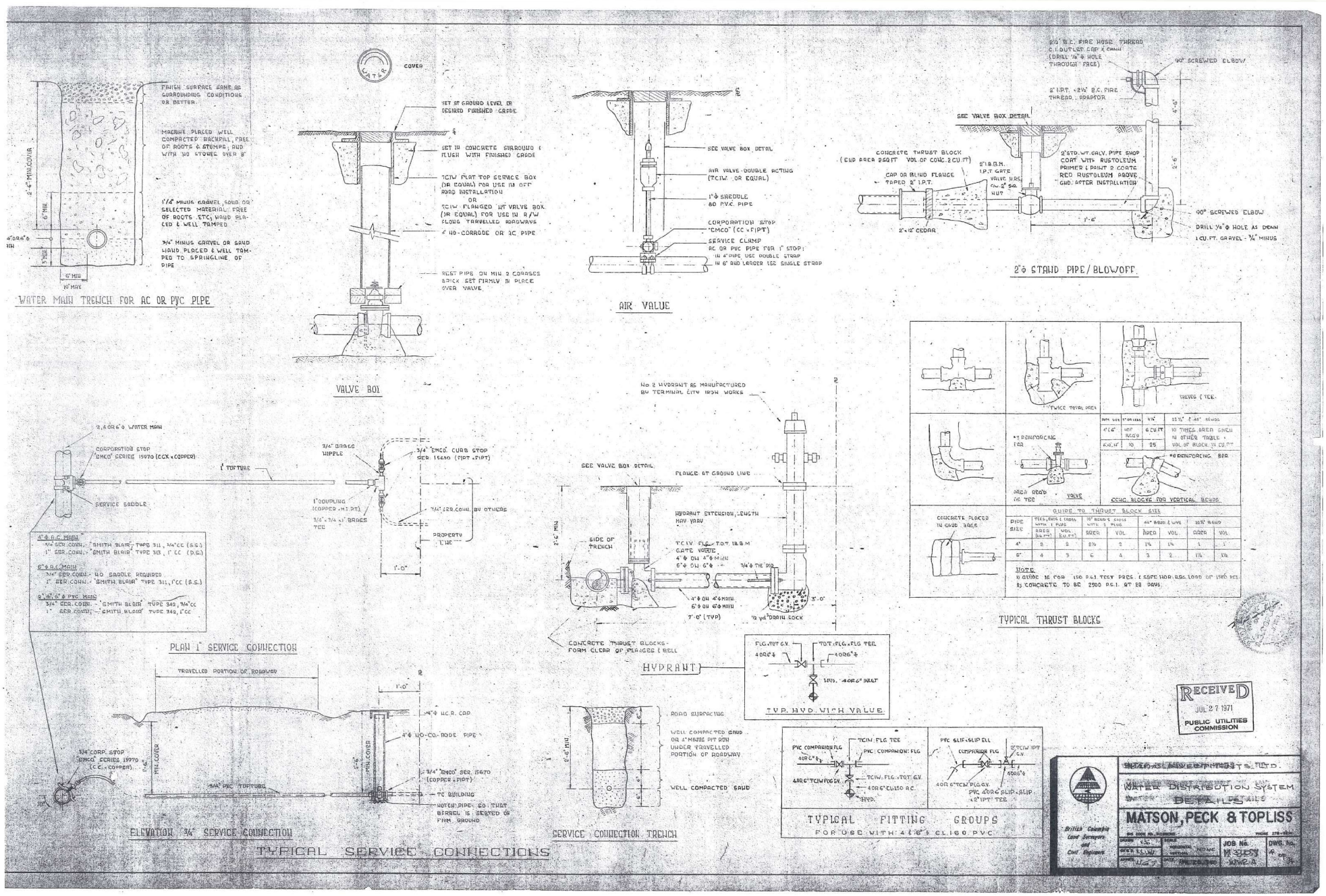
PUMP HOUSE No. 1, 8 & 13
LAYOUT & DETAILS

MATSON, PECK & TOPLISS

815 COOK RD., RICHMOND PHONE 278-1674

DRAWN	H.G.	SCALE AS SHOWN HORIZONTAL VERTICAL	JOB No. M3107 W-2A	DWG. No. 2 of 4
CH'K'D.				
APP'D.	M.G.T.	DATE APR. 29, 70		

