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WILDERNESS MOUNTAIN WATER SERVICE COMMISSION
Notice of Meeting on **Tuesday, June 28, 2022 at 1:00 p.m.**
Goldstream Conference Room, 479 Island Highway, Victoria, BC

For members of the **public who wish to listen to the meeting** via telephone please call **1-833-353-8610** and enter the **Participant Code 1911461 followed by #.** You will not be heard in the meeting room but will be able to listen to the proceedings.

D. Pepino (Chair) L. Cutler (Vice Chair) M. Hicks, Electoral Area Director M. Lechowicz

AGENDA

1. APPROVAL OF AGENDA

2. ADOPTION OF MINUTES 3

***Recommendation**: That the minutes of the February 22, 2022 meeting be adopted.*

3. CHAIR'S REMARKS

4. PRESENTATIONS/DELEGATIONS

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

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

Alternatively, you may email your comments on an agenda item to the Wilderness Mountain Water Service Commission at iwsadministration@crd.bc.ca.

Requests must be received no later than 4:30 p.m. two calendar days prior to the meeting.

5. SENIOR MANAGER'S REPORT

- Bylaw No. 4452 – A Bylaw to Amend Appointments for the Wilderness Mountain Water Service Commission (Bylaw No. 3511)
- Verbal discussion to introduce draft Local Service Area Water Conservation Bylaw

6. COMMISSION BUSINESS

6.1. Project and Operations Update 7

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

6.2. 2021 Annual Report.....9

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

*To ensure quorum, advise **Mikayla Risvold 250.474.9518** if you cannot attend.*

IWSS-297445977-8472

6.3. Wilderness Mountain Source Water Protection Plan 2022 18

Recommendation: That the Commission endorse the Source Water Protection Plan, and prior to directing staff to implement the recommendations, await the results of the Conceptual Water Treatment Plant Design Project to avoid duplication and confirm regulatory requirements from Island Health.

7. CORRESPONDENCE

8. NEW BUSINESS

9. ADJOURNMENT

Next Meeting: November 2022

Making a difference...together

MINUTES OF A MEETING OF THE Wilderness Mountain Water Service Commission, held Tuesday, February 22, 2022 at 1:00 p.m., In the Goldstream Meeting Room, 479 Island Highway, Victoria, BC

PRESENT: **Committee Members:** D. Pepino (Chair); L. Cutler (Vice Chair); M. Hicks, Electoral Area Director; M. Lechowicz

Staff: T. Robbins, General Manager, Integrated Water Services; S. Irg, Senior Manager, Water Infrastructure Operations; D. Puskas, Manager, Capital Projects; C. Moch, Manager, Water Quality Operations; T. Duthie, Manager, Administrative Services; M. Risvold, Committee and Administrative Clerk (Recorder)

REGRETS:

EP = Electronic Participation

The meeting was called to order at 1:01.

1. ELECTION OF CHAIR

The Senior Manager called for nominations for the position of Chair of the Wilderness Mountain Water Service Commission for 2022.

M. Lechowicz nominated D. Pepino. D. Pepino accepted the nomination.

The Senior Manager called for nominations a second time.

The Senior Manager called for nominations a third and final time.

Hearing no further nominations, the Senior Manager declared D. Pepino Chair of the Wilderness Mountain Water Service Commission for 2022 by acclamation.

2. ELECTION OF VICE CHAIR

The Chair called for nominations for the position of Vice Chair of the Wilderness Mountain Water Service Commission for 2022.

M. Lechowicz nominated L. Cutler. L. Cutler accepted the nomination.

The Chair called for nominations a second time.

The Chair called for nominations a third and final time.

Hearing no further nominations, the Chair declared L. Cutler vice Chair of the Wilderness Mountain Water Service Commission for 2022 by acclamation.

3. APPROVAL OF AGENDA

MOVED by M. Hicks, **SECONDED** by L. Cutler,
That the agenda be approved as amended.

CARRIED

4. ADOPTION OF MINUTES

Paragraph four of item 5.1 was amended as follows:

"T. Robbins stated that Island Health has put the onus on the ~~CRD~~ Commission…"

MOVED by M. Hicks, **SECONDED** by L. Cutler,
That the minutes of the October 28, 2021 meeting be adopted as amended.

CARRIED

5. CHAIR'S REMARKS

The Chair provided background academic history and thanked the commission for election of Chair.

6. PRESENTATIONS/DELEGATIONS

There were no presentations or delegations.

7. SENIOR MANAGER'S REPORT

S. Irg provided the commission meeting schedule for the year, advising there will be three meetings held in 2022. The meetings will be held in the months of February, June and in the Fall. Additional meetings remain at the call of the Chair.

8. COMMISSION BUSINESS

8.1. Project and Operations Update

S. Irg spoke to the item. He advised that reservoir cleaning, inspection and flushing of the distribution system was completed after the report was written.

Staff responded to a question from the commission regarding the recent communication outage and back-up battery. Staff advised there is a back-up battery, however a fuse had tripped causing the outage. The pump failure was ruled to be end of life.

Discussion ensued regarding:

- Power outage and back-up generator.
- Storage tank cleaning procedure.

MOVED by M. Hicks, **SECONDED** by L. Cutler,
The Wilderness Mountain Water Service Commission receives this report for information.

CARRIED

9. CORRESPONDENCE

9.1. Wilderness Mountain Water System (Capital Regional District), 706 Cains Way, Sooke, BC

S. Irg spoke to the item and outlined the details on the follow up response to Island Health to meet the surface water objectives. He noted the filtration exemption has not existed since 2017, and advised the system is not currently in compliance.

T. Robbins advised Island Health responded to CRD seeking clarification with respect to the conceptual design work proposed starting this year. Staff will create the terms of reference for hiring a consultant to obtain further conceptual design information to provide more formal feedback. Discussion ensued.

10. NEW BUSINESS

10.1. Correspondence from D. Pepino

The Chair discussed budget alternatives proposed by the commission which included:

- A request for more data from the water system, reservoir and treatment plant.
- The possibility of changing the filter type.
- Increasing SCADA analysis.
- Working collaboratively with staff.
- Making minor adjustments to the existing infrastructure.

Discussion ensued.

Staff highlighted the funds transferred into the operating reserve account from the 2021 year end, surplus, revenue, and operating account. Staff advised that the intake pump failure and water license fees being reconciled have cost the commission $5,500 for 2022. Staff advised SCADA is used for plant operators to monitor for any anomalies. Staff advised that the Harmsco filters down to five microns are washable, filters below five microns are not washable and costly. String wound filters are not washable.

Discussion ensued regarding:

- Analyzing data from all systems for consultants to review.
- Meeting and trial proposal with Vancouver Island Health Authority (VIHA).
- The commission working in partnership with the CRD.

T. Robbins acknowledged the willingness and expertise that the commission brings to the community. A hybrid model consisting of staff working collaboratively with the commission was discussed. A consultant would be hired and funded through Community Works Funds to view the proposal for Island Health. At the request of the consultant more data may be required following their initial review to complete the conceptual design based on all relevant parameters. Staff will involve the commission in various stages of the conceptual design. The consultant will sign off on the conceptual design for provincial service water objectives. Discussion ensued.

MOVED by M. Lechowicz, **SECONDED** by L. Cutler,
That the Wilderness Mountain Water Service Commission support the Capital Regional District with hiring an engineering consultant for the water treatment plant conceptual design work project scheduled for 2022.

CARRIED

MOVED by M. Lechowicz, **SECONDED** by L. Cutler,
That the Wilderness Mountain Water Service Commission re-affirm acceptance and approval of the 2022 operating and capital budget, as amended and presented on October 28, 2021 with the inclusion of year-end actuals.

CARRIED

11. ADJOURNMENT

MOVED by M. Hicks, **SECONDED** by M. Lechowicz,
That the February 22, 2022 meeting be adjourned at 2:31.

CARRIED

_____
CHAIR

_____
SECRETARY

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REPORT TO WILDERNESS MOUNTAIN WATER SERVICE COMMISSION
MEETING OF TUESDAY, JUNE 28, 2022

SUBJECT **Capital Project Status Reports and Operational Updates – June 2022**

ISSUE SUMMARY

To provide the Wilderness Mountain Water Service Commission with capital project status reports and operational updates.

BACKGROUND

The Wilderness Mountain Water System is located near the top of Mount Matheson in East Sooke on Vancouver Island in the Juan de Fuca Electoral Area and provides drinking water to approximately 74 customers. Capital Regional District (CRD) Integrated Water Services is responsible for the overall operation of the water system with day-to-day operation and maintenance, design and construction of water system facilities provided by the CRD Infrastructure Engineering and Operations Divisions. The quality of drinking water provided to customers in the Wilderness Mountain Water System is overseen by the CRD Water Quality Division.

CAPITAL PROJECT UPDATE

21-01 | Source Water Protection Plan

Project Description: Source Water Protection Plan

Project Rationale: Provide a regulatory required Source Water Protection Plan for the Wilfred Reservoir.

Project Update and Milestones:

Milestone	Completion Date
This project is complete and the final report submitted to Island Health	May 19, 2022
Staff report to Wilderness Mountain Water Service Commission	June 28, 2022

22-02 | Water Treatment Plant Conceptual Design

Project Description: Conceptually design the water treatment plant upgrades.

Project Rationale: Update previous conceptual water treatment plant upgrade designs to inform borrowing requests.

Project Update and Milestones:

Milestone	Completion Date
Through a competitive process, this project has been awarded to Associated Engineering	May 17, 2022
Project Kick-off Meeting	May 24, 2022
Working Group – CRD, Consultant, Commission	June 23, 2022
Final Submission	December 2022
Community Works Fund (CWF) Vetting Application	Complete
CWF Application Submission	Complete
Request for Proposal (RFP) Scope of Works & Issue	Complete
CWF Application Approval	Complete
CRD Board Approval	Complete
RFP Close	Complete

OPERATIONAL UPDATE

- February 17 and 18: Clean concrete tanks.
- February 24 and 25: Flushing of distribution system.
- March 13: Special call out Ultraviolet (UV) transmittance, clean sleeve and sensor.
- April 11: Special call out UV transmittance, clean sleeve and sensor.
- June 14: Pressure tank serviced and recharged.
- June 12: Special call out to review high turbidity and complete additional filter change.
- June 19: Special call out to review high turbidity and complete additional filter change.

RECOMMENDATION

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

Submitted by:	Shayne Irg, P. Eng., Senior Manager, Water Infrastructure Operations
Submitted by:	Ian Jesney, P. Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Ted Robbins, B.Sc., C.Tech., General Manager, Integrated Water Services

Wilderness Mountain Water System

2021 Annual Report

CRD | Drinking Water

Introduction

This report provides a summary of the Wilderness Mountain Water Service for 2021 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 Wilderness Mountain is a rural residential development located on Mount Matheson in the Juan de Fuca Electoral Area. The area was originally serviced by a private water utility from about 1983, and in 2008 the service converted to the Capital Regional District (CRD). The Wilderness Mountain water service is made up of 82 parcels encompassing a total area of approximately 124 hectares. Of the 82 parcels, 74 were customers to the water system in 2021.

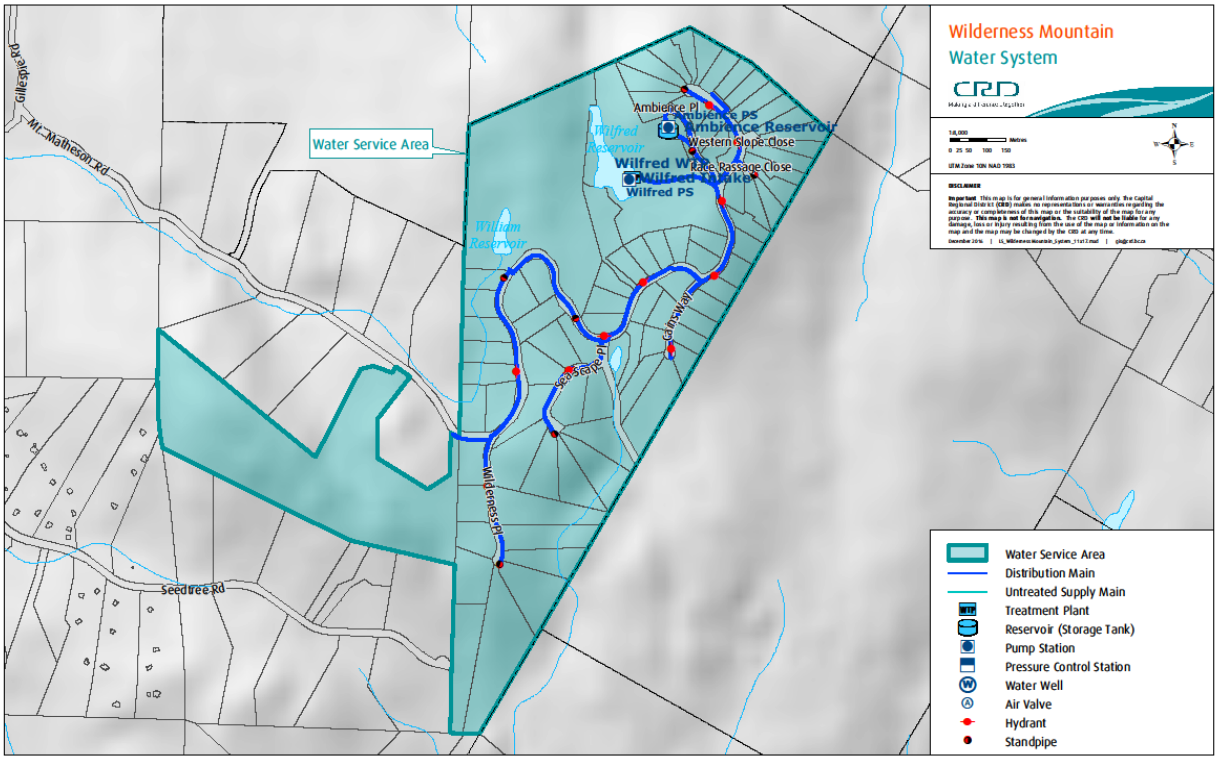

Figure 1: Map of the Wilderness Mountain Water Service Area

The Wilderness Mountain water system is primarily comprised of:

- Raw water obtained from Wilfred Reservoir, a small surface water body which lies within a protected watershed and was created by the construction of two dams.
- Water from Wilfred Reservoir is pumped to the treatment plant which consists of coarse cartridge filtration, ultraviolet disinfection and chloramine disinfection.
- The chloraminated water is then pumped to two distribution system storage tanks (combined capacity of 250 cubic metres or 66,000 US gallons) and the distribution system.
- Distribution system (3,750 meter network of 150 millimeter (6 inch) and 100 mm (4 inch) polyvinyl chloride (PVC) water mains).
- Other water system assets: 74 service connections, 10 hydrants, six standpipes, 21 gate valves and a Supervisory Control and Data Acquisition (SCADA) system.
- Although the water system also includes the William Brook Dam and related water reservoir, this reservoir is no longer utilized for water supply.

Water Supply

The raw water supply level in Wilfred Reservoir is shown in Figure 2. The lake level was at its lowest point in September and November. The reservoir reached full volume in January 2021.

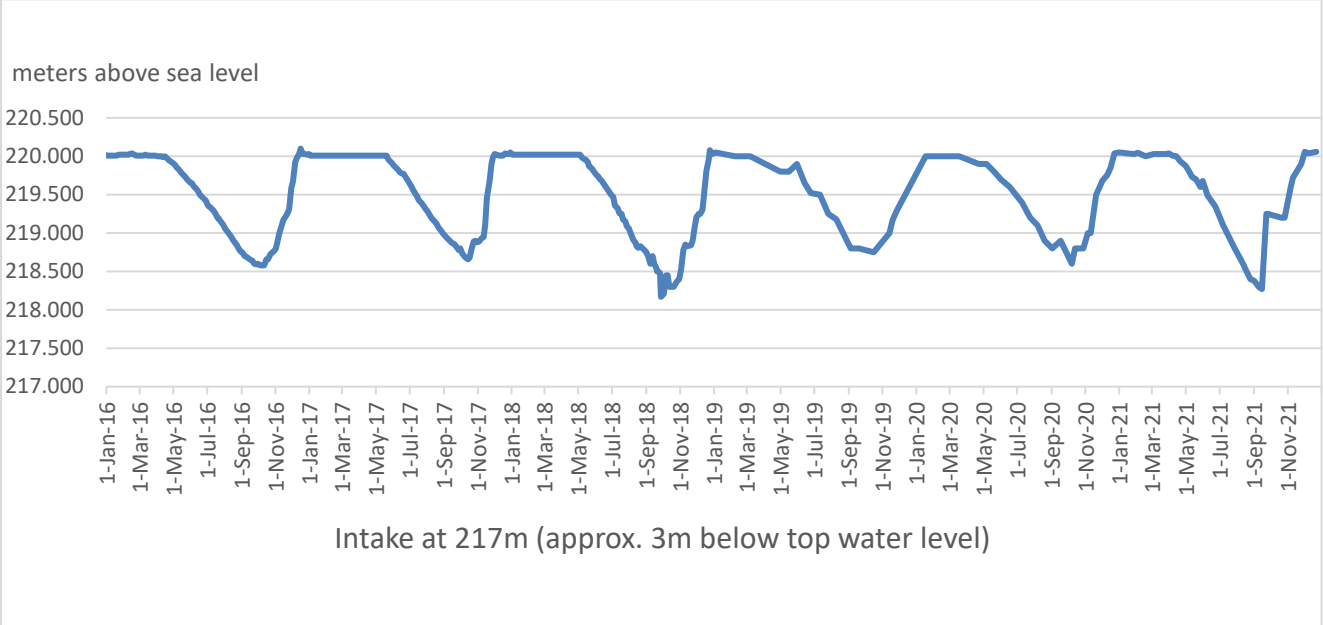

Figure 2: Wilfred Reservoir Water Level 2016-2021

Water Usage

The volume used by the community, or the water demand, is illustrated in Figure 3. The demand in 2021 was 19% higher than in 2020 and 29% higher than the five year average.

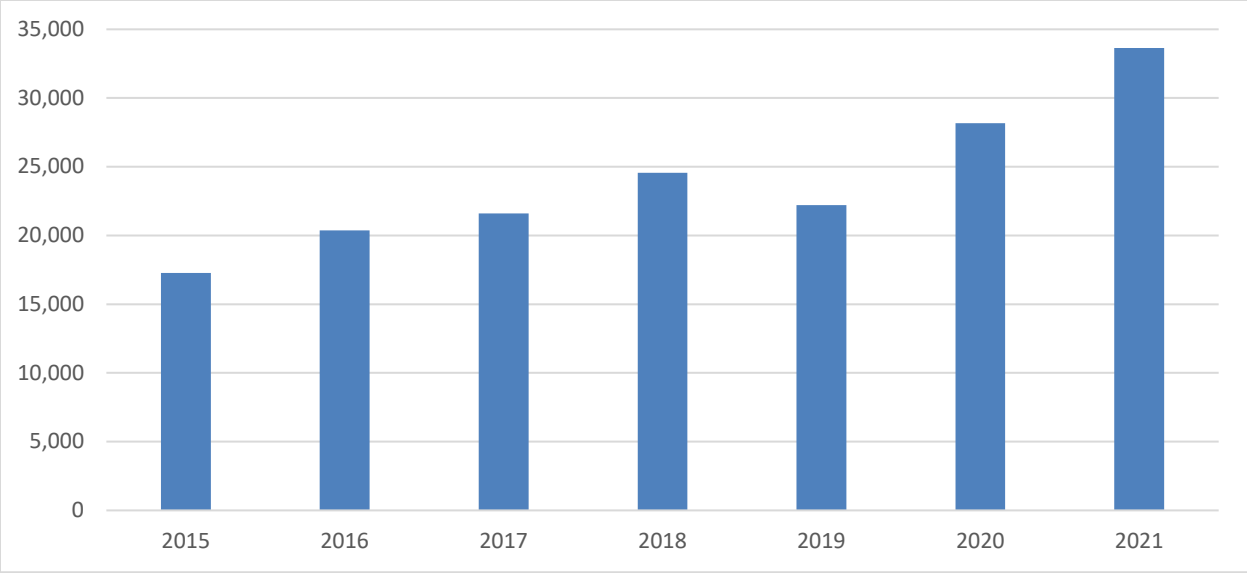

Figure 3: Wilderness Mountain Water Demand (cubic meters) 2015-2021

Drinking Water Quality

The Wilderness Mountain Water System was on a boil water advisory (BWA) for 224 days in 2021 due to elevated turbidity in the treated water. High algal activity and the inability of the existing filtration system to filter out very small algae species in bloom were the main factors for this record-long BWA for this system. Discussions with the Commission, Island Health, and CRD staff have taken place to plan upgrades in the near future to mitigate this situation.

Wilfred Reservoir raw water exhibited elevated iron and manganese concentrations throughout the entire year, but especially during the fall. In the days following the extreme rainfall and runoff event on November 14 and 15, 2021, both iron and manganese concentrations in the reservoir reached unusually high levels. Without designated treatment in place to remove these metals from the raw water, the aesthetic objective for manganese, as per Guidelines for Canadian Drinking Water Quality (GCDWQ), was regularly exceeded in the treated water. In samples from November 19 following this extreme weather event, the manganese concentrations in the treated water even exceeded the maximum acceptable concentration (MAC), and the iron concentrations surpassed the aesthetic limit. Concentrations beyond the aesthetic limit can lead to water discolourations, while exceedances of the MAC can become a health issue with chronic exposure. Because the disinfection process in the Wilderness Mountain Water System utilizes chloramination, the effects on customers in terms of discoloured water may have been reduced. Additional treatment is required to mitigate this issue.

The data below provides a summary of the water quality characteristics in 2021:

Raw Water:

- Between June and August, the raw water exhibited medium to high concentrations of total coliform bacteria. Outside this timeframe, total coliform concentrations were low.
- *E. coli* bacteria concentrations were mostly low with higher concentrations in the fall and winter, which included one exceedance of the USEPA 20 CFU/100mL unfiltered surface water treatment criterion (26 CFU/100mL on Nov 19, following the extreme rainfall and runoff event).
- *Cryptosporidium* and *Giardia* parasites were tested twice in 2021 and neither were detected.
- The raw water was tested for metals in March, May, August and November and in all samples manganese was above the aesthetic objective and the sample from November above the MAC in the GCDWQ. Iron concentrations were elevated but only the November sample was in exceedance of the aesthetic objective. Concentrations of both metals are highest in the fall following events of high precipitation and runoff into the reservoir and during the lake turnover. No significant water discolouration was reported by customers.
- The mean annual raw water turbidity was 1.25 Nephelometric Turbidity Unit (NTU) and therefore significantly higher than in 2020. The maximum turbidity was 2.2 NTU (July to August). Most raw water turbidity spikes coincided with algal and/or zooplankton blooms in Wilfred Reservoir.
- The raw water was soft (median hardness 15.3 mg/L $CaCO_3$).
- The pH was neutral (median pH 7.1).
- The median total organic carbon (TOC) concentration was moderately high at 4.35 mg/L, slightly higher than in 2020; likely a result of higher algal activity in 2021.

Treated Water:

- The treated water was bacteriologically safe to drink outside the two BWA periods (first BWA April 20 to October 7; second BWA: October 26 to December 17). No *E. coli* bacteria were found in the treated water and only one of 112 bacteriological samples tested positive for total coliform bacteria throughout the year (October 4: 3 CFU/100mL at 719 Cains Way).
- The treated water turbidity was periodically above the GCDWQ turbidity limit of 1.0 NTU in particular during spring and summer. This led to the aforementioned prolonged BWAs. The short-term exceedances lasted only a few minutes and were usually related to pump starts or other operational activities.
- The disinfection by-products Trihalomethanes (TTHM) and Haloacetic Acids (HAA) were well below the GCDWQ limits.
- The annual median total chlorine residual in the system was 1.54 mg/L.

Table 1 and 2 below provide a summary of the 2021 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 operational issues that were addressed by CRD Integrated Water Services staff:

- Maintenance of all 10 fire hydrants
- Repair of 50 mm diameter service line leak on Cains Way
- Replacement of hypochlorite metering pump at the treatment plant
- Monthly dam inspections and maintenance

Capital Project Updates – 2021

- Source Water Protection Plan – Started in 2021 with completion expected in 2022.

Financial Report

Please refer to the attached 2021 Statement of Operations and Reserve Balances.

Revenue includes parcel taxes (Transfers from Government), fixed user fees (User Charges), water sales and interest on savings (Interest earnings), and miscellaneous revenue such as late payment charges (Other revenue).

Expenses include all 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 added to any surplus or deficit carry forward from the prior year, yielding an Accumulated Surplus (or deficit) that is carried forward to the following year.

Submitted by:	Shayne Irg P.Eng., Senior Manager, Water Infrastructure Operations
	Ian Jesney, P.Eng., Senior Manager, Infrastructure Engineering
	Glenn Harris, Ph.D., R.P.Bio., Senior Manager, Environmental Protection
	Rianna Lachance, BCom, CPA, CA, Senior Manager, Financial Services
Concurrence	Ted Robbins, B.Sc., C.Tech, General Manager, Integrated Water Services

Attachment: 2021 Statement of Operations and Reserve Balances

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

Table 1

Table 1: 2021 Summary of Raw Water Test Results, Wilderness Mountain Water System									
PARAMETER		**2021 ANALYTICAL RESULTS**				**CANADIAN GUIDELINES**	**2011 - 2020 RESULTS**		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Minimum	Range Maximum	≤ = Less than or equal to	Median	Samples Analyzed	Range Minimum-Maximum
mg/L = parts per million ug/L = parts per billion									
Physical Parameters (ND means Not Detected by analytical method used)									
Alkalinity, Total	mg/L	**8.2**	1	8.2	8.2		8.78	28	7.28-13.3
Carbon, Dissolved Organic	mg/L as C	**4.2**	2	3.0	5.4		3.8	24	1.91 - 5.20
Carbon,Total Organic	mg/L as C	**4.35**	4	3.5	8.8	Guideline Archived	4	25	2.96 - 6.83
Colour, True	TCU	**14**	7	7	26	≤15 AO	12.0	78	2.1 - 23.0
Conductivity @ 25 C	uS/cm	Not tested in 2021					75.3	33	67.7-92.7
Hardness as $CaCO_3$	mg/L	**15.3**	4	14.2	16.9	No Guideline Required	16.6	31	11.1 - 20.6
pH	pH units	**7.1**	18	6.6	8.1	7.0 - 10.5 AO	6.845	44	6.14-7.36
Total Suspended Solids	mg/L	**7.2**	1	7.2	7.2		1.65	20	ND - 1.6
Total Solids	mg/L	**79.0**	2	70.0	88.0		49.45	20	42-58
Turbidity, lab tests	NTU	**1.25**	38	0.55	2.2		0.86	388	0.38 - 5.8
Ultraviolet Absorption, 5 cm	Abs.@254 nm	Last tested in 2015					0.425	22	0.345-0.659
Ultraviolet Transmittance	%	**74.5**	5	72.7	76		78.4	30	73.7 - 82.8
Water Temperature	degrees C	**10.5**	27	3.5	20.4	≤15 AO	11.0	461	1.7 - 21.2
Non-Metallic Inorganic Chemicals (ND means Not Detected by analytical method used)									
Ammonia, Total	ug/L as N	**ND**	2	ND	ND		12.6	20	ND - 71.0
Bromide	ug/L as Br	**0.036**	1	0.036	0.036		12.855	18	ND - 50
Chloride	mg/L as Cl	**14**	1	14	14	≤ 250 AO	11.0	8	11.0 - 12.1
Cyanide	mg/L as Cn	**ND**	1	ND	ND	0.2 MAC	ND	2	ND - 0.02
Fluoride	mg/L as F	**ND**	1	ND	ND	1.5 MAC	ND	8	ND - 0.02
Nitrogen, Nitrate	ug/L as N	**ND**	2	ND	0.03		ND	19	0.15 - 37.0
Nitrogen, Nitrite	ug/L as N	**ND**	2	ND	ND		ND	18	ND
Nitrogen, Total	ug/L as N	**122.0**	2	0.26	244		188.5	20	84.0- 263
Phosphate,Total	ug/L as P	**3.6**	2	0.005	7.2		6.2	22	ND - 71.0
Silica	mg/L as SiO_2	**5.1**	2	4.90	5.2		2.76	17	ND - 5.28
Silicon	mg/L as Si	**2375**	4	2040	2610		1430	20	380-2360
Sulphate	mg/L as SO_4	**5.45**	2	5.4	5.5	≤ 500 AO	7.139	20	4.9-19
Sulphide	mg/L as H_2S	**ND**	1	ND	ND	≤ 0.05 AO	ND	7	ND - 0.29
Sulphur	mg/L as S	**ND**	4	ND	ND		ND	21	ND - 5.94
Metals (ND means Not Detected by analytical method used)									
Aluminum	ug/L as Al	**44.4**	4	18.7	53.7	2900 MAC / 100 OG	24.9	20	7.8-81.5
Antimony	ug/L as Sb	**ND**	4	ND	ND	6 MAC	ND	20	ND
Arsenic	ug/L as As	**ND**	4	ND	0.12	10 MAC	ND	20	ND - 0.15
Barium	ug/L as Ba	**2.25**	4	1.5	2.3	1000 MAC	1.85	20	ND - 2.70
Beryllium	ug/L as Be	**ND**	4	ND	ND		ND	20	ND
Bismuth	ug/L as Bi	**ND**	4	ND	ND		ND	20	ND
Boron	ug/L as B	**ND**	4	ND	ND	5000 MAC	ND	20	ND
Cadmium	ug/L as Cd	**ND**	4	ND	ND	5 MAC	ND	20	ND - 0.117
Calcium	mg/L as Ca	**3.265**	4	2.97	3.66	No Guideline Required	3.425	20	2.91-4.56
Chromium	ug/L as Cr	**ND**	4	ND	ND	50 MAC	ND	20	ND
Cobalt	ug/L as Co	**ND**	4	ND	0.3		ND	20	ND
Copper	ug/L as Cu	**2.85**	4	1.97	4.85	2000 MAC / ≤ 1000 AO	3.135	20	1.95-14.6
Iron	ug/L as Fe	**147.5**	4	111	643	≤ 300 AO	178	20	115 - 471
Lead	ug/L as Pb	**0.27**	4	ND	0.4	5 MAC	0.27	20	ND - 1.01
Lithium	ug/L as Li	**ND**	4	ND	ND		ND	11	ND
Magnesium	mg/L as Mg	**1.745**	4	1.65	1.89	No Guideline Required	1.795	20	1.56-2.24
Manganese	ug/L as Mn	**39.25**	4	23.7	137	120 MAC / ≤ 20 AO	59.5	20	33-167
Mercury	ug/L as Hg	**ND**	4	ND	0.0023		ND	17	ND
Molybdenum	ug/L as Mo	**ND**	4	ND	ND		ND	20	ND
Nickel	ug/L as Ni	**ND**	4	ND	ND		ND	20	ND - 5.20
Potassium	mg/L as K	**0.306**	4	0.249	0.381		0.32	20	0.252 - 0.36
Selenium	ug/L as Se	**ND**	4	ND	ND	50 MAC	ND	20	ND - 0.12
Silver	ug/L as Ag	**ND**	4	ND	ND	No Guideline Required	ND	20	ND
Sodium	mg/L as Na	**6.74**	4	6.48	7.34	≤ 200 AO	7.01	20	6.25-10.9
Strontium	ug/L as Sr	**14.45**	4	13.9	16.1	7000 MAC	14.45	20	12.8-16
Thallium	ug/L as Tl	**ND**	4	ND	ND		ND	20	ND
Tin	ug/L as Sn	**ND**	4	ND	ND		ND	20	ND
Titanium	ug/L as Ti	**ND**	4	ND	ND		ND	20	ND
Uranium	ug/L as U	**ND**	4	ND	ND	20 MAC	ND	20	ND
Vanadium	ug/L as V	**ND**	4	ND	ND		ND	20	ND
Zinc	ug/L as Zn	**ND**	4	ND	7.5	≤ 5000 AO	ND	20	ND - 18.6
Zirconium	ug/L as Zr	**ND**	4	ND	ND		ND	20	ND
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	Coliforms/100 mL	**112**	17	12	280		158	240	ND - 2419
E. coli	E.coli/100 mL	**3.5**	18	ND	26		ND	242	ND - 40
Hetero. Plate Count, 28C (7 day)	CFU/1 mL	Last analyzed in 2014				No Guideline Required	845	80	40 - 5800
Chlorophyll									
Chlorophyll, Total	ug/L	**5.41**	18	0.73	12.6		2.91	464	0.04 - 18.93
Parasites						No MAC Established			
Cryptosporidium, Total oocysts	oocysts/100 L	**ND**	2	ND	ND	Zero detection desirable	**ND**	35	ND
Giardia, Total cysts	cysts/100 L	**ND**	2	ND	ND	Zero detection desirable	**ND**	31	ND - 1.2

