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JUAN DE FUCA WATER DISTRIBUTION COMMISSION
Notice of a Meeting on **Tuesday, June 5, 2018 at 12:00 pm**
Goldstream Conference Room, 479 Island Highway, Victoria, BC

B. Gramigna (Chair)	G. Logan (Vice-Chair)	G. Baird
M. Hicks	K. Pearson	J. Rogers
M. Sahlstrom	L. Szpak	

AGENDA

1. Approval of Agenda

2. Minutes of the Meeting held May 1, 2018 1

3. Chair's Remarks

4. Presentations/Delegations
   - No one has registered to speak.

5. Correspondence (deferred from May 1, 2018 meeting) 4

6. Water Audit for the Juan de Fuca Water Distribution Service (Report #JWDC 2018-05) 13

7. Juan de Fuca Water Distribution Development Cost Charge Program Update (Report #JWDC 2018-04) 95

8. Skirt Mountain Reservoir Agreement Dissolution Agreement (Report #JWDC 2018-06) 177

9. Electronic Billing Implementation (Report #JWDC 2018-07) 202

10. Water Watch 208

11. New Business

12. Adjournment

To ensure a quorum, advise Margaret at 250.474.9606 if you or your alternate cannot attend.

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MINUTES OF A MEETING OF THE JUAN DE FUCA WATER DISTRIBUTION COMMISSION, Held Tuesday, May 1, 2018, Goldstream Conference Room, 479 Island Highway, Victoria, BC

PRESENT: **Commissioners:** B. Gramigna, G. Baird, M. Hicks, G. Logan, J. Rogers, L. Szpak, M. Sahlstrom

Staff: R. Lapham, T. Robbins, I. Jesney, M. Montague (Recorder)

GUESTS: M. Mahovlich, City of Langford; M. Dillabaugh, City of Langford

The meeting was called to order at 12:05 pm.

1. APPROVAL OF AGENDA

MOVED by Commissioner Rogers and **SECONDED** by Commissioner Baird,
That the Juan de Fuca Water Distribution Commission approve the agenda.

CARRIED

2. MINUTES OF THE MEETING HELD FEBRUARY 6, 2018

MOVED by Commissioner Szpak and **SECONDED** by Commissioner Baird,
That the Juan de Fuca Water Distribution Commission adopt the minutes of the meeting held February 6, 2018.

CARRIED

3. CHAIR'S REMARKS

The Chair remarked as follows:

- He recognized Robert (Bob) Lapham, CAO at the CRD and welcomed him to the meeting;
- He noted that there were a number of items on today's agenda that could generate some interesting discussion;
- He advised that there will be a meeting of the Juan de Fuca Water Distribution Commission in June in order to finalize a number of items before the summer.

4. PRESENTATIONS/DELEGATIONS

There were no presentations/delegations.

5. CORRESPONDENCE

MOVED by Commissioner Szpak and **SECONDED** by Commissioner Hicks,
That the Juan de Fuca Water Distribution Commission defer consideration of correspondence from Hayworth Communities Inc. to the June 5, 2018 meeting of the Commission.

CARRIED

6. JUAN DE FUCA WATER DISTRIBUTION DEVELOPMENT COST CHARGE PROGRAM UPDATE

T. Robbins spoke to the report. He noted that, at the January 16, 2018 meeting of the Juan de Fuca Water Distribution Commission (JWDC), staff were directed to proceed with finalizing the Development Cost Charge (DCC) program with the inclusion of a Local Service Area (LSA). Since that time, staff reconsidered the project timing of the works envisioned under the LSA, water servicing implications, and updated financial forecasts for DCC revenue and DCC reserve funding commitments. The basis for the review was to reaffirm if the LSA is necessary prior to initiating the formal service establishment process. Without the LSA, project timing and funding certainty could be established without limiting water servicing capability. Not proceeding with the LSA would allow accelerated completion of the updated DCC program, including implementation of new DCC rates, and eliminate the ongoing administration of the LSA.

Given the updated DCC financial forecast and reaffirmation of development water servicing requirements and timing, staff expect that the funding and project/servicing capacity timing certainty resulting from having an LSA can be provided without an LSA. If the LSA is not required, the schedule for getting the DCC program finalized will be advanced by 6 – 8 months. The updated DCC financial forecast and DCC project timing also allows for the dissolution of the Bear Mountain Adventures Ltd. agreement, which also supports certainty in supplying water to future developments in the Skirt Mountain/Bear Mountain service area.

MOVED by Commissioner Szpak and **SECONDED** by Commissioner Baird,
That the Juan de Fuca Water Distribution Commission:

a. Rescind resolutions b. and c. from the January 16, 2018 Juan de Fuca Water Distribution Commission meeting; and
b. Direct staff to proceed with finalizing the 2018 JDF Water DCC Program Update and drafting amendments to DCC Bylaw No. 2758 (including amendments by subsequent amending bylaws to 2017) for the Commission's consideration; and
c. Direct staff to prepare an agreement and bylaw to enable the dissolution of the Reservoir 2 service area agreement with Bear Mountain Adventures Ltd.; and
d. Keep to the projected order of Water DCC Projects with corresponding projected dates as outlined in an acceptable version of Schedule A attached to CRD Staff report dated May 1, 2018.

CARRIED

7. PLANNING FOR POST-DISASTER WATER SUPPLY ACROSS GREATER VICTORIA

T. Robbins made a presentation on planning for post-disaster water supply across Greater Victoria. Following is an overview of the presentation:

- Post-disaster water supply and distribution planning initiative endorsed by the Regional Water Supply Commission, Saanich Peninsula Water Commission and Juan de Fuca Water Distribution Commission
- Regional Water Supply System Overview
- Post-Disaster Water Supply planning work completed to date
- Overview of supply and distribution centre concept
- Supply and distribution system resiliency and distribution centre mapping
- Next steps

8. WATER WATCH

MOVED by Commissioner Rogers and **SECONDED** by Commissioner Baird,
That the Juan de Fuca Water Distribution Commission receive the staff report for information.

CARRIED

9. NEW BUSINESS

There was no new business.

10. ADJOURNMENT

MOVED by Commissioner Logan and **SECONDED** by Commissioner Rogers,
That the meeting of the Juan de Fuca Water Distribution Commission be adjourned at 1:15 pm.

CARRIED

Chair

Secretary

Agenda Item 5

Hayworth

April 25, 2018

Mr. Bob Gramigna
Chair
Juan de Fuca Water Distribution Commission
Victoria, BC

RE: Appeal for Bill Adjustment for Account # 118391 (Westshore Child, Youth and Family Centre)

Dear Mr. Gramigna,

We are writing you in regards to the October 2017 water meter reading and invoice for the Westshore Child Youth and Family Centre (Hayworth ITF Children's - Wale) at service address 345 Wale Road. We would like to appeal for a bill adjustment for the excessive water consumption on this account. We are the property manager for this building, owned by the Children's Health Foundation of Vancouver Island, a non-profit organization. The Invoice# 230001916785 is in the amount of $4,952.50 for 2,589 cubic meters which is equivalent to 2,589,000 liters of water (more than the volume of water to fill an Olympic sized swimming pool). This level of consumption far exceeds the historic consumption levels for this period as noted below.

In November 2017, a payment in the amount of $1,350 (estimate) was made based on the average of past payments. The remaining outstanding amount owing on this invoice is $3,602.50. A copy of these documents is attached for your reference.

We have been in discussions with Ted Robbins at the CRD Integrated Water Services. In a letter dated February 14, 2018, we had requested a bill adjustment for the overstated consumption but it was declined since there was no evidence that the water bill was calculated in error nor a cause found for the over consumption (letter attached). We had done our due diligence on our end and had the irrigation and plumbing checked and no leaks were determined. Additionally, the water

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meter was tested and found to not be faulty and operating within normal parameters. Also, nightly patrols of the property are conducted by the Commissionaires and there were no reports of any suspicious water activity or usage.

We feel it is important to share with you the nature of the Westshore Child, Youth and Family Centre. It is owned by the Children's Health Foundation of Vancouver Island and the Agencies in the Centre provide valuable services to children, youth and families in the community, with several being not-for-profit organizations. Based on the proportionate share of the space each occupies, each Agency pays a monthly amount for building operating costs. The water bill is part of the expenses that the Agencies pay for and this additional amount owing was not anticipated in the 2017 fiscal budget. This high water bill, if not adjusted, would cost the Agencies extra money that would normally be put towards the valuable programs they offer the community. In consideration that the building provides necessary services for children, youth and families, we would like to appeal the decision to adjust the outstanding amount owing.

We have reviewed the past 6 years of consumption for the same time of year from 2012 to 2017 to show the difference in past readings as shown below:

2011 Water Consumption for period Sept 3 – Oct 28
Cubic meters: 274 Bill: $422.21

2012 Water Consumption for period Sept 1 – Oct 26
Cubic meters: 315 Bill: $501.54

2013 Water Consumption for period Aug 31 – Oct 25
Cubic meters: 261 Bill: $444.54

2014 Water Consumption for period Aug 30 – Oct 24
Cubic meters: 483 Bill: $864.18

2015 Water Consumption for period Aug 29 – Oct 23
Cubic meters: 467 Bill: $845.32

2016 Water Consumption for period Aug 27 – Oct 21
Cubic meters: 696 Bill: $1,331.38

2017 Water Consumption for period Aug 26 – Oct 20
Cubic meters: 2,589 Bill: $4,952.50

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Also, attached is a chart showing the previous bill amounts from August 26, 2016 through to October 20, 2017. As it indicates, the consumption reading is a significant amount of almost 3 times more than the amount of our highest bill for time period June 17, 2017 – August 25, 2017 of 890 cubic meters. From October 20 – October 27, 2017, there were only 60 cubic meters of water usage.

We understand that no known cause for the consumption was found, but we plead, on behalf of the Westshore Centre Agencies, for an adjustment to be made to the amount owing on this account. Please feel free to contact me to discuss further if needed. We greatly appreciate your time and we look forward to your reply.

Best Regards,

Dana Adams
COO, CFO
Hayworth Communities Inc.
250-478-4438

250-474-2117

CRD

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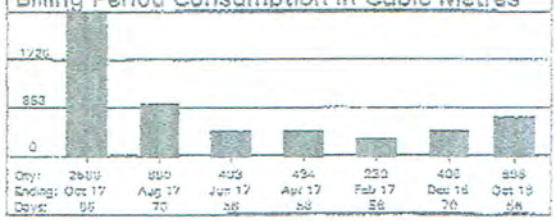
WATER BILL

CAPITAL REGIONAL DISTRICT
479 Island Highway
Victoria, BC V9B 1H7
250.474.9600 | 800.663.4425 | Fax 250.474.4012
www.crd.bc.ca | waterbilling@crd.bc.ca

Account number:	118391
Access code:	23712
Invoice number:	230001916785
Date:	Oct 26, 2017
Due date:	Nov 24, 2017
Billing from:	Aug 26, 2017
to:	Oct 20, 2017

Hayworth ITF Children's (Wale)
345 Wale Rd
Victoria BC V9B 6X2

Billing Period Consumption in Cubic Metres



METER READING SUMMARY

From Date	To Date	Days	Device	Reading Old	Reading New	Quantity Billed	
Service Address: 345 Wale Rd							
Aug 26, 2017	Oct 20, 2017	56	71290780	13,032	15,621	2,589	Cubic Metres

Previous Balance	2,481.09
Payment Received on Sep 05, 2017	770.90-
Payment Received on Oct 10, 2017	1,702.48-
Balance Forward	7.71
Water Consumption Charge 2,589 X 1.9129	4,952.50
Refund Late Payment Charge	7.71-
Balance due	4,952.50

CRD refuses to take in irrigation.

General Message

All overdue water accounts as of December 31, 2017 will be added to the real property taxes and collected as taxes in arrears, except for properties exempt from taxation.
An administration fee of $40 will be added to all accounts transferred to real property taxes.
If your account balance is current, please disregard the above message. Thank you.