Appendix A


WATER MAIN TRENCH FOR AC OR PVC PIPE
FINISH SURFACE SAME AS SURROUNDING CONDITIONS OR BETTER.
MACHINE PLACED WELL COMPACTED BACKFILL FREE OF ROOTS & STUMPS, AND WITH NO STONES OVER 8"
1"/4 MINUS GRAVEL, SAND OR SELECTED MATERIAL FREE OF ROOTS, ETC, HAND PLACED & WELL TAMPED
3/4" MINUS GRAVEL OR SAND HAND PLACED & WELL TAMPED TO SPRINGLINE OF PIPE
4'-6" MIN. COVER
6" MIN
4"OR6"ϕ
MIN
5" MIN
6" MIN
10" MAX
VALVE BOX
COVER
SET AT GROUND LEVEL OR DESIRED FINISHED GRADE
SET IN CONCRETE SURROUND & FLUSH WITH FINISHED GRADE
TCIW "FLAT TOP" SERVICE BOX (OR EQUAL) FOR USE IN OFF ROAD INSTALLATION
OR
TCIW FLANGED "M" VALVE BOX (OR EQUAL) FOR USE IN R/W FLOOR TRAVELLED ROADWAYS
4" HD-CORROGDE OR AC PIPE
REST PIPE ON MIN. 2 COURSES BRICK SET FIRMLY IN PLACE OVER VALVE.
AIR VALVE
SEE VALVE BOX DETAIL
AIR VALVE-DOUBLE ACTING (TCIW OR EQUAL)
1"ϕ SHEDDLE 80 PVC PIPE
CORPORATION STOP "CMCO" (CC x IPT)
SERVICE CLAMP AC OR PVC PIPE FOR 1" STOP: IN 4" PIPE USE DOUBLE STRAP IN 6" AND LARGER USE SINGLE STRAP
2"ϕ STAND PIPE/BLOWOFF
2"ϕ B.S. FIRE HOSE THREAD C.I. OUTLET CAP & CHAIN (DRILL 1/8"ϕ HOLE THROUGH 1 FACE)
90° SCREWED ELBOW
2" I.P.T. x 2"W B.C. FIRE THREAD ADAPTOR
SEE VALVE BOX DETAIL
CONCRETE THRUST BLOCK (END AREA 2SQ FT VOL OF CONC. 2 CU FT)
CAP OR BLIND FLANGE TAPED 2" I.P.T.
2"-18 CEDAR
2"18 B.M. I.P.T. GATE VALVE W.R.S. C/W 2" SQ. NUT
2" STD. WT. GALV. PIPE SHOP COAT WITH RUSTOLEUM PRIMER & PAINT 2 COATS RED RUSTOLEUM ABOVE GND. AFTER INSTALLATION
90° SCREWED ELBOW
DRILL 1/8"ϕ HOLE AS SHOWN
1 CU. FT. GRAVEL - 3/4" MINUS
2"ϕ SERVICE CONNECTION
2,4 OR 6"ϕ WATER MAIN
CORPORATION STOP "CMCO" SERIES 15970 (CCX x COPPER)
1" TUFTUBE
SERVICE SADDLE
3/4" BRASS NIPPLE
3/4" "CMCO" CURB STOP SER. 16240 (FIPT x FIPT)
1" COUPLING (COPPER x FIPT)
3/4" x 3/4" x 1" BRASS TEE
3/4" SERV. CONN. BY OTHERS
PROPERTY LINE
1'-0"
4"ϕ A.C. MAIN
3/4" SER. CONN. - "SMITH BLAIR" TYPE 311, 3/4"CC (B.S.)
1" SER. CONN. - "SMITH BLAIR" TYPE 313, 1"CC (B.S.)
6"ϕ A.C. MAIN
3/4" SER. CONN. - NO SADDLE REQUIRED
1" SER. CONN. - "SMITH BLAIR" TYPE 311, 1"CC (B.S.)
2"ϕ, 6"ϕ PVC MAIN
3/4" SER. CONN. - "SMITH BLAIR" TYPE 349, 3/4"CC
1" SER. CONN. - "SMITH BLAIR" TYPE 349, 1"CC
PLAN 1" SERVICE CONNECTION
TRAVELLED PORTION OF ROADWAY
1'-0"
3/4"ϕ H.C.R. CAP
4"ϕ HD-CO-MODE PIPE
3/4" CORP. STOP "CMCO" SERIES 15970 (CC x COPPER)
MIN. COVER
2'-6" MIN.
3/4" PVC TUFTUBE
3/4" "CMCO" SER. 15670 (COPPER x FIPT)
TC BUILDING
NOTCH PIPE SO THAT BARREL IS SEATED ON FIRM GROUND
ELEVATION 3/4" SERVICE CONNECTION
No 2 HYDRANT AS MANUFACTURED BY TERMINAL CITY IRON WORKS
SEE VALVE BOX DETAIL
FLANGE AT GROUND LINE
HYDRANT EXTENSION, LENGTH MAY VARY
TCIW FLG. TOT. 18 B.M. GATE VALVE 4"ϕ OH x 4"ϕ MAIN 6"ϕ OH x 6"ϕ
3/4"ϕ TIE ROD
4"ϕ OH x 4"ϕ MAIN 6"ϕ OH x 6"ϕ MAIN
7'-0" (TYP)
1/2 yd³ DRAIN ROCK
3'-0"
2'-6" MIN
SIDE OF TRENCH
CONCRETE THRUST BLOCKS - FORM CLEAR OF FLANGES & BELL
HYDRANT
FLG. x TOT. G.V. 4ORG"ϕ
TOT. x FLG. x FLG TEE 4ORG"ϕ
HYD. - 4ORG" INLET
TYP. HYD. WITH VALVE
TYPICAL THRUST BLOCKS
TWICE TOTAL AREA
VALVES & TEE
*2 REINFORCING BAR
AREA REQ'D OF TEE
VALVE
**2 REINFORCING BAR
CONC. BLOCKS FOR VERTICAL BENDS
CONCRETE PLACED IN GOOD SOILS
GUIDE TO THRUST BLOCK SIZE
PIPE SIZE
TEES, ENDS & CROSS WITH 1 PIPE
90° BENDS & CROSS WITH 2 PIPES
45° BEND & LIVE
22½° BEND
AREA (SQ FT)
VOL. (CU FT)
4" 8 2 8½ 2 1¼ ¼ 1 ¼
6" 4 3 6 4 3 2 1½ 1
NOTE
1) GUIDE IS FOR 150 P.S.I. TEST PRES. (SAFE HOR. SOIL LOAD OF 1500 PSF)
2) CONCRETE TO BE 2500 P.S.I. AT 28 DAYS.
TRAVELLED PORTION OF ROADWAY
ROAD SURFACING
WELL COMPACTED SAND OR 4" MINUS PIT RUN UNDER TRAVELLED PORTION OF ROADWAY
2'-6" MIN.
WELL COMPACTED SAND
SERVICE CONNECTION TRENCH
PVC COMPANION FLG
TCIW FLG TEE
PVC COMPANION FLG
4ORG"ϕ
4ORG"TCIW FLG G.V.
TCIW FLG x TOT G.V.
4ORG"CL150 A.C.
HYD.
PVC SLIP x SLIP ELL
COMPANION FLG
4"TCIW IPT G.V.
4ORG"ϕ
4ORG"TCIW FLG G.V.
PVC 4ORG" SLIP x SLIP
4"2" IPT TEE
TYPICAL FITTING GROUPS
FOR USE WITH 4"&6"ϕ CL150 PVC
TYPICAL SERVICE CONNECTIONS
RECEIVED
JUL 27 1971
PUBLIC UTILITIES COMMISSION
"British Columbia Land Surveyors and Civil Engineers"
MATSON, PECK & TOPLISS
WATER DISTRIBUTION SYSTEM
DETAILS
JOB No. M-3153
DWG. No. W-2-A