Table 2

Table 2: 2021 Summary of Treated Water Test Results, Wilderness Mountain Water System									
PARAMETER		**2021 ANALYTICAL RESULTS**				**CANADIAN GUIDELINES**	**2011-2020 RESULTS**		
Parameter Name	Units of Measure	Annual Median	Samples Analyzed	Range Min.	Range Max.	≤ = Less than or equal to	Median	Samples Analyzed	Range Min.-Max.
mg/L = parts per million ug/L = parts per billion									
Physical Parameters									
Colour, True	TCU	**10.15**	6	5	18	≤ 15 AO	8.3	73	3.0 - 18.0
Conductivity @ 25 C	uS/cm	Not tested in 2020					91.8	31	82.2-100.3
Hardness as CaCO3	mg/L	**15.35**	4	14.2	17.1		16.05	10	13.9-18.1
pH	pH units	**7.52**	17	6.86	9.1	7.0 - 10.5 AO	6.96	48	6.31-8.86
Total Organic Carbon	mg/L	**4.35**	4	3.5	8.7		3.45	4	2.5-4.3
Turbidity, lab tests	NTU	**0.73**	38	0.35	1.7	1 MAC and ≤ 5 AO	ND	463	0.17 - 3.6
Water Temperature	degrees C	**11.05**	276	2.8	21.1	≤ 15 AO	11.0	1904	1.8 - 20.9
Microbial Parameters									
Indicator Bacteria									
Coliform, Total	CFU/100 mL	**ND**	112	ND	3	0 MAC	ND	826	ND - 16
E. coli	CFU/100 mL	**ND**	112	ND	ND	0 MAC	ND	920	ND
Hetero. Plate Count, 28C (7 day)	CFU/1 mL	**7700**	14	690	ND	No Guideline Required	510	145	0 - 32400
Disinfectants									
Disinfectants									
Chlorine, Total Residual	mg/L as Cl_2	**1.54**	325	0	3.24	No Guideline Required	1.01	1974	ND-5.2
Monochloramine, Field - 1 Station	mg/L	**2.46**	32	0.45	2.81		2.23	30	0.17 - 1.16
Disinfection By-Products (ND means Not Detected by analytical method used)									
Trihalomethanes (THMs)									
Bromodichloromethane (BDCM)	ug/L	**ND**	4	ND	ND		ND	57	ND - 26.0
Bromoform (BRFM)	ug/L	**ND**	4	ND	ND		ND	57	ND
Chloroform (CHLF)	ug/L	**2.3**	4	1.8	2.9		5.9	57	ND - 256
Chlorodibromomethane (DBCM)	ug/L	**ND**	4	ND	ND		ND	57	ND - 3.10
Total Trihalomethanes (TTHM)	ug/L	**2.3**	4	1.8	2.9	100 MAC	5.8	57	ND - 274
Haloacetic Acids (HAAs)									
Haloacetic Acids (*5 Total, HAA5)	ug/L	**14**	4	7.7	21	80 MAC	10	51	0.75-262
Metals (ND means Not Detected by analytical method used)									
Aluminum	ug/L as Al	**29.9**	4	13.2	44.1	2900 MAC / 100 OG	24	10	4.5-62.1
Antimony	ug/L as Sb	**ND**	4	ND	ND	6 MAC	ND	10	ND
Arsenic	ug/L as As	**ND**	4	ND	ND	10 MAC	ND	10	ND - 0.14
Barium	ug/L as Ba	**2**	4	1.3	2.3	1000 MAC	1.25	10	ND-2.6
Beryllium	ug/L as Be	**ND**	4	ND	ND		ND	10	ND
Bismuth	ug/L as Bi	**ND**	4	ND	ND		ND	10	ND
Boron	ug/L as B	**ND**	4	ND	ND	5000 MAC	ND	10	ND
Cadmium	ug/L as Cd	**ND**	4	ND	ND	5 MAC	ND	10	ND
Calcium	mg/L as Ca	**3.275**	4	2.98	3.89	No Guideline Required	3.44	10	2.93-3.95
Chromium	ug/L as Cr	**ND**	4	ND	ND	50 MAC	ND	10	ND
Cobalt	ug/L as Co	**ND**	4	ND	0.23		ND	10	ND
Copper	ug/L as Cu	**8.1**	4	3.75	13.1	2000 MAC / ≤ 1000 AO	11.85	10	5.16-92.7
Iron	ug/L as Fe	**102.65**	4	81.7	573	≤ 300 AO	119	10	52-902
Lead	ug/L as Pb	**0.345**	4	0.2	0.4	5 MAC	0.48	10	0.38-0.99
Lithium	ug/L as Li	**ND**	4	ND	ND		3.5	6	ND
Magnesium	mg/L as Mg	**1.72**	4	1.63	1.84	No Guideline Required	1.8	10	1.6-2.07
Manganese	ug/L as Mn	**20.2**	4	17.6	136	120 MAC / ≤ 20 AO	36.25	10	11.9-364
Mercury	ug/L as Hg	**ND**	4	ND	0.0032		ND	7	ND
Molybdenum	ug/L as Mo	**ND**	4	ND	MD		ND	10	ND
Nickel	ug/L as Ni	**ND**	4	ND	ND		ND	10	ND
Potassium	mg/L as K	**0.3055**	4	0.241	0.388		0.341	10	0.257-0.423
Selenium	ug/L as Se	**ND**	4	ND	ND	50 MAC	ND	10	ND
Silicon	mg/L as Si	**2260**	4	2160	2640		1375	10	408-2400
Silver	ug/L as Ag	**ND**	4	ND	ND	No Guideline Required	ND	10	ND
Sodium	mg/L as Na	**9.105**	4	8.3	10.3	≤ 200 AO	9.86	10	8.73-11.4
Strontium	ug/L as Sr	**14**	4	13.7	16.4	7000 MAC	14.35	10	13-17.2
Sulfur	mg/L as S	**ND**	4	ND	ND		ND	10	ND - 4.60
Thallium	ug/L as Tl	**ND**	4	ND	ND		ND	10	ND
Tin	ug/L as Sn	**ND**	4	ND	ND		ND	10	ND
Titanium	ug/L as Ti	**ND**	4	ND	ND		ND	10	ND
Uranium	ug/L as U	**ND**	4	ND	ND	20 MAC	ND	10	ND
Vanadium	ug/L as V	**ND**	4	ND	ND		ND	10	ND
Zinc	ug/L as Zn	**ND**	4	ND	5.4	≤ 5000 AO	ND	10	ND - 21.3
Zirconium	ug/L as Zr	**ND**	4	ND	ND		ND	10	ND

CAPITAL REGIONAL DISTRICT

WILDERNESS MOUNTAIN WATER
Statement of Operations (Unaudited)
For the Year Ended December 31, 2021

		2021	2020
Revenue			
Transfers from government		59,520	63,859
User Charges		70,239	65,659
Water Sales		17,760	17,520
Fees and Charges		256	200
Other revenue from own sources:			
Interest earnings		60	33
Other revenue		61	72
Grant revenue		-	3,255
Total Revenue		147,896	150,598
Expenses			
General government services		5,607	5,487
Contract for services		2,436	3,575
CRD Labour and Operating costs		68,625	71,532
Debt Servicing Costs		23,648	23,659
Other expenses		40,630	36,133
Total Expenses		140,946	140,387
Net revenue (expenses)		6,950	10,211
Transfers to own funds:			
Capital Reserve Fund		-	-
Operating Reserve Fund		9,882	1,640
Annual surplus/(deficit)		(2,932)	8,571
Accumulated surplus/(deficit), beginning of year		2,932	(5,639)
Accumulated surplus/(deficit), end of year	$	-	2,932

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CAPITAL REGIONAL DISTRICT

WILDERNESS MOUNTAIN WATER
Statement of Reserve Balances (Unaudited)
For the Year Ended December 31, 2021

	Capital Reserve	
	2021	**2020**
Beginning Balance	50,130	40,732
Transfer from Operating Budget	-	-
Transfers from Completed Capital Projects	-	8,620
Transfer to Capital Projects	(3,500)	-
Interest Income	722	778
Ending Balance	47,351	50,130

	Operating Reserve	
	2021	**2020**
Beginning Balance	1,657	-
Transfer from Operating Budget	9,882	1,640
Transfer to Operating Budget	-	-
Interest Income	73	17
Ending Balance	11,613	1,657

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Making a difference...together

REPORT TO WILDERNESS MOUNTAIN WATER SERVICE COMMISSION
MEETING OF TUESDAY, JUNE 28, 2022

SUBJECT **Wilderness Mountain Water Service – Source Water Protection Plan 2022**

ISSUE SUMMARY

As directed by the Capital Regional District (CRD), WSP Ltd. (WSP) completed a Source Water Protection Plan (SWPP) for Wilfred Reservoir in the Wilderness Mountain Water Service. The final report has been received along with recommendations to address source water risks and hazards. CRD staff have prepared a plan to address the report recommendation.

BACKGROUND

The Wilderness Mountain Water Service extracts water from Wilfred Reservoir and treats for potable use. In recent years the water service has experienced extended boil water advisories due to turbidity exceeding Island Health Authority's guidelines for surface water drinking water quality. A SWPP was completed in 2022.

The following milestones and key dates were instrumental in the completion of the Wilderness Mountain Water Service's SWPP:

Activity	Completion Date
WSP Completed the Source Water Vulnerability Assessment	November 6, 2020
Confirmation with Island Health on SWPP Requirements	January 27, 2021
First Technical Advisory Committee Meeting	September 20, 2021
Draft SWPP submitted by WSP	November 30, 2021
Draft SWPP presented at stakeholder meeting – revisions were discussed and to be incorporated into the final draft	January 24, 2022
Final draft submitted by the consultant	April 19, 2022

In preparation for the SWPP, CRD contacted Island Health Authority to confirm the requirements. It was agreed that, for the Wilderness Mountain Water Service, the Ministry of Healthy Living and Sport's Comprehensive Source to Tap Assessment 2010 would be followed. The following modules were used to limit the assessment in scope:

- Module 1 – Delineate and characterize drinking water sources
- Module 2 – Conduct contaminant source inventory
- Module 7 – Characterize risks from source to tap
- Module 8 – Recommend actions to improve drinking water protection

A technical advisory group of Wilfred Reservoir stakeholders was struck and was made up of the following:

Organization	Contact	Role
Capital Regional District	Dale Puskas	Manager, Capital Projects
Capital Regional District	Christoph Moch	Manager, Water Quality
Wilderness Mountain Water Commission	Doug Pepino	Water Service Commission Chair, water user
Wilderness Mountain Water Commission	Larry Cutler	Water Service Commission Member, water user
Wilderness Mountain Water Commission	Martin Lechowicz	Water Service Commission Member, water user
Island Health Authority	Rory Beise	Environmental Health Officer
Habitat Acquisition Trust (HAT)	Sara Lax	Habitat Management Coordinator
Land Owner	Doug Funk	Owner of a portion of the watershed, water user
Land Owner	Chris Gilbert	Owner of water treatment plant property and a portion of the watershed property, water user

Two meetings were held:

- The first meeting was held on September 20, 2021 to review the watershed boundary and identify risks and hazards.
- The second meeting was held on January 24, 2022 to review the draft SWPP.

Feedback from all stakeholders, information obtained from a site visit, and a previously conducted watershed vulnerability study were utilized by WSP to complete the first draft of the SWPP, and presented at the second Technical Advisory Committee meeting on January 24, 2022.

WSP submitted the final SWPP report on April 19, 2022. The final SWPP recommendations from the identified risks and hazards were made in Module 8 – Recommendations for Risk Management, page 34 of the SWPP report. The recommendations are a mix of capital works, operational requirements, and administrative tasks. Some of the recommendations are currently being actioned through the Conceptual Water Treatment Plant Design Project.

Source Water Protection Action Plan

CRD staff have prepared an action plan based upon the recommendations from the SWPP:

SWPP Recommendation	Action
1.1 Intake Upgrade	Design a floating intake further from shore. Start with hydraulic assessment on whether the existing pump can accommodate the increased suction head requirements.

SWPP Recommendation	Action
	Capital funding will be required. Item to be added to 5-year capital plan.
1.2 Treatment Plant Upgrade	Currently started a conceptual water treatment plant design, to be completed in 2022 with outcome informing next steps.
2.1 Ongoing Monitoring	Develop and implement a monitoring plan. Operational funding will be required to develop and execute a source water monitoring plan.
2.2 Installation of a syphon drain system at the bottom of a reservoir	Assess whether feasible, then if feasible, design and construct a syphon drain system with an operating plan. Capital funding will be required for the feasibility, design and construction. Item to be added to the 5-year capital plan. Operating funds will be required for ongoing operation.
2.3 Steep slope assessment mapping and erosion control	Develop and implement a plan for assessing the possibility of significant erosion on the steep slopes. Capital funding will be required. Item to be added to the 5-year capital plan.
2.4 Preventative maintenance and asset management	Continue with refining preventative maintenance on the water system, update the asset management plan and implement. Asset management plan updates should occur after the treatment plant upgrades, with no immediate funding requirements.
2.5 Inspection of pole-mounted transformers	Add an annual preventive maintenance item for inspection of the pole-mounted transformers. No additional funds are required.
2.6 Vegetation management around the reservoir	Develop and implement a plan to minimize organics from near-shore vegetation entering the reservoir. Planning will require input from the landowners and Habitat Acquisition Trust. Additional operating funds will be required to develop and implement the plan as well as carry it out annually.
3.1 Update existing Emergency Response Plan	Include identified risks into the existing Emergency Response Plan and ensure the Spill Response Plan is up to date. No additional funds are required.
3.2 Coordination with Metchosin Fire Department and Province	Establish a chemical-free firefighting area within the reservoir catchment. No additional funds are required.
3.3 Water Conservation Bylaw	Develop and implement a water conservation bylaw so that it can be enforced in the Wilderness Mountain System. No additional funds are required.
4.2 Hydrogeological Study for ground infiltration path of 4928 Mt Matheson septic disposal	Assess whether the septic system for 4928 Mt. Matheson can drain into the reservoir. Capital funds are required to assess the work.

An operations and capital expenditures plan has been drafted to address the noted recommendations and is attached as Appendix B – Wilderness Mountain Source Water Protection Plan Cost Implications.

ALTERNATIVES

Alternative 1

That the Commission endorse the Source Water Protection Plan, and prior to directing staff to implement the recommendations, await the results of the Conceptual Water Treatment Plant Design Project to avoid duplication and confirm regulatory requirements from Island Health.

Alternative 2

That staff be directed to provide further information.

IMPLICATIONS

Regulatory
An Island Health Authority representative, as part of the Technical Advisory Committee, provided feedback during the plan preparation with the expectation that action is taken on the created plan.

Financial
Implementing the SWPP will require one-time capital and ongoing operational expenditures. Currently, capital expenditures are estimated at $490,000 over the next five years, not including treatment plant upgrades as the planning is currently underway. On-going estimated operational expenditures total $47,000 annually starting in 2024 and gradually being implemented until 2025.

Operational expenditures are funded through water rates which will have to be increased to fund the additional tasks.

CONCLUSION

The completion of the Wilderness Mountain Source Water Protection Plan has identified the risks to the Wilfred Reservoir and made recommendations to address them. To continue to use the surface water as a source for potable water steps are required to protect it.

RECOMMENDATION

That the Commission endorse the Source Water Protection Plan, and prior to directing staff to implement the recommendations, await the results of the Conceptual Water Treatment Plant Design Project to avoid duplication and confirm regulatory requirements from Island Health.

Submitted by:	Shayne Irg, P.Eng., Senior Manager, Water Infrastructure Operations
Concurrence:	Ian Jesney P.Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Ted Robbins, C.Tech., General Manager, Integrated Water Services

ATTACHMENTS

Appendix A: Wilderness Mountain Water System – Source Water Protection Plan
Appendix B: Wilderness Mountain Source Water Protection Plan Cost Implications

CAPITAL REGIONAL DISTRICT
REPORT NUMBER: 201-08298-00

WILDERNESS MOUNTAIN WATER SYSTEM

SOURCE WATER PROTECTION PLAN

APRIL 19, 2022 FINAL

WILDERNESS MOUNTAIN WATER SYSTEM

SOURCE WATER PROTECTION PLAN

CAPITAL REGIONAL DISTRICT

FINAL

PROJECT NO.: 201-08298-00
CLIENT REF: 2020-618
DATE: APRIL 19, 2022

WSP
SUITE 301, BUILDING 15
3600 UPTOWN BOULEVARD
VICTORIA, BC V8Z 0B9

T: +1 250 384-5510
WSP.COM

April 19, 2022

Capital Regional District
625 Fisgard Street
Victoria, BC V8W 1R7

Attention: Dale Puskas, P.Eng., Manager of Capital Projects

Dear Sir:

Subject: Capital Regional District – Wilderness Mountain Source Water Protection Plan
Client ref.: 2020-618

We are pleased to issue the Source Water Protection Plan for the Wilderness Mountain for CRD and the Technical Advisor Committee's future reference and follow-up.

We note that the Source Water Protection Plan is a living document to be amended over time as required based on changes in development; land ownership and covenants; hazards; treatment and distribution systems; regulatory framework; and additional information obtained and analysis performed after this study.

Yours sincerely,

Simon Kras, P.Eng
Project Manager

2022-04-19

SK/po
Encl.

WSP ref.: 201-08298-00

SUITE 301, BUILDING 15
3600 UPTOWN BOULEVARD
VICTORIA, BC V8Z 0B9

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REVISION HISTORY

FIRST ISSUE

November 9, 2021	DRAFT			
Prepared by	Reviewed by	Approved By		
Patricia Oka, P.Eng.	Stephen Horsman, P.Eng.	Simon Kras, P.Eng.		
REVISION 1				
November 30, 2021	DRAFT REVISION 1			
Prepared by	Reviewed by	Approved By		
Patricia Oka, P.Eng.	Stephen Horsman, P.Eng.	Simon Kras, P.Eng.		
REVISION 2				
April 19, 2022	FINAL REVISION			
Prepared by	Reviewed by	Approved By		
Patricia Oka, P.Eng.	Gerson Neiva, P.Eng.	Simon Kras, P.Eng.		

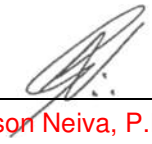
SIGNATURES

PREPARED BY

Patricia Oka, P.Eng.(OIQ # - *Quebec only*)
Senior Project Manager

April 19 , 2022
Date

REVIEWED BY



Gerson Neiva, P.Eng.
Director

April 19 , 2022
Date

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1 INTRODUCTION

This Source Water Protection program builds on the previous Source Water Vulnerability Assessment work completed by WSP in 2020 for the Wilderness Mountain Source Water System (WMWS). The end objective of this work is to determine the long-term sustainability of the Wilfred reservoir given the source water demands, surrounding land use permits, and existing hazards to the source.

1.1 ASSESSMENT STRUCTURE AND GUIDING DOCUMENTS

The assessment and planning process presented herein follows the Ministry of Healthy Living and Sport's Comprehensive Source to Tap Assessment (CS2TA) 2010. CS2TA may be completed on a voluntary basis by water suppliers or following an order from a drinking water officer (DWO) pursuant of the *Drinking Water Protection Act* (DWPA) Part 3 when significant risks are identified for a water system. Typical physical components of a water supply system include source waters and their catchment areas, intakes, wells, storage reservoirs, treatment facilities, pumps, and power sources. The CS2TA guideline consists of eight modules:

- Module 1 - Delineate and characterize drinking water sources
- Module 2 - Conduct contaminant source inventory
- Module 3 - Assess water supply elements
- Module 4 - Evaluate water system management, operation and maintenance practices
- Module 5 - Audit water quality and availability
- Module 6 - Review financial capacity and governance of water system
- Module 7 - Characterize risks from source to tap
- Module 8 - Recommend actions to improve drinking water protection

For small systems such as Wilderness Mountain, it is not common to complete a full Source-to-Tap Assessment. Based on our discussions with Island Health, it is considered appropriate to limit the assessment in scope to Modules 1, 2, 7 and 8, hereafter referred to as a Source Water Protection Plan (SWPP). The primary objectives of this assessment are as follows:

- Identify inherent risks to water quality as well as describing land uses, human activities and other potential contaminant sources or external factors that could affect source water quality and availability;
- Provide a qualitative assessment of probability and consequence of risk and assessment of the system strengths, weaknesses, opportunities and threats (SWOT) to drinking water quality and availability; and
- Provide recommended actions to effectively manage risks identified earlier in the assessment through prevention, reduction or mitigation.

1.2 METHODOLOGY

The methodology for Modules 1, 2, 7 and 8 of this assessment was conducted in general accordance with the CS2TA Guideline. In completing the SWPP, WSP also incorporated input and feedback from the Technical Advisory Committee (TAC) members regarding the assessment area, daily local activities as well as, issues within the area. The TAC members are as listed in Table 1.

Table 1-1 List of Technical Advisory Committee (TAC) members

ORGANIZATION	CONTACT	ROLE
Capital Regional District	Dale Puskas	Manager of Capital Projects CRD Project Lead
WMWS Water Commissioners	Doug Pepino Larry Cutler Dr. Martin Lechowicz	Wilderness Mountain Commission Members, Water Users
Island Health	Roy Beise	Environmental Health Officer
Habitat Acquisition Trust (HAT)	Sara Lax	Habitat Management Coordinator
Landowner	Doug Funk Chris Gilbert	Water User, Owner of a portion of the watershed Water User, Owner of Water Treatment Plant property, and a portion of watershed

The overall assessment process was iterative in nature. As part of this SWPP, WSP:

- Reviewed existing background information, including historical aerial photographs review, GIS analysis, land use permits and zoning, contaminated sites databases, recent water quality and reservoir water level data from CRD;
- Completed a site reconnaissance of the Wilfred Reservoir and catchment area on October 7, 2021;
- Provided a draft Hazard Identification and Contaminant Source Tables to the TAC members;
- Conducted a TAC meeting on September 20 2021;
- Completed a qualitative risk assessment of the source water vulnerability and issued a draft Source Water Assessment Report on November 30, 2021 for TAC review;
- Issued a final report on April 19, 2022.

First Nations consultation was not a component of this study. However, it may be a requirement for some future activities related to the reservoir. Indigenous rights holders may include Scia'new [Beecher Bay], Malahat, Snaw-naw-AS [Nanoose], Songhees, and T'Sou-ke [Sooke] First Nations.

1.3 REPORT ORGANIZATION

This report presents the results of the source water assessment for the Wilfred Reservoir:

- Section 2 provides an overview of the water system components.
- Section 3 present the assessment of the source in accordance with Module 1.
- Section 4 presents the assessment of the source in accordance with Module 2.
- Section 5 discusses the characterization of risks identified in Section 4 (per Module 2).
- Section 6 provides recommended actions to improved drinking water protection (per Module 8).

2 WILDERNESS MOUNTAIN WATER SYSTEM

The community of Wilderness Mountain, also known as Mount Matheson Estates, is a rural residential development located in East Sooke, BC. The estates are made up of 82 total parcels over a total area of 124 hectares. The 2020 Annual Water Report indicates 73 active service connections and a total demand of approximately 28,947 m^3. The 2020 water demand indicated a 27% increase from the 2019 water demand. Major components of the water system from source to tap includes the following:

- One surface source – Wilfred Reservoir;
- Submersible, raw water intake pump and pipeline;
- Water treatment plant consisting of cartridge filtration followed by UV and chlorine disinfection;
- 3,740 m PVC distribution network of 100 mm and 150 mm diameter mains; and
- Two treated water storage tanks with a combined capacity of 250 m^3.

The WMWS is operated and managed by CRD since 2008. Figure 2-1 provides a general site plan of the Wilderness Mountain water system.

Figure 2-1 General Site Plan

2.1 SOURCE WATER – WILFRED RESERVOIR

The Wilderness Mountain water system is solely supplied by the Wilfred Reservoir. The Wilfred Reservoir is a man-made, bedrock basin with oligotrophic characteristics. The lake is dammed on the north and south ends to provide storage volume. The south dam is allowed to spill over in the winter and spring months, forming an

ephemeral stream extending south from the reservoir. The water level is typically below the spillway during the summer and fall. The lake has an estimated total storage volume of 57,088 m^3, with approximately 42,378 m^3 available above the intake elevation (Coastal Geoscience Research, 2002). There are two waterworks licenses (C125686 and C125687) on this source which permit the diversion of 29,000 m^3/year (CRD, 2015). The reservoir's recharge pathway is dominated by precipitation and groundwater interaction is assumed to be insignificant.

The Wilfred Reservoir is bordered by slopes on all sides, with steep slopes (greater than 1:1) in the northern portion of the reservoir. Due to the surrounding topography and the presence of loose soil in some areas, the Wilfred Reservoir is prone to turbidity events, which appear to coincide with algal blooms in the spring and fall months, although bank erosion and organic matter from the forested watershed likely contribute to turbidity and provide nutrients for algal growth. The decomposing organic matter and algal activity may contribute to the "very weak" odour reported by the WMSW Commission. The odour has a mean value of 1.7 out of 5 (modified FPA scale used by CRD) based on data between 2010 and 2021, and is characterized as fishy, decomposing vegetation, green vegetation, and aquarium.

Based on the 2015-2020 water quality data[1], the Wilfred water can be characterized as a moderately high organic water source with a mean True Colour of 14 TCU, which is just under the recommended maximum of 15 TCU per the *Guidelines of Canadian Drinking Water Quality* (GCDWQ). Both alkalinity and pH in the source water are relatively low, with the median pH of 6.67 being slightly lower than the recommended minimum of 7.0. Total manganese in the water exceeds the aesthetic objective of 0.02 mg/L, but is generally below the Maximum Acceptable Concentration (MAC) of 0.12 mg/L.

Table 2-1 summarizes of the source water quality between January 1st, 2015 and September 2nd, 2020 as provided by the CRD. The red coloured numbers indicate values exceeding the Guidelines for Canadian Drinking Water Quality (GCDWQ).

Table 2-1 Source Water Quality Parameters

PARAMETERS	UNIT	GCDWQ	COUNT	RANGE	MEDIAN
Temperature	°C	AO ≤ 15	195	3.7-21.2	12.0
pH	pH unit	7.0-10.5	19	6.33-7.16	6.67
Hardness (as $CaCO_3$)	mg/L	None	14	14.1-18.6	16.1
Total Coliform	CFU	0/100 ml	128	0-4300	158
Total Organic Carbon (TOC)	mg/L	None	8	2.96-6.83	4.1
Total Dissolved Solids (TDS)	mg/L	AO ≤ 500	5	48-65	56
Turbidity	NTU	<1	108	0.5-2.5	1.10
True Colour	TCU	<15	24	9.4-23	14.0
Total Iron (Fe)	mg/L	AO ≤ 0.3	14	0.115-0.387	0.147
Total Manganese (Mn)	mg/L	MAC < 0.12 AO ≤ 0.02	14	0.034-0.125	0.056
Total Algal	NU/ml		49	659-38,683	6,283

AO : Aesthetic Objective MAC : Maximum Allowable Concentration

2.2 TREATMENT AND DISTRIBUTION

Raw water from the Wilfred reservoir is conveyed through a near-shore intake to an on-shore treatment plant, which are located on the east side of the reservoir. The intake is located at a fixed elevation, approximately 4.27 m below

[1] Based on analyzed data between January 1st 2015 and September 2nd 2020 as part of the Treatment Assessment and Recommendation Report (WSP, 2020).

the maximum water level. A 1.5 HP submersible intake pump (approx. elevation 222 m geodetic) provides the required pressure to feed raw water through the treatment system.

Figure 2-2 Water Treatment Buildings: Filtration and UV Building (left) and Chloramination Building (right)

Treatment inside the treatment plant includes a series of pre-filtration and filtration, followed by a UV disinfection, and chloramination. Pre-filtration is provided with a series of 50-micron and 20-micron cartridge filters. Filtration is provided by two parallel trains (1 duty - 1 standby) of 25-micron and 5-micron string wound filters in series, with a 2.5 L/s at 5 psi treatment capacity. UV disinfection is provided with three parallel (2 duty - 1 standby) Trojan PRO MAX-30 UV reactors, rated for a 3-log pathogen deactivation, based on a dose of 40 mJ/cm^3 at 1.8 L/s. Secondary disinfection is provided through chloramination. There is no primary disinfection for viruses in the current treatment process. The treatment plant also houses a 5 HP booster pump which conveys treated water through the distribution and finally to the two storage tanks (TWL 288m). Figure 2-3 depicts the treatment's process flow diagram provided by the CRD.

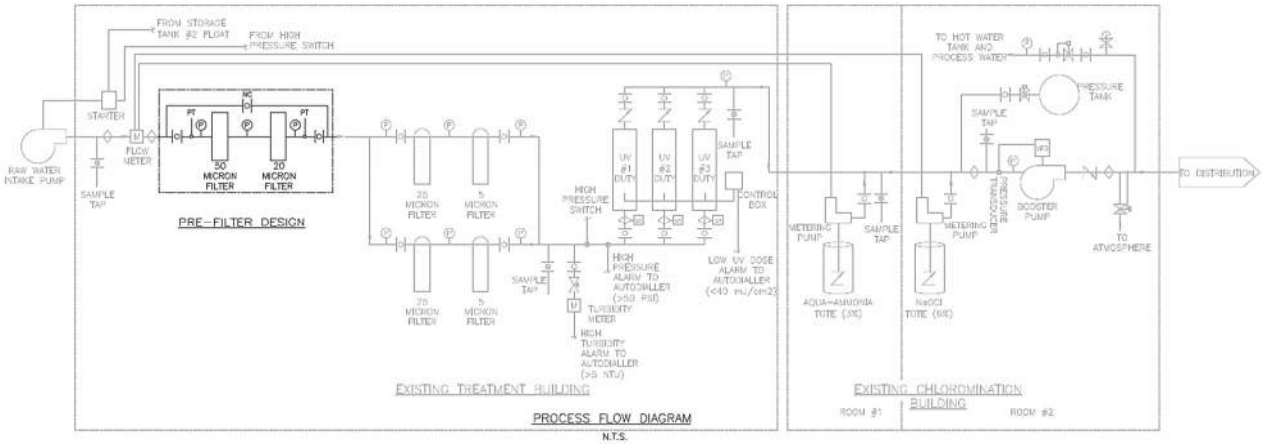

Figure 2-3 Treatment Process Flow Diagram

Based on water quality data reviewed by WSP, the system periodically fails to meet the 1.0 NTU maximum treated water turbidity requirement. In addition, the system does not provide treatment for the elevated manganese and low

pH in the source water and does not have an adequate contact time for disinfection prior to reaching the first customer (located at 706 Cains Way).

2.3 WATER USAGE

Table 2-2 and Figure 2-4 present the annual water consumptions of the Mount Matheson Estates between 2016 and 2020. As shown in Table 2-2, the annual consumption is consistently below the licence amount of 29,000 m^3; however, it was nearly exceeded in 2020.