$1352

pay $1350.00 as per above possible irrigation leak

HAYWORTH COMMUNITIES INC.
ITF CHILDREN'S HEALTH WALE ROAD

4416

CRD Water Services 11/22/2017 4416

230001916785..... 1,350.00

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Integrated Water Services
479 Island Highway
Victoria, BC, Canada V9B 1H7

T: 250.474.9600
F: 250.474.4012
www.crd.bc.ca

FEB 6 - 2018

January 25, 2018

Queen Alexandra Foundation for Children
2400 Arbutus Rd
Victoria, BC V8N 1V7
Canada

Dear Customer:

NOTICE OF OVERDUE WATER ACCOUNT AND PENDING TRANSFER TO PROPERTY TAXES

Service Address:	345 Wale Rd
Account Number:	118391
Amount Outstanding To Date:	$3,602.50

This is a courtesy letter to inform you that in accordance with the Local Government Act, unpaid water bills from December 31, 2017 will be considered taxes in arrears and will be collected as part of the property tax bill. Our records indicate you are the registered owner(s) or authorized agent of the property listed above. **This is your notification that the water account for 2017 is overdue and will be transferred to the property taxes and treated as taxes in arrears.**

Please be advised the Municipality or Surveyor of Taxes will be notified of the balance owing unless payment is received in our office, 479 Island Highway, Victoria, BC, V9B 1H7 by 4:30 p.m., **Friday, February 23, 2018**. CRD Integrated Water Services will apply a $40 administrative fee to all accounts transferred to taxes. As well, there may be additional fees applied by the Municipality or Surveyor of Taxes.

To view your current account balance online, please visit www.crd.bc.ca/account you will need your account number and access code provided on the top right hand corner of your bill.

If you have any questions regarding your account, please contact Capital Regional District Integrated Water Services billing department at 474-9601.

Thank you.

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RECEIVED MAR 2 3 2018

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Integrated Water Services
479 Island Highway
Victoria, BC, Canada V9B 1H7

T: 250.474.9600
F: 250.474.4012
www.crd.bc.ca

March 16, 2018

File: 5240-20
Juan de Fuca Water System

Ms Dana Adams, COO, CFO
Hayworth Communities Inc.
2234 Sooke Road
Victoria, BC V9B 1X1

Dear Ms Adams:

RE: CRD WATER ACCOUNT NO. 118391 – JUAN DE FUCA WATER DISTRIBUTION SERVICE (345 WALE ROAD – WESTSHORE CHILD, YOUTH AND FAMILY CENTRE)

Thank you for your February 14, 2018 letter regarding Capital Regional District (CRD) Water Account #118391 (345 Wale Road) and the October 2017 meter reading in question and for the previous correspondence from Mr. Ron Fedosenko on this matter. I understand that your staff and contractors have confirmed that there were no leaking plumbing or irrigation piping/fixtures on the private side of the water meter which may have contributed to the abnormal water consumption during the August 26 – October 20, 2017 billing period. CRD staff have confirmed through bench testing the water meter associated with this account and subsequent readings that the meter is recording accurately. Our records do show that in years prior to the 2011 period information that you provided, there have been instances when billing period consumption has been in excess of 1,000 cubic metres and one period in 2008 when consumption during a summer billing period was 2,624 cubic metres and that leakage has not been attributed to high consumption historically.

Provisions to adjust water bills for abnormal consumption are set out in Section 98 of CRD Bylaws No. 3889 and 4190, Capital Regional District Water Distribution Local Service Conditions, Fees and Charges Bylaw No.1, 2013. A copy of this section is attached for your reference. As you will read, adjustments are only permitted as a result of a leak, along with a number of other conditions that must be met.

Unfortunately, since there is no evidence that the water bill was calculated in error, or that the water meter recorded in error, or that there was a leak that caused the abnormal consumption (and that would have been repaired which would allow for an adjustment of the bill in accordance with Section 98 of Bylaws No. 3889 and 4190), under the Bylaw, as the General Manager, I do not have the authority to adjust the amount of the water bill. Since discussions regarding the cause of the abnormal consumption were ongoing in February, the overdue portion of the water account was not transferred to taxes and administrative fees were not charged to the account. Therefore, the CRD will require payment for the invoiced amount.

If you would like to discuss payment plan options, please contact the Water Billing Supervisor at 250-474-9686.

Yours truly,

Ted Robbins, BSC., C.Tech.
General Manager, Integrated Water Services

TR:ls
Attachment: 1

SECTION 98 ADJUSTMENTS TO THE WATER BILL FOR ABNORMAL WATER CONSUMPTION CAUSED BY LEAKS IN THE SERVICE LINE OR FAILURE OF PRIVATE WATERWORKS

98.1 CRD Integrated Water Services may notify a Customer if it becomes aware the Abnormal Water Consumption in the current billing period is more than 50% greater than the Customer's water consumption or $300 greater than the Customer's Water Charge for the same billing period in the previous year, but CRD Integrated Water Services assumes no duty to do so or liability in the event it does not notify a Customer pursuant to this section.

98.2 An adjustment to a water bill shall be considered by the General Manager for Abnormal Water Consumption caused by leaks in a Service Line or failure of Private Waterworks located on a Property. For clarity, no adjustments shall be made for Abnormal Water Consumption caused by intentional activities such as, watering of sod, gardening, filling of pools, or similar activities, not limited to those listed above, nor will an adjustment be made for Abnormal Water Consumption resulting from negligence or fault, such as unrepaired leaking faucets, toilets, hot water tanks, irrigation leaks resulting from failure to winterize, or running garden hoses. Notwithstanding the above, the General Manager may adjust a water bill taking into consideration the opportunity for the Customer to detect the leak and the promptness with which the leak was stopped or repaired after discovery, and only in situations where:

(a) the Customer demonstrates that the leak was caused by circumstances beyond the Customer's control, such as a break in the Service Line or failure of Private Waterworks, a mechanical malfunction, water theft or vandalism;

(b) the Customer provides proof that all leaks have been repaired to the satisfaction of CRD Integrated Water Services, which may inspect the repair;

(c) the Customer provides proof that the Abnormal Water Consumption was caused by leaks originating on the Customer's side of the meter service box or chamber;

(d) the Customer provides proof that the Unit where the leak occurred was not occupied for 60 days or more when the leak occurred;

(e) the Customer has repaired the leak within thirty (30) days of the earliest of the CRD notification of the Abnormal Water Consumption or the billing date; and

(f) the Customer submits a leak adjustment application form within thirty (30) days of the earliest of the CRD notification of the Abnormal Water Consumption or the billing date.

98.3 If the General Manager permits a leak adjustment, the Customer shall assume responsibility for the average amount of water consumed at the applicable Water Charge prescribed in section 3 of Schedule C based on the Customer's water consumption history or similar properties in the same area, plus 50% of the water consumed as a result of the leak at the applicable Water Charge prescribed in section 3 of Schedule C.

98.4 No leak adjustment shall be considered for water consumption which is recorded subsequent to the repair date and no greater than thirty (30) days from the date of billing.

98.5 Notwithstanding section 98.4, the maximum amount for which a Customer shall be required to pay for Abnormal Water Consumption caused by a leak is one thousand dollars ($1,000) per single family residential or small commercial Unit on the Property or two thousand dollars ($2,000) per large commercial, industrial or institutional Unit, residential strata or multifamily residential Unit, mobile home parks or campgrounds on the Property.

98.6 Only one (1) leak adjustment per Property within a twenty-four (24) month water consumption period shall be permitted.

SECTION 74 APPEAL OF WATER BILL

74.1 Any Customer obtaining water from the Waterworks may formally register an appeal of their water bill with the General Manager regarding the amount of any water bill, no more than thirty (30) days from the date of billing.

74.2 The General Manager may review the appeal and, where the General Manager considers that:

(a) there is an error in the calculation of the amount of the water bill;

the General Manager may adjust the amount of the water bill to the correct amount.

Westshore Child, Youth and Family Centre - 345 Wale Road
CRD Water Invoices Aug 26, 2016 - Oct 20, 2017

FROM	TO	CUBIC METERS	COST PER CUBIC METER	BILL AMOUNT	OLD READING	NEW READING	Cubic Meters Correct
27-Aug-16	21-Oct-16	696	1.9129	$1,331.38	9,973	10,669	696
22-Oct-16	30-Dec-16	406	1.9129	$776.64	10,669	11,075	406
31-Dec-16	24-Feb-17	230	1.9129	$439.97	11,075	11,305	230
25-Feb-17	21-Apr-17	434	1.9129	$830.20	11,305	11,739	434
22-Apr-17	16-Jun-17	403	1.9129	$770.90	11,739	12,142	403
17-Jun-17	25-Aug-17	890	1.9129	$1,702.48	12,142	13,032	890
26-Aug-17	20-Oct-17	2,589	1.9129	$4,952.50	13,032	15,621	INCORRECT: 2,589

Aug 26 - Oct 20/17 - 2,589 cubic meters used in 56 days = 46.23 cubic meters per day average

Since Oct 20th reading, in 7 days only 60 cubic metersused = 8.6 cubic meters a day average

Meter Reading on October 27, 2017	**15681.44**	**less 15,621 = 60**

Gardner: Irrigation Flashed Up June 1/17 and on Oct 12th, shut down and blown out

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Agenda Item 6
REPORT #JWDC 2018-04

REPORT TO THE JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF TUESDAY, JUNE 5, 2018

SUBJECT **WATER AUDIT FOR THE JUAN DE FUCA WATER DISTRIBUTION SYSTEM**

ISSUE

A water audit was conducted of the Juan de Fuca Water Distribution Service and the findings and recommendations are presented in this report.

BACKGROUND

The Juan de Fuca Water Distribution (JDFWD) Service provides drinking water obtained from the Regional Water Supply (RWS) Service to approximately 22,600 metered retail service connections (as of December 2015) in the municipalities of Langford, Colwood, View Royal, Highlands, Sooke, Metchosin, a portion of East Sooke in the JDF Electoral Area and First Nations.

In 2016, the Capital Regional District (CRD) retained Kerr Wood Leidal Associates Ltd. (KWL) to conduct a water audit of the JDFWD service for the 2015 operating year. The results are documented in the attached report titled “Greater Victoria Water Supply System Audit – Juan De Fuca Water Distribution System, July 2017”.

Water audits are undertaken by water utilities to assess the efficiency of the system’s ability to deliver drinking water, establish the system water balance, determine the sources of non-revenue water and identify where improvements can be made to reduce the cost of providing treated water to the service. This is the first comprehensive audit completed for the JDFWD service.

The audit consisted of three main objectives:

1. Meter Inventory and assessment – Compilation of various data sources into a meter inventory database and reporting on the completeness of the dataset and recommended actions,
2. Water Balance – Using inflow meter and meter consumption data from 2015, quantify water entering and exiting the water system (i.e. customer consumption and volumes of losses), and
3. Asset Management – Provide recommendations for meter replacements, meter replacement priorities, maintenance and testing programs, funding requirements, and next steps.

Secondary benefits of water audits include updating of drawings, reviewing existing water meter installations, confirming results of current hydraulic analysis, identifying potential public health issues, and identifying data gaps. The results of the water audit will be useful as a benchmark to measure future system efficiency.

The water audit process was completed using the industry best management practices manual, the American Water Works Association’s (AWWA) *Water Audits and Loss Control Programs Manual 36*, whereby the real and apparent water losses and consumption volumes throughout the system(s) are quantified.

Water consumption (revenue and non-revenue water) and water losses (non-revenue water) include:

- Billed Authorized Consumption: billed metered consumption, billed distribution metered consumption, billed unmetered consumption;
- Unbilled Authorized Consumption: unbilled metered consumption, unbilled unmetered consumption;
- Real Losses: leakage on transmission and distribution mains, leakage and overflows at storage tanks (balancing reservoirs), leakage on service connections up to point of customer metering; and
- Apparent Losses: unauthorized consumption, customer metering inaccuracies, systematic data handling errors.

It should be noted that water audits have also been conducted for the Regional Water Supply and the Saanich Peninsula Water Services managed by the CRD. The results of those water audits have or will be reported directly to those respective service Commissions. Since the RWS and JDFWD systems have multiple unmetered connections, a combined audit of the JDFWD and a portion of the RWS system was completed to assess the losses in the JDFWD.

KWL's key findings of the JDFWD service water audit are summarized as follows (based on the study period of 2015):

1. There are approximately 381 km of distribution mains and 181 km of service connections in the Westshore sub-system. There are approximately 132 km of distribution mains and 44 km of service connections in the Sooke sub-system.
2. The JDFWD service has 31 non-billing distribution system meters installed at various water system facilities throughout the distribution system. The average age of these meters was 8 years.
3. There were approximately 22,600 individual customer billing meters.
4. The average age of the meter inventory as of 2017 is approximately 16 years.
5. The CRD began its customer metering program in 1994; approximately 10,500 of the existing meter inventory were installed in the first year of the program and are approaching 25 years of age.
6. Since 1994, new meters have been added to the system at a rate of approximately 500 meters per year, primarily due to new development.
7. The vast majority of customer billing meters are residential 5/8" diameter meters, representing 91.4% of the inventory and 60% of the 2015 billing volume.
8. The highest volume billing meters are 1-1/2", 2",and 3" meters that collectively represent 3% of the inventory and 30% of the 2015 billing volume. It is, therefore, critical that these meters be systematically reviewed to ensure that they are sized and function correctly.
9. A metering sizing review was completed for meters 25mm through 150mm in diameter. Meters 40mm, 75mm, 100mm, and 150mm in diameter generally appear to be appropriately sized.
10. More attention should be taken in right-sizing residential customers where a 25mm or 50mm service is requested or warranted by the building code fixture unit count.