Appendix A

APPENDIX D – LIFE CYCLE ANALYSIS

Associated Engineering | GLOBAL PERSPECTIVE. LOCAL FOCUS.

Project #: 2021-2386-05
Client: CRD Mayne Island
Project Name: Skana Reservoir
Revision Date: 01-Apr-25
Author: SD

Life Cycle Analysis

Option	Estimated capital cost	Estimated life	Equivalent Annual Capital Cost					
discount rate	*0%*	*2%*	*4%*	*6%*	*8%*	*10.0%*
92 m3 bolted steel tank	$ 500,000	30	$ 17,000	$ 22,000	$ 29,000	$ 36,000	$ 44,000	$ 53,000
twin 46 m3 welded steel tanks	$ 250,000	50	$ 5,000	$ 8,000	$ 12,000	$ 16,000	$ 20,000	$ 25,000
twin 46 m3 XLPE tanks	$ 174,000	20	$ 9,000	$ 11,000	$ 13,000	$ 15,000	$ 18,000	$ 20,000

$$Annual\ cost = \frac{cost \times r}{1 - \frac{1}{(1+r)^t}}$$

r = discount rate
t = number of years
(note r=0 is calculated using lim(r -> 0))

Sample calculation for
cost = 500,000
r = 2%
t = 30

$$Annual\ cost = \frac{cost \times r}{1 - \frac{1}{(1+r)^t}} = \frac{500000 \times 2\%}{1 - \frac{1}{(1+2\%)^{30}}} = \frac{10000}{1 - \frac{1}{1.8114}} = \frac{10000}{0.4479} = 22326$$

Appendix A

Making a difference...together

REPORT TO SKANA WATER SERVICE COMMITTEE
MEETING OF FRIDAY, JUNE 13, 2025

SUBJECT **Capital Projects Requiring Funding - Potential Funding Options and Cost Implications**

ISSUE SUMMARY

The Skana Water Service Committee has requested that staff prepare a staff report outlining the proposed path forward to carry out water system improvements in future years, the amount of borrowing required through a loan authorization bylaw and options for obtaining elector approval for the loan (petition or alternative approval process).

BACKGROUND

The Skana Water System is located on the north side of Mayne Island in the Southern Gulf Islands Electoral Area and provides drinking water to approximately 53 customers. There are 73 parcels within the Skana Water System. Capital Regional District (CRD) Infrastructure and Water Services is responsible for the system's overall operation, maintenance, design, and construction.

There are currently three major capital improvement projects on the Skana Water System Capital Plan that reserve funds are insufficient to carry out. The three projects are the Water Storage Tank Replacement, source water surveillance and Well #8 upgrades. The project budgets and scopes are noted in Table 1.

Table 1: Capital Projects requiring Debt Funding

Project #	Capital Project Title	Budget	Scope
18-01	Storage Tank Replacement	$940,000	Replacement of existing water storage tanks.
17-04	Well #8 Upgrade	$25,000	Addition of remote monitoring and control of the site.
24-01	Source Water Surveillance	$35,000	Well surveillance and monitoring to record and predict water issues with primary focus on Well#13.
Subtotal =		$1,000,000	
Project Management (+/-10%) =		$100,000	
Total =		**$1.1M**	

These capital improvement projects are required to support future years of water service. The total budget required to complete these projects is $1,100,000. In the absence of grant funding, debt funding (borrowing) will be required in order to proceed with the capital improvements. It would be expected that authorization would be for total debt funding and specific budget allocation on a project specific basis would be adjustable through the annual capital planning process.

A loan authorization bylaw is required to borrow funds to complete the works. Under the *Local Government Act*, participating area approval is required prior to adopting a loan authorization.

Approval may be obtained for a service in an electoral area in one of three methods: by petition, by alternative approval process (AAP), or assent voting (referendum). A matrix outlining these three unique processes and the benefits and challenges of each is attached as Appendix A.