From the provided data, the current maximum daily demand (MDD) is 260 m^3/day, determined by the highest daily consumption within the assessed period. The current average daily demand (ADD) is 70 m^3/day, determined by taking the linear average of the daily consumptions over the assessed dates. The average winter flow is 45 m^3/day and summer is 90 m^3/day.

Table 2-2 Water Consumption for Mount Matheson Estates

ANNUAL WATER CONSUMPTION (m^3)

2016	2017	2018	2019	2020
16,901	22,780	25,432	22,793	28,947

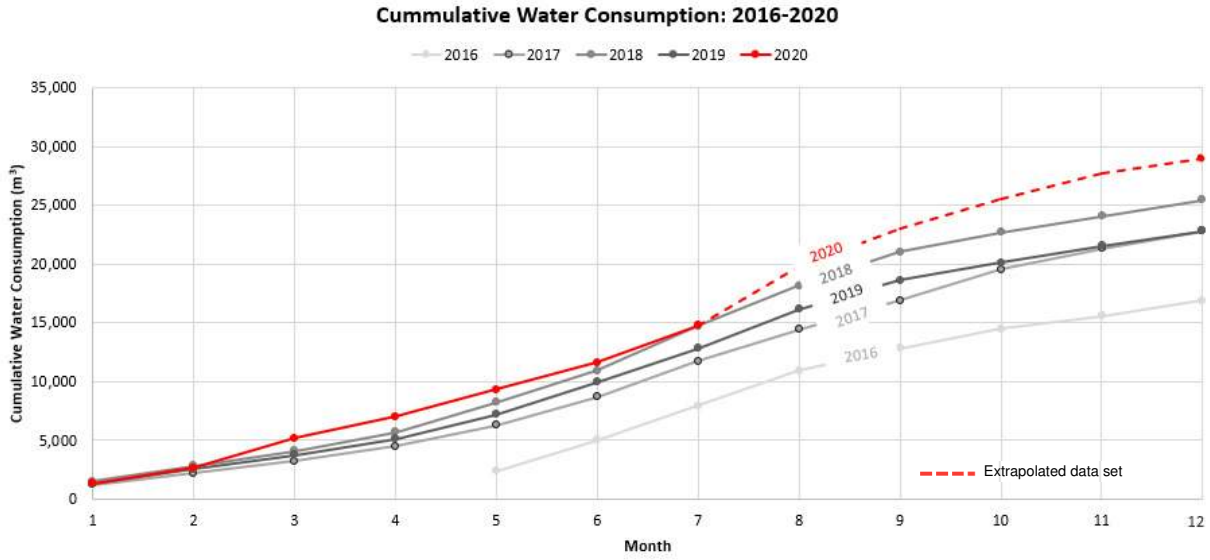

Figure 2-4 Water Consumption for Mount Matheson Estates

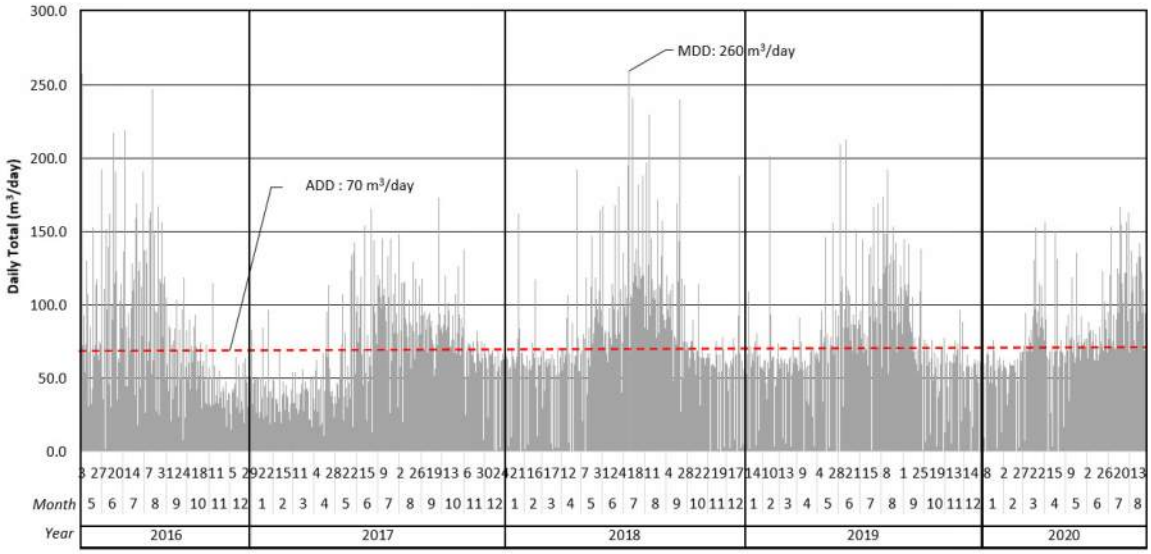

Figure 2-5 Daily Water Consumption Mount Matheson Estates
(source: Treatment Assessment & Recommendation, WSP, 2020)

3 MODULE 1 – DELINEATE AND CHARACTERIZE WATER SOURCE

Module 1 provides the framework for completing the source protection assessment by delineating the assessment area and intake protection zone based on the physical and natural characteristics of the source watershed. This section discusses the delineated assessment area and the identified hazards that influence over source water quality. For Wilderness Mountain, due to the small size of the catchment, the assessment area is the entire catchment for the water source.

3.1 WILFRED RESERVOIR WATERSHED ASSESSMENT AREA

The Wilfred Reservoir is located within Lot 3 Section 130 and 131 (VIP 73608) in East Sooke. Based on the *Impact Assessment Proposed Residential Development* report (Michael Bocking Landscape Architect Ltd, 2001) the reservoir catchment includes zones E^1, E^3, and I, with a total estimated area of 88,000 m^2 and as depicted in Figure 3-1.

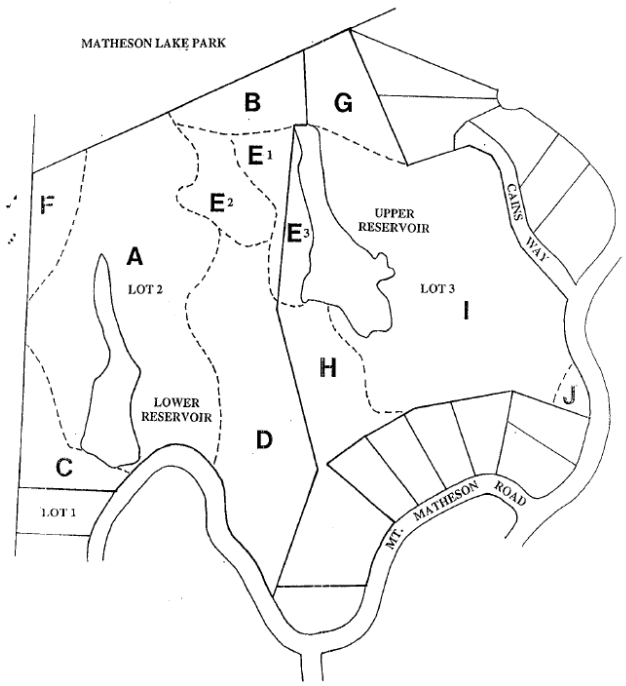

Figure 3-1 Watershed Boundaries for Wilfred and William Brook Reservoirs

Source: *Impact Assessment Proposed Residential Development* report (Michael Bocking Landscape Architect Ltd, 2001)

As part of Module 1, WSP delineated the assessment area based on topography and all the area that may contribute to surface water runoff towards the reservoir, as groundwater infiltration is assumed to be negligible. The delineated assessment area includes the full surface area of the Wilfred Reservoir, and the surrounding slopes along the lakeshore, with an estimated area of 13.3 Ha. The delineated area largely aligns with the referenced report, with a few modifications based on WSP's investigation. The 100m intake protection zone is not included in full because

parts of the protection zone are outside the catchment boundary. The study area of this assessment is illustrated on Figure 3-2 and Appendix A – Figure 1.

The south portion of Lot 3 is a developed residential area, with the closest property located directly south of the south dam on 4928 Mt. Matheson Road. A 30-meter setback is maintained as a natural buffer between the reservoir and any development works. The 30-meter setback is also consistent with the minimum horizontal separation between sewage dispersal systems (i.e. septic systems) and surface drinking water sources[2]. There are two residential properties which are partially within the 30-meter setback area: 4928 Mt. Matheson Road and 5052 Mt. Matheson Road. Confirmation of the septic field locations for both properties based on the Provincial registry is recommended. If any septic field locations are found to be near the 30-meter setback, then a hydrogeological study would be recommended to determine whether the field represents a potential hazard to the source water.

The property at 5052 Mt. Matheson Road includes a recreational organic vegetable garden, which is permitted by the Rural Residential 6 (RR-6) zone under Bylaw 2040.

[2] Sewerage System Standard Practice Manual, Version 3, Volume II, September 2014, Health Protection Branch, Ministry of Health, Province of British Columbia

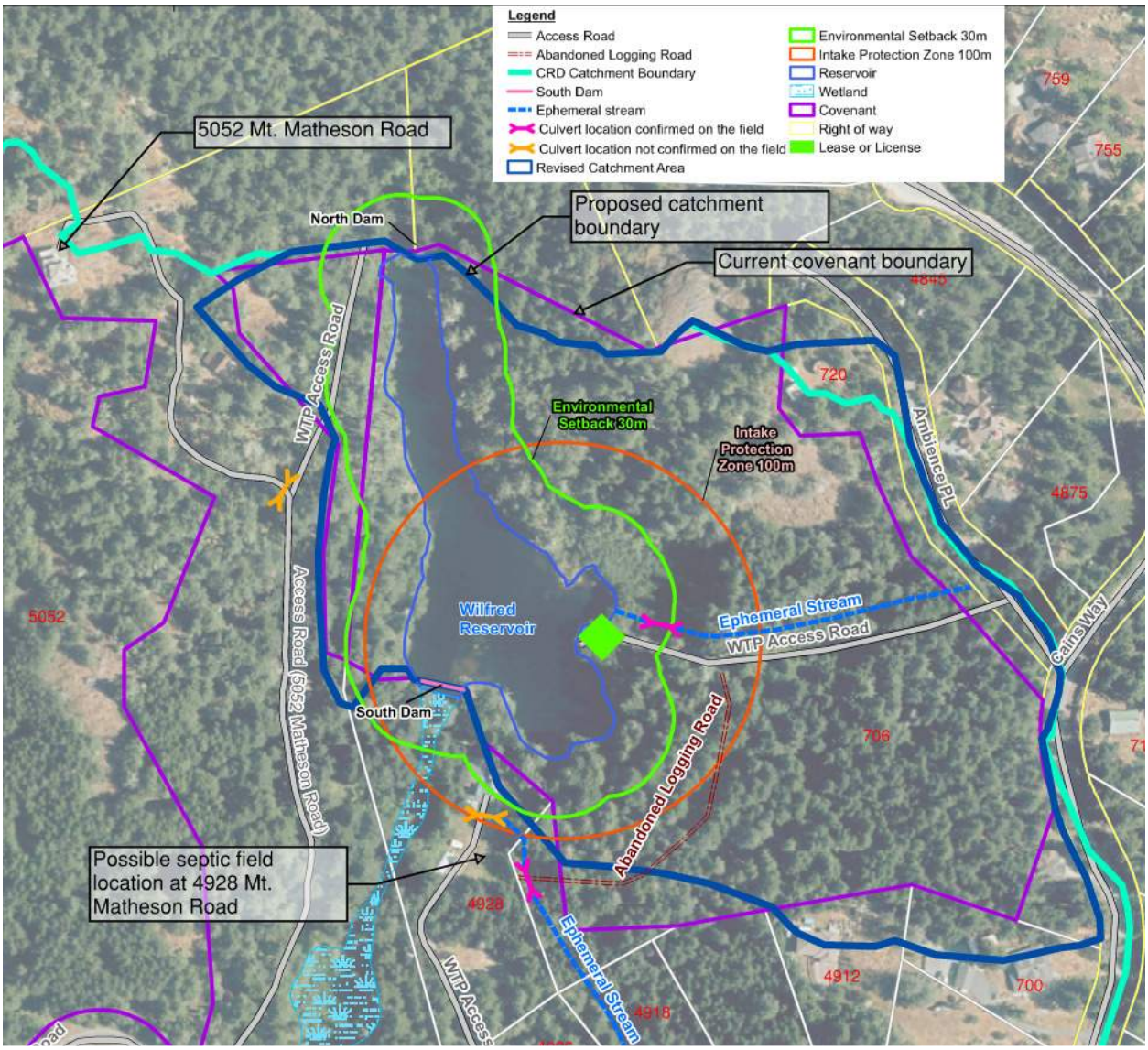

Figure 3-2 General Site Plan and Land Use

The Wilfred watershed is protected by conservation covenants between the Land Conservancy of British Columbia (TLC), Habitat Acquisition Trust (HAT) (CRD, 2010), and the Wilderness Mountain Water Corporation, which was taken over by the CRD in 2008 (CRD Bylaw 3503). This covenant is described in the Land Title which is included in Appendix B. The referenced report above is also attached in the Land Title. Under this covenant, the reservoir is protected from public access and use for recreational, such as swimming and fishing. Access to the water is limited to a single wharf, where the raw water intake is located. Boating in the reservoir is restricted subject to Covenant #EW47310.

3.2 NATURAL INFLUENCES ON SOURCE WATER QUALITY AND QUANTITY

3.2.1 TOPOGRAPHY

Elevations within the assessment area range from the Wilfred reservoir highest water level of 226m to the highest point at 292m. The lakeshore is steep, with slopes averaging greater than 30% to the northeast and northwest of the reservoir. The reservoir is subject to turbidity events from lakeshore erosion and seasonal algal blooms, which are the likely contributors to the raw water turbidity. Historically, frequent raw water turbidity spikes above 1.0 NTU have been observed for 8 to 13-hour consecutive periods.

3.2.2 VEGETATION

The majority of the catchment is a well established second-growth Douglas Fir forest with natural understory.

Vegetation is present along the lakeshore to the high-water level, except where bedrock is exposed. Large deciduous trees are also present around the reservoir which shed considerable amount of leaves directly into the waterway. Decomposing leaves around the watercourse and elsewhere in the catchment likely contribute to the moderately-high true colour and the low pH observed in the Wilfred water. Sampling at depth during the summertime revealed a thermocline with greatly reduced dissolved oxygen and pH below the thermocline, which may be a result of anaerobic decomposition of vegetation.

3.2.3 WILDLIFE IN WATERSHED

The watershed provides habitat for wildlife, including deer, otters, and cougars. Waterborne pathogens, such as *Cryptosporidium* and *Giardia*, are associated with otter feces. The property owner of 706 Cains Way reported that there has been a recent ecological change in the reservoir which started with an explosion in the green sunfish population. The sunfish proliferation coincided with a depletion in previously abundant freshwater clam, caddis fly (stick bugs), and newt populations in the reservoir, likely as a result of predation. Residents report seeing a recent reduction in the sunfish population, likely due to a declining food source and predation by birds and otters.

3.3 ANTHROPOGENIC INFLUENCES ON SOURCE WATER QUALITY

3.3.1 ACCESS ROADS

There are two gated, maintenance access roads to the Wilfred reservoir: 1) from Ambience Place which leads to the water treatment plant and 2) from Mt. Matheson Road which leads to the south dam and north dam. Overhead powerlines are existing along the access road to the Water Treatment Plant. At the TAC Meeting, it was reported that the roads to the water treatment plant and the south dam are contributing to ground erosion and sediment flows into the reservoir. Based on our review during the site visit, the access road to the north and south dam is outside the catchment area and is therefore not considered to impact the reservoir. No signs of erosion were visible along the dam access road during WSP's site visit.

3.3.2 NON-POWER BOATING

Public access and power boating at the reservoir are strictly prohibited. Non-power boating is restricted subject to Covenant #EW47310. Although the impacts are likely negligible, non-power boating can have negative impacts to water quality and cause loss of shoreline and aquatic vegetation in the reservoir.

3.3.3 RESIDENTIAL SEPTIC DISPOSAL

As discussed in Section 3.1, there are five residential lots that lie within the assessment area. Each lot is served by a septic disposal system. However, at the time this report is written, the exact locations of these septic disposal areas are unknown and therefore the associated hazards to the Wilfred Reservoir are, too, unknown. Refer to Section 6 Recommendation 4 for suggested studies.

3.4 HAZARD IDENTIFICATION

The results of the hazard identification are presented in Table 4-1 and in Appendix 1 – Figure 2 Hazard Map.

Table 3-1 Hazard Identification Inventory for the Wilfred Reservoir

HAZARD ID	DRINKING WATER HAZARD	POSSIBLE EFFECTS	EXISTING PREVENTATIVE MEASURES	ASSOCIATED BARRIER
1-1	**Landside or slope failure in watershed**	Increased turbidity, organic, as well as nutrient loading in source water, negatively affecting drinking water quality.	None.	Source Protection.
1-2	**Wildlife in watershed**	Wildlife can contribute to pathogenic contamination of source water that can harm people following consumption without sufficient treatment. See Item 1-9.	Cartridge filter, UV disinfection, and Chloramination.	Source protection. Water treatment.
1-3	**Wildfire**	Wildfires can negatively impact source water quality through release of nutrients in the watershed, increase TOC, impact colour, increase turbidity, and shift limnological patterns.	Cartridge filter.	Water treatment.
1-4	**Water availability**	Insufficient water to meet demand.	Raw water reservoir with fixed dam height; voluntary water conservation program.	Water Supply and Demand Management.
1-5	**No alternative water sources**	Insufficient water to meet demand; potential degradation in water quality.	Bulk water supply from alternative system.	

HAZARD ID	DRINKING WATER HAZARD	POSSIBLE EFFECTS	EXISTING PREVENTATIVE MEASURES	ASSOCIATED BARRIER
1-6	**Intake location is near the shore and maybe be subject to near-shore erosion.**	Potential to reduce water quality, increased turbidity.	Cartridge filtration.	Water Treatment. Water System Maintenance.
1-7	**Seismic**	Dam failure; temporary loss of source.	Regular inspections by trained CRD personnel to review condition of dams.	Periodic Inspection.
1-8	**Fuel or chemical spills; pesticides**	Potential for harmful effects on human health.	Covenant limiting development; sparse population.	Source Protection.
1-9	**Water Quality - Coliform**	Consumption of the source water without sufficient treatment is unsafe and can cause pathogenic disease.	Cartridge filtration, UV disinfection, and chloramination; Boil Water advisories.	Source protection. Water treatment.
1-10	**Water Quality - Turbidity Event (1.0NTU-5.0NTU)**	Turbidity can indicate a decrease in water quality and treatment efficacy depending on nature of particles involved and location of turbidity within system.	Cartridge filtration.	Source protection. Water treatment.

HAZARD ID	DRINKING WATER HAZARD	POSSIBLE EFFECTS	EXISTING PREVENTATIVE MEASURES	ASSOCIATED BARRIER
1-11	**Water Quality - Organic Content**	High organic content in treated water typically creates odour and taste issues in drinking water, can affect the performance of UV disinfection systems by reducing the UV transmittance (UVT), and can also produce harmful disinfection by-products (DBPs) in the presence of chlorine. However, since chloramination is used for secondary disinfection, DBP formation in the current treatment system is expected to be minimal.	None.	Water treatment.
1-12	**Water Quality – Algal (Phytoplankton) blooms during summer**	Algal blooms contribute to elevated turbidity in the source water, resulting in frequent replacement of the WTP filter cartridges. Depending on the type of the algae, algal bloom can produce toxins that can harm wildlife, fish, and people when ingested. Poisonous algae blooms have not been observed to date in the Wilfred Reservoir.	Cartridge filtration.	Source protection (managing stormwater runoff, septic system leaching, agricultural runoff). Water treatment.
1-13	**Water Quality – Zooplankton blooms during summer**	Because zooplankton feed on algae, zooplankton blooms typically occur in conjunction with algal blooms. Like algal blooms, zooplankton blooms contribute to elevated turbidity in the source water, resulting in frequent replacement of the WTP filter cartridges.	Cartridge filtration.	Source protection (managing stormwater runoff, septic system leaching, agricultural runoff). Water treatment.

HAZARD ID	DRINKING WATER HAZARD	POSSIBLE EFFECTS	EXISTING PREVENTATIVE MEASURES	ASSOCIATED BARRIER
1-14	**Water Quality - Manganese**	Mn level beyond AO level often causes discoloured water and can stain laundry. Mn level beyond MAC may cause neurological effects in children, and can also build up on UV lamp sleeves and affect the performance of UV disinfection systems by reducing the UV transmittance (UVT).	None.	Water treatment. Dredging to limit endogenic sources.
1-15	**Water Quality - Alkalinity and pH**	Low pH and hardness may cause corrosion in the distribution and plumbing system that can compromise drinking water quality, i.e., discoloured water, increased metal concentrations in water.	None.	Water treatment.

4 MODULE 2 – CONTAMINANT SOURCE INVENTORY

Module 2 identifies contaminant sources that are present in the assessment area defined in Module 1 (Section 3) by defining land uses, human activities, and other potential contaminant sources that can negatively affect the source water quality.

4.1 METHODOLOGY

The following methods were used in completing the contaminant source survey:

1. A search of the B.C. Site Registry Database for waste management and contaminated sites;
2. A review of historic aerial photographs for the area;
3. Discussions with TAC members on historic, current, and future land uses;
4. A visual survey of the assessment area to verify the identified hazards.

The B.C. Site Registry Database search for reported contaminated sites confirmed that there are no active contaminated and/or remediated sites within the assessment area. The closest reported contaminated sites are approximately 3.6km and 4km in linear distance from the intake location, precisely located at the respective addresses:

- 5717 East Sooke Road, Sooke (Site ID 4015); and
- 4575 East Sooke Road, Metchosin (Site ID 10805).

Provided the distant proximity between the contaminated sites and the intake, no further investigation was conducted.

Aerial photos from 2013, 2015, 2017, and 2019 from the CRD's interactive GIS map were reviewed to confirm that there have not been significant changes in land use, in and around the study area over the last 8 years. The discussion with TAC members identified that the CRD's maintenance access roads to the Wilfred Reservoir and South Dam are main contributors to increased turbidity and sedimentation in the Wilfred Reservoir.

Simon Kras (WSP) and Dale Puskas (CRD) completed a visual review of the watershed on October 7, 2021. During the site visit, WSP and CRD visually surveyed the catchment area and completed the following activities:

- Mapping of catchment boundary using GPS based on visual observations of topography and evidence of flow patterns;
- Photo documentation and GPS mapping of hazards including pole mounted transformers, evidence of sloughing and erosion, ephemeral streams and ponds, animal feces, active and abandoned roads, buildings and sheds and water distribution flush points.

The hazard maps provided in the Appendix include information collected during the site visit.

The results of the contaminant source inventory are summarized in Table 4-1.

4.2 POTENTIAL CONTAMINANT SOURCES

4.2.1 LAND USES

As discussed in Section 3.1, the assessment area is largely zoned Rural Residential 6 (RR-6) zone except for the southeast corner of the area that is zoned Rural Residential 3 (RR-3). Despite the zoning, the land is predominantly

forested with limited infrastructure, including two existing treatment buildings located near the east shore of the Wilfred Reservoir and an organic garlic farm located directly south of the Wilfred Reservoir. The land is generally protected by the existing covenant from any activities that will cause the following conditions or activities to occur:

- a release of silt, leachate, and fill;
- erosion and loss of soil;
- alteration of and/or interference with the hydrology;
- storage of fills, rubbish, and waste; and
- application of pesticides, herbicides, insecticides, and/or fungicides.

Rural Residential 6 Use: aside from a residential usage, this zone also permits the use of land for agriculture, horticulture, lodging, and home-based businesses Categories 1, 2, and 3. Per the Bylaw 3705, the permitted home-based businesses include a pre-school, bed and breakfast, and home industry which may involve portable sawmills and storage of raw materials on the land. Potential contaminants from the land use may therefore include, woodchips, sawmill dust, and a variety of other wastes that are organic-based and are prone to bacteria contamination. Poorly managed agriculture/ horticulture wastes may impact the source water through increased turbidity, nutrient, and organic loading.

Rural Residential 3 Use: this zoning permits the same use of land as RR-6, with the exception of horticulture and the addition of veterinary clinics and animal hospitals. Note that there are only two lots within the assessment area that are zoned RR-3, precisely the properties on 700 Cains Way and 4912 Mt. Matheson Road. Although both lots are currently used as residential dwellings, the zoning allows other types of land use as previously listed to be applied in the future. Similar potential contaminants as identified for RR-6 are also anticipated for this zone.

4.2.2 HUMAN ACCESS AND RECREATION

The existing covenant on the land prevents public access to the area and prohibits activities such as swimming, hunting, gathering or grazing domestic animals. Access and potential disturbance to the land, waterfront, and source water are, therefore, limited to operations and maintenance activities by CRD staff, as discussed in Section 3.3. Non-power boating is restricted under Covenant #EW47310, which is allowed only for the property owner at 706 Cains Way, where the water treatment plant is located.

4.2.3 WILDFIRES

There have been 14 historic forest fires in the Wilderness Mountain area, which have ranged in size from 0.6 ha to 836.8 ha. The high fuel availability in this area combined with the historic occurrence of forest fires demonstrates that there is a risk of wildfire in this area. Future occurrence of wildfires is expected to increase by 50% in western Canada due to climate change. Wildfires present a risk of contamination to the Wilfred Reservoir by ash, sediment and particulates, which can result in increased nitrate/nitrite levels, turbidity, and organics. Loss of trees and plants due to wildfires will also increase run-off and sediment transport into the reservoir. If chemicals are used for firefighting activities, there is an additional risk of Perfluorinated Alkyl Substances (PFAS) entering the source water. PFAS chemicals have been linked to a wide range of health impacts.

4.2.4 ALGAE

The historical records show algal concentrations to be high primarily in spring and fall, which is consistent with limnological expectations for oligotrophic lakes. Anomaly bloom events were observed in June-July of 2014 and 2021 which are not yet fully understood. It is understood that the 2014 algal bloom was associated with a transient doubling of phosphorus levels, followed by a higher base level for nitrogen which persisted in the subsequent years.

4.2.5 SEISMIC EVENTS

Southwestern BC is the most seismically active region in Canada. The southwestern side of Vancouver Island is in proximity to the Cascadia Subduction Zone (CSZ), which may be impacted by earthquakes from the Juan de Fuca Plate, North America Plate, and/or at the plate boundary. Historical earthquakes in the area have been seen up to magnitude 9. Seismic impacts in the assessment area could potentially damage the north and south dams, and cause landslides/rockslides on the surrounding slopes, resulting in prolonged loss of the water source.

4.2.6 CLIMATE CHANGE

Although climate change is not a direct health risk, it can exacerbate other risks to the reservoir through increased water temperatures. Increased temperature affects biological growth and algal blooms and can have impacts on the structure of the reservoir's ecosystem which are difficult to predict – this may include new species of dominant plankton, including the chance of toxic algae blooms.

Increased ambient temperatures also increase the risk of wildfires. Furthermore, climate change increases the frequency and intensity of extreme weather events, which can in turn decrease water availability through drought; and increase pollutant and nutrient transfer through increased stormwater runoff.

4.3 CONTAMINANT INVENTORY

Because the assessment area is relatively small and located within a protected zone with restricted land use, the potential contamination sources are limited. The contaminant source inventory is presented in Table 4-1.

Table 4-1 Potential Contaminant Sources for the Wilfred Reservoir

HAZARD ID	CONTAMINANT SOURCE TYPE AND DESCRIPTION	OWNER/ JURISDICTION	LOCATION	DISTANCE/ DIRECTION TO SOURCE	POSSIBLE CONTAMINANTS OF CONCERN	CONTAMINANT TRANSPORT MECHANISM
2-1	**Road run-off**	Local Govt / Private	Mt. Matheson Rd / Ambience Pl / WTP access road	250m upslope from reservoir surrounding SE embankment.	Turbidity, nutrients, organics.	Overland flow, and/or subsurface soil diffusion.
2-2	**Reservoir Bank Erosion**	Local Govt / Private	Within study area	<250m from water level.	Turbidity.	Sediment transport.
2-3	**Agriculture Land Use per RR-6 Zone**	Local Govt	Within study area	30 m upslope from reservoir.	Nutrients, pathogens.	Overland flow.
2-4	**Veterinary Clinics and Animal Hospital use per RR-3 Zone (Future)**	Local Govt	Within study area	100m upslope, south of reservoir.	Pathogens, biohazard.	Overland flow.
2-5	**Algae formation and decay**	Local Govt	Wilfred Reservoir	At source.	Cyanobacteria.	Algae decomposition into source water; dissolution.
2-6	**Wildfires**	Provincial / Local Govt	Surrounding	Forested zone immediately surrounding reservoir; regional.	PFAS, turbidity (ash), nitrate/nitrite.	Airborne, direct application, overland flow.
2-7	**Accidental spills of residential fuels or chemicals**	Private	Within study area	Anywhere within catchment.		Overland flow.

HAZARD ID	CONTAMINANT SOURCE TYPE AND DESCRIPTION	OWNER/ JURISDICTION	LOCATION	DISTANCE/ DIRECTION TO SOURCE	POSSIBLE CONTAMINANTS OF CONCERN	CONTAMINANT TRANSPORT MECHANISM
2-8	**Wildlife**	Provincial	Within study area	Various.	Pathogens.	Overland flow.
2-9	**Pole mounted transformers**	BC Hydro	Hydro line from Ambience Place to reservoir	< 250m SE side of reservoir.	PCBs (unlikely), silicon oils, other toxic substances.	Overland flow.
2-10	**Climate Change - Drought (Future)**	Municipal	Wilfred Reservoir	Within and surrounding reservoir.	Microbes, manganese, nutrients, turbidity (ash) due to wildfires.	Overland flow. Concentration of contaminants in water due to increased water evaporation and reduced precipitation in the lake.
2-11	**Climate Change - Precipitation (Future)**	Municipal	Wilfred Reservoir	Within and surrounding reservoir.	Turbidity (organics), nutrients.	Overland flow.

5 MODULE 7 – CHARACTERIZE RISKS FROM SOURCE TO TAP

The purpose of Module 7 is to bring together all the information on the water supply system — its hazards and vulnerabilities identified through Modules 1 and 2— into a comprehensive assessment of the major water supply elements and the system as an integrated whole. Module 7 is the focal point of the SWPP process. It includes a structured approach for identifying the areas of greatest risk and fostering an understanding of the strengths and weaknesses throughout a water supply system.

5.1 METHODOLOGY

Module 7 involves:

- Evaluating individual drinking water protection barriers and the multiple barrier (multi-barrier) system as a whole;
- Characterizing risk for each drinking water hazard identified in Modules 1 and 2;
- Assessing the water supply system's primary strengths, weaknesses, major threats, and key opportunities for significantly improving drinking water protection; and
- Uncertainty analysis.

Evaluating the multiple barrier system is performed based on assessments of the existing barrier components in Modules 1 and 2. It involves assessing the robustness and reliability of each barrier as well as the multiple barrier system.

Risk characterization is a process of assigning a risk level to each of the hazards to separate serious, imminent risks from those that are less significant. In a risk assessment it is important to distinguish between the concepts of hazard and risk. A hazard is an agent or situation with the potential for causing harm. Risk is the combination of the likelihood that a hazard will cause harm, and the expected magnitude and duration of the harm if it were to occur (NHMRC/ARMCANZ, 2001). The end point of the SWPP is a sufficient and reliable supply of safe and aesthetically acceptable water. Any event, condition, action or inaction that could threaten this end point is a hazard.