Westshore Sub-System Water Audit Conclusions

1. In 2015, approximately 46,156 ML of water was supplied through the RWS source meters of which approximately 8,359 ML of water was supplied to the JDF Westshore sub-system and the level of uncertainty was 443 ML, primarily due to uncertainty attributed to the RWS meters.
2. Source meter error from the RWS meters was estimated as +/-0.6% based on the range of actual operating flows and the manufacturer's stated performance for the meter.

3. The RWS meters used to determine the total supplied volume to the Westshore sub-system were estimated to be over-registering by a total volume of 765 +/-442 ML.
4. In 2015, the JDFWD Westshore sub-system billed 7,190 ML, approximately 86% of the total water supplied.
5. Authorized un-billed consumption was estimated to be 109 ML of which 68 ML was metered flushing works performed by the CRD (annual watermain flushing program), 31 ML is attributed to real losses in the RWS system within the Westshore and 10 ML is attributed to other authorized municipal unmetered uses.
6. Non-revenue water is estimated to be 1,169 ML +/-443 ML approximately 14% of the total water supplied.
7. Customer metering accuracy is estimated to be 98 +/-1% registration of flow. This equates to 144ML +/- 72 ML. At a retail customer rate water rate of $1.8101 per cubic meter, this equated to $260,600 +/-$130,300. This however does not represent a true revenue loss as the CRD adjusts its rates based on the previous years' consumption and anticipated operating costs for the year.
8. Real water losses are estimated to be 895ML +/- 443 ML which corresponds to an infrastructure leakage index (ILI) of 1.9. This ILI value is considered low by industry standards and represents a well-managed system with little opportunity for loss reduction.

Sooke Sub-System Water Audit Conclusions

1. In 2015, approximately 1,545 ML of water was supplied to the JDFWD Sooke sub-system. The level of uncertainty was estimated to be +/- 5 ML.
2. In 2015, JDFWD Sooke sub-system billed 1,186 ML, approximately 77% of the total water supplied.
3. Authorized un-billed consumption was estimated to be 15 ML of which 13 ML was metered flushing work performed by the CRD (annual watermain flushing program).
4. Non-revenue water was estimated to be 359 +/-5ML approximately 23% of the total water supplied.
5. Customer metering accuracy was estimated to be 98% +/-1% registration of flow. This equates to 24 ML +/- 12 ML
6. Real water losses are estimated to be 316 ML +/-14 ML which corresponds to an Infrastructure Leakage Index (ILI) of 2.5. This loss volume was validated by bottom up night flow analyses. This ILI value is considered low by industry standards and represents a well-managed system with little opportunity for loss reduction.

Proposed Water Meter Replacement Program

The CRD completed a testing program of water meters in 2014 and proposed a water meter replacement program (refer to JDF staff report "Residential Water Meter Replacement Program" dated July 8, 2014). KWL suggests that the program be initiated based on a water meter replacement rate of 1,000 meters per year on an ongoing basis.

The financial analyses that KWL conducted concluded the following replacement frequency; 23 year replacement frequency for 15mm, 19mm and 100 meter dimeters, 21 year replacement frequency for meters 25 to 400 mm diameter and 200 to 250 mm, 15 year replacement frequency for 50 to 75 mm meter diameter and 43 year replacement frequency for 150 mm diameter meters. Based on the replacement frequencies, cost for construction/installation, contingency and administration, KWL recommends an annual replacement program budget of $500,000 per year be established and adjusted annually for inflation.

The following list summarizes KWL's final recommendations:

1. Meter data - Continue to address data gaps identified in the non-billing distribution system meter inventory. Gaps should include meter installation date, model numbers and diameters. The data will inform future proposed water audits.
2. Meter selection and sizing – create a new section in the CRD's Manual of Engineering Standards and Specifications for meter selection and sizing based on the AWWA M22 methodology Sizing Water Service Lines and Meters.
3. Usage monitoring – review and track changes in registered consumption. Utilize the annual billing records to highlight meters that are potentially under-registering and use this data, along with meter age to prioritize replacements.
4. Residential Meter Replacement Program – implement a formal residential water meter replacement program including installation of backflow prevention devices at an estimated cost of $500,000 per year.
5. RWS and JDFWD metering – conduct a business case analysis for metering of the RWS and JDFWD connections considering the value of accurately measuring the volume of bulk water sales between the RWS and JDFWD services, improved zone control for managing real losses and reducing the number of connections between the two services.
6. Future water audits – complete a detailed water audit every five years (next audit proposed for 2021 for the 2020 operating year) as well as internally produced audits on a yearly basis.
7. Future water loss management plan – at a future date when justified by increased water loss develop a water loss management plan considering water loss management measures including leak detection, purchase of equipment and training, district metering, and pressure management.

The CRD staff are considering these recommendations in current operational practices and decisions as well as future capital programs.

CONCLUSION

A water audit was successfully completed for the JDFWD service utilizing best management practices (AWWA M36). The results of the audit show that the water system is conveying water to customers with a high-level of efficiency (i.e. low volume of losses) and is "well-managed". The significant metering and unauthorized consumption issues identified in the report have been or are being addressed, however the report does provide several recommendations to consider in the future.

RECOMMENDATION

That the Juan de Fuca Water Distribution Commission receive the staff report for information.

Submitted by:	Scott Mason, B.Sc., P.Eng. Manager, Water Supply Engineering & Planning
Concurrence:	Ian Jesney, P.Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Matthew McCrank, P.Eng., Senior Manager, Infrastructure Operations
Concurrence:	Ted Robbins, BSc, CTech, General Manager, Integrated Water Services

SM/DG/TR:mm

Attachment:
1. KWL report titled "Greater Victoria Water Supply System Audit – The Juan De Fuca Water Distribution System", dated July 2017.

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Capital Regional District

Greater Victoria Water Supply System Audit – Juan De Fuca Water Distribution System

Final Report
July 2017
KWL Project No. 0719.050

Prepared for:

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Executive Summary

Executive Summary

KWL was retained by the Capital Regional District (CRD) to provide a desktop analysis of the efficiency of each of the three water supply systems that make up the Greater Victoria Water Supply System and identify prioritized actions needed to improve service. This report provides the findings and recommendations for the Juan de Fuca Water Distribution (JDFWD) system. The scope of work included the following three tasks:

1. **Meter Inventory and Assessment** – Compilation of various data sources into a meter inventory database and reporting on the completion of the dataset and recommended actions.
2. **Water Balance** – An AWWA M36 water audit for the 2015 calendar year quantifying customer consumption and volumes of real and apparent losses.
3. **Asset Management** – Recommendations on meter replacements, meter replacement prioritization, meter testing program, program funding, and recommendations on further tasks.

Findings

There were approximately 22,600 individual customer billing meters and 31 non-billing distribution system meters, as of December 31, 2015, in the JDFWD systems.

The current average age of the meter inventory, as of 2017, is approximately 16 years. The CRD began its customer metering program in 1994; approximately 10,500 of the existing meter inventory were installed in this first year of the program, and are now 23 years old. Since 1994, new meters have been added to the system at a rate of approximately 500 meters per year.

Most customer meters are residential 19mm diameter meters, representing 91.4% of the inventory and 60% of the 2015 billing volume. The highest volume billing meters are 40mm, 50mm, and 75mm meters that collectively represent 3% of the inventory and 30% of the 2015 billing volume. It is therefore critical that these meters be systematically reviewed to ensure that they are sized and functioning correctly.

A meter sizing review was completed for meters 25mm through 150mm in diameter. The review found meters 40mm, 75mm, 100mm, and 150mm in diameter appear to be appropriately sized, however, more attention should be taken in right-sizing residential customers where a 25mm or 50mm service is requested or warranted by the building code fixture unit count. It is noted that the required service size, as calculated by the BC building code fixture unit count method, is intended for sizing of the service piping and not sizing of the meter.

The scope of the AWWA M36 water audits included all supply mains and appurtenances in the JDFWD system, consisting of two sub-systems: Westshore and Sooke. The JDFWD Westshore system has multiple unmetered connections to the RWS system. Therefore, KWL assumes that the infrastructure leak index (ILI) for the JDFWD system is equal to the RWS system upstream of in-line meters at Burnside, Adams, St. Giles, and Craigflower.

The following summarizes the key findings of the water audit:

Westshore System

- In 2015, approximately 46,156 ML of water was supplied through the RWS in-line source meters on Mains #4 & #5 downstream of the JGWTP, of which approximately 8,359 ML of water was supplied to the JDFWD-Westshore system. The level of uncertainty in this estimate is ± 443 ML, primarily due to uncertainty attributed to the RWS in-line meters separating the Westshore from the Core area.
- Source meter error from the Main #4 & #5 meters was estimated as ±0.6% based on the range of actual operating flows, and the manufacturer's stated performance for the meters.

- The RWS in-line meters used to determine the total supplied volume to the Westshore were estimated to be over-registering 765 ± 443 ML.
- In 2015, JDFWD-Westshore billed 7,190 ML, approximately 86% of the total water supplied.
- Authorized un-billed consumption is estimated to be 109 ML, of which 68 ML was metered flushing works performed by the CRD, 31 ML is attributed to real losses in the RWS system within the Westshore, and 10 ML is attributed to other authorized municipal unmetered uses.
- Non-revenue water is estimated to be 1,169 ±443 ML approximately 14% of the total water supplied.
- Customer metering accuracy is estimated to be 98 ±1% registration of flow. This equates to 144 ±72 ML. At a retail customer water rate of $1.8101 per cubic meter, this equates to $260,600 ±$130,300. This however does not represent a true revenue loss as the CRD adjusts its rates based on the previous years' consumption and anticipated operating costs for the year.
- Real water losses are estimated to be 895 ± 443 ML which corresponds to an ILI = 1.9. This ILI value is low and represents a well-managed system with little opportunity for loss reduction. There is not a direct business case for a leak detection find and fix program based solely on operational cost savings at this time. Other loss reduction tools and business case parameters should be considered in the future development of a water loss management plan, when justified by increased loss levels.

Sooke System

- In 2015, approximately 1,545 ML of water was supplied to the JDFWD-Sooke system. The level of uncertainty in this estimate is ± 5 ML.
- In 2015, JDFWD-Sooke billed 1,186 ML, approximately 77% of the total water supplied.
- Authorized un-billed consumption is estimated to be 15 ML, of which 13 ML was metered flushing work performed by the CRD.
- Non-revenue water is estimated to be 359 ±5 ML approximately 23% of the total water supplied.
- Customer metering inaccuracy (under-registration) is estimated to be a 2 ±1% of the total billed water consumption (1186 ML x 2%) which equates to 24 ±12 ML.
- Real water losses are estimated to be 316 ±14 ML which corresponds to an ILI = 2.5. This loss volume was validated by bottom up night flow analysis. This ILI value is low and represents a well-managed system with limited cost-effective opportunities for loss reduction.

The CRD completed a meter testing program consisting of 413 of the oldest retail meters in 2012-2014 and approved a customer meter replacement program that was planned to begin in 2015. The budget approved for the program was subsequently reallocated, and the program was not initiated. Under the program, 1,000 meters would be replaced per year, adding backflow prevention or replacing existing devices. The program had a budget of $500,000 per year (2014 dollars) that was to continue indefinitely. The average meter age upon replacement under this program would be 25 years.

The financial analysis completed by KWL indicates that the CRD's meter replacement program and budget were well justified and appropriately set. The analysis included an optimization of replacement frequencies for all meter sizes within the inventory. Residential retail meters (15 & 19mm) have an optimum replacement frequency of 23 years, whereas meters registering higher volumes (50 & 75mm) have an optimum replacement frequency of 15 years.