ALTERNATIVES

Alternative 1

1. That the petition process be initiated to borrow up to $1,100,000 over 25 years debt term to complete the capital improvement projects.
2. If the petition process is successful, that a loan authorization bylaw be advanced to the Electoral Areas Committee and Capital Regional District Board for readings and adoption; and
3. That staff complete the remaining steps required to secure the funds and begin the projects.

Alternative 2

1. That the alternative approval process (AAP) be selected as the method for obtaining participating area approval to borrow up to $1,100,000 over 25 years debt term to complete the capital improvement projects.
2. That a loan authorization bylaw be advanced to the Electoral Areas Committee and Capital Regional District Board for up to three readings and be referred to the Inspector of Municipalities for approval prior to conducting an AAP process.
3. If the AAP process is successful, that staff complete the remaining steps required to secure the funds and begin the projects.

Alternative 3

1. Defer the capital improvement projects and continue to operate the system as is; and
2. Keep the capital improvement projects within the 5-year capital plan and apply for eligible grants to fund the replacements.

Alternative 4

That this report be referred back to staff for additional information.

IMPLICATIONS

Elector Approval of Loan Authorization Bylaw

Elector approval may be secured through a petition if the owners representing at least 50% of the parcels in the service area, that in total must represent at least 50% of the assessed value of land and improvements, submit signed forms supporting the proposal to borrow funds. The petition process is the least costly and most efficient approval process and typically takes up to 4 months; however, if less than 50% support it, assent voting (referendum) will be required prior to borrowing the funds.

Elector approval is obtained from an alternative approval process (AAP) when less than 10% of estimated eligible electors in the participating area oppose the proposed borrowing unless an assent voting (referendum) is held. The estimate of eligible electors will include the count of non-resident property owners and tenants residing in the service area as provided from Elections BC voters list. If less than 10% respond in opposition, then no further assent is required.
If 10% or more oppose then an assent vote or referendum is required, which can cost upwards of

$70,000 and must be held within 80 days of the AAP deadline date.

Staff recommend proceeding with a petition process to obtain elector approval for borrowing in local water service areas due to following reasons:

1. **Efficiency**: The petition process can be quicker and more straightforward, often taking up to 4 months, compared to the AAP, which can take up to 7 months.
2. **Cost-Effective**: The petition process generally involves fewer administrative costs. It doesn't require public notices or advertising, which can save money.
3. **Clear Support**: The petition process directly measures support from property owners, who are often the most affected by the proposed changes. This can provide a clearer indication of genuine support.
4. **Less Risk of Failure**: The petition process requires a majority of property owners to show support, which can be easier to achieve than avoiding a 10% opposition threshold in the AAP.
5. **Simplicity**: The petition process is simpler, with one vote per property, making it easier to manage and understand.
6. **Direct Engagement**: It allows for direct engagement with property owners, potentially leading to more informed and committed support. As part of this process, the CRD recommends a public open house to educate the property owners about the projects and garner support.

Implementation of Petition Process

The steps required to obtain elector approval via the petition are outlined below:

- Confirm Committee approval for a petition process to obtain elector approval.
- Complete and send petition letter addressed to each owner(s) of the parcel/folio within the participating area (draft petition attached as Appendix B)
- Advertise the petition within the Skana Water System (direct mail, local newspapers, notice boards and website).
- Host a public open house to share information and gather signatures (not required but recommended).
- Determine results of the petition following the deadline of August 29, 2025 (the petition is at least a 30-day period from date petition letters are sent to each owner).
- If a 50% approval threshold is exceeded, present the loan authorization bylaw to the Electoral Areas Committee and CRD Board with a recommendation to introduce and provide up to three readings.
- Send the loan authorization bylaw to the BC Inspector of Municipalities.
- Following approval by the Inspector, return the loan authorization bylaw to the CRD Board for final approval.
- Following the one-month bylaw challenging period, complete process to draw upon loan and begin projects.

Financial Implications

Long-term debt must be arranged through the Municipal Finance Authority (MFA) which offers a maximum lending term of 30 years. MFA will set a fixed interest rate for an initial term, generally 10 years, and subsequently refinance the loan, typically in five-year increments.

The loan amortization bylaw will define the maximum debt term; however, the length of the initial fixed term and the subsequent refinancing terms are at the sole discretion of the MFA.

For analytical purposes only, four different amortization term scenarios are simulated in Table 2. The cost of borrowing is the total of the estimated principal and interest payments over the borrowing term. The information in Table 2 is a high-level estimation only based on the indicative interest rates published by MFA at the time of this staff report. The actual cost of borrowing will be dependent on the loan amount, actual interest rates at the time of borrowing and refinancing, and the amortization term selected.

Table 2: Skana Water System Debt Servicing Costs - Simulation

Borrowing Amount	$ 1,100,000			
Borrowing term (years)	15	20	25	30
Indicative Interest Rate*	4.48%	4.74%	4.74%	4.74%
Cost of Borrowing $	$1,600,644	$1,816,755	$2,004,853	$2,198,212
Annual Debt Payment $	$106,710	$90,838	$80,194	$73,274
Annual Parcel Tax per taxable folio $ **	$1,462	$1,244	$1,099	$1,004

**MFA Indicative Market Rates used for analysis, taken from MFA Website, May 28, 2025.*
*** Calculated parcel tax assuming no change in total folios, set at 2025 level of 73 folios.*

CRD staff consider multiple guidelines with respect to amortization term, including estimated useful life of the infrastructure, the impact of the annual debt payment requirement, the total cost of borrowing over debt term, and the interest rate risk. A longer amortization term will minimize the annual debt payments, but it results in higher total cost of borrowing and higher interest rate risk exposure. Although a debt term of 15 years has the lowest total borrowing costs, a 25-year term is recommended in balancing the annual debt payments requirement for ratepayers, the interest rate risk and the useful life of the capital assets.