5.2 EVALUATION OF DRINKING WATER PROTECTION BARRIERS

The multiple barrier system is comprised of the following six barriers:

1. Source protection;
2. Treatment, including system design;
3. Water system maintenance/asset management;
4. Water monitoring;
5. Operator training; and
6. Emergency response planning.

And three supporting mechanisms:

1. Sound water supply system management;
2. Affordability; and
3. Effective governance.

The strengths and reliability of barriers applicable to source protection are presented in the table below with respect to anthropogenic and non-anthropogenic barriers.

Table 5-1 Existing Source Protection Barriers for the Wilfred Reservoir

ANTHROPOGENIC BARRIERS	NON-ANTHROPOGENIC BARRIERS
• Locked access gates to the assessment area.	• 30-m riparian buffer from the south shore of the reservoir to the residential zone.
• Existing water treatment plant designed to remove turbidity and inactivate pathogens.	• Natural attenuation provided by the vegetation along the lakeshore prior to reaching the reservoir in the event of a spill.
• Online monitoring of treated water turbidity and chlorine residual to ensure that treated water quality meets the treatment objectives.	• Bedrock reservoir bottom provides protection to source water quality from groundwater infiltration.
• Operator training and certification through EOCP to reduce operation errors and system failures.	• Natural settling of sediment due to depth and configuration of reservoir.
• Land Use Zoning and Covenant to protect against hazardous activities in the assessment area including public access and use of pesticides/ herbicides.	• Natural dilution of contaminants with rainwater captured in reservoir.
• Dam Emergency Plan (BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development) and Emergency Response Plan (CRD Integrated Water Services)	
• Voluntary Water Conservation Plan—the CRD's Water Conservation Plan for the Juan de Fuca (JdF) system is implemented on a voluntary basis for the CRD's small water systems including Wilderness Mountain.	

5.3 RISK CHARACTERIZATION

A qualitative risk assessment of hazards and vulnerabilities identified in Modules 1 and 2 were completed. A simplified characterization of Risk may be:

RISK = Likelihood x Consequence

where:

Likelihood is the chance that a hazard will actually compromise drinking water quality or quantity, and pose a public health threat; and

Consequence is the combination of the severity, nature, and duration of an event, the proportion of the population affected, and type of health consequence.

The qualitative measures of likelihood and consequence used in this assessment along with the resulting risk analysis matrix are detailed in Section 2.2 of the Assessment Guidance Module 7 and summarized in the tables below.

Table 5-2 Qualitative Measures of Likelihood (After NHMRC/ARMCANZ, 2001; Berry and Failing, 2003)

LEVEL	DESCRIPTOR	DESCRIPTION	PROBABILITY OF OCCURRENCE IN NEXT 10 YEARS
A	Almost Certain	Is expected to occur in most circumstances	>90%
B	Likely	Will probably occur in most circumstances	71-90%
C	Possible	Will probably occur at some time	31-70%
D	Unlikely	Could occur at some time	10-30%
E	Rare	May only occur in exceptional circumstances	<10%

Table 5-3 Qualitative Measures of Consequence (after NHMRC/ARMCANZ, 2001)

LEVEL	DESCRIPTOR	DESCRIPTION
1	Insignificant	Insignificant impact, no illness, little disruption to normal operation, little or no increase in normal operating costs.
2	Minor	Minor impact for small population, mild illness moderately likely, some manageable operation disruption, small increase in operating costs.
3	Moderate	Minor impact for large population, mild to moderate illness probable, significant moderation to normal operation but manageable, operating costs increase, increased monitoring.
4	Major	Major impact for small population, severe illness probable, systems significantly compromised and abnormal operation if at all, high level monitoring required.
5	Catastrophic	Major impact for large population, sever illness probable, complete failure of systems.

Once likelihood and consequence scores are determined for a hazard, the risk analysis matrix below was used to assign a risk level by finding the cell in the matrix corresponding to the likelihood and consequence scores.

Table 5-4 Qualitative Risk Analysis Matrix

LIKELIHOOD	CONSEQUENCES				
	1 INSIGNIFICANT	2 MINOR	3 MODERATE	4 MAJOR	5 CATASTROPHIC
A (almost certain)	Moderate	High	Very High	Very High	Very High
B (likely)	Moderate	High	High	Very High	Very High
C (possible)	Low	Moderate	High	Very High	Very High
D (unlikely)	Low	Low	Moderate	High	Very High
E (rare)	Low	Low	Moderate	High	High

Hazards and vulnerabilities identified in Modules 1 and 2 were characterized for risk following this methodology and are detailed in the table below. Resultant risk level is qualitative and best interpreted relative to other hazards considered in the assessment as to highlight areas for continued improvement and resource allocation. Table 5-5 summarizes the risk characterization of the identified hazards.

Table 5-5 Risk Evaluation Summary for the Potential Drinking Water Hazards for the Wilfred Reservoir

HAZARD ID	DRINKING WATER HAZARD	LIKELIHOOD LEVEL	CONSEQUENCE LEVEL	RISK LEVEL	ASSUMPTIONS/ COMMENTS
7-1	**Access Road run-off (Quality – Turbidity)**	Likely	Moderate	High	Road run-off from the existing access roads and a small portion of Ambience Place can reach the reservoir, especially during heavy rains. Run-off from Ambience Place can reach the reservoir through an ephemeral stream which flows almost parallel to the WTP access road. There are two basins in the ephemeral stream which gather organic matter, likely contributing to the colour and dissolved organics in the reservoir.
7-2	**Residential Fertilizer and Pesticide Application (Quality - Chemical)**	Rare	Moderate	Moderate	Application of fertilizer and pesticide is unlikely in the assessment boundary as it is prohibited by the existing Covenant on Lot 3. However, contamination of the reservoir by pesticides could potentially cause a major issue to the drinking water as the existing treatment barrier will not be sufficient to fully breakdown the pesticides in the water. The closest residence is approximately 30 meters away from the south dam.
7-3	**Agriculture Land Use per RR-6 Zone (Quality - Chemical)**	Unlikely	Minor	Low	This land is currently protected by the covenant which prohibits the use of pesticides and herbicides.
7-4	**Veterinary Clinics and Animal Hospital use per RR-3 Zone (Quality - Biohazard)**	Rare	Catastrophic	High	Although low likelihood given the location of the RR-3 zone in relation to the reservoir and the current use of the land, the consequence of water contamination by biohazard products could catastrophically impact the raw water quality as the treatment plant would not be able to sufficiently treat the contaminant.

HAZARD ID	DRINKING WATER HAZARD	LIKELIHOOD LEVEL	CONSEQUENCE LEVEL	RISK LEVEL	ASSUMPTIONS/ COMMENTS
7-5	**Algae formation and decay (Quality – Aesthetic and bacteriological)**	Almost Certain	Moderate	Very High	Heavy algal growth is already observed seasonally in the reservoir. Impacts to the treatment plant can be major as it could blind the cartridge filters, cause the WTP to go offline, and trigger a boil water advisory. Toxic algal species have not been observed to date at the Wilfred Reservoir and are not likely to occur in the future unless there is significant additional dissolved phosphorus in the water body.
7-6	**Surrounding Wildfire (Quality – Turbidity, Nutrient, and Chemical)**	Possible	Moderate	High	It is possible that a wildfire occurs in the assessment area. The consequences will include erosion, nutrient loading and contamination by fire retardants in the reservoir, which could result in elevated phosphate levels.
7-7	**Accidental spills of residential fuels or chemicals (Quality – Chemical)**	Rare	Catastrophic	High	This incident is possible to occur in the access road during chemical transport. The consequence of a large spill could be catastrophic as the existing treatment plant will not provide a sufficient treatment barrier.
7-8	**Source water contamination by wildlife (Quality – Bacteriological)**	Likely	Minor	High	The watershed and the reservoir are habitats for otters, deer, and cougars. *Giardia* and *Cryptosporidium* are associated with otter feces. Treatment is currently provided by the treatment plant via cartridge filtration and disinfection by UV. However, the existing treatment has not been fully effective in reducing turbidity, as evidenced by recent boil water advisories. It is also not designed to remove dissolved organic matter.

HAZARD ID	DRINKING WATER HAZARD	LIKELIHOOD LEVEL	CONSEQUENCE LEVEL	RISK LEVEL	ASSUMPTIONS/ COMMENTS
7-9	**Pole mounted transformers (Quality – Chemical)**	Possible	Moderate	High	It is unlikely that an accident involving a leaking transformer will happen within the assessment area and make its way to the reservoir. However, a small amount of the release can be transported to the reservoir through runoff. PCBs are the common contaminants in older transformers and are toxic to human health, but may not be present in the transformers in the study area. Newer transformers may still contain harmful substances such as silicon oils.
7-10	**Reservoir Bank Erosion (Quality – Physical)**	Almost Certain	Minor	High	Sloughing of the steep lakeshores is almost certain, in particular during high precipitation periods; one consequence of this is increased turbidity, causing blinding of filter cartridges. Erosion also introduces organics into the water, which results in colour, taste and odour issues.
7-11	**Treatment System Failure – Cartridge Filtration**	Possible	Moderate	High	Filtration is required for turbidity removal. The treatment plant consists of a series of cartridge filters. A complete failure of the filtration system would cause a major problem as the water would likely not meet the required 1.0 NTU for drinking water limit, particularly during a high precipitation event.
7-12	**Treatment System Failure – UV Disinfection**	Unlikely	Moderate	Moderate	UV Disinfection is required to meet the required 3-log pathogen removal. Failure of the UV would fail the system to meet this requirement.

HAZARD ID	DRINKING WATER HAZARD	LIKELIHOOD LEVEL	CONSEQUENCE LEVEL	RISK LEVEL	ASSUMPTIONS/ COMMENTS
7-13	**Treatment System Failure – Chloramination**	Unlikely	Moderate	Moderate	Chloramination is provided for secondary disinfection residual in the distribution system. Without chloramination, the system would have neither primary nor secondary disinfection, which would trigger a boil water advisory.
7-14	**Treatment System Failure – Prolonged Power Failure**	Rare	Major	High	The treatment plant currently relies on the connection of the CRD's portable emergency generator for backup power in the event of a BCH power outage. If the portable generator cannot be mobilized to site in a timely manner due to access or equipment issues, the intake and treatment system would be left without power. Without power, the community will depend on the treated water storage reservoir for drinking water. The reservoir is able to provide 3 days of supply at current ADD. Should a prolonged power failure occur beyond this time, the community will be left with no water as the raw water pump will not be able to operate and send water to the treatment plant and the UV disinfection and Chloramination systems will not be able to operate either.

HAZARD ID	DRINKING WATER HAZARD	LIKELIHOOD LEVEL	CONSEQUENCE LEVEL	RISK LEVEL	ASSUMPTIONS/ COMMENTS
7-15	**Climate Change (Future) (Quantity – Recharge; Quality – Physical)**	Likely	Moderate	High	Climate change may affect the water source in both quantity and quality. Increased drought period will reduce availability of the water. An increase in temperature and precipitation may worsen the quality of the water through increased manganese, algal blooms, and increased organics. As the current treatment plant does not provide treatment for manganese and organics, worsening water quality as mentioned would require the treatment plant to be improved with a higher and more robust treatment capability.

5.4 SWOT ANALYSIS

A “birds-eye view” of the water system highlighting the effectiveness and deficiencies of the system is provided by the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis as described below.

Strengths are the major assets of the water supply system, the areas where the water supply system is doing well. Highlighting strengths serves to recognize and encourage the positive aspects of the water supply system.

Weaknesses are vulnerabilities in the protective and preventative measures in the water supply system. Where significant vulnerabilities exist, more attention is required. No fundamental deficiencies in source water protection were identified by this assessment. However, some vulnerabilities were identified, which highlight areas for possible improvement in safeguarding the water system.

Opportunities are prospects for improvements to the safety or sustainability of the water supply. Opportunities have been identified in improving stakeholder awareness and cooperation for source water protection.

Threats are major hazards to the safety or sustainability of the drinking water supply. No immediate threats to the water supply were identified by this assessment.

The SWOT analysis for each water sources is presented in Table 5-6.

5.5 UNCERTAINTY ANALYSIS AND LIMITATIONS

The conclusions presented represent the best judgement of the assessors based on the information compiled in Modules 1 and 2 and site conditions observed at the time of the site visits. The conclusions and opinions are based on a reasonable review of available information compiled within the scope of work, schedule and budget constraints of the project. In doing so the assessment team has relied in good faith on information provided by others as noted in the report and has assumed the information as provided is both factual and accurate. WSP accepts no responsibility for any deficiencies, misstatements or inaccuracy resulting from information provided by others. However, it is the opinion of the assessor that resources provided were adequate to meet the objectives of the assessment guidance and provide an adequate level of due diligence in realizing a safe drinking water supply.

Table 5-6 SWOT Analysis for the Wilfred Reservoir

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
• Low anthropogenic use of watershed with predominantly undeveloped land in the assessment area. • Limited road area within catchment, with no major through-roads.	• Current treatment plant is not adequately addressing turbidity, as evidenced by treated water turbidity spikes and boil water advisories. Treatment system also does not provide treatment for organics or manganese and does not provide sufficient contact time for virus disinfection by chloramination.	• Upgrade of the treatment plant to include improved filtration, manganese and biological treatment. • Modify chloramination system to provide free chlorine injection first with an appropriate contact time for primary disinfection, followed with ammonia injection to provide a chloramine residual and limit the formation of disinfection by-products.	• Spill event of significance directly into watercourse.
• Sparse population, as only the south side of the assessment area is populated.	• Open reservoir with steep banks that is prone to sedimentation from erosion of surrounding slopes and landslides.	• Develop a Reservoir Management Plan specifying both capital improvements and regular maintenance activities, which may include aeration of the lake, dredging/ draining of the lake to remove sedimentation, replacing fixed intake with a floating intake.	• Climate change altering raw water quality.
• Protected by a Covenant for use of hazardous chemicals and access to public.	• Intake location is close to the shore and near the bottom, resulting in relatively high levels of metals and turbidity in source water intake.	• Collaborate with the East Sooke Fire Department, to identify the reservoir location to the Province and have future firefighting efforts avoid any direct application of retardants over water body during a fire.	• Turbidity events from erosions and surface runoffs from existing access roads.

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
• Bedrock man-made lake with negligible groundwater infiltration/ recharge.	• Poor vegetation control.	• Collaborate with the Land Conservancy of British Columbia (TLC) and the Habitat Acquisition Trust (HAT), who are both listed on the watershed covenant, to possibly cut back Alder trees from the reservoir's shore to reduce fallen leaves which negatively affect the organic loading and colour of the source water.	• Wildfires in the assessment area.
• A multi-barrier water treatment plant with a series of filtration, and dual disinfection systems.		• Emergency Response Plan updates to better protect the water system for hazards, and training in execution of emergency response.	• Seismic event causing major damages to the dams.

6 MODULE 8 – RECOMMENDATIONS FOR RISK MANAGEMENT

Module 8 is the final module of the SWPP Guideline and recommends risk management actions to improve drinking water protection. As the scope of this assessment only included the identification of hazards related to source protection, this barrier is the primary focus of the recommended actions. The objective of the recommendations below is to strengthen source water protection at the Wilfred Reservoir. Recommendations have been developed with consideration to the SMART principle as included in the CS2TA Guideline, being Specific, Measurable, Achievable, Realistic, and Time-bound. System-wide recommendations and source-specific recommendations are provided. Risks addressed are referenced to Hazard Inventory (Table 3-1) and Risk Evaluation Summary (Table 5-5).

RECOMMENDATION 1 – SUPPLY/ TREATMENT

1.1 **Intake upgrade** - Relocate intake further away from the shore to reduce the effects of near-shore runoff on source water quality. CRD may also consider replacing the fixed intake with a floating intake to draw water from seasonal elevation where water quality is highest. [Risk addressed: 1-6, 7-1, 7-10]

1.2 **Treatment plant upgrade** to include treatments for organics and manganese removal, as well as sufficient chlorine contact time prior to ammoniation, as well as corrosion control. [Risk addressed: 1-11, 1-13, 1-14, 7-1, 7-5, 7-6, 7-8]

RECOMMENDATION 2 – MONITORING AND PREVENTATIVE MAINTENANCE AND MANAGEMENT

2.1 **Ongoing monitoring**, including sampling at various depths and multiple locations, is recommended to track how source water quality is changing, and understand variations in water quality throughout the reservoir. Additional monitoring can be implemented to monitor sediment levels in the reservoir to allow planning for dredging or draining of the reservoir. Refer to 2.2. [Risk addressed: All]

2.2 **Installation of a syphon drain system at the bottom of a reservoir** to allow sediment to transport downstream instead of accumulating in the reservoir, which contributes to turbidity and organic loading in the source water and reduces storage capacity within the reservoir. Draining of the reservoir may require further management of the sludge which may require new infrastructure to be built. Alternatively, CRD may also consider **dredging the reservoir** when the sediments have reached a certain level or programmed within the Operations and Maintenance procedure every 3 to 5 years. [Risk addressed: 7-10]

2.3 **Steep slope assessment mapping and erosion control** for ongoing ground monitoring and sediment control around the lake-shore. [Risk addressed: 7-10]

2.4 **Preventative maintenance and asset management** to regularly inspect and maintain the existing water system for the purpose of preventing failures of infrastructure and disruption to water service. This may include intake infrastructure, dams, treatment equipment, and distribution system. Asset management may include tracking, maintaining, upgrading, renewing and disposing assets effectively. [Risk addressed: 7-11, 7-12, 7-13, 7-15]

2.5 **Inspection of pole mounted transformers** in the event of power failure to visually confirm integrity of pole and transformers. Regular maintenance of the pole and transformer is otherwise conducted by BC Hydro. [Risk addressed: 7-9].

2.6 **Vegetation management around reservoir** to minimize organic transport from fallen leaves and branches from near-shore vegetation, as well as to reduce risks of lake-shore erosion into the reservoir. It could also include periodic removal of sediments and vegetation from basins in ephemeral stream near WTP access road to limit contamination of surface water with organics.

RECOMMENDATION 3 – POLICY AND REGULATION

3.1 **Update existing Emergency Response Plan** to include all the identified risks in Section 5, such as power failure, chemical contamination of the water source, and wildfire. Emergency Response Plan to include a Spill Response Plan. [Risk addressed: 7-6, 7-7, 7-9, 7-10, 7-11, 7-12, 7-13]

3.2 **Coordination with Metchosin Fire Department and Province** to delineate a chemical-free firefighting area within the reservoir catchment. [Risk addressed: 7-6]

3.3 **Water Conservation Bylaw** to allow for enforcement of the CRD's water conservation plan for the Wilderness Mountain System. [Risk addressed: 7-15]

RECOMMENDATION 4 – ADDITIONAL STUDY

4.1 **Locate all septic disposals for properties partially within the 30-meter setback area** to complete the hazard identification table of Module 1 and determine the risks of source water contamination on the reservoir. Refer to Section 3.3.3 for further discussion. If any septic fields are found to be near the 30-meter setback area, then implement Recommendation 4.2.

4.2 **Hydrogeological Study, if required, to determine the ground infiltration path of the septic disposals within the assessment area**. The results of the study will determine the risks of source water contamination on the reservoir and help to develop an appropriate risk mitigation plan. Refer to Section 3.3.3 for further discussion.

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- Ministry of Healthy Living and Sport. (2010). Comprehensive Drinking Water Source-to-Tap Assessment Guideline:

  https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/resources-for-water-system-operators

APPENDIX

A FIGURES

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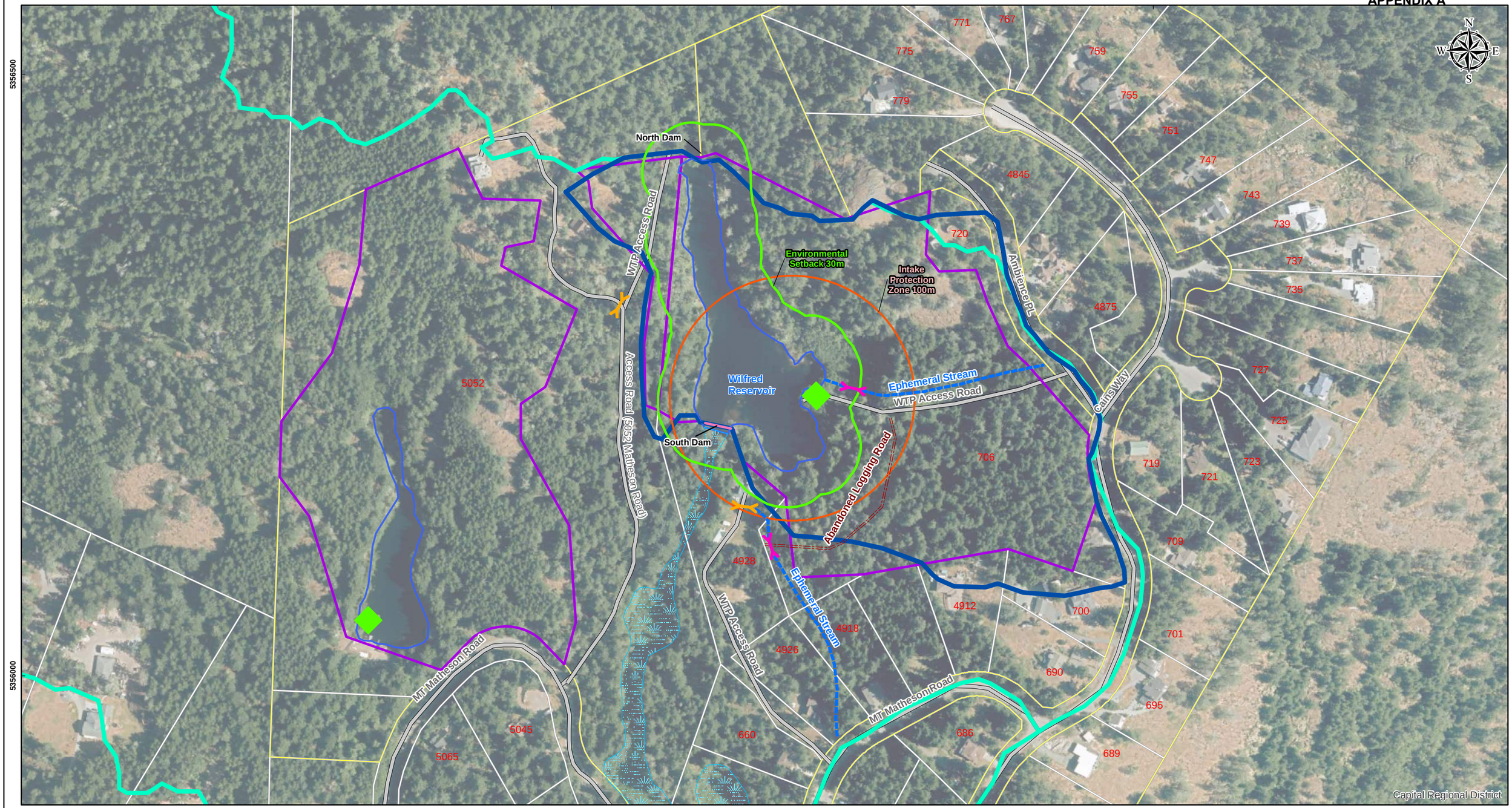

Legend

- Access Road
- Abandoned Logging Road
- CRD Catchment Boundary
- South Dam
- Ephemeral stream
- Culvert location confirmed on the field
- Culvert location not confirmed on the field
- Revised Catchment Area
- Environmental Setback 30m
- Intake Protection Zone 100m
- Reservoir
- Wetland
- Covenant
- Right of way
- Lease or License

0 50 100 150 Meters

Scale: 1:3,000

References:
Data BC - BC Catalogue
Open Government License
(http://www.data.gov.bc.ca/)
CRD
ArcGIS Server
(https://mapservices.crd.bc.ca/arcgis/rest/services)

PROJECT:
Wilderness Mountain Source Water Protection Plan

TITLE:
Overview Map

CLIENT:
Capital Regional District

DATE:	ANALYST:	REVIEWED:	
November 26, 2021	KP	MY	**Figure 1**

GIS FILE: Figure1_Overview_Map.mxd

PROJECT NO: 201-08298-00

COORDINATE SYSTEM: NAD 1983 UTM Zone 10N

68

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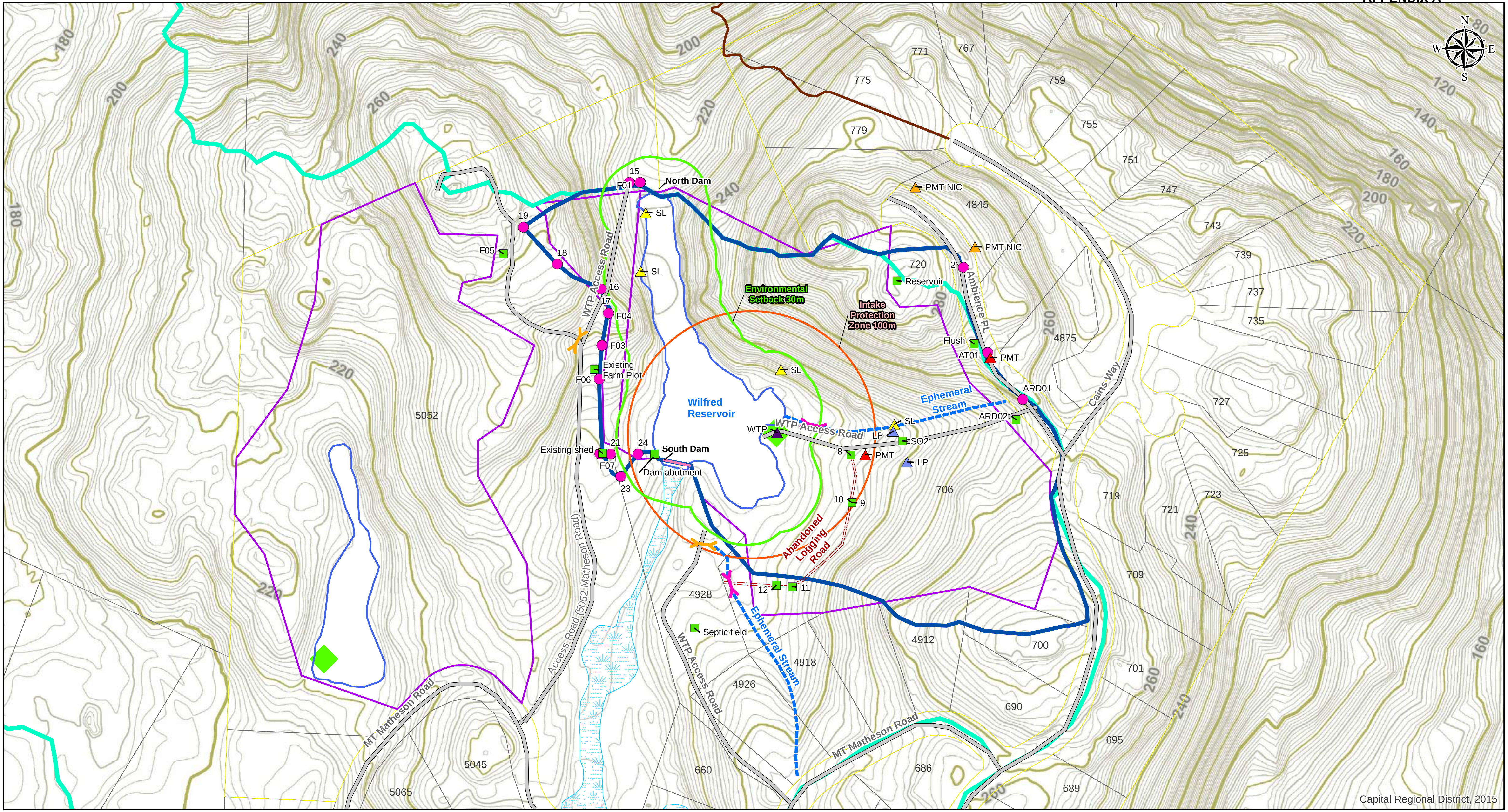
APPENDIX A



Legend

- CBP: Catchment Boundary Point
- Field Points Other
- LP: Low Point/Basin
- SL: Sloughing
- PMT: Pole Mounted Transformer
- PMT NIC: Pole Mounted Transformer Not in Catchment
- WTP: Water Treatment Plant
- Park Trail to 2501
- Abandoned Logging Road
- Access Road
- South Dam
- Ephemeral stream
- CRD Catchment Boundary
- Culvert location confirmed on the field
- Culvert location not confirmed on the field
- Revised Catchment Area
- Environmental Setback 30m
- Intake Protection Zone 100m
- Reservoir
- Wetland
- Covenant
- Right of way
- Lease or License

0 50 100 150 Meters

Scale: 1:3,000

References:
Data BC - BC Catalogue
Open Government License
(http://www.data.gov.bc.ca/)
CRD
ArcGIS Server
(https://mapservices.crd.bc.ca/arcgis/rest/services)

Project Location

PROJECT: Wilderness Mountain Source Water Protection Plan	CLIENT: Capital Regional District
TITLE: Hazard Map	DATE: November 24, 2021 — ANALYST: KP — REVIEWED: MY — Figure 2
	GIS FILE: Figure 2_Hazard_Map.mxd
	PROJECT NO: 201-08298-00
	COORDINATE SYSTEM: NAD 1983 UTM Zone 10N

wsp

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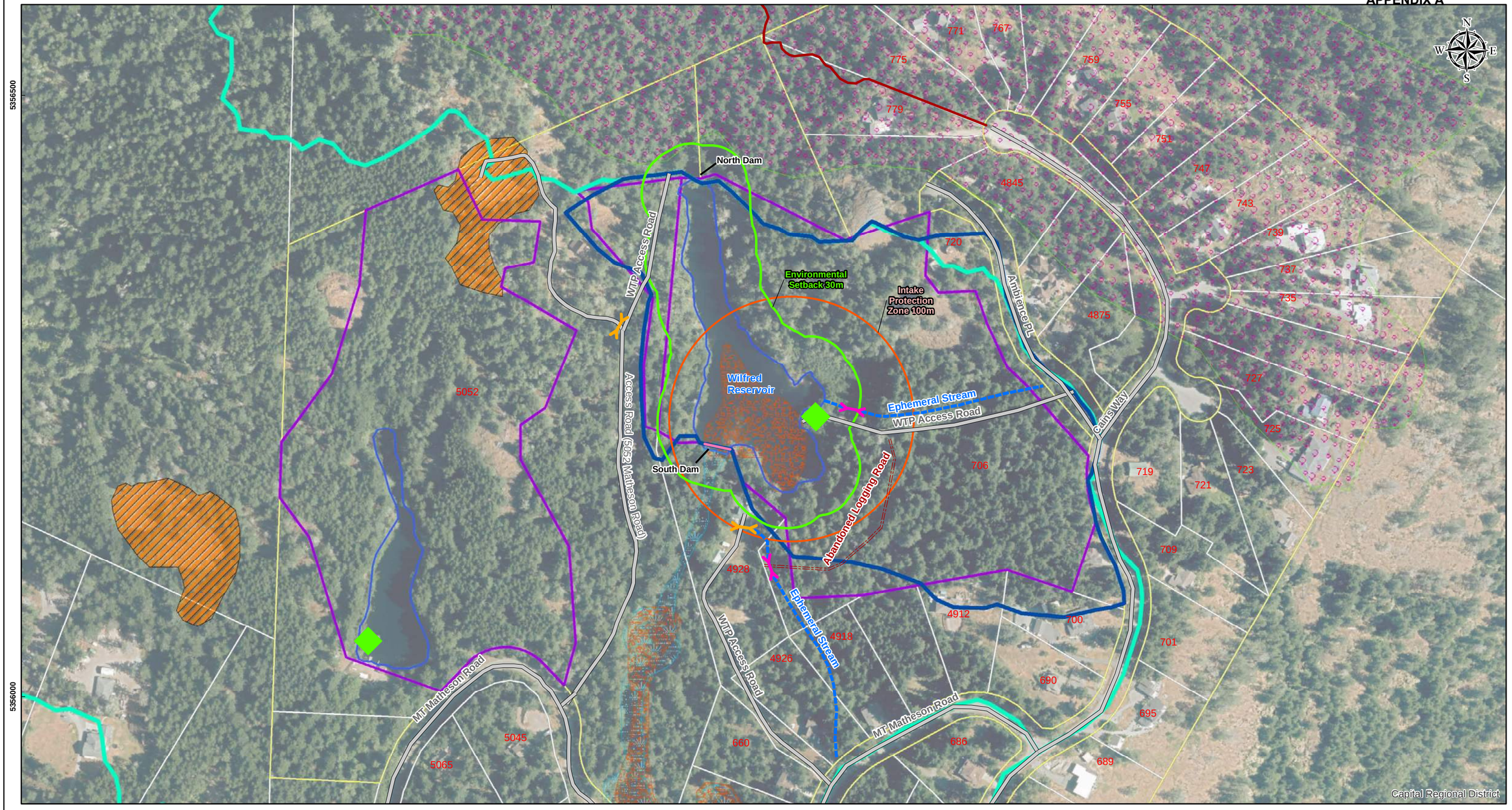