Recommendations

KWL recommends that the CRD take the following actions to continue to improve the overall system efficiency:

- Fill data gaps identified in the non-billing distribution system meter inventory. Gaps include meter installation date, model numbers and diameters (Appendix A);
- Create a new section within the CRD's Manual of Engineering Standards and Specifications for meter selection and sizing. This section should be based on the current AWWA M22 methodology.
- Provide a spreadsheet within the CRD's Manual of Engineering Standards and Specifications for the correct sizing of meters. This will make both the calculation and review by city staff easier.
- Specify that meter chambers within new multi-phased developments be sized for complete build-out and the meter is sized to match each phase of the development (developer to replace meter as necessary as phasing progresses).
- An AWWA M22 meter sizing calculation should be done at the time of all replacements.
- Review and track changes in registered consumption. Utilize the yearly billing records to highlight meters that are potentially under-registering and use this data, along with meter age to prioritize replacements.
- It is recommended that the CRDs residential meter replacement program and $500,000 (2017 dollars) annual budget be re-instated in 2018. This budget should cover the cost of adding or replacing backflow prevention devices as well as yearly allowance of $7,900 allocated to inspection, testing and calibration of non-billing distribution system meters. The budget should be adjusted yearly to account for inflation. A 23-year replacement frequency is recommended for standard residential meters (19mm diameter representing 91.4% of the inventory) based on a financial analysis. Shorter replacement frequencies of 21 years for 25 – 40mm diameter meters and 15 years for 50 – 75mm diameter meters are recommended based on the high percentage/volume of billing through these meters.
- As part of the strategic asset management plan for the Regional Water Supply (RWS) system budgeted for 2017, conduct a business case analysis for metering of JDFWD connections to the RWS. The analysis should include consideration of the value of:
    - Accurately measuring the volume of RWS system bulk sales to JDFWD system;
    - Improved zone control for managing real losses in the JDFWD system; and
    - Reducing the number of connections between the RWS and JDFWD systems.
    - Complete a detailed top-down water audit every 5 years as well as internally produced audits on a yearly basis. The internal audit is meant to update the yearly system input volume, billed authorized consumption and other easily obtained components of the audit without detailed assessment of the data inputs. The detailed audit should have a budget of $50,000 and $8,000 should be budgeted for yearly expedient audits. These budget numbers are for the combined effort of auditing all three water systems including RWS, SPW, and JDFWD.
- At a future date, when justified by increased water loss in either of the JDFWD systems as identified by the yearly water audits, develop a water loss management plan at an estimated one time capital budget of $50,000. Development of a business case for additional operational costs related to specific water loss management measures including leak detection programs, purchase of equipment and training, district metering and pressure management, should consider:
    - operational cost savings of reduced pumping and treatment costs
    - asset life expectancy;

- break frequency reduction and annual repair cost budget;
- continuity of service and levels of service;
- reduction of financial risk related to property damage;
- deferral of capital projects such as treatment plant expansions; and
- sustainability goals.

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Section 1

Introduction

1. Introduction

1.1 Context

Kerr Wood Leidal Associates Limited (KWL) was retained by the Capital Regional District (CRD) to provide a desktop analysis of the efficiency of each of the three water supply systems that make up the Greater Victoria Water Supply System and identify prioritized actions needed to improve service. It is the CRD's goal to deliver high quality drinking water to customers and manage water infrastructure in a sustainable manner.

The three systems are administered and funded independently and are described as:

1. **Juan de Fuca Water Distribution (JDFWD)** – Consists of the distribution mains, reservoirs and appurtenances that deliver drinking water from the RWS to approximately 21,000 metered individual retail connections (in the municipalities of Langford, Colwood, View Royal, Metchosin, Highlands, Sooke and a portion of the CRD Juan de Fuca Electoral Area;
2. **Regional Water Supply (RWS)** – Consists of the trunk water supply mains, reservoirs and appurtenances (including 45 bulk billing meters, 7 source meters, 4 in-line meters and 2 production meters) that deliver drinking water from the JGWTP to the CRD's JDFWD and SPW systems, and to distribution systems owned and operated by the City of Victoria (including Esquimalt), District of Oak Bay and District of Saanich; and
3. **Saanich Peninsula Water (SPW)** – Consists of the distribution mains, reservoirs and appurtenances (including 31 bulk meters) that deliver drinking water from the RWS to distribution systems owned and operated by the Districts of Central Saanich and North Saanich and the Town of Sidney.

Collectively, the three water systems consist of treatment facilities, transmission and distribution water mains, bulk and customer water meters, pressure control stations, reservoirs, tanks, pump stations, and various other water infrastructure assets. Each of the three water services measures water at a variety of locations for process, treatment, consumption, or billing purposes.

This report is focussed solely for the JDFWD system. Separate reports were also prepared for RWS and SPW.

1.2 Project Scope

The project scope is to conduct a water audit and provide meter asset management recommendations for each of the three CRD water services (RWS, JDFWD and SPW) utilizing the American Water Works Association (AWWA M36) - Water Audits and Loss Control Programs manual methodology, and best practices from the National Research Council's Guide to Sustainable Municipal Infrastructure. The work is divided into the following three key tasks consisting of:

1. **Meter Inventory and Assessment:**
   - Develop a bulk meter database that includes type, model, age, size, flow range, use, service area, level of importance based on flow rate and redundancy.
   - Complete an installation assessment of bulk water meters and compile utility data: Assess type, function, and installation of CRD's bulk water meters and provide list of recommendations for improvements related to:

- meter inspection, maintenance, testing and calibration requirements;
- meter validity and installation;
- bulk meter checks and balances;
- use industry standards/guidelines and best practices for recommending future selection; and
- sizing and replacement of bulk meters, including minimum SCADA requirements.

2. **Water Balance**
   - Assess and quantify all current authorized revenue water consumption within the system.
   - Interview staff and review the current methodology of collecting and validating consumption data and provide conclusions and recommendations.
   - Assess and quantify non-revenue water in the system including apparent losses, real losses, and unbilled authorized consumption; and
   - Quantify the estimated cost of the losses to the CRD.
3. **Asset Management**
   - Identify meter replacement priorities and existing deficiencies;
   - Develop a prioritized meter replacement plan based on asset criticality, age and condition;
   - Develop cost estimates based on the characteristics of replacement and regulatory considerations;
   - Recommend lifecycle operational and maintenance costs;
   - Recommended total annualized lifecycle cost for the metering program; and
   - Recommend further tasks for auditing and water loss management.

The scope of work does not include a field program to detect leakage in the water systems.

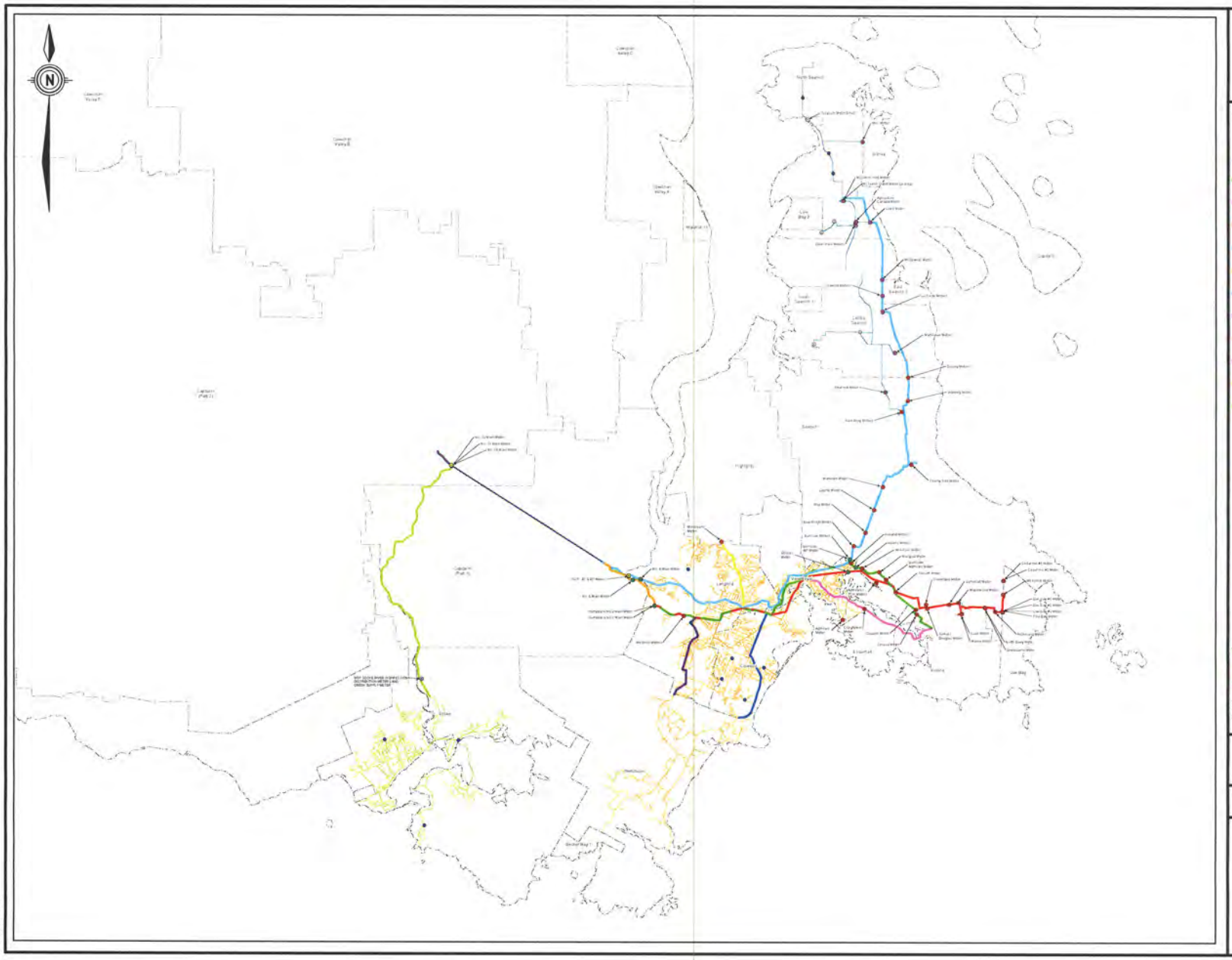
1.3 Report Structure

This report provides the results of the water audit for the JDFWD system.

The body of the report is structured into the three main sections described above in the project scope and also includes this introductory section and a final section summarizing conclusions and recommendations.

1.4 Water Commission Boundaries

Figure 1-1 shows the supply and distribution piping and boundaries between the CRD's three water systems as well bulk metering locations used for the water audit.



Greater Victoria

Legend

Regional Water Supply System

- Kapoor Tunnel
- Supply Main No. 1
- Supply Main No. 2
- Supply Main No. 3
- Supply Main No. 4
- Supply Main No. 5
- Supply Main No. 7
- Supply Main No. 8
- Supply Main No. 10
- Supply Main No. 11
- Supply Main No. 14
- Supply Main No. 15
- RWS Bulk Billing Meters
- RWS Source and In-line Meters
- RWS Non-Billing Meters

Saanich Peninsula Water System

- Saanich Peninsula Water System
- SPW Bulk Billing Meters
- SPW Non-Billing Meters

Juan De Fuca Water Distribution System

- JDFWD - West Shore
- JDFWD - Sooke
- JDFWD - Source Meter
- JDFWD - Distribution System Meter

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5,000 0 5,000 (m)
1:180,000

Project No.	Date
719-050	March 2017

Water Commission Boundaries and Assets

Figure 1-1

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Author: PCollins

1.5 Data Sources, Assumptions and Limitations

1.5.1 Data Sources

The following data sources were provided by the CRD:

1. Database of Water infrastructure assets labeled "2016_July27_CRDWaterInfrastructure_KWL" (Access Database File);
2. 2015 tabulated flushing quantity estimates labelled "2015 UDF Program Annual Summary - Water Usage" (PDF) and "2015_JDFWDS_UDF_WATER_USAGE_YearEndSummary" (PDF);
3. CRD Metering schematic labelled "3994 Metering Schematic" (PDF);
4. A 2012 preliminary assessment of bulk meters within the RWS labelled "Bulk Meter Review Draft Report 2012" (PDF);
5. Municipal Retail consumption statistics for the communities serviced with bulk water by the CRD labelled "CRD Water Consumption Retail Water Use Statistics by Municipality 2015" (Excel);
6. RWS and SPW transmission main drawing labelled "DrinkingWaterSupplySystem_24x26" (PDF);
7. An internal report from a 2002/2003 meter validation exercise on meters at the head tank and Japan Gulch Water Treatment Plant labelled "Flowmeter Reconciliation" (PDF);
8. 2004 strategic plans for water management labelled "Review Strategic Plan for Water Mgmt Nov 2004" (PDF) and "Update Strategic Plan for Water Mgmt- Transmission System Dec 2004" (PDF);
9. 2015 Hourly and Daily SCADA data for RWS and SPW meters labelled "RWS SCADA -Daily and Hourly" (Excel) and "SPW SCADA -Daily and Hourly Flows" (Excel);
10. 2015 RWS Water Bills labelled "RWS Water bills 2015" (Excel);
11. Strategic Plan for Water Management: Supply Management and Demand Management (Volume 1 of 4) –Mar 9, 1999 labelled "Strategic Plan for Water Mgmt Vol 1 of 4 TOC-Transmission System Mar 1999" (PDF);
12. Strategic Plan for Water Management: Transmission System (Volume 2 of 4) –Aug 19, 1999 labelled "Strategic Plan for Water Mgmt Vol 2 of 4 -Transmission System Aug 1999" (PDF);
13. 2015 Retail billing data for the JDFWD system and Gulf Islands labelled "WesternComm2015BillingData" (Excel);
14. The 2016 wholesale meter database labelled "Wholesale Meter Database 2016" (Excel);
15. 2015 SPW Bulk Meter Readings labelled "WaterConsumption(SPWS)2015-01" (12 Excel spreadsheets representing each month of data);
16. Screen shots from SCADA for 2015/2016 flows through bulk billing meters replaced in 2016 labelled:
    a. "Cecelia Meter Screen Capture" (JPEG);
    b. "Cloverdale Meter Screen Capture" (JPEG);
    c. "Dupplin Meter Screen Capture" (JPEG);
    d. "Tillicum Meter Screen Capture" (JPEG);

e. "Wilkinson Meter Screen Capture" (JPEG);