Staff will continue pursing grant opportunities if any become available. Approved Loan Authorization Bylaw will increase the grant success as often the grant programs require cost sharing by demonstrating the local share is committed and secured. The required actual borrowing amount will be reduced if future grant is awarded.

Service Delivery Implications

Completing the approval process and borrowing funds sooner will minimize service disruptions caused by water quality issues, continued tank leakage and other issues related to aging infrastructure. The likelihood of disruptions will continue to increase until a solution is implemented.

The sooner the projects are complete, the lower the risk of emergency repairs and system disruptions. Higher operational costs to maintain the existing infrastructure requiring upgrades will be incurred until funding is attained to complete the projects or failure occurs. If the infrastructure is left to fail, emergency replacement costs will likely be significantly higher than any planned replacement costs.

CONCLUSION

Multiple capital improvements are needed to upgrade the Skana Water System. With insufficient reserve funds, debt funding and a loan authorization bylaw are required to borrow the necessary estimated $1,100,000. Under the *Local Government Act*, participating area approval is required for the loan authorization. A petition process is recommended over an AAP to seek approval, as it is more efficient, cost-effective, and better represents parcel owners' feedback.

RECOMMENDATION

1. That the petition process be initiated to borrow up to $1,100,000 over 25 years debt term to complete the capital improvement projects.
2. If the petition process is successful, that a loan authorization bylaw be advanced to the Electoral Areas Committee and Capital Regional District Board for readings and adoption; and
3. That staff complete the remaining steps required to secure the funds and begin the projects.

Submitted by:	Joseph Marr, P.Eng., Senior Manager, Infrastructure Planning and Engineering
Concurrence:	Alicia Fraser, P.Eng., General Manager, Infrastructure and Water Services
Concurrence:	Kristen Morley, JD, General Manager, Corporate Services
Concurrence:	Varinia Somosan, CPA, CGA, Deputy CFO and Senior Manager of Financial Services

ATTACHMENT(S)

Appendix A: Matrix of Elector Approval Processes
Appendix B: Draft Letter & Petition for the Skana Water System Borrowing

Matrix of Elector Approval Processes

CRITERIA	PETITION	ALTERNATIVE APPROVAL PROCESS (AAP)	ASSENT VOTING (REFERENDUM)
Legislation	LGA s. 337 – EA services LGA ss. 347, 407, 408 CC s. 212 (4) to (6)	LGA s. 345	LGA Part 4
Length to complete[1]	Up to 4 months	Up to 7 months	Up to one (1) year
Approx. Cost of Elector Approval Method	$500 - $3,000 *for the mailing and delivery of petition letter/form*	$1,500 - $10,000 *for paid advertising*	$70,000 + *for paid advertising and 3 days of voting*
Format	Signed Petition per property	Signed Elector Response form	Secret Ballot
Success is…	Petition must be signed by the **owners of at least 50% of the parcels** that would be subject to the local service tax, and the persons signing must be the **owners of parcels that in total represent at least 50% of the assessed value of land and improvements** that would be subject to the local service tax	When the number of elector response forms submitted by the AAP deadline **is less than the 10% threshold**	When a **majority** of the votes cast are in favour *Majority = 50% plus 1*
Failure is….	Receiving an insufficient value (less than 50% parcels and 50% of assessed values) of signed petitions by the requested response deadline	When the number of verified elector response forms submitted by the AAP deadline reaches or exceeds the 10% threshold	Less than a majority of the votes cast are in favour

[1] Calculation is based on a START date of either 1) date petition letter is distributed or 2) date that CRD Board gives 3rd reading of Bylaw

Matrix - Participating Area Approval Processes

CRITERIA	PETITION	ALTERNATIVE APPROVAL PROCESS (AAP)	ASSENT VOTING (REFERENDUM)
Administrative Pros	Can be administered before a Bylaw is drafted Only one petition response per property	Requires less resources than assent voting With 2/3 Board approval, AAP is to be conducted for the ENTIRE PROPOSED SERVICE AREA to increase the 10% threshold	Cost-efficient to run assent voting at same time as General Local Elections (next in 2026)
Administrative Cons	Most time intensive approval process for **program area staff** to administer and communicate with participants in the service May require an open house or "petition signing" event	Must wait for Inspector Approval before proceeding with AAP In smaller service areas, a 10% threshold may be too small for an AAP to be successful (i.e. 100 estimated voters results in a threshold of 10 received responses) If unsuccessful, bylaw must be abandoned, or ASSENT VOTING must be held within 80 days of AAP response deadline	Would have a major impact on operations and may require additional resources to conduct (i.e. contracted staff and auxiliary) Very expensive to publish all statutory notices as it will include call for scrutineers for and against the question
Voter Pros	All property owners are directly notified of petition Property owners are given a number of weeks to consider proposal and respond by the requested response date	Voters have at least 30 days to participate by submitting a signed Elector Response Form May submit form electronically by email	Most democratic with majority of voters deciding outcome (voters = property owners and tenants)
Voter Cons	Only one petition response per property When more than one owner on title, signatures from the majority of owners on title is required	Notification of AAP is indirect with one statutory in newspapers and one posted on CRD Public Notices webpage Additional communication methods may be considered	Limited to advance and general voting opportunities (i.e. 3 opportunities within a 10-day period) or must apply to vote by mail ballot Considered unfair by landlord property owners as tenants may vote on matters impacting tax requisition