Legend

- Park Trail to 2501
- Abandoned Logging Road
- Access Road
- South Dam
- Ephemeral stream
- Culvert location confirmed on the field
- Culvert location not confirmed on the field
- CRD Catchment Boundary
- Revised Catchment Area
- Environmental Setback 30m
- Intake Protection Zone 100m
- Reservoir
- Wetland
- Covenant
- Right of way
- Lease or License

Sensitive Ecosystems

- Non-Sensitive
- Older Second Growth
- Riparian

0 50 100 150 Meters

Scale: 1:3,000

References:
Data BC - BC Catalogue
Open Government License
(http://www.data.gov.bc.ca/)
CRD
ArcGIS Server
(https://mapservices.crd.bc.ca/arcgis/rest/services)

PROJECT:
Wilderness Mountain Source Water Protection Plan

TITLE:
Environmental Features

CLIENT:
Capital Regional District

DATE:	ANALYST:	REVIEWED:	
November 26, 2021	KP	MY	**Figure 3**

GIS FILE:
Figure 3_Environmental Features_Map.mxd

PROJECT NO:
201-08298-00

COORDINATE SYSTEM:
NAD 1983 UTM Zone 10N

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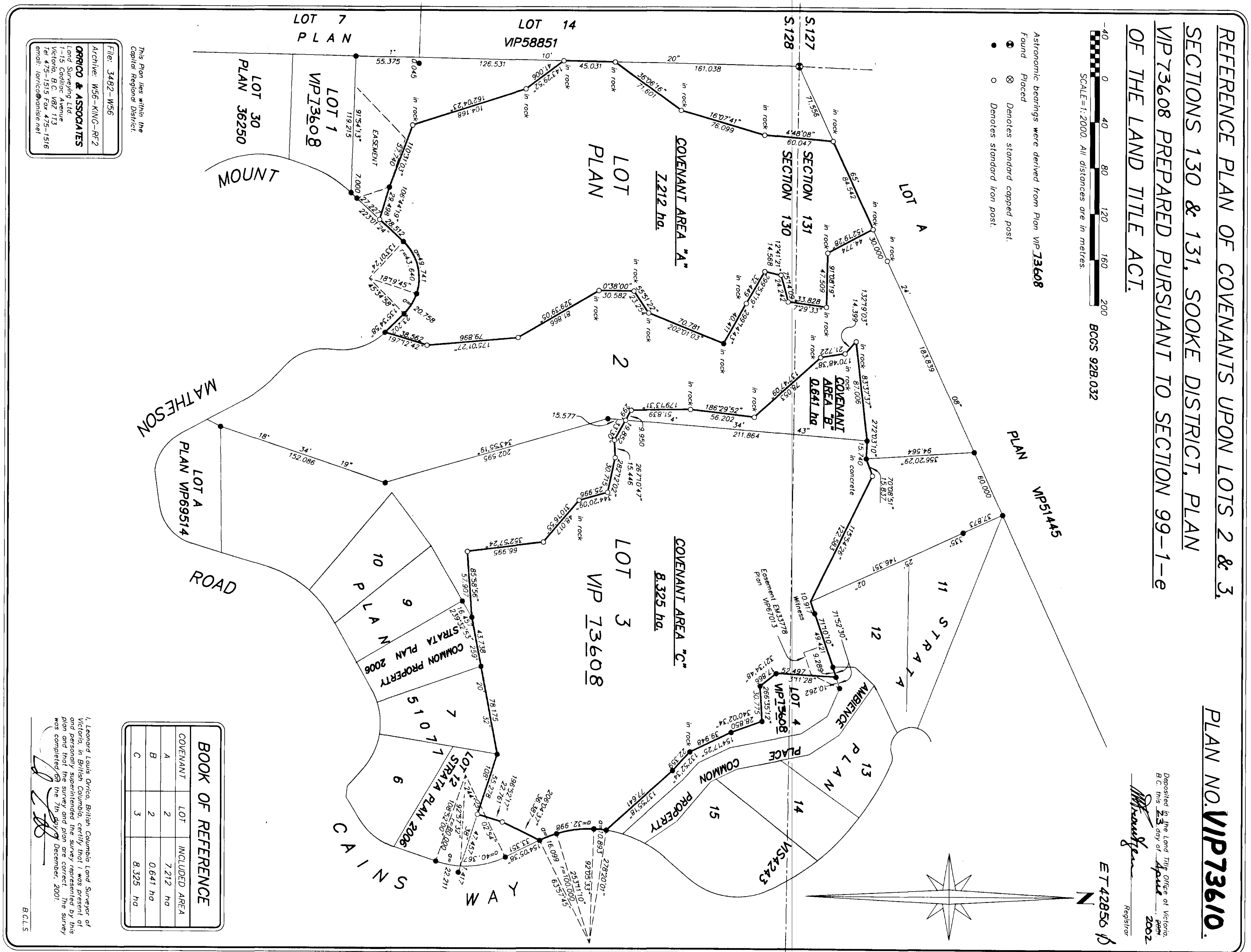
APPENDIX

B LOT 3 LAND TITLE


REFERENCE PLAN OF COVENANTS UPON LOTS 2 & 3, SECTIONS 130 & 131, SOOKE DISTRICT, PLAN VIP73608 PREPARED PURSUANT TO SECTION 99-1-e OF THE LAND TITLE ACT.
SCALE=1:2000. All distances are in metres.
BCGS 92B.032
Astronomic bearings were derived from Plan VIP73608
Found Placed
Denotes standard capped post.
Denotes standard iron post.
PLAN NO. VIP73610.
Deposited in the Land Title Office at Victoria, B.C. this 23 day of April 2002
Registrar
ET42856
COVENANT AREA "A" 7.212 ha.
COVENANT AREA "B" 0.641 ha
COVENANT AREA "C" 8.325 ha.
LOT 2 PLAN
LOT 3 VIP 73608
LOT A PLAN VIP51445
LOT 14 VIP58851
LOT 7 PLAN
LOT 1 VIP73608
LOT 30 PLAN 36250
LOT A PLAN VIP69514
LOT 4 VIP73608
STRATA PLAN 2006 COMMON PROPERTY
STRATA PLAN VIS4243
AMBIENCE PLACE
MOUNT MATHESON ROAD
CAINS WAY
SECTION 130
SECTION 131
BOOK OF REFERENCE
COVENANT | LOT | INCLUDED AREA
A | 2 | 7.212 ha
B | 2 | 0.641 ha
C | 3 | 8.325 ha
I, Leonard Louis Orrico, British Columbia Land Surveyor of Victoria, in British Columbia, certify that I was present at and personally superintended the survey represented by this plan and that the survey and plan are correct. The survey was completed on the 7th day of December, 2001.
B.C.L.S.
File: 3482-W56
Archive: W56-KING-RF2
ORRICO & ASSOCIATES Land Surveying Ltd
1-15 Cadillac Avenue Victoria, B.C. V8Z 1T3
Tel 475-1515 Fax 475-1516
This Plan lies within the Capital Regional District.

3 LT 53

LAND TITLE ACT EW047312 23 APR 2004 13 53 EW047310
FORM C
(Section 219.9)

Province of British Columbia

GENERAL INSTRUMENT - PART 1 Page 1 of 42 pages

1.APPLICATION: Aaltje van Grootheest (van Akker), Barrister and Solicitor
4054 Knibbs Green, Victoria, B.C. V8Z 6Y7
250-479-4692

2.PARCEL IDENTIFIER AND LEGAL DESCRIPTION OF LAND:*
(PID) (LEGAL DESCRIPTION)
025-399-276 LOT 3 SECTIONS 130 AND 131 SOOKE DISTRICT PLAN VIP73608, EXCEPT THAT PART IN PLAN VIP 76869

3.NATURE OF INTEREST:*

DESCRIPTION	DOCUMENT REFERENCE (page and paragraph)	PERSON ENTITLED TO INTEREST
3 C SECTION 219 COVENANT/STATUTORY RIGHT OF WAY AND RENT CHARGE, ALL OVER PART IN PLAN VIP 76871	Part 2	Transferees

4.TERMS: Part 2 of this instrument consists of (select one only)
(a) Filed Standard Charge Terms ___ D.F. No.
(b) Express Charge Terms X Annexed as Part 2
(c) Release ___ There is no part 2 of this instrument.
A selection of (a) includes any additional or modified terms referred to in Item 7 or in a schedule annexed to this instrument. If (c) if selected, the charge described in Item 3 is released or discharged as a charge on the land described in Item 2.

5.TRANSFERORS/COVENANTORS:*
573132 B.C. LTD. (Inc. No. 603450), 4054 Knibbs Green, Victoria, B.C., V8Z 6Y7.

6.TRANSFEREES/COVENANTEES:*
HABITAT ACQUISITION TRUST (Inc. No. S-36193), P.O. Box 8552, Victoria, B.C. V8W 3S2
***TLC* THE LAND CONSERVANCY OF BRITISH COLUMBIA** (Inc. No. S-36826),
5793 Old West Saanich Road, Victoria, B.C. V9E 2H2, AND
WILDERNESS MOUNTAIN WATER CORPORATION (Inc. No. 232326),
4054 Knibbs Green, Victoria, B.C. V8Z 6Y7

02 2004/04/23 13:54:10 02 VI 559616
CHARGE $180.00

7.ADDITIONAL OR MODIFIED TERMS:*

8.EXECUTION(S):** This instrument creates, assigns, modifies, enlarges, discharges or governs the priority of the interest(s) described in Item 3 and the Transferor(s) and every other signatory agree to be bound by this instrument, and acknowledge(s) receipt of a true copy of the filed standard charge terms, if any.

Officer Signature(s)	Execution Date Y.	M.	D.	Party(ies) Signature
Aaltje van Grootheest Barrister and Solicitor 4054 Knibbs Green, Victoria, B.C. V8Z 6Y7	2004	04	21	573132 B.C. LTD. by its duly authorized signatory: Ronald Edward King

OFFICER CERTIFICATION: Your signature constitutes a representation that you are a solicitor, notary public or other person authorized by the Evidence Act, R.S.B.C. 1979, c. 116, to take affidavits for use in British Columbia and certifies the matters set out in Part 5 of the Land Title Act as they pertain to the execution of this instrument.
*If space insufficient, enter "SEE SCHEDULE" and attach schedule in Form E.
**If space insufficient, continue executions on additional page(s) in Form D.

LAND TITLE ACT
FORM D
EXECUTIONS CONTINUED

Officer Signature(s)	Execution Date Y.	M.	D.	Party(ies) Signature
Richard L. Reeson A Notary Public in and for the Province of Alberta. Being a solicitor, my commission expires at the pleasure of Her Majesty.	2003	12	30	HABITAT ACQUISITION TRUST by its authorized signatories: Boyd Pypor, Executive Director
As to all signatures				
DEREK E. ASHURST Barrister and Solicitor 1620 Cedar Hill X Road Victoria, BC V8P 2P6	2003	12	27	*TLC* THE LAND CONSERVANCY OF BRITISH COLUMBIA by its authorized signatories: WILLIAM G. TURNER JUDITH BRAND
As to all signatures				
Aaltje van Grootheest Barrister and Solicitor 4054 Knibbs Green, Victoria, B.C. V8Z 6Y7	2003	12	03	WILDERNESS MOUNTAIN WATER CORPORATION its duly authorized signatory: Ronald Edward King

OFFICER CERTIFICATION: Your signature constitutes a representation that you are a solicitor, notary public or other person authorized by the Evidence Act, R.S.B.C. 1979, c. 116, to take affidavits for use in British Columbia and certifies the matters set out in Part 5 of the Land Title Act as they pertain to the execution of this instrument.

Terms of Instrument - Part 2

This Agreement is dated for reference the 3rd day of December, 2003.

BETWEEN:

573132 B.C. Ltd., a corporation registered in British Columbia, with a registered office at 4054 Knibbs Green, Victoria, B.C., V8Z 6Y7

AND:

Habitat Acquisition Trust, a society duly incorporated under the *Societies Act* (British Columbia) (Inc. # S-36193), with a registered office at PO Box 8552, Victoria, B.C., V8W 3S2

AND:

***TLC* The Land Conservancy of British Columbia**, a society registered in British Columbia (Inc. # S-36826), with a registered office at 5793 Old West Saanich Road, Victoria, B.C., V9E 2H2

AND:

Wilderness Mountain Water Corporation, a corporation registered in British Columbia (Inc. # 232326), with a registered office at 202 - 911 Yates Street., PO Box 547, Victoria, B.C., V8W 2R9.

(collectively, the "Parties")

BECAUSE:

A. The Owner is the registered owner of the Land;

B. The Land contains significant amenities including flora, fauna and natural features, and the generation of potable water, of great importance to the Owner, the Covenantees and the public;

C. The Owner wishes and has agreed to grant the Covenantees a covenant pursuant to section 219 of the *Land Title Act* (British Columbia) to restrict the use of the Land;

D. A Statutory Right of Way in favour of the Covenantees is necessary for the operation and maintenance of the covenant created by this Agreement and the undertaking of the Covenantees;

E. Habitat Acquisition Trust has been designated by the British Columbia Minister of the then Ministry of Environment. Lands and Parks as a person authorised to accept covenants pursuant to section 219 of the *Land Title Act* (British Columbia) and as a person authorised to accept a Statutory Right of Way, pursuant to section 218 of the *Land Title Act* (British Columbia);

F. *TLC* The Land Conservancy of British Columbia has been designated by the British Columbia as a person authorised to accept covenants pursuant to section 219 of the *Land Title Act* (British Columbia) and as a person authorised to accept a Statutory Right of Way, pursuant to section 218 of the *Land Title Act* (British Columbia);

G. Wilderness Mountain Water Corporation has been designated by the Surveyor-General of British Columbia as a person authorised to accept this covenant pursuant to section 219 of the *Land Title Act* (British Columbia) and as a person authorised to accept a Statutory Right of Way, pursuant to section 218 of the *Land Title Act* (British Columbia).

NOW THEREFORE in consideration of the payment of $10.00 by each of the Covenantees to the Owner, the receipt and sufficiency of which is acknowledged by the Owner, and in consideration of the promises exchanged below, the Parties agree as follows in accordance with sections 218 and 219 of the *Land Title Act* (British Columbia):

1. Interpretation

1.1. In this Agreement:

1.1.a. "Amenities" include those natural, scientific, environmental, wildlife, plant, and cultural values relating to the Covenant Area as identified in the Report;

1.1.b. "Biodiversity" means the variety of life and its processes and encompasses genetic, species, assemblage, ecosystem and landscape levels of biological organization and their structural, compositional and functional components;

1.1.c. "Business Day" means any day on which the Land Title Office in New Westminster, British Columbia, is open for business;

1.1.d. "Contaminant" means any pollutant, contaminant, waste, special waste, or any matter that impairs the Land or the Amenities;

1.1.e. "Covenant Area" means those parts of the Land shown on the Reference Plan of Covenant upon the Remainder of Lot 3, Sections 130 & 131, Sooke District, Plan VIP73608 Prepared Pursuant to Section 99-1-e of the *Land Title Act*, shown as the Covenant Area; VIP76811

1.1.f. "Covenantee" means, unless the context otherwise requires, Habitat Acquisition Trust or The Land Conservancy or Wilderness Mountain singularly;

1.1.g. "Covenantees" means, unless the context otherwise requires, Habitat Acquisition Trust, The Land Conservancy, and Wilderness Mountain collectively;

1.1.h. "CPI" means the All-Items Consumer Price Index published by Statistics Canada, or its successor in function, for Vancouver, British Columbia, where 2003 equals 100;

1.1.i. "Habitat Acquisition Trust" means, unless the context otherwise requires, Habitat Acquisition Trust, a society duly incorporated under the *Societies Act* (British Columbia) (Inc. # S-36193);

1.1.j. "Land" means any and all parts of the Land and to any water on the Land, described legally as Lot 3, Sections 130 and 131, Sooke District, Plan VIP73608;

1.1.k. "Natural State" means the state of the Land and Amenities as described in the Report;

1.1.l. "Notice" means any notice or other communication required or permitted under this Agreement which must be in writing and delivered in person to a Party or sent by pre-paid registered mail addressed to the Party at their respective address set out in section 15.3;

1.1.m. "Notice of Enforcement" means the notice of enforcement of the Rent Charge given under section 12.8,

1.1.n. "Owner" means 573132 B.C. Ltd. With a registered office at 4054 Knibbs Green, Victoria, B.C., V8Z 6Y7, and includes any Successor or Successors to the Owner;

1.1.o. "Plan" means the Reference Plan certified correct by Leonard Louis Orrico, B.C.L.S., dated 22 August 2003, and deposited in the Victoria Land Title

Office as VIP 76871, a copy of which is attached to this Agreement as Schedule A;

1.1.p. "Rent Charge" means the rent charge granted by the Owner in this Agreement;

1.1.q. "Rent Charge Amount" means the amount set out in section 12.2, the payment of which is secured by the Rent Charge;

1.1.r. "Report" means the baseline documentation report that describes the Land and the Amenities in the form of text, maps, photographs and other records of the Land and the Amenities as of the date of registration of this Agreement, a copy of which is attached as Schedule B;

1.1.s. "Successor" means a person who, at any time after registration of this Agreement, becomes a registered owner of the Land or any part thereof by any means, including a beneficial owner;

1.1.t. "The Land Conservancy" means, unless the context otherwise requires, *TLC* The Land Conservancy of British Columbia, a society duly incorporated under the *Societies Act* (British Columbia) (Inc. # S-36826),

1.1.u. "Water Utility" means the company which supplies potable water from the reservoir in the Covenant Area, currently known as Wilderness Mountain Water Corporation; and

1.1.v. "Wilderness Mountain" means, unless the context otherwise requires, Wilderness Mountain Water Corporation, a corporation registered in British Columbia (Inc. # 232326).

1.2. Where this Agreement says something is in the "sole discretion" of a Party, that thing is within the sole, absolute, and unfettered discretion of that Party;

1.3. This Agreement shall be interpreted in accordance with the laws of British Columbia and the laws of Canada applicable in British Columbia.

1.4. This Agreement is comprised of the recitation of the Parties, the recitals to the Agreement, the Schedules to the Agreement, and Part 1 of the *Land Title Act* (British Columbia) Form C to which this Agreement is attached.

1.5. In this Agreement:

1.5.a. Reference to the singular includes a reference to the plural, and vice versa, unless the context otherwise requires;

1.5.b. Where a word or expression is defined in this Agreement, other parts of speech and grammatical forms of the same work or expression have corresponding meanings;

1.5.c. Reference to a particular numbered section or article, or to a particular lettered Schedule is a reference to the correspondingly numbered or lettered article, section or Schedule of this Agreement;

1.5.d. Article and section headings have been inserted for ease of reference only and are not to be used in interpreting this Agreement;

1.5.e. The word "enactment" has the meaning given to it in the *Interpretation Act* (British Columbia) on the reference to the date of this Agreement;

1.5.f. Reference to any enactment is a reference to that enactment as consolidated, revised, amended or re-enacted or replaced, unless otherwise expressly provided;

1.5.g. Reference to a "Party" or the "Parties" is a reference to a party or the parties to this Agreement and their respective successors, assigns, trustees, administrators, and receivers; and

1.5.h. Reference to a "day", "month" or "year" is a reference to a calendar day, calendar month, or calendar year, as the case may be, unless otherwise expressly provided.

2. Representations and Warranties

2.1. The Owner warrants that the facts set out in Recitals A and C are true as of the date of this Agreement

2.2. The Covenantees warrant that the facts set out in Recitals E, F, and G are true as of the date of this Agreement.

2.3. The Parties warrant that the facts set out in Recitals B and D are true as of the date of this Agreement.

3. Intent of Agreement

3.1. The Parties each agree that the general intent of this Agreement is:

3.1.a. to protect, preserve, conserve, maintain, enhance or restore the Covenant Area and its Amenities, in a Natural State; and

3.1.b. to permit the continued operation of the Water Utility presently operated by Wilderness Mountain on part of the Land; and

3.1.c. to prevent any occupation or use of the Covenant Area that will impair or interfere with its natural state or its Amenities, except as provided in section 7;

and the Parties agree that this Agreement is to be interpreted, performed and applied accordingly.

3.2. This Agreement shall be perpetual to reflect the public interest in the protection, preservation, conservation, maintenance, and enhancement of the Land and Amenities for ecological and environmental reasons.

4. Restrictions on Use of the Covenant Area

4.1. Except as expressly permitted in this Agreement, or with the prior written approval of the Covenantees, in the Covenantees' sole discretion, the Owner must not do anything, omit to do anything, allow anything to be done, or allow the omission of anything, that does or could reasonably be expected to destroy, impair, diminish, negatively affect, or alter the Covenant Area or the Amenities from the condition described in the Report.

4.2. Without restricting the generality of section 4.1, the Owner shall not, except with the prior written approval of the Covenantees, in the sole discretion of each of them:

4.2.a. Use or permit the use of the Covenant Area for an activity or use which:

4.2.a.i. causes or allows the release of any silt, leachate, fill or other deleterious substances into any watercourse on the Covenant Area

4.2.a.ii. causes the erosion of the Covenant Area to occur;

4.2.a.iii. causes or facilitates the loss of soil on the Covenant Area;

4.2.a.iv. alters or interferes with the hydrology of the Covenant Area, including by the diversion of natural drainage or natural flow of water in, on or through the Covenant Area which may impact the Covenant Area;

4.2.a.v. causes or allows fill, rubbish, ashes, garbage, waste or other material foreign to the Covenant Area to be deposited in or on the Covenant Area;

4.2.a.vi. causes or allows any component of the Covenant Area, including soil, gravel, or rock, to be disturbed, explored for, moved, removed from or deposited in or on the Covenant Area

4.2.a.vii. causes or allows pesticides, including but not limited to herbicides, insecticides or fungicides, to be applied to or introduced onto the Covenant Area;

4.2.a.viii. causes or allows any indigenous flora in the Covenant Area to be cut down, removed, defoliated or tampered with in any way except where required for the proper maintenance of the Water Utility;

4.2.a.ix. causes or allows removal and or adaptation of structural elements within the forest such as coarse woody debris, wildlife trees, standing dead trees or fallen trees except for concern over safety with the approval of all covenantees; or

4.2.a.x. causes or allows the removal of known habitat for fauna on the property such as denning sites, daybed areas, wildlife trees, bird nests, small mammal tunnels except for concern of safety with the approval of all covenantees.

4.2.b. use or permit the use of the Covenant Area for hunting, gathering or grazing of domestic animals;

4.2.c. cause or allow the restocking of the reservoir with fish or other aquatic organisms;

4.2.d. cause or allow the use of the reservoir for swimming or other water recreational activities;

4.2.e. construct, build, affix or place on the Covenant Area any building, structures, fixtures or improvements of any kind;

4.2.f. lay out or construct any new roads or paths, which require the removal of native vegetation, on the Covenant Area;

4.2.g. lease or license the Covenant Area or any part thereof unless the lease or licence is expressly made subject to the provisions of this Agreement and expressly entitles the Owner to terminate the lease or licence if the tenant or licensee breaches any of the provisions of this Agreement;

4.2.g.i. Failure by the Owner to comply with the provisions of this action shall not affect the enforceability of this Agreement against the Owner or any Successor.

4.2.h. subdivide the Land within the Covenant Area by any means.

5. Baseline Documentation Report

5.1. The Parties agree that the Covenant Area and its Amenities are described in the Report, a copy of which is on file with each of the Parties at the addresses set out in section 15.4, an overview of which is attached as Schedule B to this Agreement.

5.1.a. The Parties further agree that if the Report is not completed at the time the Agreement is registered, the document entitled "Impact Assessment: Proposed Residential Development, Remainder Lot 1, Sections 130 and 131, Sooke District", prepared by Michael Bocking Landscape Architect Ltd., dated December 11, 2001, will replace the Report as Schedule B, until the Report

can be completed, and that on completion, the Report shall be registered as a document in substitution to that document attached hereto as Schedule B;

5.2. The Parties agree that the Report is intended to serve as an objective information baseline for monitoring compliance with the terms of this Agreement and the Parties each agree that the Report provides an accurate description of the Covenant Area and its Amenities as of the date of this Agreement.

5.3. The Parties each acknowledge that the flora and fauna on the Covenant Area will evolve through natural succession over time and, unless otherwise expressly stated, references to the Report in this Agreement are intended to take into account the natural succession of the native flora and fauna over time, without human intervention other than as expressly permitted by this Agreement.

6. Dispute Resolution

6.1. If a breach of this Agreement occurs or is threatened, or if there is disagreement as to the meaning of this Agreement, any one of the Covenantees or the Owner may give notice to the other Parties requiring a meeting of all Parties within ten (10) Business Days of receipt of the notice.

6.2. All activities giving rise to a breach or threatening a breach of this Agreement, or giving rise to a disagreement as to the meaning of this Agreement must immediately cease upon receipt of notice.

6.3. The Parties must attempt to resolve the matter, acting reasonably and in good faith, within twenty (20) Business Days of receipt of the notice.

6.4. If the Parties are not able to resolve the matter within that time, the Parties may appoint a mutually acceptable person to mediate the matter, with the costs to be borne equally between the Parties, and the Parties must act reasonably and in good faith and cooperate with the mediator and with each other in an attempt to resolve the matter within thirty (30) days after the mediator is appointed.

6.5. If the Parties are not able to resolve the matter within that time with the assistance of a mediator, the Parties agree to submit the matter to a single arbitrator appointed jointly by them.

6.6. The decision of the arbitrator is final and binding.

6.7. The cost of the arbitration will be borne equally between the Parties.

7. Owner's Reserved Rights

7.1. The Owner reserves all of their rights as owner of the Land, including the right to use, occupy and maintain the Land in any way that is not expressly restricted or prohibited by this Agreement, so long as the use, occupation or maintenance are consistent with the intent of this Agreement.

7.2. Without limiting the generality of section 7.1, the following rights are expressly reserved to the Owner:

7.2.a. to remove non-native vegetation from the Covenant Area;

7.2.b. to operate a non-motorised vessel on the reservoir subject to the reversion of the water rights to the Owner as set out in section 9.2 in this Agreement;

7.2.c. to maintain, or restore, an entrance gate and a driveway, the locations of which are indicated in the Report, and to use informal footpaths, on the Covenant Area;

7.2.d. to install, maintain, restore , or replace signs for the purpose of public safety or informing the public about the Covenant Area and its Amenities; and

7.2.e. to permit the continued operation of a Water Utility on the Land.

7.3. subject to section 7.4, nothing in this Agreement restricts or affects the right of the Owner or any other Party to do anything reasonably necessary to;

7.3.a. prevent potential injury or death to any individual, or

7.3.b. prevent, abate or mitigate any damage or loss to any real or personal property.

7.4. Except in the case of an emergency, if the Owner or any other Party intends to do anything described in section 7.3, the Owner must give at least thirty (30) days' prior written notice to each Covenantee, describing in reasonable detail the intended action, the reason for it, and its likely effect on the Covenant Area or its Amenities. Despite the rest of this Agreement, the Owner must permit each Covenantee to enter upon the Land and inspect the Covenant Area if any action is proposed under section 7.

8. Owner's Obligations as to Taxes and Other Matters

8.1. The Owner retains all responsibilities and bear all costs and liabilities related to the ownership, use, occupation and maintenance of the Land, including any improvements expressly authorized by this Agreement.

8.2. The Owner must indemnify the Covenantees, their directors, officers, employees, agents and contractors, from and against any and all liabilities, damages, losses, personal injury or death, causes of action, actions, claims, and demands by or on behalf of any person, arising out of any act or omission, negligent or otherwise, in the use, occupation and maintenance of the Land and the Amenities by the Owner from the granting of this Agreement, or by the act or omission of the Owner in relation to the operation and maintenance of the Land.

8.3. The Owner must further indemnify the Covenantees, their directors, officers, employees, agents and contractors, from and against any and all liabilities, damages, losses, personal injury or death, causes of action, actions, claims, and demands by or on behalf of any person, arising out of any act or omission, negligent or otherwise, in the operation or maintenance of a Water Utility operating on the Land, or by the act or omission of a Water Utility in relation to its operation and maintenance on the Land.

8.4. The Owner is liable for any and all breaches of this Agreement, but the Owner is not liable for

8.4.a. breaches of this Agreement which occur while the Owner is not the registered owner of any interest in the Land;

8.4.b. injury or alteration to the Land or the Amenities resulting from natural causes, or causes beyond the Owner's reasonable control, including accidental fire, flood, storm, vandalism, trespass and earth movement, but excluding injury or alteration resulting from actions of the Owner or any person acting with the actual or constructive knowledge of the Owner;

8.4.c. any reasonable action taken by the Owner under emergency conditions to prevent, abate, or mitigate significant injury to the Land or its Amenities resulting from natural causes, including accidental fire, flood, storm and earth movement; or

8.4.d. injury or alteration to the Land caused by the Covenantees while exercising their rights under this Agreement.

8.5. Without limiting the generality of sections 8.1, 8.2, and 8.3, the Owner:

8.5.a. is solely responsible and liable for any loss or damage, or liability of any kind (whether civil, criminal, or regulatory), in any way connected with the existence in, on, from, to or under the Covenant Area (whether through spill, emission, migration, deposit, storage or otherwise) of any Contaminant, including the water supplied by the Water Utility; and

8.5.b. must indemnify each Covenantee from and against any loss, damage, liability, cause of action, action, penal proceeding, regulatory action, order, directive, notice or requirement, including those of any government agency, incurred, suffered, brought against or instituted against the Covenantees, jointly or severally, in any way associated with anything described in section 8.5.a.

8.6. Where, as provided under section 8.4.b, the Owner is not responsible for damage or theft due to trespass or vandalism, the Owner will take all reasonable steps to identify and prosecute the person responsible and to seek financial restitution for the damage or theft.

8.7. The Owner must pay when due all taxes, assessments, levies, fees, and charges of whatever description which may be levied on or assessed against the Land and must pay any arrears, penalties, and interest in respect thereof.

8.8. The Owner must indemnify each Covenantee from and against any fee, tax, or other charge which may be assessed or levied against the Owner or the Covenantee pursuant to any enactment, including the *Income Tax Act* (Canada) with respect to the Land or with respect to this Agreement, including any fee, tax, or any other charge which may be assessed or levied against the Owner or Covenantee as a result of the amendment or termination of this Agreement.

8.9. Any debts or other amounts due from the Owner to the Covenantees under this agreement, if not paid within thirty (30) days of notice, will bear interest at the annual interest rate that is 1 per cent greater than the prime rate of interest. For the purposes of this section, the "prime rate of interest" is the annual rate of interest charged from time to time by the Bank of Montreal, at its main branch in Vancouver, British Columbia, for demand Canadian dollar commercial loans and designated from time to time by the Bank of Montreal as its prime rate.