17. 2016 Cecile Meter Validation and zeroing exercise results labelled "RE Portable Flow meter moved to Main #1 near Cecelia" (Email with data attachments and photos);
18. 2016 Saanich Interurban PRV clamp-on meter flow test labelled "RE-INTER" (Email with photos attached);
19. RWS supply schematics labelled "3280-A Supply Schematic" (PDF) and "3280-B Saan Pen" (PDF);
20. The 2013 / 2014 JDFWD residential meter replacement program data labelled "2013-2014 MeterReplacement Program formatted" (Excel), 2015 JDFWD large meter testing data labelled "Copy of LargeMeterTesting_2015" (Excel) and staff report with recommendations from this work labelled "Pages from agenda-with-reports" (PDF);
21. RWS meter replacement prioritization spreadsheet prepared by Operations labelled "0285_001" (PDF);
22. Main #15 head tank flow (in) and out flows at Sooke River Road Disinfection Facility labelled "Sooke Data" (Excel);
23. Main #4 and #5 magnetic (mag) meter 6-point calibration results conducted at time of installation labelled "#4&5 mags" (PDF);
24. Forty-two (42) bulk metering station as-built drawings (Various PDFs) and a database reference file labelled "Meter Mechanical Dwgs TOC" (Excel); and
25. Staff Report: Report to Juan de Fuca Water Distribution Commission Meeting of Tuesday July 8, 2014 – Residential Water Meter Replacement Program, labelled "Pages from agenda-with-reports" (pdf).

1.5.2 Assumptions and Limitations

The following is a general list of assumptions and limitations related to the work of this report:

- The meter billing data was reviewed and checked for errors where possible. It is assumed that the billing databases are free of errors and omissions that could not have been identified through our review process;
- It is assumed that billing data represents actual meter reads and has not been altered to represent the volume billed to the customer if billing credits were made to any accounts;
- The following criteria and assumptions were used for evaluating meter under-registration:
  a. Initial review of 25mm through 150mm meters that are the sole customer meter (compound meters excluded) that registered flow in all six billing cycles of 2015 (meters registering zero volume for any billing cycle were excluded);
  b. Secondary review of 40mm and 50mm meters in both single and acting as primary meter in compound arrangements, that registered flow in all recorded cycles;

c. The following mechanical meter models and corresponding meter minimum flows were assumed for each meter size:

Meter Size (mm)	Minimum Flow (L/s)	Assumed Model
25	0.017	SRII
40	0.028	SR – DN40
50	0.125	SR - DN50
75	0.252	W-350 DR
100	0.631	W-1000 DR
150	1.262	W-2000DR

d. The following flow criteria is assumed to categorize meters and the probability of under-registration:

   i. ADD < 0.25 x Minimum Flow;

   ii. ADD < 0.10 x Minimum Flow; and

   iii. ADD < 0.05 x Minimum Flow.

- Data in the 2016 wholesale meter database is correct and as-built drawings provided represent the current meters installed unless otherwise shown to have been changed through KWLs cross referencing to the 2016 wholesale meter database.
- Bulk monthly meter read data represents actual register reads or estimates complete with supporting data. Where estimates were performed, we assume the comments in the excel database are complete and accurate.
- Levels of uncertainty are estimated from engineering judgement based on the quality of the data used and its limitations as well as meter manufacturer literature. Compounding levels of uncertainty are derived from the Gaussian equation for normally-distributed errors which states that if:

  $$Q = a + b + c + d,$$

  the expected uncertainty in Q, δQ is:

  $$\delta Q = \sqrt{\delta a^2 + \delta b^2 + \delta c^2 + \delta d^2}$$

- Mag meter performance was assessed assuming Endress and Hauser (E&H) ProMag 53W performance, regardless of the manufacturer, as a simplifying assumption. E&H mag meters represent 61% of the population, 23 of the total 38, and 11 of the 12 mag meters installed since 2010 are E&H ProMag 53W.
- Water service connections are assumed to be 10 metres in length.
- The JDFWD systems are both assumed to be operated at an average pressure of 50 meters head.
- The proportion of losses associated with RWS and JDFWD are calculated by assuming the two systems have an equivalent infrastructure leakage index (ILI) for mains and accounting for Haliburton losses. This assumption divides the total real losses by the unavoidable annual real losses (UARL for each system.
- Source metering error is approximated as ±0.6%.

- Unauthorized consumption is difficult to monitor in a large distribution system; most cases of unauthorized consumption only being discovered if caught in the act. AWWA recommends an allowance of 0.25% of source flows be used as an estimate of unauthorized consumption of a system.
- The customer billing data was reviewed and no clear errors were found. The AWWA recommended minimum default value of 0.25% of billed authorized consumption was therefore attributed to data handling errors.
- A unit cost of $50 per ML is estimated for chlorination, UV disinfection and pumping and is assumed for real losses.
- The scope of the asset management tasks covered in this report is limited to the lifecycle cost analysis and replacement planning of water meters, and does not include pipework, vaults/enclosures, meter reading equipment or other assets owned by the JDFWD except where noted.
- We assume that the general approach for meter replacements is to minimize changes to the existing pipework and avoid the need for chamber replacement for the purpose of improving the hydraulic configuration of meters.
- The unit costs provided in this report are Class C opinions of probable cost, are not guaranteed or warranted and are based on recent supplier quotations and assumed average levels of construction and engineering effort for each constructability scenario as described in Section 4.2 and therefore do not consider site specific requirements. An additional 30% allowance for construction contingency and 10% allowance for CRD project management are in addition to the costs provided in this section.
- Residential meter testing, completed by the CRD for its meter replacement program, was completed as per the AWWA M6 Manual of Water Supply Practices testing procedures. The majority of meters tested were 20 years old and therefore the rate at which meters wear must be assumed. Given the test results for the average 20-year-old meter, the following meter wear and accuracy assumptions were made:
  a. meters are assumed to remain in "as new" condition for the first 4-5 years;
  b. A linear relationship for wear and accuracy depletion over time is assumed after 5 years; and
  c. Linear accuracy depletion is based on 20-year-old meters having an average accuracy of 96.6% as per the test results.

The above meter accuracy age relationship was also assumed for large diameter meters.

Cost estimates for replacement of non-billing distribution system meters are based on the following assumptions:

d. all stations will at a minimum require two short sections of piping to be replaced on either side of the meter with the inclusion of a flange adaptor;
e. Allow engineer time ($600) for meter selection, and design retrofit of piping within the station;
f. Three operator crew ($100/hr/operator) for one day allowed for meter sizes 50 – 200mm;
g. Four-person crew ($100/hr/operator) and excavator ($250/hour) for one day allowed for meters sized 250 – 300mm; and
h. Meters with unknown size are assumed to be 200mm diameter.

1.6 Units of Measure

The units of measure used in the water audit are metric. Water volume is given in megalitres (ML). One ML is equal to one million litres, and 1,000 cubic metres. Operating pressures are given in metres head (mH), and length of water mains is expressed in kilometers (km).

1.7 Definitions and Abbreviations

The following standard water loss management terms and abbreviations used in this Report and the AWWA M36 Water Audits and Loss Control Programs Manual.

Active Leakage Control	A proactive utility policy and program to control unreported leaks in a water distribution system, including regular sounding, monitoring minimum night flows in district metered areas (DMAs), and continuous monitoring of leak noise levels.
ADD	Acronym for Average Day Demand.
Apparent Losses	Error in the measurement or estimation of customer water use due to customer meter inaccuracy, systematic data handling errors and unauthorized consumption.
Asset Management	An integrated approach to managing the selection, construction, maintenance, renewal and replacement of utility infrastructure in a manner that provides sustainable service at expected levels, at a minimum life cycle cost.
Authorized Consumption	The volume of water taken by customers, the supplier and others with the supplier's explicit or implicit approval.
AWWA	Acronym for American Water Works Association.
Background Leakage (BL)	Leakage that is not detectable by acoustic detection methods.
Bottom-Up Approach	Detailed investigation of individual components of water loss, including minimum night flow measurement and step testing in district metered areas, to accurately quantify loss volume and cost impact.
Class C Cost Opinion	Class C opinions are prepared with limited site information and is based on probable conditions affecting the project. It represents the summation of all identifiable project elemental costs and is used for program planning, to establish a more specific definition of client needs and to obtain preliminary project approval.
Core Communities	Core Communities refers to the communities of Victoria, Saanich, Esquimalt, and Oak Bay.

Current Annual Real Losses (CARL) and Current Real Losses (CRL)	Current Annual Real Losses is the total volume of losses occurring through reported, un-reported and background leakage as calculated by a top-down water audit. Current Real Losses is a terminology used for the purpose of bottom-up analysis (night flow testing) and represents the loss volume on the day of a test.
District Metered Area (DMA)	A hydraulically discrete part of a water distribution system that is supplied from one or more metered point.
Flow Profiling	Flow profiling is the collection of flow data for a customer by means of data logging. Data is collected at a short time interval to obtain an accurate pattern of how water is being used by a customer. Data is typically collected by connecting a data logger, referred to as a Meter-Master, to the meter.
Infrastructure Leakage Index (ILI)	The ratio of current annual real losses to the calculated unavoidable annual real losses: ILI = CARL / UARL.
Leakage	Water escaping from the pressurized distribution system through defects, ruptures or failures.
Leak Detection Programs (Acoustic Leak Sounding)	Seeking, discerning and pinpointing leak noise generated from pressurized water distribution systems, typically using specialized acoustic instruments.
Minimum Night Flow	The minimum recorded flow into a system or district metered area (DMA) during the period of lowest demand, typically between 2:00 AM and 4:00 AM.
Non-Revenue Water	Water that does not provide revenue consisting of un-billed authorized and unauthorized consumption, real losses and apparent losses.
Real Losses	The physical volume of water lost from the pressurized distribution system up to the point of customer consumption due to leakage and operator error.
Right-Sizing	Right-sizing refers to sizing of a meter to closely match the actual demand pattern of the customer as opposed to sizing of a meter based on the peak flow that it might encounter.
Top-Down Approach	Compiling an annual water balance from available water supply and customer meter readings, and other available records of water uses and losses in the system.
Unauthorized Consumption	Any water taken from the system without the approval of the supplier, unauthorized use of hydrants, illegal connections, customer meter bypasses or tampering.

Unavoidable Annual Real Losses (UARL)	UARL is the minimum volume of annual real losses that can be expected for a well-managed system calculated for top-down water auditing purposes. UARL includes run-time loss volumes due to reported and unreported leakage as well as unavoidable background leakage.
Water Audit	A thorough examination of water utility data to estimate the volumes of water moved from the source to customers. The primary objective of a water audit is to separate volumes reaching customers from volumes lost in the system. Audits may use a top-down and/or bottom-up approach.
Water Balance	The summary of water audit data used to account for all water entering the system.
Westshore Communities	Westshore Communities, in reference to the water audit, refers to the communities of Langford, Colwood, View Royal, and Metchosin. Sooke is excluded from the definition of Westshore Communities as a separate water audit was completed for Sooke and the Westshore Communities.

1.7.1 The AWWA Water Audit

The AWWA water audit methodology published in the M36 Water Audits and Loss Control Programs manual quantifies customer consumption and volumes of real and apparent losses. This method reveals the destinations of water supplied throughout the distribution system and quantifies volumes of consumption and losses. The complete audit process occurs at three levels, each adding increasing refinement:

- Top-down approach: the initial desktop process of gathering information from existing records, procedures, data, and other information systems (included within scope of services);
- Component analysis: a technique that models leakage volumes based on the nature of leak occurrences and durations. Component analysis analyzes district metered flows before, during and after a leak detection find a fix program is completed. It is an important water loss management tool utilized by water loss management teams somewhere 3-5 years out from plan inception (not in scope);
- Bottom-up approach: validating the top-down results with actual field measurements. A bottom up validation of water losses was completed for the JDFWD – Sooke system (not in scope).