June XX, 2025

File: ######

Dear Property Owner(s) in the Skana Water Local Service,

RE: LOAN AUTHORIZATION PETITION FOR SKANA WATER LOCAL SERVICE

The Skana water system is in need of upgrades and current capital reserves are insufficient to cover the projected capital costs of $1,100,000. Multiple projects, including storage tank replacement and ground well upgrades are deemed necessary to continue providing safe drinking water in the service area.

If property owners in the Skana Water Local Service would like the CRD to finance the costs of the works on their behalf, and undertake the capital works necessary to upgrade the water system, a form of public petition is enclosed for property owners to complete.

If a property is owned by more than one person, the *Local Government Act* requires that a majority of the owners must sign the petition and return it to the CRD in order for it to be counted in the affirmative. For the petition to be successful, the owners of at least 50% of the properties must consent and those properties must represent at least 50% of the net taxable value in the service area. Petitions that are not returned will be counted in the negative. It is important to note that the borrowing and taxation will apply to all properties in the service area (not just the property owners who voted yes).

Before completing and returning the petition, property owners are encouraged to review relevant background information provided at www.crd.ca/skana-ws

Should you have question or concerns please contact Jared Kelly, Manager of Infrastructure and Water Services, Capital Projects by email at jkelly@crd.bc.ca.

Please return the enclosed petition, in the envelope provided, to the CRD no later than August 29, 2025.

Sincerely,

Alicia Fraser
General Manager
Infrastructure and Water Services

Attachments: 3

Skana Local Service Area Petition
Bylaw No. 3089, “Skana Water Service Establishment Bylaw No. 1, 2003;
FAQ

cc: Ted Robbins, Chief Administrative Officer
Kristen Morley, General Manager, Corporate Services

AF:mm

PETITION

TO AUTHORIZE THE PROPOSED BORROWING OF ONE MILLION AND ONE HUNDRED THOUSAND DOLLARS ($1,100,000) FOR INFRASTRUCTURE UPGRADES IN THE SKANA WATER SERVICE AREA

Petition deadline: August 29, 2025

I/We do hereby petition the Capital Regional District (CRD) to borrow monies for capital project works in the **Skana Water Service** (map of area enclosed) on Mayne Island within the Southern Gulf Islands Electoral Area.

I/We understand and agree that:

1. The proposed borrowing is in relation to the service established under the Capital Regional District Bylaw Bylaw No. 3089, "Skana Water Service Establishment Bylaw No. 1, 2003;
2. The estimated total amount of the proposed borrowing is up to $1,100,000;
3. The purpose of this proposed borrowing is to complete the required capital works, facilities and equipment necessary to replace the storage tank and upgrade the well water protection system;
4. The maximum term for which debentures for the proposed borrowing will be issued is 25 years; and
5. The annual costs of the debt related to proposed borrowing will be recovered through annual tax requisition from all the taxable folios (currently there are 73 folios).

Legal Description of property:

[Insert Legal Description]