8.10. For clarity, the indemnities granted by the Owner to the Covenantees under sections 8.2, 8.3, 8.5.b and 8.8 are indemnities granted as an integral part of the section 219 covenant granted by this Agreement.

9. Obligations of Wilderness Mountain

9.1. Wilderness Mountain must indemnify the Owner and each other Covenantee from and against any loss, damage, liability, cause of action, whether negligent or otherwise, action, penal proceeding, regulatory action, order, directive, notice or requirement, including those of any government agency, incurred, suffered, brought against or instituted against the Owner or the other Covenantees, jointly or severally, in any way associated with the operation of the Water Utility

9.2. Wilderness Mountain agrees that should a municipal, or other local government, water supply be connected, which replaces the supply provided by the Water Utility, such that the Water Utility ceases to operate, the potable water rights would revert to the Owner upon application to the Water Utility and to the Comptroller of Water Rights, Land and Water British Columbia Inc., or its successor, and upon confirmation that there will be no longer be any potable water supplied to the public from the Covenant Area by the Water Utility.

10. Statutory Right of Way for Monitoring and Enforcement

10.1. The Owner grants to each Covenantee a license, and a statutory right of way pursuant to section 218 of the *Land Title Act* (British Columbia), permitting each Covenantee to enter upon the Land to do the following:

10.1.a. inspect the Covenant Area at least once each calendar year, with the date for each inspection to be agreed on by the Parties before August 31 of

each year, but if the Parties cannot agree, on those days by August 31 each year, the Covenantees are entitled to enter upon the Land and inspect the Covenant Area in accordance with section 10.1.b;

10.1.b. inspect the Covenant Area at all reasonable times upon prior written notice, by a Covenantee to the Owner of at least twenty-four (24) hours, unless in the opinion of a Covenantee there is an emergency or other circumstance which does not make giving such notice practicable, in the sole discretion of the Covenantee;

10.1.c. as part of inspection of the Covenant Area, to take soil, water or other samples, photographs and video and sound recordings as may be necessary to monitor compliance with and enforce the terms of this Agreement;

10.1.d. protect, preserve, conserve, maintain, enhance, rehabilitate or restore, in a Covenantee's sole discretion and at the Covenantee's expense, the Covenanted Area or the Amenities to as near the condition described in the Report as is practicable, if an act of nature or of any person other than as described in section 10.1.c destroys, impairs, diminishes or negatively affects or alters the Covenant Area or the Amenities from the condition described in the Report;

10.1.e. in accordance with section 11, to protect, preserve, conserve, maintain, enhance, rehabilitate or restore, in a Covenantee's sole discretion and at the Owner's expense, the Covenanted Area or the Amenities to as near the condition described in the Report as is practicable, if an action of the Owner or any other person acting with the actual or constructive knowledge of the Owner contravenes any term of this Agreement;

10.1.f. to carry out or evaluate, or both, any program agreed upon between the Parties for the protection, preservation, conservation, maintenance, restoration or enhancement of all or any portion of the Covenant Area or the Amenities; and

10.1.g. to place survey pegs or other markings on the Land, or to increase the visibility of existing survey pegs or other markings.

10.2. The Owner grants to Wilderness Mountain a license, and a statutory right of way pursuant to section 218 of the *Land Title Act* (British Columbia), permitting that Covenantee to enter upon the Land as necessary at any time, with no prior notice, to carry out any activities related to the routine inspection, operation or maintenance of the Water Utility, including, but not limited to:

10.2.a. maintain, restore, or replace existing buildings and other improvements on the Covenant Area, required for the use of the Owner, or permitted by the Owner for the continued operation of the Water Utility, the locations of which are indicated in this Report, as of the date of registration of this Agreement,

10.2.b. maintain, restore, or replace the existing utility lines running through the Covenant Area, the location of which are indicated in the Report;

10.2.c. install, maintain, restore, or replace the existing utility dock on the reservoir, using non-toxic materials approved by the Covenantees,

10.3. The Covenantees may bring workers, vehicles, equipment and other personal property onto the Land when exercising their rights under this Agreement.

11. Enforcement Remedies of the Covenantees

11.1. If any Covenantee, in its sole discretion, believes that the Owner has neglected or refused to perform any of the obligations set out in this Agreement or are in breach of any term of this Agreement, that Covenantee may serve on the Owner and the other Covenantees a notice setting out particulars of the breach and of the Covenantee's estimated maximum costs of remedying the breach.

11.2. The Owner has sixty (60) days from receipt of the notice given under section 11.1 or from the conclusion of the dispute resolution provision under section 6 if it is invoked, to remedy the breach or make arrangements satisfactory to the Covenantee for remedying the breach, including with respect to the time within which the breach must be remedied.

11.3. If the Owner does not remedy a breach described in section 11.1 within the period of time acceptable to the Covenantee under section 11.2, which a Covenantee under section 10.1 shall be the sole judge acting reasonably, a Covenantee may enter upon the Land and carry out the Owner's obligations and the Owner must reimburse that Covenantee for any expenses incurred, up to the estimated maximum costs of remedying the breach set out in the notice, and such expenses incurred by a Covenantee must, until paid, be a debt owed by the Owner to the Covenantees, recoverable in court by anyone of the Covenantees.

11.4. Expenses incurred by the Covenantee under this section, until paid, are a debt owed by the Owner to the Covenantee.

11.5. By this section, each Covenantee appoints one of the other Covenantees as its agent for the purpose of recovering any debt owed by the Owner to the Covenantee who incurred expenses under this section, including through legal proceedings, and the Covenantee who recovers the debt holds it, less reasonable legal fees and disbursements and other reasonable expenses of recovery, as agent for the Covenantee that incurred the expenses.

12. Rent Charge and its Enforcement

12.1. As security for the performance of the Owner's obligations under this Agreement, the Owner grants to the Covenantees a perpetual Rent Charge

against the Land, ranking prior to all other financial charges and encumbrances registered against the Land, including options to purchase and rights of first refusal. The Rent Charge is granted both under section 219 of the *Land Title Act* (British Columbia) as an integral part of the statutory covenant created by this Agreement and as a fee simple rent charge at common law.

12.2. The Rent Charge secures payment to the Covenantees by the Owner of the sum of $2,000.00 per year, subject to adjustment under section 12.3, for any violations occurring in that year. For clarity, only one Rent Charge Amount is payable by the Owner for each violation.

12.3. The Rent Charge Amount is to be adjusted on January 1 of each year by increasing or decreasing, as the case may be, the Rent Charge Amount by the amount determined by multiplying the Rent Charge Amount on December 31 immediately preceding by the percentage increase or decrease, as the case may be, in the Consumer Price Index between the previous January 1 and that December 31, and adding the amount so determined to the Rent Charge Amount as it stands on that December 31. If Statistics Canada, or its successor in function, ceases to publish a Consumer Price Index or comparable indicator as determined by the Covenantee in its sole discretion, the Parties agree that the factor to be used in determining the Rent Charge Amount for each year shall be 3 per cent.

12.4. The Rent Charge Amount shall be increased by a sum equal to 110% of the market value at the date of the breach of this Agreement of any flora or fauna, soil, rock, gravel or minerals, which have been altered, damaged, destroyed, moved, harvested or removed.

12.5. The Covenantees shall be entitled to recover from the Owner all reasonable expenses, including legal fees on a solicitor and own client basis, incurred as a result of any successful enforcement of the Rent Charge.

12.6. The Rent Charge is suspended unless and until the Owner is in breach of any provision of this Agreement and have not cured the breach, or are not diligently proceeding to cure the breach in accordance with section 11 of this Agreement.

12.7. The Covenantee may enforce the Rent Charge by any of the following:

12.7.a. an action against the Owner for the Rent Charge Amount;

12.7.b. an action for appointment of a receiver in respect of the Land;

12.7.c. distraint against the Land to the extent of the Rent Charge Amount; or

12.7.d. an order for sale of the Land.

12.8. If any of the Covenantees wishes to enforce the Rent Charge, it must provide notice to that effect to the Owner and the other Covenantees. The Notice of Enforcement may be given at any time after the notice of breach is given.

12.9. The Covenantee receiving the Notice of Enforcement has thirty (30) days from receiving it to send notice to the notifying Covenantee that it wishes to enforce the Rent Charge jointly, and, if it does not do so, it is deemed to have elected not to enforce the Rent Charge.

12.10. If the Rent Charge is enforced jointly:

12.10.a. Reasonable expenses incurred as a result of the enforcement of the Rent Charge must be shared equally between the Covenantees; and

12.10.b. The net proceeds obtained as a result of the enforcement of the Rent Charge must be shared equally between the Covenantees, unless otherwise agreed in writing between the Covenantees.

12.11. If the Covenantee receiving the Notice of Enforcement does not wish to enforce the Rent Charge jointly, that Covenantee shall not be entitled to the Rent Charge unless otherwise agreed in writing between the Covenantees.

12.12. A Covenantee who declines to enforce the Rent Charge jointly must execute all documents which may be necessary for the enforcement and collection of the Rent Charge by the notifying Covenantee.

12.13. If the Covenantees are unsuccessful in the enforcement of a Rent Charge, the Owner shall be entitled to recover from the Covenantees all reasonable expenses incurred as a result, including legal fees on a solicitor and own client basis.

13. Successors of the Owner

13.1. This Agreement shall enure to the benefit of and be binding on the Owner and the Owner's successors.

14. Assignment of Agreement or Dissolution of the Covenantees

14.1. This Agreement shall be transferable, by a Covenantee, but the Covenantee may assign its rights and obligations under this Agreement only to a person or entity qualified by law at the time of transfer to hold covenants under section 219 of the *Land Title Act* (British Columbia) (or any successor provision then applicable) and any applicable regulations.

14.2. The Covenantees agree that before any of them assigns its rights and obligations under this section, it must consult with the Owner, and consider the Owner's comments, with respect to the proposed assignee. The Covenantee must give notice to the Owner of the proposed assignment, setting out in reasonable

detail the identity of the proposed assignee and the qualifications and experience of the proposed assignee relevant to performance by the assignee of the rights and obligations of the Covenantees under this Agreement. If the Owner does not provide comments to the Covenantees regarding the proposed assignee within ten (10) Business Days after the Covenantee gave notice to the Owner under this section, the Owner are conclusively deemed to have declined to comment on the proposed assignee and to have consented to the assignment. For clarity, the Owner agrees that the Covenantee is only required to consult the Owner and that the Covenantee is entitled to assign its rights and obligations so long as it has consulted the Owner.

14.3. In the event of the winding-up or dissolution of a Covenantee, the Covenantee must use its best efforts to assign and transfer all of its interests under this Agreement to a person or entity authorized to accept covenants under Section 219 of the *Land Title Act* (British Columbia). If the Covenantee does not assign and transfer all of its interest under this Agreement as set out in this section, it shall be deemed to have assigned all of its interest under this Agreement to the other Covenantee to hold until another qualified and suitable covenantee can be found, or if the other Covenantee is not available, to Her Majesty the Queen in Right of the Province of British Columbia. For clarity, the consultation process set out in section 14.2 does not apply to this section.

15. Notice

15.1. If a Notice is delivered in person, the Party receiving the Notice must forthwith acknowledge in writing receipt of the notice, and the Notice shall be deemed to have been received on the earlier of the date of the acknowledgement and the date that is five (5) Business Days after the Notice is delivered.

15.2. If a Notice is sent by pre-paid registered mail, it is deemed to have been received on the fourth Business Day following the day on which the Notice was sent.

15.3. The addresses of the Parties for Notice are as follows:

The Owner:

573132 B.C. Ltd.
4054 Knibbs Green,
Victoria, British Columbia, V8Z 6Y7

The Covenantees:

Habitat Acquisition Trust
PO Box 8552
Victoria, British Columbia, V8W 3S2 or,
316 – 620 View Street
Victoria, British Columbia, V8W 1J6

TLC The Land Conservancy of British Columbia
5793 Old West Saanich Road
Victoria, British Columbia, V9E 2H2

Wilderness Mountain Water Corporation,
4054 Knibbs Green,
Victoria, British Columbia, V8Z 6Y7.

15.4. Each Party agrees to give Notice immediately to the other Parties of any change in its address from that set out in section 15.3.

15.5. If a Party refuses to sign an acknowledgement of receipt of a Notice, the person delivering the Notice may swear an affidavit of service and the Notice shall be deemed to have been received on the date of the service set out in the affidavit.

16. Access

16.1. No right of access by the general public to any portion of the Land is conveyed by this Agreement.

17. Notice of Covenant

17.1. The Owner agrees to allow the Covenantees to publicise the existence of this Agreement in a tasteful manner.

17.2. Without restricting the generality of the foregoing, the Owner agrees to allow the Covenantees to erect a plaque or other sign on the Land, in a tasteful manner and at the expense of the Covenantees, indicating that they hold a covenant on the Land. The size, style, wording and location of any sign or plaque must be approved by the Owner prior to its placement, such approval not to be reasonably withheld. The Covenantees are responsible for the maintenance and upkeep of any sign or plaque they place on the Land at the expense of the Covenantees.

18. No Liability in Tort

18.1. The Parties agree that this Agreement creates only contractual obligations and obligations arising out of the nature of this document as a covenant under seal. Without limiting the generality of the foregoing, the Parties agree that no tort or fiduciary obligations or liabilities of any kind are created or exist between the Parties in respect of this Agreement, and nothing in this Agreement creates any duty of care or other duty on any of the Parties or anyone else. For clarity, the intent of this section is to, among other things, exclude tort liability of any kind and to limit the Parties to the rights and remedies under the law of contract and the law pertaining to covenants under seal.

19. Waiver

19.1. An alleged waiver of any breach of this Agreement is effective only if it is an express written waiver signed by each of the Covenantees and is only effective to the extent of that express waiver and does not operate as a waiver of any other beach.

19.2. The failure of either or both Covenantees to require performance by the Owner at any time of any obligation under this Agreement does not affect the Covenantee's right to subsequently enforce that obligation.

20. Joint and Several Obligations

20.1. Where there is more than one party comprising the Owner in this Agreement, the obligations of those parties are joint and several.

21. Remedies not Exhaustive

21.1. Exercise or enforcement by a Party of any remedy or right under or in respect of this Agreement does not limit or affect any other remedy or right that Party may have against the other Parties in respect of or under this Agreement or its performance or breach.

22. Covenant Runs With the Land

22.1. Unless it is expressly provided in this Agreement, every obligation and covenant of the Owner in this Agreement constitutes a personal covenant and also a covenant granted under section 219 of the *Land Title Act* (British Columbia) and a statutory right of way granted under 218 of the *Land Title Act* (British Columbia) in respect of the Land. This Agreement burdens the Land and runs with it and binds the successors in title to the Land. This Agreement burdens and charges all of the Land and any parcel into which it is subdivided by any means and any parcel into which it is consolidated.

23. Registration

23.1. The Owner agrees to do everything necessary at the Owner's expense to ensure that this Agreement, and the interests it creates, is registered against title to the Land.

23.2. The Owner agrees to do everything necessary and possible, at the Owner's expense, to ensure that this Agreement, and the interests it creates, are registered with priority over all financial charges, liens and encumbrances, including options to purchase and rights of first refusal, registered or pending registration in the Land Title Office at the time of application for registration of this Agreement.

24. Severance

24.1. If any part of this Agreement is held by a court or arbitrator to be invalid, illegal or unenforceable, that part is to be considered to have been severed from the rest of this Agreement and the rest of this Agreement is to remain in force unaffected by that holding or by the severance of that part as if the part was never part of this Agreement.

25. No Other Agreements

25.1. This Agreement is the entire agreement between the Parties and it terminates and supersedes all other agreements and arrangements regarding its subject.

26. Independent Advice

26.1. The Owner acknowledges and agrees that the Owner has sought and obtained, to the Owner's satisfaction, independent advice from an accountant or other income tax expert with respect to the income tax implications of this Agreement and acknowledge that they do not rely and have not relied on any Covenantee for advice in this regard and that the Covenantees have given no representation or warranty in that regard.

26.2. The Owner acknowledges and agrees that the Owner has been advised by the Covenantees that the Owner should seek independent legal advice as to the meaning and effect of this agreement, and the Owner further acknowledge and agree that no legal advisor of any of the Covenantees has advised the Owner on the meaning or effect of this Agreement or in connection with this Agreement.

27. Amendments

27.1. This Agreement is meant to be perpetual and this Agreement may only be changed by a written instrument signed by all the Parties.

28. Deed and Contract

28.1. By executing and delivering this Agreement, each of the Parties intends to create both a contract and a deed and covenant executed and delivered under seal.

29. Rights of Covenantees

29.1. A Covenantee may exercise its rights under this Agreement through its directors, officers, employees, agents, or contractors

As evidence of their agreement to be bound by the above terms, the Parties each have executed this Agreement under seal by signing Part 1 of the *Land Title Act* (British Columbia) Form C to which this Agreement is attached.

The schedules referred to throughout this document are attached after this page.

Schedule A

Attached to and forming part of the Agreement between the Owner of the first part and the Covenantees of the second part, dated as of the 28th day of November, 2003.

Legal Description:
Lot 3, Sections 130 & 131, Sooke District, Plan VIP73608,
EXCEPT THAT PART IN PLAN VIP_____

PID 025-399-276

(legal survey) (the "Plan")

REFERENCE PLAN OF COVENANT UPON THE REMAINDER OF LOT 3, SECTIONS 130 & 131, SOOKE DISTRICT, PLAN VIP73608 PREPARED PURSUANT TO SECTION 99-1-e OF THE LAND TITLE ACT.

PLAN NO. _____

Deposited in the Land Title Office at Victoria, B.C. this ____ day of _____, 2004.

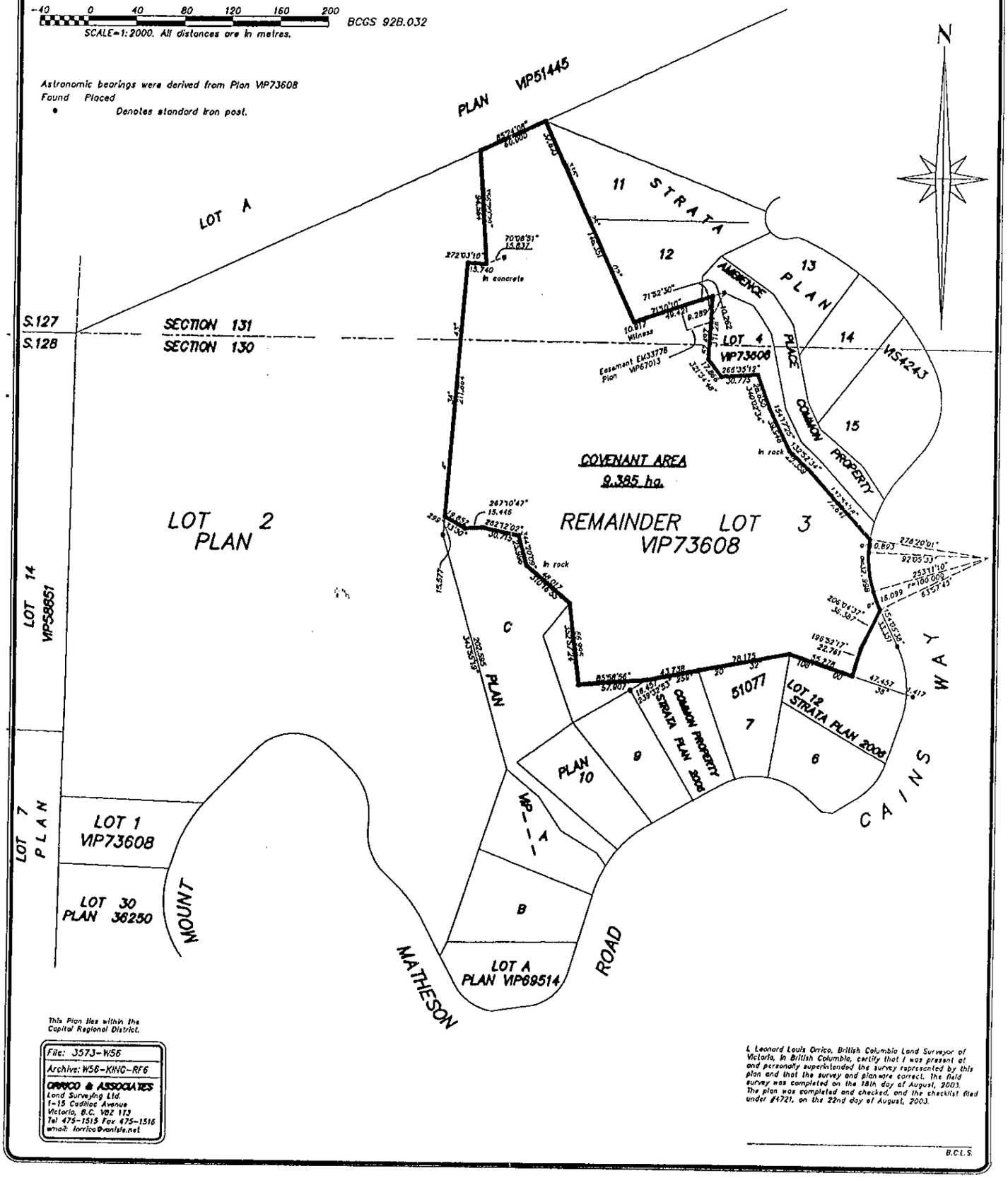
_____
Registrar

-40 0 40 80 120 160 200
SCALE=1:2000. All distances are in metres.

BCGS 92B.032

Astronomic bearings were derived from Plan VIP73608

Found Placed
● Denotes standard iron post.



This Plan lies within the Capital Regional District.

File: 3573-W56
Archive: W56-KING-RF6

ORRICO & ASSOCIATES
Land Surveying Ltd.
1-15 Cadillac Avenue
Victoria, B.C. V8Z 1T3
Tel 475-1515 Fax 475-1516
email: lorrico@vanisle.net

I, Leonard Louis Orrico, British Columbia Land Surveyor of Victoria, in British Columbia, certify that I was present at and personally superintended the survey represented by this plan and that the survey and plan are correct. The field survey was completed on the 18th day of August, 2003. The plan was completed and checked, and the checklist filed under #4721, on the 22nd day of August, 2003.

_____
B.C.L.S.

Schedule B

Attached to and forming part of the Agreement between the Owner and the Covenantees dated as of the 28th day of November, 2003.

(baseline report) (the "Report")

IMPACT ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT

REMAINDER LOT 1 SECTIONS 130 & 131, SOOKE DISTRICT

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2. SITE INVENTORY & ASSESSMENT

3. PROPOSED SITE DEVELOPMENT

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5. POTENTIAL RECREATIONAL IMPACTS

6. RECOMMENDATIONS

7. CONCLUSIONS

APPENDIX

A. TERMS OF REFERENCE

B. SITE PHOTOGRAPHS

MAP 1 PROPOSED SUBDIVISION

MAP 2. WATERSHED BOUNDARIES

MAP 3 SITE ANALYSIS

MAP 4 PROPOSED DEVELOPMENT

December 11, 2001

1. INTRODUCTION

The following is a report on the potential impacts of proposed residential development on the reservoir situated on Lot 2, Remainder Lot 1, Sections 130 & 131, Sooke District, and the potential impacts of recreational use on the reservoir on lot 2 (see Map 1). No recreational use shall be permitted on the upper reservoir which is a drinking water supply. Also addressed is proposed residential development within Lot 3 related to protection of the water quality of the upper reservoir. Large portions of lots 2 and 3 lie outside of the watersheds of the reservoirs. This report and its recommendations focus on issues related to land and water uses within the watershed areas.

The subject property is situated southwest of Mount Matheson in East Sooke. It is proposed to subdivide Remainder Lot 1 Sections 130 & 131, Sooke District into two lots. Proposed Lot 2 is approximately 15.8 hectares in area, and contains the lower reservoir which is intended as a reserve community water supply. Lot 3 is approximately 12.3 hectares in area, and contains the upper reservoir, which is currently used as a community water supply.

Terms of reference for the study were prepared in consultation with the Water Management Branch of the Ministry of Water, Land and Air Protection. A copy of the terms of reference is attached (see Appendix A).

2. SITE INVENTORY AND ASSESSMENT (see Map 3)

A reconnaissance of the site was undertaken on October 8, 2001 to identify and photograph site features and examine areas proposed for development. Areas assessed include the lower reservoir access road and dam, the existing and proposed driveway routes, the proposed sewage disposal area, the upper reservoir and dam, the proposed house site and adjacent areas, the north end of the lower reservoir and the area between the two reservoirs. A photographic record was made of site features, and keyed to Map 3. Further site visits were made on November 29, December 4 and December 6, 2001 with surveyors and representatives of Water Management Branch to review watershed areas.

Elevations on Lot 2 range from 205 meters above sea level at the lower reservoir to 274 meters at the hilltop near the north boundary. The upper reservoir elevation is 220 meters. The land rises from south to north. The lowest slopes are found between the two reservoirs and in the southeast part of the site. The steepest slopes lie north of the lower reservoir. Approximately 40 % of the area has slopes under 15%, 50% of the area has slopes between 15 and 30% and 10% of the site has slopes over 30 %.

Soils are predominantly gravelly sandy loams. Soils are shallower on steep slopes and deeper in gully areas. Exposed bedrock is most evident in upper areas of the site. The texture of soils results in generally rapid drainage.

The dominant vegetation on the site is Douglas fir, with an understory of salal and Oregon grape. In lower seepage areas, western red cedar, alder, and sword fern are found. Lodgepole pine and broom has established on disturbed areas. Upper portions of the site are characterized by scattered Douglas firs, occasional arbutus trees and a ground cover of mosses and grasses between rock outcrops.

Water from Lot 2 drains in several directions. Map 2 prepared by the author in consultation with Mr. Peter Gericke, P. Eng. of J. E. Anderson and Associates shows the watershed boundary between the upper and lower reservoirs as recently surveyed. The following is a summary of drainage areas on Lot 2

Area A	7.4 hectares (47% of lot) drains to lower reservoir
Area B	1.0 hectares (6% of lot) drains to Matheson Lake
Area C	1.1 hectares (7% of lot) drains to Sooke Basin
Area D	3.9 hectares (25% of lot) drains to Becher Bay
Area E1	.6 hectares (4% of lot) drains to upper reservoir
Area F	.8 hectares (5% of lot) drains to Sooke Basin

Area E2 (1.0 hectares, 6% of lot) is considered a sub-unit of Area D. Water would naturally flow from area E2 into area D, however, a 150 mm diameter culvert has been placed under the road which separates the lower portion of areas E1 and E2, directing surface runoff water from area E2 into area E1 and the upper reservoir. Removal of this culvert would re-direct surface water back into drainage area D.

The lower reservoir is approximately 1.1 hectares in area (7% of lot). It is contained by a concrete dam at the south end. Vegetation has been retained above the high water level, and a variety of marginal and aquatic plants including cattails, rushes and sedges have naturalized in shallow areas along the southwest shore and at the north end of the reservoir. An access road leads from Mt. Matheson Road to the dam. A locked gate and signs discourage public access.

Water from Lot 3 drains as follows:

Area E3	0.5 hectares (4% of lot) drains to upper reservoir
Area G	1.1 hectares (9% of lot) drains to Matheson Lake
Area H	2.8 hectares (23% of lot) drains to Sooke Basin
Area I	7.7 hectares (62% of lot) drains to upper reservoir
Area J	.2 hectares (2% of lot) drains to Becher Bay

The upper reservoir is approximately 1.3 hectares in area (11% of lot), and is contained by concrete dams at the north and south ends. A pumphouse is located on the southeast shore. The lakeshore is steep, and vegetated to the high water level, except where bedrock is exposed. A gated and signed road provides service access to the reservoir pumphouse.

At the time of the site reconnaissance on October 8, there was no flowing water on the site. There is evidence of seasonal water flows in the culvert at the bottom of area E2 as well as in a gully north of the lower reservoir. Water began flowing over the reservoir spillways in mid November.

3. PROPOSED SITE DEVELOPMENT

Lot 2

Proposed development on Lot 2 includes a driveway from Mt. Matheson Road to the hilltop area near the north boundary, a house immediately south of the hilltop, adjacent outdoor use areas, a water supply line, a sewage disposal system and electrical and communications services. Map 4 shows proposed development.

The proposed driveway is 560 meters long. The southern 230 meters will follow an existing access road to a gate where the road runs for 40 meters through the upper reservoir watershed. From

immediately south of the gate, the driveway will be relocated west of the watershed boundary. At 300 meters, a culvert under the road drains watershed area E2. From this point, the driveway is proposed to run up a forested gully for 100 meters and traverse an open forested bench before turning west to the building site. Slopes on the driveway will range from less than 10% on the lower section, up to 20% in the gully, and 10 to 15% on the upper portion. The driveway will be hard surfaced but not blacktopped, and the width will be 3 meters. The lower 300 meters is entirely within watershed drainage area D which does not drain into the upper or lower reservoir. The upper 230 meters is entirely within watershed area E2 (a sub unit of area D).

Mr. P. Gericke, P.Eng has examined the proposed driveway route and advises that 20% is an acceptable maximum grade for a residential road. He believes that the driveway can be constructed with minimal impact on existing vegetation.

It is proposed to direct all road runoff water from Lot 2 away from the upper and lower reservoirs and into area D which is outside of the watersheds of both reservoirs. The existing culvert, which currently drains water from area E2 into area E1, will be removed, and runoff water will be redirected into area D in keeping with the natural flow pattern.

The proposed house site is situated on a sloping open rock outcrop area immediately southwest of the hilltop within watershed drainage area A. An area of 3000 square meters is proposed for the residential use area, which would include a house site and outdoor use areas. The proposed driveway and turnaround lie entirely outside of the upper and lower watersheds. Roof rain runoff will be directed to the ground and is not expected to have a negative impact on the lower reservoir.

Domestic water will be supplied from the community water supply system. The water line to the house will follow the driveway.

Sewage will be transmitted by pipe from the house site to a disposal field situated west of the existing access road 150 to 230 meters north of Mt. Matheson Road. The disposal field is within area D which is not part of the watershed of either reservoir. The sewer line will follow the driveway.

Power and communications lines will run overhead along the driveway route.

Lot 3

Proposed residential development on Lot 3 comprises an access driveway from Mt. Matheson Road, a house and outdoor use areas south of the upper reservoir, a sewage disposal area near the south property boundary, and a water supply line and electrical and communications services. Map 4 shows proposed development. An existing gated road will continue to provide service access to the reservoir pumphouse.

It is proposed to site all residential development on Lot 3 within watershed area H which drains away from the upper reservoir. An undisturbed natural buffer a minimum of 30 meters wide will be maintained between the reservoir and the residential use area. All surface runoff will be carried away from the upper reservoir. A suitable sewage disposal site has been identified as shown on Map 4. Water and power lines will follow the driveway.

The result of the proposed residential development on Lot 3 will be no new environmental impact on the upper reservoir.

4. POTENTIAL RESIDENTIAL IMPACTS ON LOWER RESERVOIR

Potential impacts related to construction activity and residential occupation of the site includes the following:

a. loss of native vegetation within the lower reservoir watershed
b. soil erosion on slopes within the lower reservoir watershed
c. increased surface water runoff into the lower reservoir
d. reduced water quality in the lower reservoir

5. POTENTIAL RECREATIONAL IMPACTS ON UPPER AND LOWER RESERVOIR

Potential impacts related to boating, fishing and swimming includes the following:

a. loss of shoreline and aquatic vegetation in reservoirs
b. reduced water quality in the reservoirs

6. RECOMMENDATIONS TO AVOID OR MITIGATE POTENTIAL IMPACTS

A. Potential Impacts from Residential Use

The following is recommended to minimize potential impacts from residential use. Potential impacts are italicized.

a. loss of native vegetation within the lower watershed area

- prohibit the removal of native vegetation outside of the residential area
- route the new section of driveway as shown to avoid the lower reservoir watershed
- minimize the removal of large trees and ground vegetation in the construction of the driveway and residence
- where possible, locate power lines adjacent to the driveway and locate water and sewer lines within the driveway
- revegetate disturbed areas with appropriate native vegetation

b. soil erosion on slopes within the lower reservoir watershed.