1.7.2 Top-down Approach (Water Balance)

The top-down approach is the recommended starting point for water authorities that have 100% metered customers. A blank copy of the water balance summary sheet for the Top-down audit is shown in Figure 1-2. The balance sheet shows each of the different components and how they related to revenue and non-revenue water and authorized consumption and water loss. The goal of the audit is to reduce sources of non-revenue water (highlighted in blue).

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Water Exported	Revenue Water
			Billed Metered Consumption	
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non-revenue Water
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorized Consumption	
			Customer Metering Inaccuracies	
			Systematic Data Handling Errors	
		Real Losses	Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Utility's Storage Tanks	
			Leakage on Service Connections up to point of Customer metering	

Figure 1-2: AWWA M36 Water Balance

1.7.3 Bottom-up Approach (not in scope)

The bottom-up approach relies on field measurements and data to determine real losses, including district metering and minimum night flow analysis, typically expressed as instantaneous flow rates (e.g. litres per second) rather than annual total flows. The bottom-up approach does not include reported and unreported leaks in the calculation of un-avoidable losses.

The volume of legitimate use that must be estimated using a bottom-up approach is quite small – only the small fraction that occurs during the period of minimum overnight flow between 2AM and 4AM – and leakage represents a larger percentage of total supply flow during this period. Therefore, the error in bottom-up leakage estimates is inherently smaller than in the top-down approach.

The main disadvantage of the bottom-up approach is the requirement to conduct field work, and the reliance on a specific system of infrastructure for DMA isolation and accurate measurement of low flow rates into each DMA. For successful implementation, a bottom-up approach should include a sufficient number of district metering points to reduce both field work and computational effort. In order to accurately identify leakage, it is also imperative that meters are sized to accurately measure the expected minimum night flows.

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Section 2

Meter Inventory and Assessment

2. Meter Inventory and Assessment

The JDFWD system meter inventory, provided by the CRD, consisted of 22,618 billing meters, serving 18,072 Westshore system customer accounts and 4,415 Sooke system customer accounts in 2015. The JDFWD system also has 31 non-billing distribution system meters located at various facilities including pump stations, reservoirs, and pressure reducing stations.

2.1 Database Assessment

2.1.1 Customer Billing Meters

There were approximately 22,600 individual customer billing meters, as of December 31, 2015, in the JDFWD system. The current average age of the meter inventory, as of 2017, is approximately 16 years. The CRD began its customer metering program in 1994. Approximately 10,500 of the existing meter inventory were installed in the first year of the program, and are now 23 years old. Since 1994, new meters have been added to the system at a rate of approximately 500 per year.

KWL has assessed the 2015 inventory and disaggregated the database into size categories as follows in Table 2-1.

Table 2-1: JDFWD System Customer Billing Meter Inventory by Meter Size

Meter Size	# of Meters	% of Inventory	2015 Billing Volume (ML)	% of Total 2015 Billing Volume	Ave. Billing Volume (ML/meter)
5/8"	20,683	91.4%	4,888	60%	0.24
3/4"	507	2.2%	162	2%	0.32
1"	640	2.8%	333	4%	0.52
1 1/2"	39	0.2%	283	3%	7.26
2"	599	2.6%	1,888	23%	3.15
3"	51	0.2%	358	4%	7.02
4"	44	0.2%	109	1%	2.48
6"	42	0.2%	52	1%	1.24
8"	12	0.1%	101	1%	8.42
10"	1	0.0%	4	0%	4.00
Total	**22,618**	**100%**	**8,200**	**100%**	**0.36**

The vast majority of customer billing meters are residential 5/8" diameter meters, representing 91.4% of the inventory and 60% of the 2015 billing volume. The highest billing meters are 1 ½ ", 2", and 3" meters that collectively represent 3% of the inventory and 30% of the 2015 billing volume.

Meters from 5/8" through to 3" are the "work horses" of the meter inventory; acting as the primary meters. The following statistics illustrate this point:

- In the 2" meter inventory (599 meters), there are approximately 95 installed in compound arrangements (a low flow and a high flow meter), of which only 6 are the high flow meter.

- In the 3" meter inventory (51 meters), there are 6 installed in a compound arrangement, of which only 1 is the larger meter.
- In the 4" meter inventory (44 meters), there are 35 installed in a compound arrangement, of which all are the larger meter.

The average billing volume per meter, provided in Table 2-1, should increase with meter size for meters 5/8" through 3". The data indicate that a portion of the 1" and 2" meters may be oversized for the current customer demand as the average flows are less than expected. A meter sizing review was completed for the large billing meter inventory (See Section 2.2 and Appendix A).

2.1.1 Non-Billing Distribution System Meters

The JDFWD system has 31 non-billing distribution system meters installed at various water system facilities throughout the distribution system.

Table 2-2 provides the type and size of non-billing distribution system meters within the inventory.

Table 2-2: JDFWD Non-Billing Distribution System Meter Inventory by Meter Type & Diameter

Size (mm)	# of Meters
Magnetic	
40	1
50	3
75	1
100	2
150	1
200	3
250	1
300	1
Unknown Size	8
Total Magnetic	**21**

Size (mm)	# of Meters
Mechanical	
50	1
75	1
200	1
Unknown Size	6
Total Mechanical	**9**
Ultrasonic	
Unknown Size	1
Total Ultrasonic	**1**
Combined Total	**31**

KWL was able to determine the type of meter in all cases from the CRDs database, which has complete "description" and "manufacturer" fields. Meter size is only 50% complete in the database, located in the "description" field for 16 of the 31 meters.

2.2 Meter Sizing Review

For the JDFWD system, 40 percent of revenue is received from meters sized 1" and greater, representing only 6.3 percent of the meter inventory. It is therefore critical that these meters be systematically reviewed to ensure that they are sized and functioning correctly.

Sizing customer meters based on the peak flow rates that the meter is expected to encounter is a common practice leading to meter under-registration, lost revenue, and a more costly inventory of assets. Because peak flows occur only rarely, meters sized this way will register flows in the low end of their design range most of the time. Mechanical SR and turbine meters are less accurate in the low end of their flow range and will not register any flow below their specified minimum flow limits. Current

wisdom focusses on the flow range most usually encountered, not seldom occurring peak flows. Right-sizing meters can recover considerable water and revenue.

Right-sizing meters requires knowledge of how water is being used. Data-logging technology provides the means to obtain detailed customer consumption profiles in increments of minutes. This method is commonly referred to as flow profiling. AMR meter networks offer the ability to complete customer flow profiling, as do stand-alone data-loggers such as the Meter-Master. The CRD owns a number of Meter-Masters that are used for conservation focussed Industrial/Commercial/Institutional (ICI) water audits throughout the CRD. The CRD should therefore have flow profiles for some of its large meter customers in the JDFWD.

Right-sizing meter replacement programs start with a desktop study to narrow the search for under-registering meters. Customer flow profiling can then be completed for the portion of meter replacements where further customer data is warranted prior to right-sizing or downsizing the meter.

A desktop review of 25mm through 150mm customer billing meters was completed to estimate percentages of the inventory that may be under-registering. Account numbers of meters identified as potentially under-registering are provided in Appendix A. This review compared customer average day demands (ADD) to the meters minimum flow limit. Meters registering an ADD of less than 25% of the meter manufacturer's stated minimum flow limit are likely to significantly under-register.

The following criteria and assumptions were used:

- Initial review of 25mm through 150mm meters that are the sole customer meter (compound meters excluded) that registered flow in all six billing cycles of 2015 (meters registering zero volume for any billing cycle were excluded);
- Secondary review of 40mm and 50mm meters in both single and acting as primary meter in compound arrangements, that registered flow in all recorded cycles;
- The following mechanical meter models and corresponding meter minimum flows were assumed for each meter size:

Meter Size (mm)	Minimum Flow (L/s)	Assumed Model
25	0.017	SRII
40	0.028	SR – DN40
50	0.125	SR - DN50
75	0.252	W-350 DR
100	0.631	W-1000 DR
150	1.262	W-2000DR

- The following flow criteria is assumed to categorize meters and the probability of under-registration:
  - ADD < 0.25 x Minimum Flow;
  - ADD < 0.10 x Minimum Flow; and
  - ADD < 0.05 x Minimum Flow.

Table 2-3 provides the results of the initial review for 25mm – 150mm single meter sites. Table 2-4 provides the results of the review for 40mm and 50mm meters in both a single meter configuration and primary meter in a compound meter configuration.

Table 2-3: 25mm through 150mm Billing Meter Flow Analysis (Single Meter Arrangement)

Meter Size (mm)	# of Meters Analyzed	% of Meter Size	Total Volume (ML)	% of Total Volume for Meter Size	# of Meters with ADD <			% of Meters Analyzed with ADD <		
					25% Min Flow	10% Min Flow	5% Min Flow	25% Min Flow	10% Min Flow	5% Min Flow
25	448	70%	272	82%	260	81	21	58%	18%	5%
40	8	21%	8	3%	3	3	1	38%	38%	13%
50	313	52%	905	48%	107	45	22	34%	14%	7%
75	40	78%	241	67%	2	1	0	5%	3%	0%
100	6	14%	64	59%	1	0	0	17%	0%	0%
150	1	2%	6	11%	1	0	0	100%	0%	0%
TOTALS	**816**	**58%**	**1,496**	**49%**	**374**	**130**	**44**	**46%**	**16%**	**5%**

Table 2-4: 40mm and 50mm Billing Meter Flow Analysis (Single and Compound Arrangements)

Meter Size (mm)	# of Meters Analyzed	% of Meter Size	Total Volume (ML)	% of Total Volume for Meter Size	# of Meters with ADD <			% of Meters Analyzed with ADD <		
					25% Min. Flow	10% Min. Flow	5% Min. Flow	25% Min. Flow	10% Min. Flow	5% Min. Flow
40	39	100%	283	100%	5	4	2	13%	10%	5%
50	527	88%	1888	100%	179	84	53	34%	16%	10%
TOTALS	**566**	**380%**	**2,171**	**39%**	**184**	**88**	**55**	**33%**	**16%**	**10%**

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The 25mm and 50mm meter inventory has the largest number of meters with ADD flows less than 25% of the meter manufacturers stated minimum registered flow. All five 40mm meters registering less than 25% of the minimum flow rate are installed in a single meter configuration. Note that only three of these meters show up in Table 2-3 as two had less than 6 billing cycles and were therefore excluded from the initial analysis.

The following is noted with regards to the type of customer serviced by 25mm and 50mm meters: 62% of 25mm meters and 63% of 50mm meters registering an ADD of less than 25% of the meter's minimum flow are metering customers have BCAA land use descriptions of single family, single family with basement suite, single unit ownership row house or single family dwelling on two or more acres.

Meters 40mm and 75mm through 150mm in diameter generally appear to be appropriately sized. In the future, more attention should be taken in right-sizing residential customers where a larger 25mm or 50mm service is requested or warranted by the building code. It is noted that the required service size, as calculated by the BC building code fixture unit count method, is intended for sizing of the service piping and not sizing of the meter.

The CRD is currently updating their design standards; it is recommended that right-sizing to AWWA M22 be incorporated into this update.

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Section 3

Water Balance

3. Water Balance

3.1 Overview

This section of the report provides the results of a top-down water audit for the JDFWD Westshore and Sooke systems, based on 2015 data. The audit is based on the AWWA M36 standard method. The ultimate purpose of the audit is to determine the sources of non-revenue water and identify where improvements can be made to reduce the cost of providing treated water delivery service. It is the CRD's goal to deliver high quality drinking water to customers and manage water infrastructure in a sustainable manner.

The JDFWD system is owned and operated by the CRD and provides drinking water to the Westshore which for the Westshore which includes the municipalities of Langford Colwood, View Royal, Metchosin, and East Sooke (CRD). The JDFWD system also distributes water to Sooke. The Sooke system is isolated form the Westshore system and has been audited separately.

Source metering can be a large source of error in an audit given the large volumes passing through the source meters. The JDFWD Westshore system has multiple unmetered connections to the RWS system and therefore the location of source metering for the audit is at the in-line meters on Main #4 and #5 downstream of the JGWTP. Consideration must be given to the components of loss in the RWS system within the Westshore as well as the accuracy of the in-line meters that register water leaving the Westshore through the RWS system.