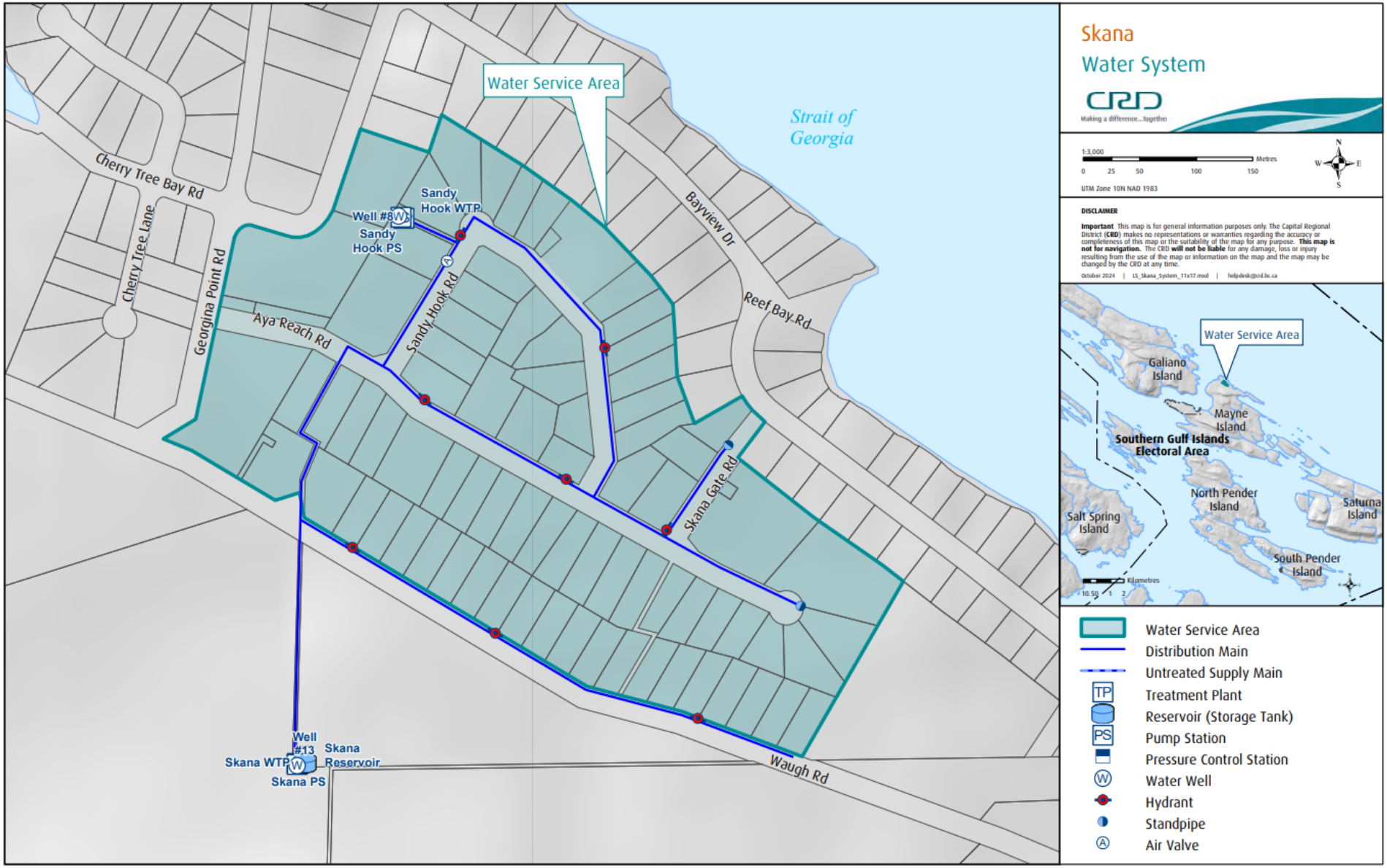
Mailing Address:

I/We am/are the Registered Owner(s) of the above noted property:

[Insert Owner's Name]		
Full Name - Owner on Title	Signature	Date
[Insert Owner's Name]		
Full Name - Owner on Title	Signature	Date
[Insert Owner's Name]		
Full Name - Owner on Title	Signature	Date

Please note: Where more than one person is the registered owner of a lot, the signatures of a MAJORITY of the owners are required.
If the owner is an incorporated body (society, incorporated business, etc.) document(s) verifying signing authority for the corporation are required.

A map identifying the Skana Water Service is on the back page of this petition.


Water Service Area
Strait of Georgia
Cherry Tree Bay Rd
Cherry Tree Lane
Georgina Point Rd
Aya Reach Rd
Sandy Hook Rd
Sandy Hook WTP
Well #8
Sandy Hook PS
Bayview Dr
Reef Bay Rd
Skana Gate Rd
Waugh Rd
Well #13
Skana WTP
Skana Reservoir
Skana PS
Skana
Water System
CRD
Making a difference...together
1:3,000
Metres
0 25 50 100 150
UTM Zone 10N NAD 1983
N
W E
S
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.
October 2024 | LS_Skana_System_11x17.mxd | helpdesk@crd.bc.ca
Water Service Area
Galiano Island
Mayne Island
Southern Gulf Islands Electoral Area
North Pender Island
Saturna Island
Salt Spring Island
South Pender Island
Kilometres
0 0.5 1 2
Water Service Area
Distribution Main
Untreated Supply Main
TP
Treatment Plant
Reservoir (Storage Tank)
PS
Pump Station
Pressure Control Station
W
Water Well
Hydrant
Standpipe
A
Air Valve

CAPITAL REGIONAL DISTRICT

BYLAW NO. 3089

****

A BYLAW TO ESTABLISH A SERVICE AREA WITHIN THE ELECTORAL AREA OF SOUTHERN GULF ISLANDS FOR THE PURPOSES OF OPERATING A WATER SUPPLY SYSTEM

****

WHEREAS:

A. The Board of the Capital Regional District may, by bylaw, establish and operate a service under the provisions of Section 800 of the *Local Government Act*.

B. Assent of the electors of the service area is required pursuant to Section 801.2 of the *Local Government Act.*

NOW THEREFORE, the Board of the Capital Regional District enacts as follows:

1. The service being established, and to be operated, is the supply, conveyance, treatment, storage and distribution of water to be known as the Skana Water Service.

2. The boundaries of the service area are shown in heavy outline on the plan attached to this Bylaw as Schedule "A".

3. Only the Electoral Area of the Southern Gulf Islands includes a participating area for this service.

4. The annual costs for the service may be recovered by one or more of the following:

   (a) by the requisition of money under Section 806 of the *Local Government Act* to be collected by a property value tax to be levied and collected on land and improvements within the service area;

   (b) by way of an annual parcel tax;

   (c) by the imposition of fees and charges to be imposed by bylaw under Section 797.2 of the *Local Government Act;* or

   (d) by revenues raised by way of agreement, enterprise, gift, grant or otherwise.