- limit earthworks to the minimum area required for construction
- grade slopes to create stable cut and fill banks
- stabilize disturbed areas and revegetate with appropriate native vegetation

c. increased surface runoff into the lower reservoir

- retain existing vegetation within the lower reservoir watershed
- direct runoff water from the house and driveway away from the lower reservoir watershed via storm sewer lines and roadside drainage ditches alongside the driveway into area D

d. reduced water quality in the lower reservoir

- retain existing vegetation in and adjacent to the lower reservoir
- provide for the containment of any contaminants (silt, oil, paint, etc.) during construction of the driveway and residence
- designate a volatiles storage area in area D outside of the reservoir watersheds
- eliminate the use of biocides and fertilizers within the lower reservoir watershed
- maintain signed and locked gated access to the lower reservoir and residence

B. Potential impacts from Recreational Use

The following is recommended to minimize potential impacts from swimming and fishing (lower reservoir only) and boating. Potential impacts are italicized.

a. loss of shoreline and aquatic vegetation in reservoirs

- prohibit the removal of shoreline vegetation
- properly manage existing aquatic vegetation
- prohibit the introduction of invasive aquatic plants into reservoirs
- discourage the establishment of geese and duck populations

b. reduced water quality in the reservoirs

- prohibit swimming and fishing in the upper reservoir which is used as a community water source
- permit non power boats only on the reservoirs
- limit reservoir recreational use to landowners and invited guests
- maintain locked gates and prohibit vehicle access to waterfront areas
- limit water access on the upper reservoir to a single wharf
- utilize only non toxic building materials in wharf construction
- maintain boats in a clean condition
- provide areas outside the watersheds for boat maintenance, toilets and waste disposal

It will be necessary to ensure that the above recommendations are incorporated in development plans, and that construction is monitored to ensure best management practices are followed to avoid or minimize impacts on reservoir watersheds.

7. CONCLUSIONS

The proposed residential development on Lot 2 can be undertaken so as to have minimal impact on the lower reservoir watershed. The proposed access driveway, water and sewer lines, sewage disposal field and electrical and communications services lie entirely outside the lower reservoir watershed.

It is anticipated that the only residential development within the lower reservoir watershed will be the house and adjacent outdoor use areas. It is estimated that the total area occupied will be less than 500 square meters, or approximately 0.6 % of the lower reservoir watershed. Since the lower reservoir is a great distance from the designated residential area, the proposed house and adjacent outdoor use areas will have next to no adverse effect on the lower reservoir if recommendations are followed to minimize vegetation removal, revegetate disturbed areas, and contain and prevent the discharge of contaminants into the lower reservoir watershed.

Recommendations in this report related to the construction of the new section of driveway and residential utilities will minimize impacts on the upper reservoir. Of particular importance will be the minimization of vegetation removal and earthworks, the containment of potential contaminants and the stabilization and revegetation of disturbed areas. Utilizing a single corridor within the driveway route for all utilities will reduce the total impact.

Proposed residential development on Lot 3 is entirely outside of the upper reservoir watershed, and is anticipated to have no new environmental impacts on the watershed.

Prepared by Michael Bocking Landscape Architect Ltd., December 11, 2001

Potential impacts of recreational use on water quality in the upper and lower reservoirs can be avoided or mitigated if the recommendations in this report are followed. Recreational use of the reservoirs should be limited to property owners and invited guests. It is recommended that swimming and fishing should be permitted in the lower reservoir, but not permitted in the upper reservoir which is used as a domestic water supply. Non power boating, which presently occurs on the upper reservoir, should be allowed on both reservoirs., provided safeguards are taken to adopt practices which maintain high environmental standards in and around the water.

The monitoring of construction will ensure that the recommendations in this report are followed.

Prepared by Michael Bocking Landscape Architect Ltd., December 11, 2001

Michael Bocking Landscape Architect Limited

Phone (250) 478-4868
Fax (250) 478-4862

405 Hazlitt Creek Road
Victoria, B.C.
V9E 2A3

September 20 2001

Mr Ron King
2010 Millstream Road
Victoria, B.C.

Re. Impact Assessment, Proposed Residential Development, Remainder Lot 1 Sections 130 and 131, Sooke District, Plan 33402

Further to our recent visit to the above property, the following will address the potential impacts of proposed residential development on the lower reservoir, as well as recreational use on both the upper and lower reservoir.

A report will be prepared which will:

1. Describe the site characteristics and photograph areas proposed to be developed.

Using air photographs and site reconnaissance, site features, including forested and open areas, rock outcrops, water runoff routes and wet areas will be identified and plotted on to a 1:2000 topographic base map. Site photographs will be keyed to the map. Site characteristics, including soils will be summarized.

2 Prepare a plan showing the watershed boundary of the lower reservoir, the proposed access road, house site and areas for the disposal of sewage and runoff water.

Using a 1:2000 topographic base map, the watershed boundary of the lower reservoir will be plotted. The plan will show the proposed location and width of the access driveway, the proposed location and size of the house and related outdoor use area, the proposed sewage disposal site and the natural water runoff pattern in areas to be developed.

3. Identify any potential impacts from the proposed residential development on the lower reservoir.

Based on the site assessment and description of proposed development, potential impacts to the lower reservoir related to construction activity and occupation of the property will be described. Potential impacts could include loss of vegetation, soil erosion, increased stormwater runoff and soil/groundwater contamination.

4. Comment on the potential impacts of swimming, boating and fishing on the respective reservoirs.

The potential impacts of recreational activities on the reservoirs will be identified as follows;

- Upper reservoir: fishing and non-power boating
- Lower reservoir: fishing, non power boating and swimming

The scope of reservoir use and potential threats to water quality will be identified.

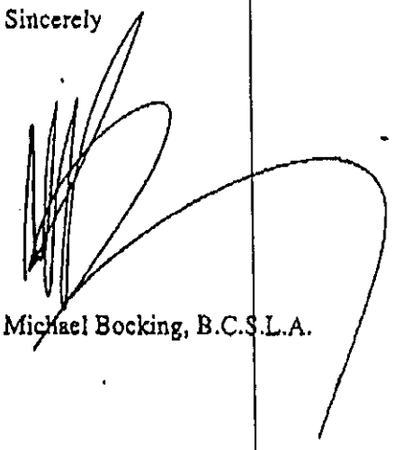
5. Recommend measures to avoid or mitigate potential impacts.

Based on proposed residential and recreational uses of the site and potential impacts identified, recommendations will be made on measures to avoid or mitigate impacts to the upper and lower reservoirs. These measures will relate to construction activities, ongoing residential occupation of the site, and recreational use of the reservoirs. Specific recommendations will be made regarding vegetation retention, soil stabilization, sediment control, stormwater runoff, road construction, building construction, sewage disposal and site restoration. Guidelines for reservoir recreational use will include types and levels of use, as well as means to optimize water quality.

6. Monitoring of Construction

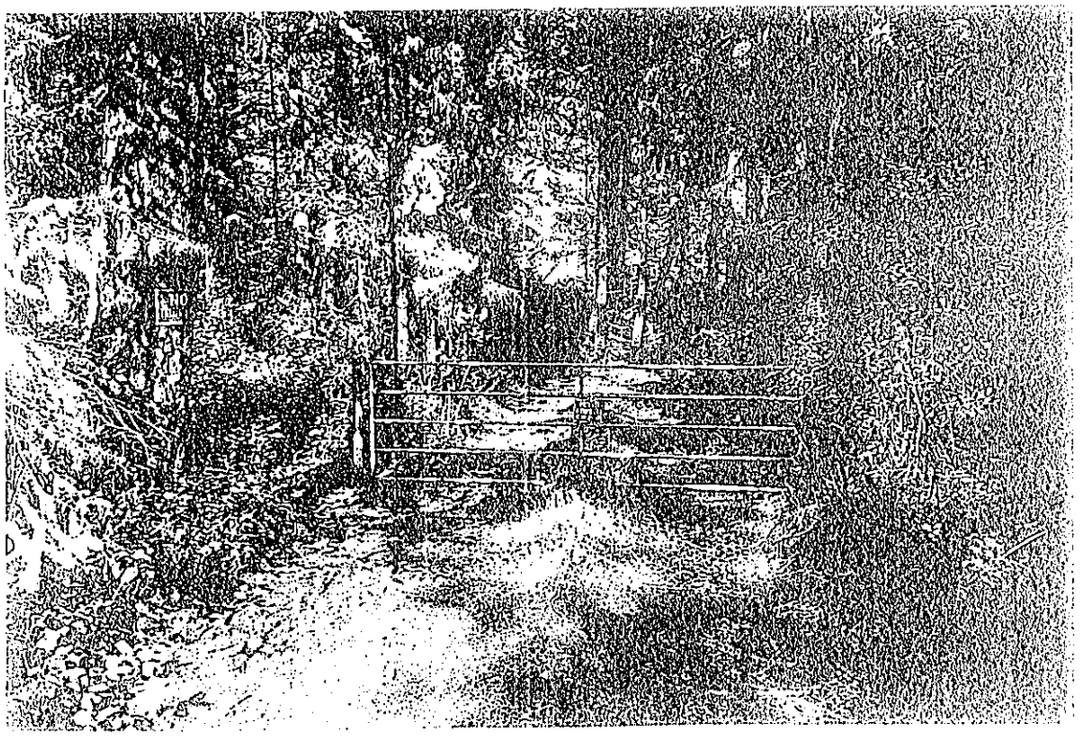
I will monitor construction work and certify that construction is carried out in accordance with plans and specifications.

Sincerely



Michael Bocking, B.C.S.L.A.

1. LOWER RESERVOIR FROM DAM

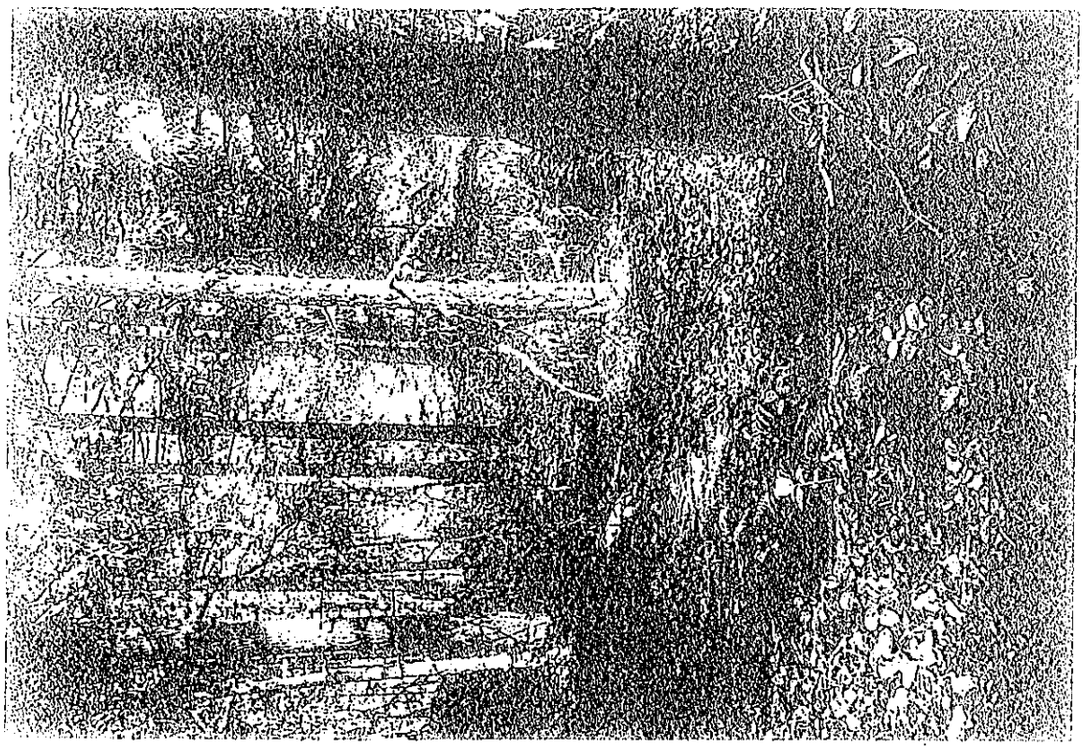


2. GATED ENTRANCE ROAD (PROPOSED DRIVEWAY)

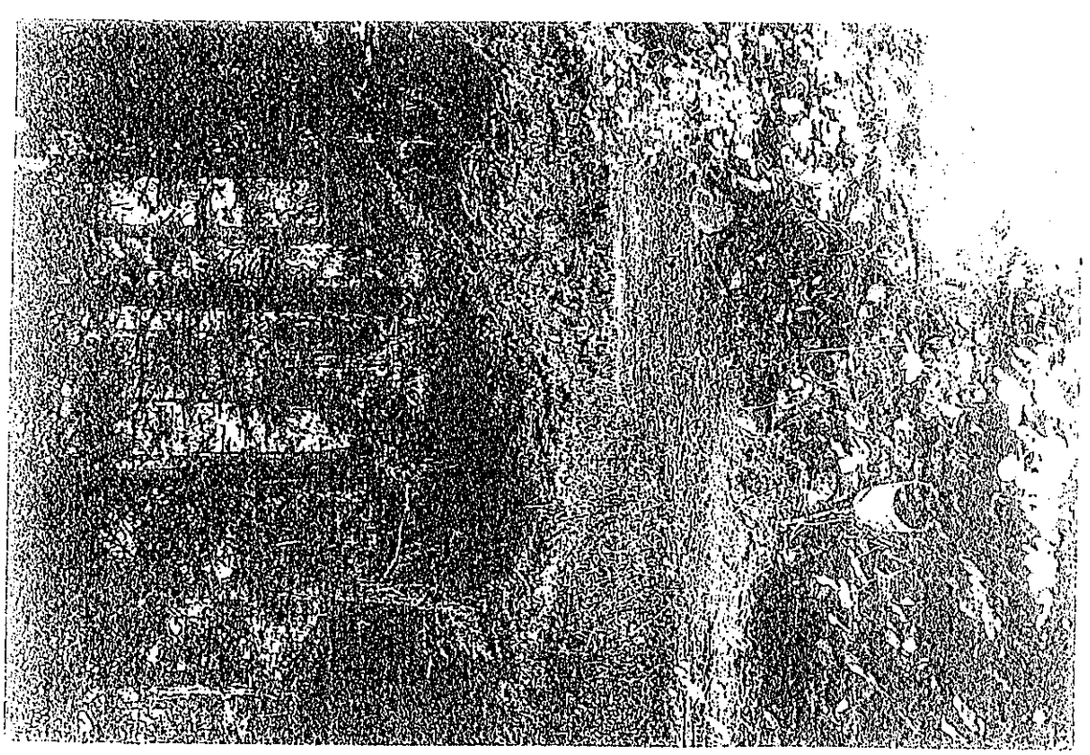
Page 35 of 43

3. UPPER RESERVOIR FROM DAM

4. EXISTING ROAD AND PROPOSED SEPTIC FIELD



6. GULLY ON PROPOSED DRIVEWAY ROUTE



5. CULVERT DRAINING WATERSHED AREA E2

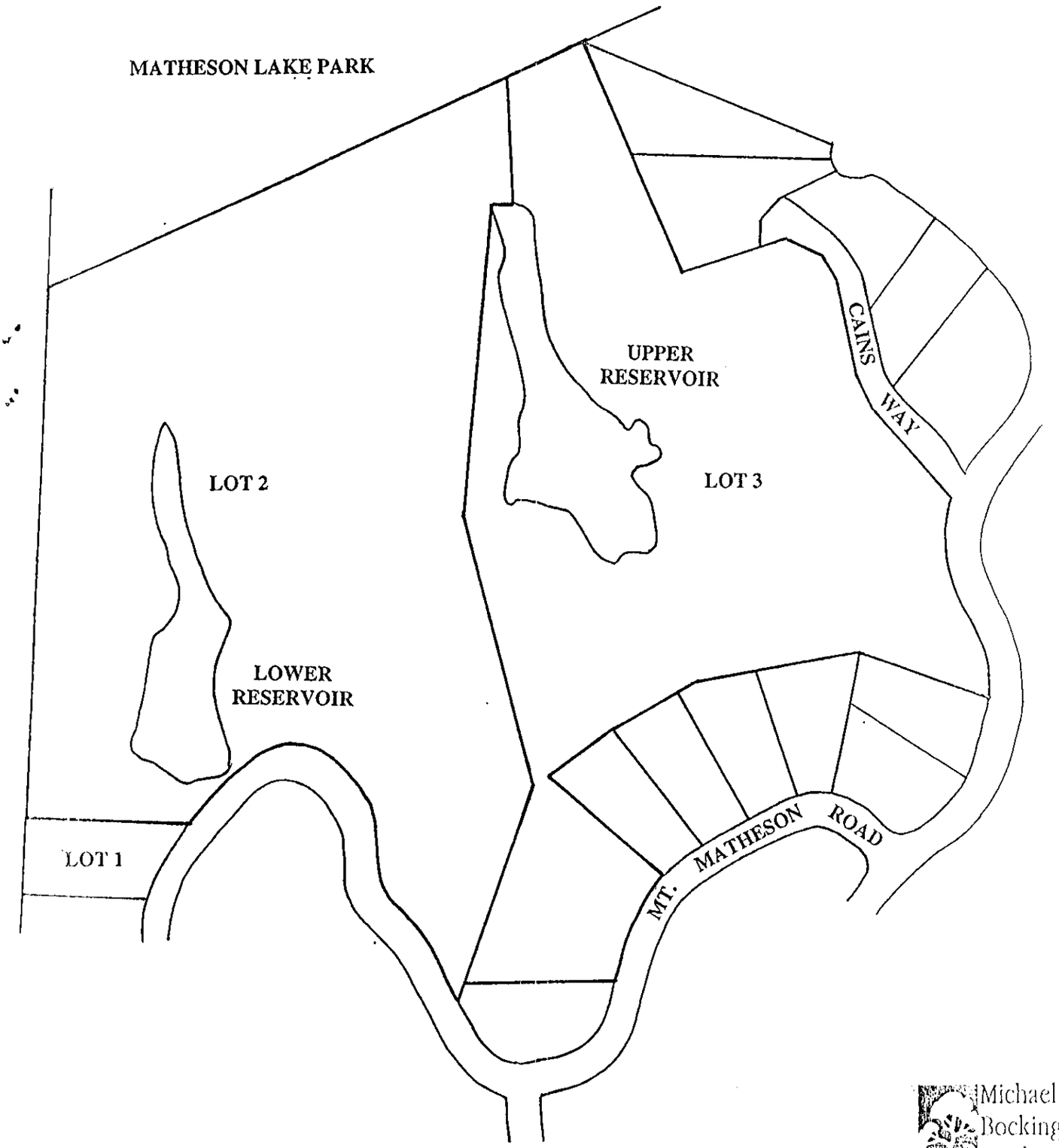
7. PROPOSED HOUSE SITE FROM SOUTH

8. PROPOSED HOUSE SITE FROM HILLTOP

9. NORTH END OF LOWER RESERVOIR

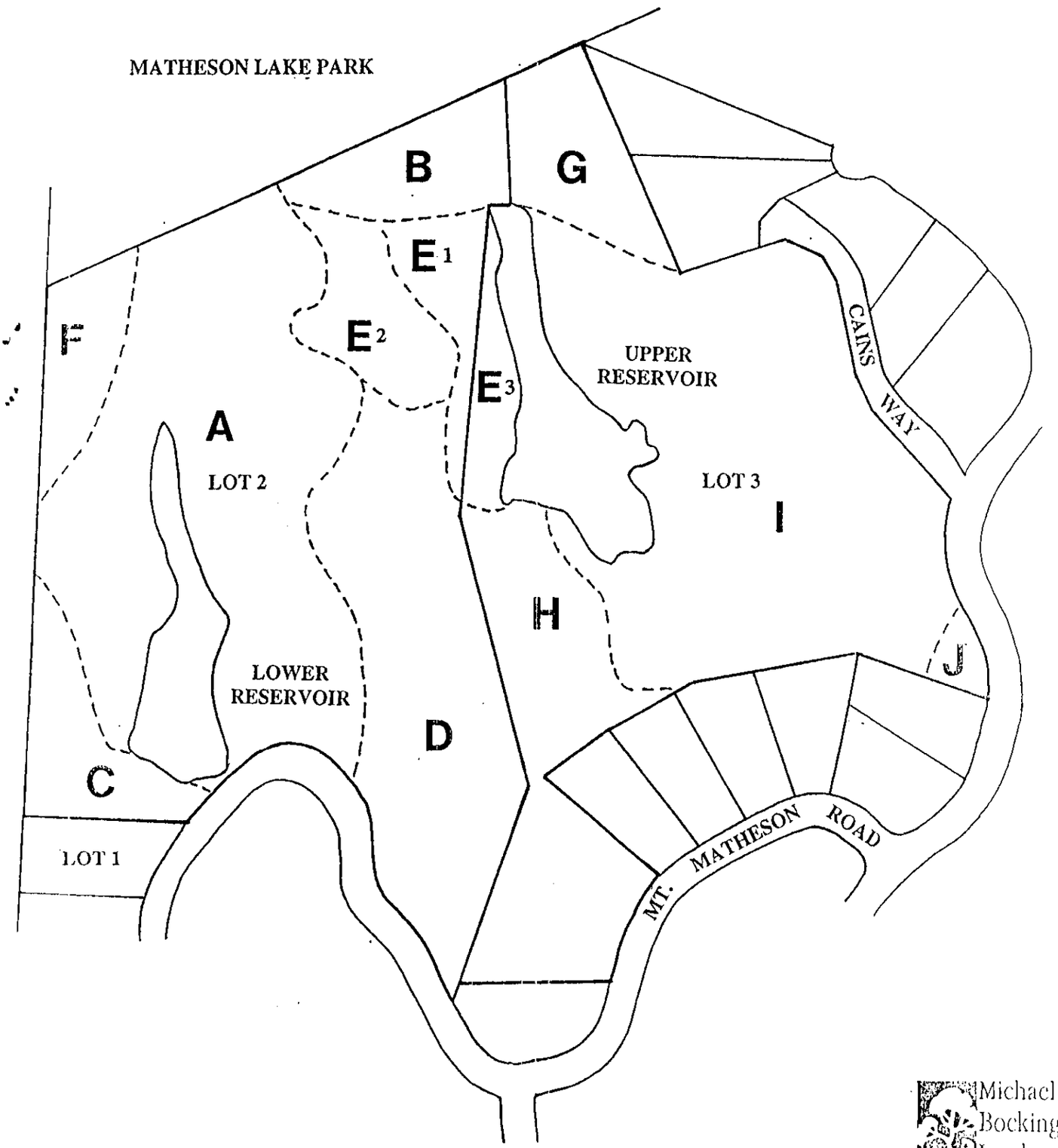
10. SOUTHWEST PORTION OF LOWER RESERVOIR

MAP 1 PROPOSED SUBDIVISION
1:4000

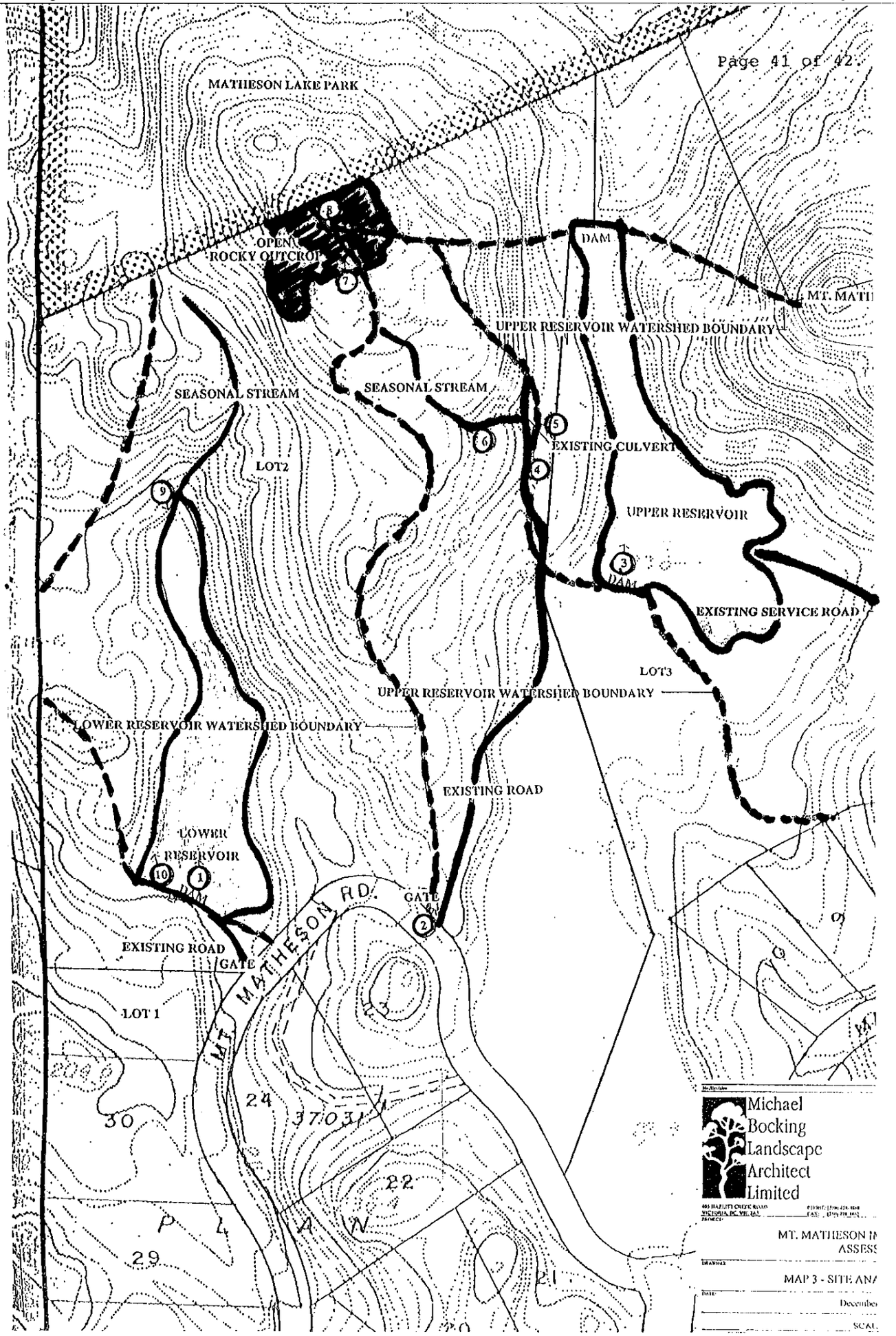


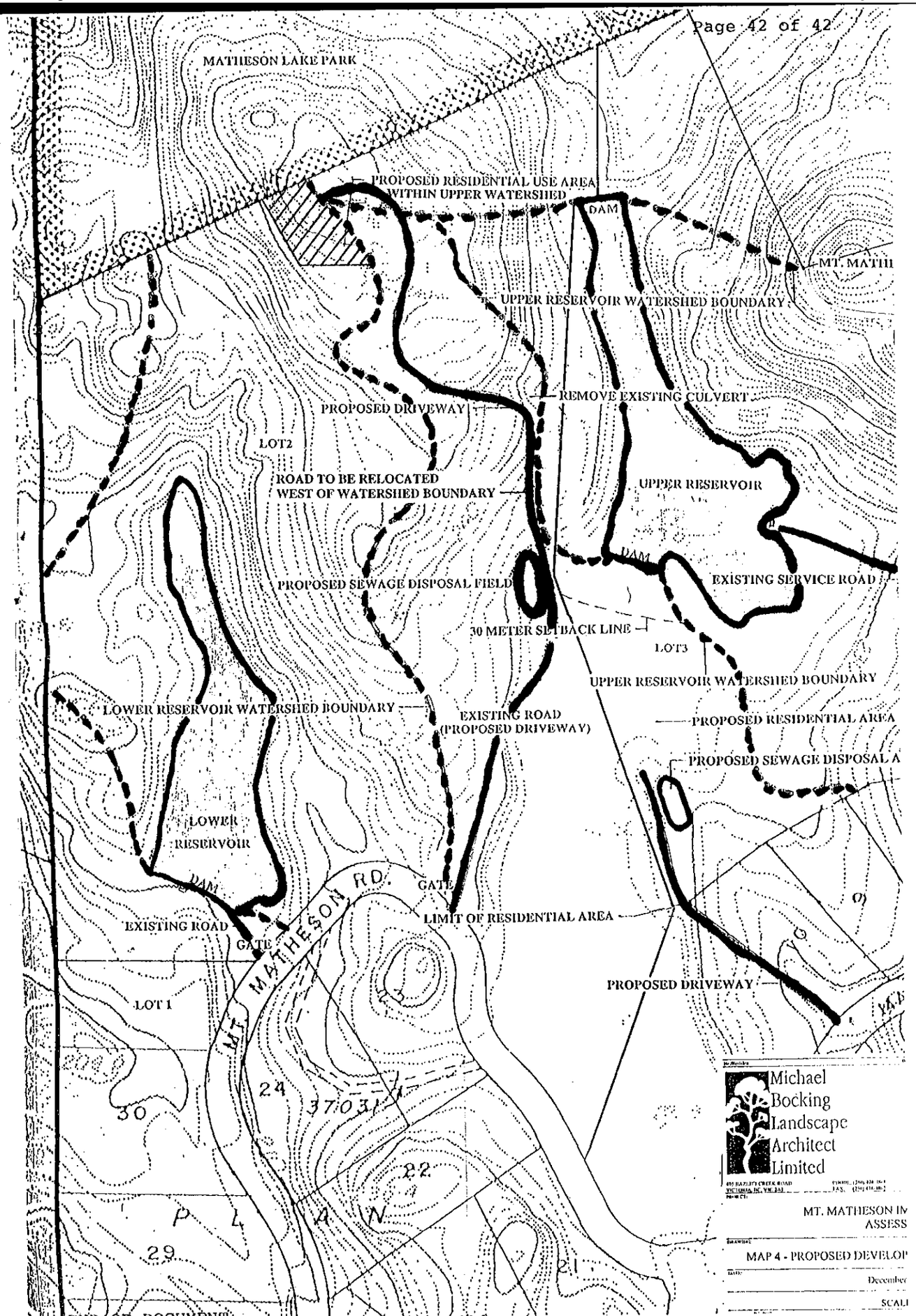
Michael Bocking Landscape Architect Limited

MAP 2 WATERSHED BOUNDARIES
1:4000



Michael Bocking Landscape Architect Limited


MATHESON LAKE PARK
OPEN ROCKY OUTCROP
DAM
MT. MATI
UPPER RESERVOIR WATERSHED BOUNDARY
SEASONAL STREAM
SEASONAL STREAM
EXISTING CULVERT
LOT2
UPPER RESERVOIR
DAM
EXISTING SERVICE ROAD
LOT3
UPPER RESERVOIR WATERSHED BOUNDARY
LOWER RESERVOIR WATERSHED BOUNDARY
EXISTING ROAD
LOWER RESERVOIR
DAM
GATE
EXISTING ROAD
GATE
MT. MATHESON RD.
LOT 1
24
37031
30
22
29
21
Michael Bocking Landscape Architect Limited
MT. MATHESON N
ASSESS
MAP 3 - SITE ANA
Decembe



END OF DOCUMENT

23 APR 2004 13 53

EW047310

LAND TITLE ACT

VIP76871

Form 11(a)
(Section 99(1)(e))

APPLICATION FOR DEPOSIT OF REFERENCE OR EXPLANATORY PLAN (CHARGE)

I, Aaltje van Grootheest (van Akker), Barrister and Solicitor, 4054 Knibbs Green, Victoria, B.C. V8Z 6Y7, Tel (250) 479-4692, apply on behalf of 573132 B.C. LTD. (Incorp. No. 573132), 4054 Knibbs Green, Victoria, B.C. V8Z 6Y7, to deposit reference/explanatory plan of:

Covenant upon the remainder of
LOT 3, SECTIONS 130 AND 131, SOOKE DISTRICT, PLAN VIP73608

I enclose:

1 The reference/explanatory plan (original mylar).

2 The reproductions of the subdivision plan required by section 67(s).

3 Fees of $ 50.00.

Date: April 23, 2004.