Refer to Figure 1-1 for a reference to key source and in-line meter locations and the pipes included in the JDFWD systems.

3.1.1 System Boundary and Sub-Boundaries

Westshore

Source flows for the audit are taken from the in-line meters on Mains #4 and #5 downstream of the JGWTP. The audit boundary includes all components of the JDFWD and RWS system downstream of the source meters to the extents of the JDFWD Westshore system and inline meters on the RWS system at Burnside 48", Adams, St. Giles, Craigflower, and RWS bulk meter at Admirals.

Sooke

The JDFWD Sooke system is fed from RWS Main #15 from Sooke Lake, and is treated and metered at the Sooke River Road Disinfection Facility. The boundary of the Sooke system audit is from the source meter at the Sooke River Road Disinfection Facility to the extents of the JDFWD Sooke system.

3.1.2 Time Period

The water audit was completed for the 2015 calendar year.

3.2 Distribution System Information (AWWA M36 TASK 1)

3.2.1 Westshore System Information

The physical characteristics of the water system are required in order to calculate key performance indicators, particularly the Infrastructure Leakage Index (ILI). Pertinent characteristics of the JDFWD system are:

- 381 km of distribution mains;
- 18,071 metered customer connections (retail meters);
- 181 kilometers of service connection lines (assumed 10 m per retail customer meter); and
- Numerous unmetered connections from the RWS system to the Westshore system off of Mains #1, #3, and #4.
- Numerous unmetered connections to the Westshore system off Mains #1, 2, 3, 4, 7, 8, and 14.

The JDFWD Westshore system is assumed to be operated at an average pressure of 50 meters head.

3.2.2 Sooke System Information

Pertinent characteristics of the Sooke system are:

- 132 kilometers of watermains;
- 4,415 metered customer connections (retail meters); and
- 44 kilometers of service connection lines (assumed 10 m per retail customer meter).

The JDFWD Sooke system is assumed to be operated at an average pressure of 50 meters head.

3.3 Water Supplied into the System (AWWA M36 TASK 2)

For the Westshore system both SCADA data and monthly manual meter read data was made available. For the purpose of this audit the monthly data was used, as it was found to be more reliable and was available for the entire audit period. Hourly SCADA data was used for the Sooke system audit.

3.3.1 System Input Volume Westshore

Flows into the RWS and JDFWD systems are measured through two Siemens 5100W mag meters installed just downstream of the JGWTP; one on Main #4 and the other on Main #5. Both meters are 762 mm diameter. The meters were installed in 2006 and were initially calibrated using a 6-point calibration test performed by the manufacturer (Calibration Report provided by CRD) to ensure accurate measure of flows between 100 and 1200 L/s. The minimum cut-off flow for these meters is approximately 20 L/s. The meters at the time of initial calibration had very low error over the range of tested flows, less than 0.2% of reading.

The manufacturer's rated precision of the meters is as follows:

for velocities greater than 0.1 m/s error is ±0.4% of reading ± 2 mm/s; and

for velocities less than 0.1 m/s error is ± 0.25/velocity % of reading.

A velocity of 0.1 m/s is approximately 45 L/s and corresponds to an error of 2.4%.

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Review of SCADA data for the month of January 2015 revealed that minimum flows through each meter very rarely fell below 100 L/s. Minimum flow is typically between 100 – 200 L/s per meter. The average flow rate is between 350 – 550 L/s per meter and peak flow rate is between 800 - 1100 L/s.

Given the manufacturer's rated precision, the above flow regime has the following assumed metering error:

- January Minimum Flow (100-200 L/s) = 0.86% – 1.3% of reading
- January Average Flow (350 – 550 L/s) = 0.57% – 0.66% of reading
- January Peak Flow (800 – 1100 L/s) = 0.48% – 0.51% of reading.

Source metering error is approximated as ±0.6%.

Table 3-1 displays the monthly source flow totals as read by the CRD technicians along with the physical meter read totals.

Table 3-1: Total Intake Volume (Japan Gulch Mag-Meters)

Billing Month	Number of Days in Billing Month	Read Date	Total Intake (Japan Gulch)			
			Main No. 4	Main No. 5	Main No. 4+5	Main No. 4+5
			Totalizer Reading (m^3)	Totalizer Reading (m^3)	Combined Volume (ML)	Estimated Daily Flow (ML/day)
		December 31, 2014	32220562	43540359		
January	30				2,710	90
		January 30, 2015	32436728	43920468		
February	28				2,588	92
		February 27, 2015	32647113	44279449		
March	32				3,039	95
		March 31, 2015	32900523	44694601		
April	30				3,121	104
		April 30, 2015	33153836	45127946		
May	29				4,419	152
		May 29, 2015	33523602	45730362		
June	32				6,197	194
		June 30, 2015	34096300	46520973		
July	31				5,990	193
		July 31, 2015	34710669	47224406		
August	31				5,516	178
		August 31, 2015	35290572	47858033		
September	30				3,651	122
		September 30, 2015	35639415	48312332		
October	30				3,113	104
		October 30, 2015	35932039	48704483		
November	31				2,965	96
		November 30, 2015	36222237	49066593		
December	31				2,847	92
		December 31, 2015	36499293	49415929		
2015 TOTAL from Monthly Meter Readings					**46,156**	

Flow to the Westshore system, including losses in the RWS system within the Westshore area, is calculated by deducting the flow passing into the Core area through the inline meters at Burnside, St. Giles, Adams, Craigflower, and the Admirals billing meter to Victoria. The total volume registered through these meters in 2015 is provided below:

- Burnside 48" = 14,060 ML
- Adams = 8,914 ML
- St. Giles = 10,319 ML
- Craigflower = 5,014 ML
- Admirals = 255 ML

The volume of water supplied to the Westshore is calculated to be 7,594 ML by deducting the above metered volumes from the total combined volume of 46,156 ML from Table 3-1. Metered authorized consumption in the Westshore, including the flushing program, was 7,258 ML, which leaves a balance of 336 ML for forms of un-metered authorized use and real and apparent water loss. This volume estimate for un-metered authorized use and real and apparent water loss is too low, pointing to either source meter under-registration or in-line meter over-registration.

In-Line Meter Over-Registration, and Real Water Loss

Understanding the accuracy of the in-line meters is essential to determining the level of loss in the JDFWD-Westshore system.

The RWS water audit (see separate report) estimated a total combined RWS & JDFWD water loss (real and apparent) of 3,995 ± 287ML for 2015. A number of meter replacements and calibration of the Victoria Cecelia meter were completed in 2016 that attributed 2,842 ±360 ML of apparent losses in the RWS system, comprised primarily on Mains #1 and #3 in the Core (downstream of the in-line meters). There was also an estimated 145 ML of loss at the Haliburton Reservoir.

The total combined real losses (RWS + JDFWD Westshore), excluding Haliburton Reservoir losses were therefore estimated as:

RWS + JDFWD Westshore Real Losses = 3,995 ± 287ML - 2,842 ±360 ML – 145 ML = 1,008 ± 460 ML

The theoretical unavoidable annual real loss (UARL) is a function of pipe length, type (service or main), and pressure; and is calculated as follows:

*UARL = (18*Lm + 0.8*Nc + 25 Lp) * P where;*

Lm is the length of distribution mains (in km);

Nc is the number of meters;

Lp is the length of service connections (in km) assumed as 10 m times # of service connections; and

P is the average pressure of the system (in m head).

Table 3-2 provides the unavoidable annual real losses for the JDFWD Westshore and RWS system.

Table 3-2: UARL Calculation for Westshore

SYSTEM	Lm (km)	Nc (#)	Lp (km)	P (mHead)	UARL (ML/Year)	% of Total
JDFWD Westshore	381	18,071	181	50	471	90.9%
RWS - Westshore Area Only	41	0	0	60	16	3.1%
TOTAL (Westshore Area)	422	18,059	181		487	94%
Complete RWS System	101	48	0	70	47	9.1%
TOTAL (RWS + JDFWD)	482	18,119	181		518	100%

The theoretical minimum yearly real losses for the JDFWD Westshore and RWS system upstream of the in-line meters is 487 ML however the inline meter water balance provides only 336 ML for real and apparent losses plus forms of un-metered authorized use in the JDFWD system. This provides strong evidence of over-registration at the in-line meters. Over-registration is suspected at the venturi meters (St. Giles and Burnside 48").

The proportion of losses associated with RWS and JDFWD are instead calculated by assuming the two systems have an equivalent infrastructure leakage index (ILI) for mains (excluding the known loss volume of 145 ML/year at Haliburton reservoir).

The ILI is a ratio of the current annual real losses (CARL) to the UARL. It provides a condition rating for a system in terms of water loss and is expressed as:

ILI = CARL / UARL

Table 3-2 provides UARL as a % of the total, from which losses in the Westshore are estimated as:

JDFWD Westshore Real Losses = 90.9% x 1,008 ML = 916 ML

RWS (Westshore Area) Real Losses = 3.1% x 1,008 ML = 31 ML.

To estimate the combined over-registration of the inline meters, we must estimate the quantity of apparent loss and forms of un-metered authorized use such that a direct comparison of real losses estimates, calculated by the two separate methods, can be made. Refer to Sections 3.4.4 and 3.7.2.

Apparent losses in the JDFWD are largely attributed to retail customer metering error. Assuming an average 2% retail customer meter under-registration, JDFWD system metering inaccuracy equates to 144 ML. Un-metered authorized use is estimated to be 10ML. The real loss estimate, calculated with in-line meter data, is therefore:

JDFWD Westshore + RWS (Westshore) Real Losses = 336 ML – 144 ML – 10 ML = 182 ML

In-line meters over-registration is calculated as follows:

In-Line Meter Over-registration = Real Loss Estimate within the Westshore – Real losses Estimated (from In-Line Meters) = 916 ML + 31 ML – 182 ML = 765 ML.

Westshore Adjusted Source Volume

The source volume is adjusted by the expected error in measurement. A ±0.6% error in the Main #4 and #5 meters would result in a volume error of ± 277 ML. Uncertainty in the in-line meters measurement must also be included.

An over-registration of 765 ML is estimated for the in-line meters. The uncertainty in this estimate is a function of uncertainty in the source meters as well as uncertainty in the distribution of real and apparent losses within the RWS system.

The combined standard uncertainty is found by squaring the uncertainties, adding them together, and taking the square root of the total. However, the total uncertainty in the source volume is equal only to the uncertainty in the in-line meter estimate, as it is already a function of the Main #4 & #5 source meter uncertainty.

The source volume is therefore calculated as:

JDFWD-Westshore Source Volume = Main #4 & Main #5 registered volume – Combined In-line meters registered volume + Estimated Over-registration in In-line meters =

46,156 ML – 38,562 ML + 765 ± 443 ML = ***8,359 ± 443 ML***

3.3.2 System Input Volume Sooke

The Sooke System is completely separate from the Westshore and RWS systems and is measured at the Sooke River Road Disinfection Facility (SRRDF) via three 200mm Siemens 3100 Mag meters installed in 2009.

The manufacturer's rated precision of the meters is 0.2% ±1 mm/s.

Review of SCADA data revealed that minimum flow through the meter was approximately 15 L/s. The average day flow rate is approximately 50 L/s and the seasonal maximum day rate is approximately 75 L/s.

Given the manufacturer's rated precision, minimum night flows will have an accuracy of ±0.67%. The site's average accuracy is ±0.34%.

Table 3-3 displays the monthly source flow totals from SCADA.

Table 3-3: Total Intake Volume (Sooke River Road Disinfection Facility)

Billing Month	Number of Days in Billing Month	Total Intake (Sooke River Road Disinfection Facility)	
		SRRDF	SRRDF
		Volume (ML)	Estimated Daily Flow (ML/day)
January	31	106	3.4
February	28	99	3.5
March	31	107	3.4
April	30	112	3.7
May	31	148	4.8
June	30	180	6.0
July	31	183	5.9
August	31	172	5.5
September	30	116	3.9
October	31	112	3.6
November	30	104	3.5
December	31	106	3.4
2015 TOTAL from Hourly SCADA Data		**1,545**	

Sooke Adjusted Source Volume

The source volume of 1,545 ML has an uncertainty of 0.34% or ±5 ML.

The source volume is therefore 1,545 ML ± 5 ML.

3.4 Authorized Consumption (AWWA M36 TASKS 3 &5)

Authorized consumption consists of the following:

- **Quantify Billed Authorized Consumption (AWWA M36 TASK 3)**
  - Billed Water Exported (bulk custody meters)
  - Billed Metered Consumption (individual end-user meters)
  - Billed Unmetered Consumption
- **Quantify Unbilled Authorized Consumption (AWWA M36 TASK 5)**
  - Unbilled Metered Consumption
  - Unbilled Unmetered Consumption

Westshore

For the audit period, the JDFWD-Westshore authorized consumption was calculated to be 7,268 ML. The components of this figure are detailed in the following sections.