5. The maximum amount that may be requisitioned for the service will be the greater of:

   (a) ($54,100) fifty-four thousand one hundred dollars; or

   (b) an amount equal to the amount that could be raised by a property value tax rate of ($9.65) nine dollars and sixty-five cents per ($1,000) one thousand dollars which, when applied to the net taxable value of land and improvements within the service area, will yield the maximum amount that may be requisitioned under Section 806.1 of the *Local Government Act* for the service.

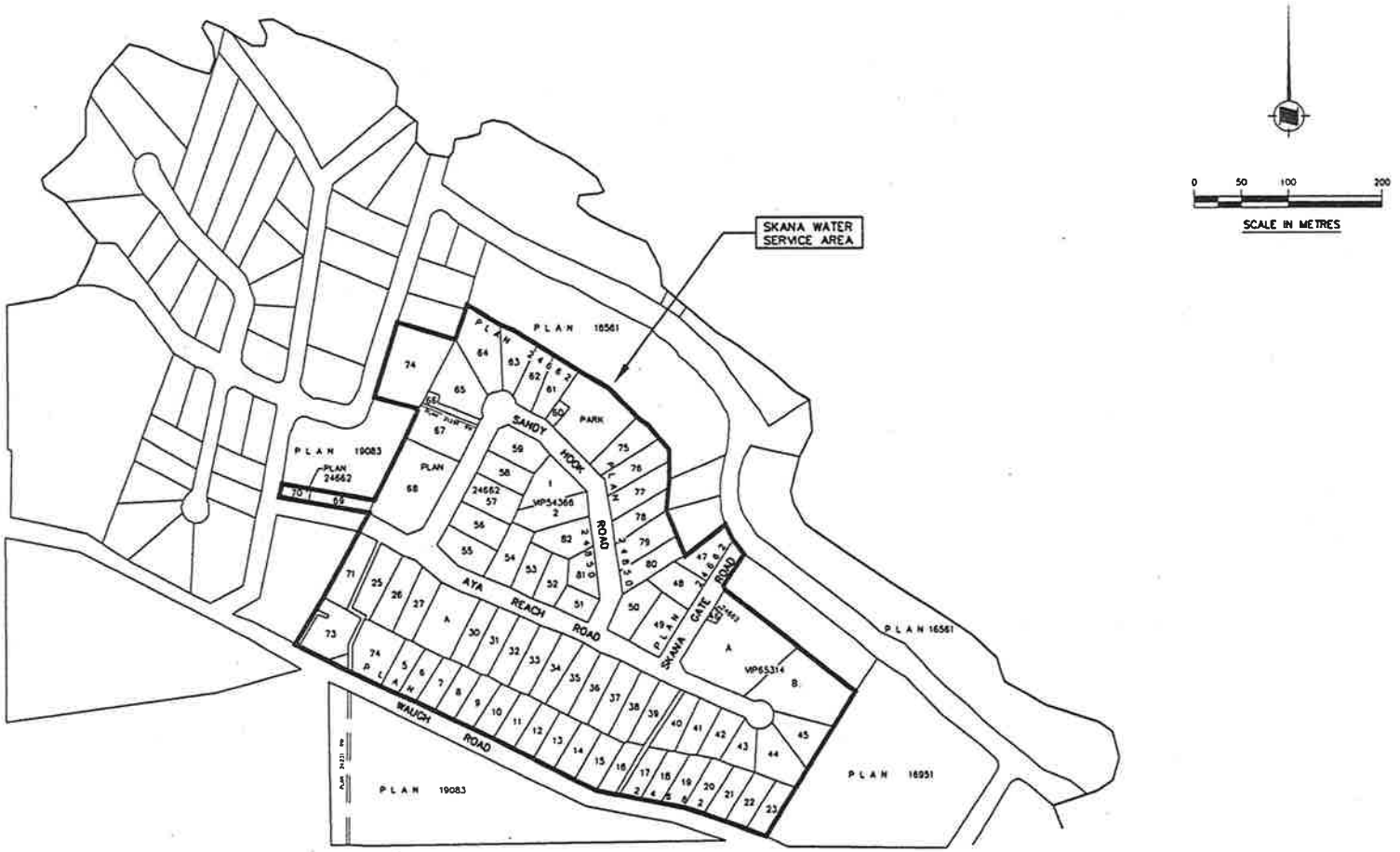
6. This Bylaw may be cited as the "Skana Water Service Establishment Bylaw No. 1, 2003".

READ A FIRST TIME THIS	13th	DAY OF	August	2003
READ A SECOND TIME THIS	13th	DAY OF	August	2003
READ A THIRD TIME THIS	13th	DAY OF	August	2003
APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS	12th	DAY OF	September	2003
RECEIVED THE ASSENT OF THE ELECTORS UNDER SECTION 801.2 OF THE *LOCAL GOVERNMENT ACT* THIS	8th	DAY OF	November	2003
ADOPTED THIS	12th	DAY OF	November	2003

CHAIR

SECRETARY

FILED WITH THE INSPECTOR OF MUNICIPALITIES THIS	14th	DAY OF	November	2003



CAPITAL REGIONAL DISTRICT

SKANA WATER SYSTEM

SCHEDULE 'A' TO BYLAW 3089
SKANA WATER SERVICE
ESTABLISHMENT BYLAW No. 1, 2003

Environmental Services

DESIGNED	DRAWN	CHECKED	APPROVED	DATE	SCALE	DWG. NO.	REV.	SHT
G.H.	MJP			08/10/03	AS SHOWN	27-D229-1A		1 OF 1