02 04/04/23 13:53:52 02 VI 559616
PLANS $50.00

Signature of Applicant, or Agent of Applicant

VIP76871

APPENDIX

C ISLAND HEALTH SEPTIC FIELD RECORDS

POSTED 03 NOV 06

VANCOUVER ISLAND health authority

SEWERAGE SYSTEM
LETTER OF CERTIFICATION

Filing #: GV06/285 Date: 11 OCT 2006 (Day/Month/Year)

To: Vancouver Island Health Authority

Re: Lot C, Section 130, Plan VIP 76869
4928 Mt Matheson Road
Civic address and legal description

Please be advised that the construction of the proposed sewerage system on the above described property was completed on 02 OCT 2006 (Day/Month/Year)

I, the undersigned, am an authorized person as defined in the Sewerage System Regulation, BC Reg. 326/2004 and certify that:

1. the owner has been provided with
   - a copy of the sewerage system plans and specifications as they were built;
   - a maintenance plan for the sewerage system that is consistent with standard practice; and,
   - a copy of this letter of certification;
2. the sewerage system has been constructed in accordance with standard practice;
3. the sewerage system has been constructed substantially in accordance with the plans and specifications filed with the Health Authority;
4. the estimated daily domestic sewage flow through the sewerage system will be less than 22,700 liters; and,
5. if operated and maintained as set out in the maintenance plan, the sewerage system will not cause or contribute to a health hazard.

A plan of the sewerage system as it was built and a copy of the maintenance plan for the sewerage system has been attached to this letter.

SIGNATURE	NAME (PLEASE PRINT)
	Brian Elrose
AUTHORIZED PERSON'S SEAL	OFFICE USE ONLY
REGISTERED ONSITE WASTEWATER PRACTITIONER • ASTTBC • BRIAN M. ELROSE PL IN OW0343	FINAL

LOC ver. 4 March 29, 2006

APPENDIX A

Print Form

FILING OF SEWERAGE SYSTEM

FINAL

VANCOUVER ISLAND health authority

This form is required to administer the *Sewerage System Regulation (326/2004)* and the collection of personal information complies with the *Freedom of Information and Protection of Privacy Act.*

☒ NEW CONSTRUCTION ☐ ALTERATION ☐ REPAIR | ☐ AMENDMENT ONLY/ PREVIOUS FILING NUMBER | FILING NUMBER: GV06/285

1. Lot Information — Descriptions where sewerage system is to be constructed

LEGAL DESCRIPTION OF PROPERTY: Lot C, Section 130, Plan VIP 76869

GPS LOCATION OF SYSTEM BY LAT/LONG (NAD83): LAT. ____ LONG. ____

SUITE/APT NUMBER	BUILDING NUMBER	STREET NAME	CITY
N/A	4928	MT. Matheson Road	Sooke

2. Owner Information — Mailing Address of Property Owner

NAME OF LEGAL OWNER OR STRATA CORPORATION: [redacted] | TELEPHONE NUMBER: [redacted]

SUITE/APT NUMBER	BUILDING NUMBER	STREET NAME	CITY	POSTAL CODE
N/A	[redacted]	[redacted]	[redacted]	[redacted]

3. Authorized Person Information — Mailing Address of Authorized Person

NAME OF AUTHORIZED PERSON: Brian M. Elrose | TELEPHONE NUMBER: (250) 642-6996 | REGISTRATION NUMBER *(if applicable)*:

SUITE/APT NUMBER	BUILDING NUMBER	STREET NAME	CITY	POSTAL CODE
117	8228	West Coast Road	Sooke	V0S 1N0

4. Facility Information

SEWERAGE SYSTEM WILL SERVE: ☒ SINGLE FAMILY DWELLING ☐ DUPLEX ☐ OTHER | NO. OF BEDROOMS: 3 | TOTAL LIVING AREA (INCL. FINISHED BASEMENT) ((in m2): 205 | EST. DAILY SEWERAGE FLOW (in litres/day): 1363 | LOT SIZE (in hectares): 1.41

5. Site Information

WILL BE CONNECTED TO A COMMUNITY WATER SYSTEM? ☒ YES ☐ NO SYSTEM NAME: Mt.Matheson | HYDRAULIC CONDUCTIVITY (K)(CM/DAY): 259 | AVG. PERC RATE (MIN/IN): N/A | SOIL TEXTURE / DESCRIPTION: Sandy Loam

DISTANCE OF PROPOSED DISCHARGE AREA FROM (in metres): +3 WATER LINES; N/A OWN WELL; N/A NEIGHBOURING WELLS; N/A BREAKOUT POINT; N/A STREAM OR LAKE; N/A DOMESTIC WATER SOURCES

NATURAL SOIL VERTICAL SEPARATION (in cms): +86

6. System Information

TOTAL VERTICAL SEPARATION(incms)	TYPE OF SEWERAGE SYSTEM	IF TYPE 2 OR TYPE 3 IS PROPOSED GIVE:	TREATMENT CAPACITY (in litres/day)
60	☒ TYPE 1 ☐ TYPE 2 ☐ TYPE 3 (PROF. ONLY)	MAKE: N/A MODEL: N/A	N/A

SEPTIC TANK MANUFACTURER	SEPTIC TANK MATERIAL	VOLUME OF TANK (litres)	EFFLUENT PUMP	HYDRAULIC LOADING RATE (in lpd/m2)
Norm's	Concrete	5455	☒ YES ☐ NO	25

DISCHARGE AREA: ☒ TRENCH BED ☐ SAND MOUND ☐ OTHER (SPECIFY)

METHOD OF EFFLUENT DISTRIBUTION: ☐ GRAVITY ☒ PRESSURE ☐ OTHER

7. Restrictive Covenants/

ARE THERE ANY RESTRICTIVE COVENANTS/EASEMENTS, WHICH WILL AFFECT THE DESIGN OR LOCATION OF THE SEWERAGE SYSTEM ☐ YES ☒ NO

If yes, please explain and attach supporting documents.

8. Plans and Specifications/ Orders

Attachments: ☒ a site or layout plan of the proposal drawn to scale, and
☒ a set of specifications of the sewerage system.
☐ a copy of the Health Act Order pertaining to the sewerage system.

☒ YES I have consulted with the MOHS' publication "Sewerage System Standard Practice Manual"
☐ NO I have used another source of standard practice listed below or copy attached.
Name of alternate source of standard practice:

9. Authorized Person's Signature a Assurance Statement

The information on this form is accurate and true to the best of my knowledge. I am an authorized person according to Sewerage System Regulation BC Reg 326/2004. The plans and specifications attached to this form are consistent with standard practice and the sewerage system will not contribute to a health hazard.

SIGNATURE	PLEASE PRINT NAME	DATE (DD/MMM/YYYY)
	Brian M. Elrose	11/OCT/2006

Please complete all applicable fields on this form. If the form is incomplete, the filing may not be accepted and it will be returned to the Authorized Person. Construction of the sewerage system may not start until filing has been accepted by the Health Authority. The Letter of Certification must be submitted within one year of the Filing Accepted Date noted below. The Authorized Person must also file the Letter of Certification, the Maintenance Plan and the as-built plans as per *Sewerage System Regulation (326/2004) within 30 days of completing the construction of the sewerage system.*

FAXED

10. Authorized Person's Seal

AUTHORIZED PERSON'S SEAL: REGISTERED ONSITE WASTEWATER PRACTITIONER · ASTTBC · BRIAN M. ELROSE · PL IN · OW0343

OFFICE USE ONLY

FILING RECEIVED DATE (DD/MMM/YYY): 11 OCT 06

RECEIPT #: 3768

DATE: 11 OCT 06

INITIALS:

HEALTH AUTHORITY STAMP: VANCOUVER ISLAND HEALTH AUTHORITY — OCT 12 2006 — FILING ACCEPTED

INITIALS: ____ TIME: ____

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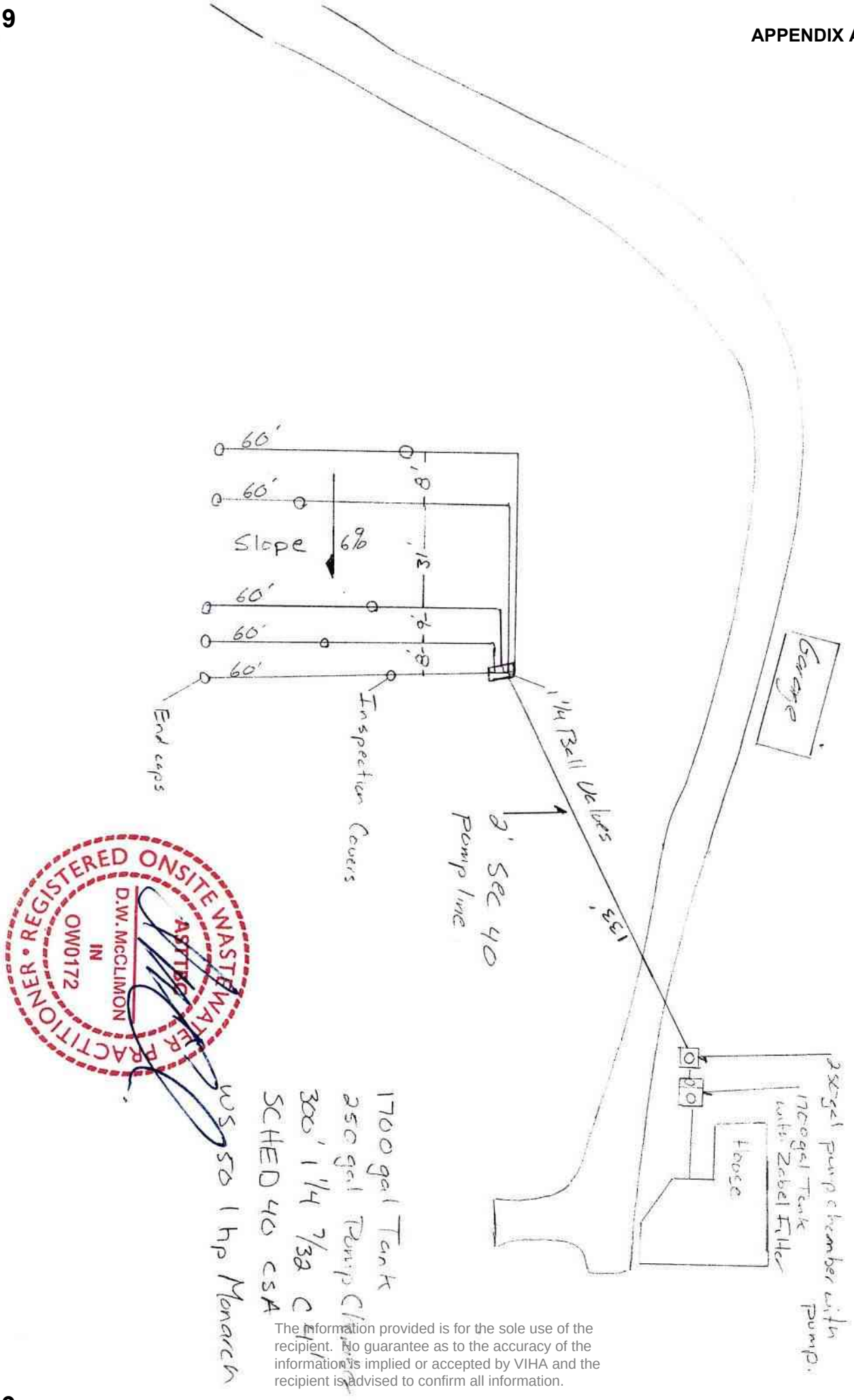

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MAINTANANCE PLAN

ANNUALLY

- Visual Inspection of all components & Monitoring Wells
- Test floats
- Check Monitoring Wells

FIVE YEARS

- Pump Tanks
- Flush Laterals

FINAL

AS BUILT SPECIFICATIONS SHEET

Location : 4928 Mt. Matheson Road
Type of Facility **: 3 bedroom home**
Daily Sewage Flow**: 300 gallons/day**
Soil Type : Sandy Loam
Permeameter Results (K(fs)mm/day) : 2596
Hydraulic Loading Rate: 0.5g/sq.ft/day
Basal Area = Daily Sewage Flow / HLR
Basal Area = 300/0.5
Basal Area = 600sq. ft
Trench Width = 2'
Trench Length = Basal Area / Trench Width
Trench Length = 600/2
Trench Length = 300ft
Linear Loading Rate: 3.7g/ft/day
Length of Soil System = Daily Sewage Flow / LLR
Length of Soil System = 300/3.7
Most Effective Length of Soil System = 81ft
Type 1 Treatment with Pressure Distribution
18" Trench Depth
5 x 60' - 1.25" Laterals
1200g Concrete Septic Tank Norm's
250g Pump Chamber Norm's
Filter: Zabel A1800
Pump: Monarch WS 50 1 HP

Capital Health Region
Building Partnerships for Better Health

APPLICATION FOR SEWAGE DISPOSAL SYSTEM PERMIT

COMPLETE TOP SECTION ONLY POSTED

☑ NEW CONSTRUCTION ☐ ALTERATION ☐ REPAIR

LOT/PARCEL INFORMATION

LEGAL DESCRIPTION OF PROPOSED DISPOSAL SYSTEM LOCATION

PLAN 73608 LOT 2 SECTION 130 & 131 DISTRICT SOOKE BLOCK

STREET ADDRESS/GENERAL LOCATION 5052 Mt. Matheson Rd., East Sooke

OWNER ☐ WISHES TO RECEIVE CORRESPONDENCE

NAME [redacted] TELEPHONE [redacted]

MAILING ADDRESS [redacted] CITY Victoria POSTAL CODE [redacted]

APPLICANT ☐ WISHES TO RECEIVE CORRESPONDENCE

NAME J.E. ANDERSON & ASSOCIATES TELEPHONE 727-2214

MAILING ADDRESS 4212 GLANFORD AVENUE VICTORIA, B.C. V8Z 4B7 CITY POSTAL CODE

PREMISES INFORMATION

SEWAGE DISPOSAL SYSTEM WILL SERVE: ☑ SINGLE FAMILY DWELLING ☐ DUPLEX ☐ OTHER SPECIFY

NUMBER OF BEDROOMS 2

ESTIMATED DAILY SEWAGE FLOW 250 Igpd

GARBURATOR ☐ YES ☑ NO

SYSTEM INFORMATION

APPROVED SEPTIC TANK	APPROVED PACKAGE TREATMENT PLANT	SAND MOUND INFILTRATION BED AREA	METHOD OF EFFLUENT DISTRIBUTION
MANUFACTURER	MAKE —		☐ GRAVITY
MATERIAL CONCRETE	MODEL —	PIPE DIAMETER 1 1/4"	☑ PRESSURE
LIQUID VOLUME OF SEPTIC TANK 750 lg	TREATMENT CAPACITY —	TOTAL LENGTH OF PIPE/CHAMBER 76m	☐ SERIAL ☐ OTHER

SITE INFORMATION

AREA OF LOT: 15.8 hq. SOURCE OF DOMESTIC WATER: ROOF CATCHMENT

DISTANCES OF PROPOSED DISPOSAL FIELD TO SOURCES OF DOMESTIC WATER & BODIES OF NON-TIDAL WATER:

FROM OWN WELL: N/A FROM STREAM OR LAKE: MORE THAN 200'

FROM NEIGHBOURS WELL: MORE THAN 200' FROM WATER LINES: MORE THAN 10'

COMPLETED SITE INVESTIGATION REPORT REQUIRED

ARE THERE ANY RESTRICTIVE COVENANTS AND/OR EASEMENTS WHICH WILL AFFECT THE LOCATION OF THE SYSTEM? ☑ NO ☐ YES. IF YES, EXPLAIN AND ATTACH DOCUMENTS

SIGNATURE

THE INFORMATION ON THIS APPLICATION IS ACCURATE AND TRUE TO THE BEST OF MY KNOWLEDGE:

SIGNATURE: [signature] DATE: 16 JAN 2003

ATTACH A SITE PLAN TO THE COMPLETED APPLICATION PACKAGE (Application Form, Notice, Authorization and Site Investigation Report)

PERMIT NUMBER Conventional. 250 feet of disposal pipe required. 12 inches of perc soil material/C33 sand or equivalent required. Filter/screen required. Final system plan required.

PURSUANT TO THIS APPLICATION, THE ONSITE SEWAGE DISPOSAL GUIDELINES AND THE SEWAGE DISPOSAL REGULATION, PERMISSION IS HEREBY GRANTED TO CONSTRUCT, INSTALL, ALTER, OR REPAIR A SEWAGE DISPOSAL SYSTEM. THIS PERMIT MAY BE CANCELLED IF VARIATIONS ARE MADE TO THESE PLANS AND SPECIFICATIONS. CONSTRUCTION MUST NOT COMMENCE UNTIL THIS PERMIT HAS BEEN SIGNED BY THE MEDICAL HEALTH OFFICER OR ENVIRONMENTAL HEALTH OFFICER.

PERMIT TO CONSTRUCT ☑ **CONDITIONS**

APPLICATION REJECTED ☐ **REASONS**

OFFICE USE ONLY

PAID ☐ CHQ

AMOUNT #250.00

OF RECEIPT 34863

DATE 03/01/17

INITIAL JM

E.H.O. [signature] DATE: 21 JAN 03

NOTE: AUTHORIZATION TO USE A SEWAGE DISPOSAL SYSTEM MUST BE GRANTED IN WRITING BY THE AUTHORITY HAVING JURISDICTION BEFORE BACKFILLING. CHECK WITH YOUR LOCAL AUTHORITIES REGARDING BUILDING AND ZONING BYLAWS.

BACKFILLING AND USE AUTHORIZED: ☑ YES ☐ NO

COMMENTS

SIGNATURE [signature] DATE 25 JAN 2003

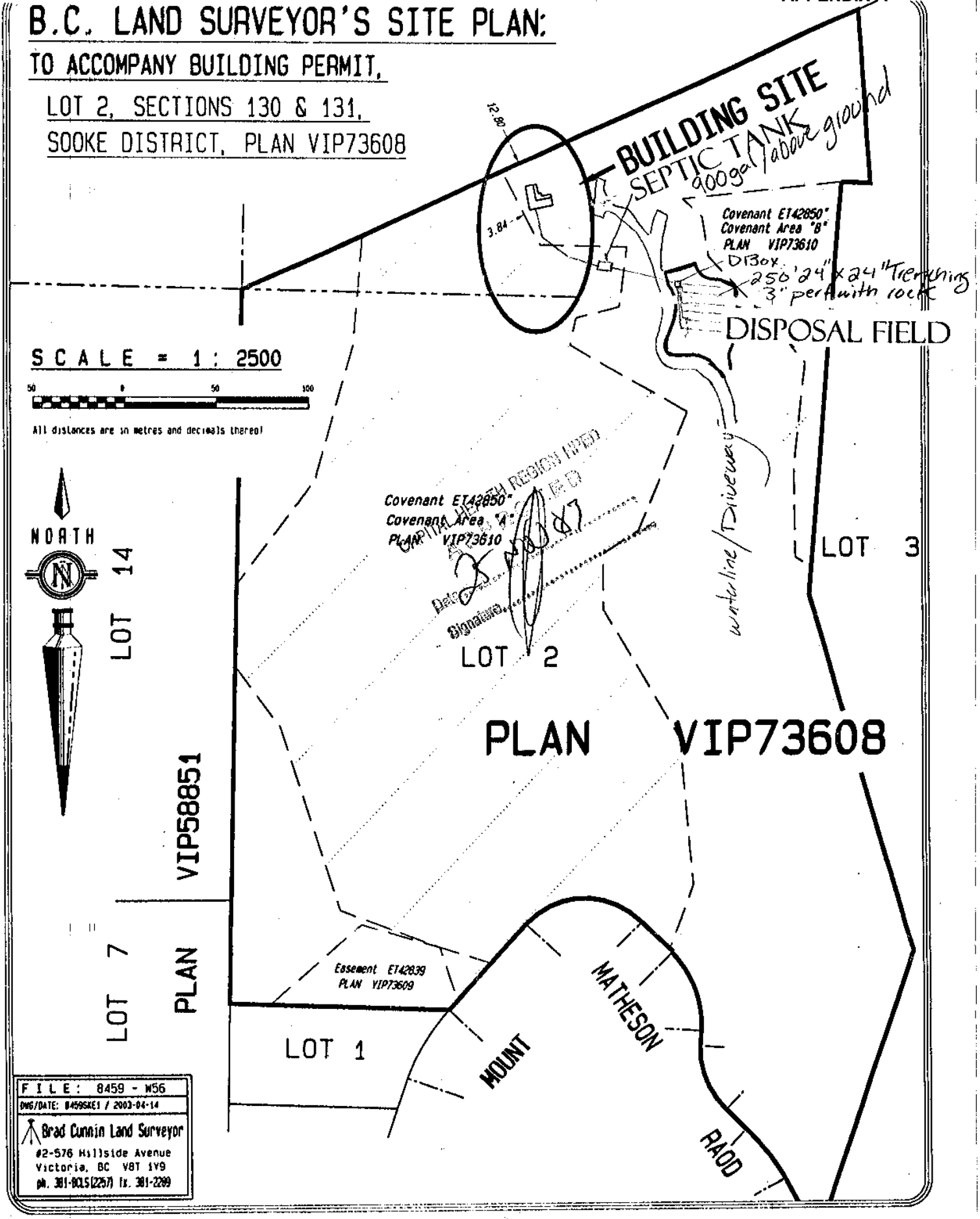
F:\EHO\FORMS\SEWPERMIT.P65 - NOVEMBER 1997 THIS PERMIT IS NOT TRANSFERABLE AND EXPIRES ONE YEAR FROM THE DATE OF ISSUE.

APPENDIX A

B.C. LAND SURVEYOR'S SITE PLAN:

TO ACCOMPANY BUILDING PERMIT,

LOT 2, SECTIONS 130 & 131,
SOOKE DISTRICT, PLAN VIP73608



Capital Health Region
Building Partnerships for Better Health

HEALTH PROTECTION & ENVIRONMENTAL SERVICES

SITE INVESTIGATION REPORT

LOT/PARCEL INFORMATION

LEGAL DESCRIPTION OF PROPERTY
PLAN 73608 LOT 2 SECTION 130 & 131 DISTRICT SOOKE BLK.
STREET ADDRESS OF PROPERTY MT. MATHESON ROAD

OWNER INFORMATION

NAME [redacted] TELEPHONE NUMBER [redacted]
MAILING ADDRESS [redacted]
NUMBER AND STREET CITY POSTAL CODE

SITE INFORMATION

AREA OF LOT 15.8 ha
DEPTH OF SOIL TO: (INCHES)
HARDPAN
BEDROCK 24" +
WATERTABLE

SOURCE OF DOMESTIC WATER: ROOF CATCHMENT
DISTANCES OF PROPOSED DISPOSAL FIELD TO SOURCES OF DOMESTIC WATER:
FROM OWN WELL N/A FEET FROM NEIGHBORS WELL 200+ FEET
FROM STREAM OR LAKE 200+ FEET FROM WATER LINES MORE THAN 10 FEET

RESTRICTIVE COVENANTS AND/OR EASEMENTS

ARE THERE ANY RESTRICTIVE COVENANTS AND/OR EASEMENTS WHICH WILL AFFECT THE DESIGN OF THIS SUBDIVISION AND/OR SEWAGE DISPOSAL SYSTEM?

☐ YES ☑ NO IF YES, ATTACH DOCUMENTS

SITE INVESTIGATION

DESCRIBE SOIL CONDITIONS FOUND IN EACH OF THE TWO 4 FOOT INSPECTION HOLES - SPECIFY TYPES OF SOIL ENCOUNTERED, DEPTH OF NATURAL POROUS SOIL AND DEPTH AT WHICH WATER TABLE, CLAY, HARDPAN AND/OR ROCK ENCOUNTERED.

INSPECTION HOLE # 1 (SPECIFY DEPTH IN INCHES)	INSPECTION HOLE # 2 (SPECIFY DEPTH IN INCHES)
T1 - AT LEAST 24 INCHES OF FOREST LOAM WITH BROKEN ROCK	T2 - SAME AS T1

PERCOLATION TEST RESULTS AS PER SCHEDULE 1, (See 1b)

DEPTHS OF HOLES TO BE 18 - 24" DEEP

AVERAGE PERCOLATION RATE FOR EACH HOLE

PERCOLATION TEST HOLE #1	10	MINUTES	PERCOLATION TEST HOLE #3	8	MINUTES
PERCOLATION TEST HOLE #2	10	MINUTES	PERCOLATION TEST HOLE #4	3	MINUTES

THE AVERAGE PERCOLATION RATE OF THE FOUR HOLES IS: 8 MINUTES

SITE INVESTIGATION PERFORMED BY

NAME J.E. ANDERSON & ASSOCIATES
ADDRESS 4212 GLANFORD AVENUE VICTORIA, B.C. V8Z 4B7
POSTAL CODE TELEPHONE NUMBER
DATE OF TESTS 14 JAN. 2003
SIGNATURE DATE 16 JAN 2003

THE ENVIRONMENTAL HEALTH OFFICER MAY REQUIRE ALTERNATIVE OR ADDITIONAL TESTS.

DETAILED INSTRUCTIONS ON BACK OF FORM

SITE INVESTIGATION REPORT - KVRHO\FORM - GREEN - NOVEMBER 1998

VANCOUVER ISLAND health authority

HEALTH PROTECTION & ENVIRONMENTAL SERVICES

DECLARATION\REQUEST FOR FINAL INSPECTION OF SEWAGE DISPOSAL SYSTEM

THE SEWAGE DISPOSAL SYSTEM AT ADDRESS: Mt Matheson Rd

LEGAL DESCRIPTION:

Plan VIP73608 **Lot** 2 **Section** 130 & 131 **District** Sooke

is ready for final inspection.

The installation has been completed in accordance with the Sewage Disposal Regulations of British Columbia, Capital Health Region Guidelines and conditions specified on the permit.

WAIVER OF INDEMNITY:

The undersigned, applicant, developer, contractor, or owner, assumes all risks or hazards incidental to health inspection services and agrees to release, dissolve, save harmless and keep indemnified the Capital Health Region and its officials, agents, servants and representatives, from and against all claims, actions, costs, expenses and demands in respect to death, injury, loss or damage to the person or property of the applicant, developer, contractor or owner, howsoever caused, arrising out of or in conjunction with the health inspection services, notwithstanding that the same may have been contributed to, caused or occasioned by the negligence of the Capital Health Region, its officers, employees, officials, agents, servants and representatives. It is understood that no warranty is implied for health inspection services of the Capital Health Region and that this agreement is to be binding on my self, my heirs, executors and assigns.

Nov 24/03
DATE

D. McClinan
SIGNATURE (OWNER/APPLICANT/INSTALLER)

4M Bobcat & Trucking Ltd
CONTRACTOR/INSTALLER

6110 Kirby Rd
PRESENT ADDRESS

642-4922
TELEPHONE NUMBER

A FINAL INSPECTION WILL NOT BE CARRIED OUT UNTIL THIS DECLARATION IS COMPLETED AND SUBMITTED.

DECLARATION-REQUEST FOR FINAL INSPECTION OF SEWAGE DISPOSAL SYSTEM - K:\EHO\FORM - NOVEMBER 1998

APPENDIX

D SELECTED SITE VISIT PHOTOS

Photo 01: Sloughing and slope erosion near basin associated with ephemeral stream east of reservoir.

Photo 02: Looking south along abandoned logging road near WTP access road.

Photo 03: Looking north from abandoned logging road towards reservoir near the western boundary of 706 Cains Way.

Photo 04: Straw bale check dams and silt fencing installed by the CRD in the southern ditch on the WTP access road to limit sediment transport into reservoir.

Photo 05: Looking southwest across reservoir from WTP. Deciduous vegetation can be seen overhanging the reservoir. Exposed soil can be seen near the waterline across from the WTP.

Photo 06: Depression (basin) in ephemeral stream near outlet to reservoir. Sediment and organic matter has accumulated in the basin. The basin outlet is a culvert constructed under an abandoned access road near the reservoir edge.

Photo 07: Sloughing/slope erosion observed just above the eastern waterline of the reservoir (Photo 1 of 2).

Photo 08: Sloughing/slope erosion observed just above the eastern waterline of the reservoir (Photo 2 of 2).

Photo 09: Loose soil near waterline just south of northern dam.

WILDERNESS MOUNTAIN
SOURCE WATER PROTECTION PLAN
COST IMPLICATIONS

SWPP Recommendation	Action	Operating Cost	Capital Cost	Implementation Year
1.1 Intake Upgrade	Design a floating intake further from shore. Start with hydraulic assessment on whether the existing pump can accommodate the increased suction head requirements. Capital funding will be required, item to be added to 5-year capital plan.	$ -	$ 150,000	2024
1.2 Treatment Plant Upgrade	Currently started a conceptual water treatment plant design, to be completed in 2022 with outcome informing next steps.			2023
2.1 Ongoing Monitoring	Develop and implement a monitoring plan. Operational funding will be required to develop and execute a source water monitoring plan.	$ 30,000	$ -	2024
2.2 Installation of a syphon drain system at the bottom of a reservoir	Assess whether feasible, then if feasible, design and construct a syphon drain system with an operating plan. Capital funding will be required for the feasibility, design and construction, item to be added to the 5-year capital plan. Operating funds will be required for ongoing operation.	$ 1,000	$ 190,000	2025
2.3 Steep slope assessment mapping and erosion control	Develop and implement a plan for assessing the possibility of significant erosion on the steep slopes. Capital funding will be required, item to be added to the 5-year capital plan.	$ 1,000	$ 80,000	2024
2.4 Preventative maintenance and asset management	Continue with refining preventative maintenance on the water system, update the asset management plan and implement. Asset management plan updates should occur after the treatment plant upgrades, with no immediate funding requirements.	$ -	$ 15,000	2025
2.5 Inspection of pole-mounted transformers	Add an annual preventive maintenance item for inspection of the pole-mounted transformers. No additional funds required.	$ -	$ -	2023

WILDERNESS MOUNTAIN
SOURCE WATER PROTECTION PLAN
COST IMPLICATIONS

SWPP Recommendation	Action	Operating Cost	Capital Cost	Implementation Year
2.6 Vegetation management around the reservoir	Develop and implement a plan to minimize organics from near-shore vegetation entering the reservoir. Planning will require input from the landowners and HAT. Additional operating funds will be required to develop and implement the plan as well as carry it out annually.	$ 15,000	$ 25,000	2025
3.1 Update existing Emergency Response Plan	Include identified risks into the existing Emergency Response Plan and ensure the Spill Response Plan is up to date. No additional funds are required.	$ -	$ -	2022
3.2 Coordination with Metchosin Fire Department and Province	Establish a chemical-free firefighting area within the reservoir catchment. No additional funds are required.	$ -	$ -	2022
3.3 Water Conservation Bylaw	Develop and implement a water conservation bylaw so that it can be enforced in the Wilderness Mountain System. No additional funds are required.		$ -	2023
4.2 Hydrogeological Study for ground infiltration path of 4928 Mt Matheson septic disposal	Assess whether the septic system for 4928 Mt Matheson can drain into the reservoir. Capital funds are required to assess the work.	$ -	$ 30,000	2025
TOTAL		**$ 47,000**	**$ 490,000**	