Sooke

For the audit period, the JDFWD-Sooke authorized consumption was calculated to be 1,186.2 ML. The components of this figure are detailed in the following sections.

3.4.1 Billed Water Exported

Westshore

For the purpose of the audit, the Westhills bulk billing meters are considered billed water exported. The total water supplied through these meters was:

- Westhills = 161 ML.

Sooke

There is no billed water exported in the Sooke system.

3.4.2 Billed Metered Consumption

Billed metered consumption is the total quantity of water measured and sold through retail meters during the audit period. In the water balance, measurement error in retail metering is enumerated separately as non-revenue water.

The JDFWD bills to approximately 22,486 meters in the Westshore. Of these customers, approximately 18,071 meters are connected to the RWS system through the Westshore distribution system. The remainder, 4,415 are located in the Sooke system.

Westshore

The JDFWD residential meter data generally represents the 2015 calendar year. The following is a summary of the database:

- Meters are read in 4 different meter read blocks, approximately 5,000 meters per block. The start dates for these blocks are as follows:
  - Block 1: October 24, 2014;
  - Block 2: November 7, 2014;
  - Block 3: November 21, 2014; and
  - Block 4: December 5, 2014.
- The final meter read dates for the 4 blocks are as follows:
  - Block 1: October 23, 2014;
  - Block 2: November 6, 2014;
  - Block 3: November 20, 2014; and
  - Block 4: December 4, 2015.
- The database represents 364 days of consumption for the vast majority of customers, 17,709;
- 333 customers had less than 364 days of consumption (new customers);

- 15 customers had 365 days of consumption;
- 14 customers had between 366 and 659 days of consumption;
- 18,059 meters read in cubic meters;
- 8 meters read in 100 cubic feet increments;
- 1 meter reads in 1000 imperial gallons increments; and
- 3 meters read in 10 cubic meter increments.

An additional average October 2015 day of consumption was added to the total billed consumption to account for the dataset only representing 364 days of consumption, generally starting and ending in the fall. An average October 2015 day was estimated from the billing database to represent 16 ML.

The total billed metered consumption for the Westshore is therefore estimated to be 7,029 ML.

Sooke

The JDFWD residential meter data generally represents the 2015 calendar year. The following is a summary of the database:

- The initial start date for the majority of meter reads was December 5, 2014. The earliest initial start date was November 21, 2014, 304 meters were read on this date;
- The final meter read date for the majority of meters was December 4, 2015 and meters initially read on November 21, 2014 had a final read on November 20, 2015;
- The database represents 364 days of consumption for the vast majority of customers, 4,316 of 4,415;
- 92 customers had less than 364 days of consumption (new customers);
- 7 customers had between 366 and 375 days of consumption; and
- 4,414 meters read in cubic meters and 1 customer reads in 100 cubic feet increments.

An additional average December 2015 day of consumption was added to the total billed consumption to account for the dataset only representing 364 days of consumption, generally starting and ending in early December. An average December 2015 day was estimated from the billing database to represent 2.1 ML.

The total billed metered consumption for Sooke is therefore estimated to be 1,186 ML.

Table 3-4 provides a summary of revenue water for the two systems:

Table 3-4: Summary of Revenue Water

System	Billed Water Exported	Billed Metered Consumption	Billed Unmetered Consumption	Total Revenue Water
Westshore	161 ML	7,029 ML	0 ML	**7,190 ML**
Sooke	0 ML	1,186 ML	0 ML	**1,186 ML**

3.4.3 Billed Unmetered Consumption

There are no forms of billed unmetered consumption in the JDFWD systems.

3.4.4 Unbilled Authorized (Metered and Unmetered) Consumption

Unbilled authorized consumption (both metered and unmetered) typically occurs for operational purposes that are necessary for a municipality to function properly. For example, operational uses include water for fire-fighting and training, flow testing, flushing of watermains and sewers, and street cleaning. AWWA notes that in most water utilities unbilled authorized consumption is a very small component which is very often substantially overestimated when the water is unmetered.

Given that there are many sub-components to unbilled authorized consumption that are difficult to quantify, the AWWA recommends that most water utilities should use a default value of 1.25% of the system input volume.

Westshore

Watermain flushing is the largest source of unbilled authorized consumption, and is metered by the CRD. As part of the JDFWD Watermain Cleaning Program for 2015 a total metered volume of 68 ML was used to flush 255 km of watermains in the Westshore System (2015 UDF Program Annual Summary – Water Usage).

An additional 10 ML is estimated for all other uses, giving a total unbilled authorized use of 78 ML. This total unbilled authorized use is just below the AWWA 1.25% default value which would equate to 95 ML.

Losses in the RWS system within the Westshore, estimated to 31 ML, are also accounted for within unbilled authorized use.

Therefore, the total Westshore unbilled authorized consumption is calculated as:

Flushing (68 ML) + Other Uses (10 ML) + RWS Real Losses (31 ML) = 109 ML

Sooke

Watermain flushing is the largest source of unbilled authorized consumption, and is metered by the CRD. As part of the JDFWD Watermain Cleaning Program for 2015 a total metered volume of 13 ML was used to flush 45 km of watermains in the Sooke System as well as several reservoirs (2015 UDF Program Annual Summary – Water Usage).

An additional 2 ML is estimated for all other uses, giving a total unbilled authorized use of 15 ML. This total unbilled authorized use is just below the AWWA 1.25% default value which would equate to 19 ML.

The total authorized consumption for the systems is:

- Westshore = Revenue (7,190 ML) + Unbilled (109 ML) = 7,299 ML
- Sooke = Revenue (1,186 ML) + Unbilled (15 ML) = 1,201 ML

3.5 Non-revenue Water (AWWA M36 TASK 4)

Non-revenue water is the portion of water that the CRD treats and distributes that is not billed and therefore does not generate revenue. Non-revenue water consists of unbilled authorized consumption (discussed above), apparent losses and real losses. In the top-down audit approach, non-revenue water is calculated as the remaining water supplied to the system that is not accounted for within the billing records.

Westshore

Non-revenue water in the Westshore system is estimated as:

= System Input Volume (8,359 +/- 443 ML) – Revenue Water (7,190 ML) = 1,169 ±443 ML.

Sooke

Non-revenue water in the Sooke system is estimated as:

= System Input Volume (1,545 +/- 5 ML) – Revenue Water (1,186 ML) = 359 ±5 ML.

3.6 Water Losses (AWWA M36 TASK 6)

Water losses are made up of apparent and real losses. In the AWWA water audit approach, water losses are determined as the adjusted source volume minus authorized consumption.

Westshore

Water losses in the Westshore system are estimated as:

= System Input Volume (8,359 +/- 443 ML) – Authorized Consumption (7,299 ML) = 1,060 ±443 ML.

(Note: Estimated 31ML of RWS losses accounted for as part of authorized unbilled unmetered consumption)

Sooke

Water losses in the Sooke system are estimated as:

= System Input Volume (1,545 +/- 5 ML) – Authorized Consumption (1,201 ML) = 344 ±5 ML.

3.7 Apparent Losses (AWWA M36 TASK 7)

Apparent losses consist of three main components:

1. Unauthorized consumption.
2. Customer metering inaccuracies; and
3. Data-handling errors.

The components of apparent losses and calculations are given below.

3.7.1 Unauthorized Consumption

Unauthorized consumption typically includes:

1. Illegal Connections,
2. Misuse of fire hydrants and flush valve systems, and
3. Vandalized or bypassed consumption meters.

Unauthorized consumption is difficult to monitor in a large distribution system; most cases of unauthorized consumption only being discovered if caught in the act.

AWWA recommends an allowance of 0.25% of source flows be used as an estimate of unauthorized consumption of a system.

Unauthorized consumption for the two systems is therefore estimated to be:

- **Westshore** = 21 ML; and
- **Sooke** = 4 ML.

3.7.2 Customer Metering Inaccuracy

A meter replacement program was completed in 2013/2014 that replaced 413 retail meters for the purpose of accuracy testing. The program targeted replacement of meters from 1994, the oldest of the meter inventory. Testing was completed to AWWA standards. The average percentage of flow registered over the three test flows were as follows:

- High Flow = 97.83%
- Medium Flow = 98.06%
- Low Flow = 86.24%

The overall accuracy is calculated assuming the following flow regime:

  - High Flow = 2% of average flow;
  - Medium Flow = 86% of average flow; and
  - Low Flow = 12% of average flow.

The overall accuracy of the meters tested, the oldest in the system, is therefore estimated to be 96.6%. A new meter will register 99.8%, given the performance characteristics of an SRII. The average percentage of flow registered by the meter inventory is estimated to be 98% ±1% provided the average error is roughly half way between the error of the newest and oldest meters in the inventory.

Westshore

Customer metering inaccuracies in the Westshore system are estimated to be:

= Billed Authorized Consumption (7,190 ML) x (2% ± 1%) = 144 ±72 ML.

Sooke

Customer metering inaccuracies in the Sooke system are estimated to be

= Billed Authorized Consumption (1,186 ML) x (2% ± 1%) = 24 ±12 ML.

3.7.3 Data Handling Errors

Systematic data handling errors for the RWS are apparent losses associated with the handling of retail water meter billing system. Errors are associated with estimates due to missed meter reads, errors in meter reads, and customer billing disputes and leak credit adjustments that make their way into the meter read database.

The customer billing data was reviewed and no clear errors were found. The AWWA recommends a minimum default value of 0.25% of billed authorized consumption be attributed to data handling errors.

Data handling errors are therefore estimated to be:

- **Westshore** = Billed Authorized Consumption (7,190 ML) x 0.25% = ±18 ML; and
- **Sooke** = = Billed Authorized Consumption (1,186 ML) x 0.25% = ± 3 ML.

3.7.4 Total Apparent Losses

In total, apparent losses are estimated to be:

- **Westshore** = Unauthorized consumption (21 ML) + Customer Metering Inaccuracy (144 ±72 ML) + Data handling errors (±18 ML) = 165 ±74 ML; and
- **Sooke** = Unauthorized consumption (4 ML) + Customer Metering Inaccuracy (24 ±12 ML) + Data handling errors (±3 ML) = 28 ±13 ML.

3.8 Real Losses (AWWA M36 TASK 8)

Real losses are calculated by subtracting apparent losses from total losses.

Westshore

In the Westshore, real losses are estimated to be:

Total Losses (1,060 ±443 ML) – Apparent Losses (165 ±74 ML) = 895 ± 449 ML.

Sooke

Real losses in Sooke are estimated to be:

Total Losses (344 ±5 ML) – Apparent Losses (28 ±13 ML) = 316 ±14 ML.

A bottom up minimum night flow assessment of losses was completed to validate this estimate.

The minimum hourly flow was approximately 15.0 L/s in 2015. A minimum night usage rate of 4 L/hour/connection is estimated which roughly equates to 1 toilet flush / hand basin use per dwelling between the hours of 2AM and 4AM. Given 4,390 customer connections legitimate night use is estimated to be 4.9 L/s. The bottom up estimate of real losses is 10.1 L/s or 318.5 ML per year which is in close agreement with the above top-down estimate.

A large but un-quantified loss was found in the spring of 2016 at the Helgesen Reservoir. It is uncertain what proportion of real losses in 2015 is Helgesen Reservoir leakage.

3.9 Costs of Apparent and Real Losses (AWWA M36 TASK 9)

Determining the cost impacts associated with apparent and real losses provides for business case analysis of loss reduction strategies.

The CRD adjusts its rates annually to reflect the costs of service, therefore apparent losses are not a problem of lost revenue but instead a concern for user pay equity as some users end up paying more to subsidize customers that are undercharged.

Apparent losses are valued at the rate that is charged to the customer. The CRD utilizes a volumetric rate structure for water billing. The 2015 western communities retail rate was $1.8767 per cubic metre ($1,877 per ML). The costs associated with each source of apparent losses identified in the Westshore and Sooke systems are estimated in Tables 3-5 and 3-6 below.

Table 3-5: Cost Associated with Apparent Losses in the Westshore System

Sources of Water Loss	Yearly Volume ML	Yearly Cost $
Data Handling Errors	±18 ML	± 33,800
Unauthorized Consumption	21	$39,000
Customer Metering Inaccuracies	144 ± 72 ML	$270,000 ± $135,000
TOTAL	**165 ± 74 ML**	**$309,000 ± $139,000**

Table 3-6: Cost Associated with Apparent Losses in the Sooke System

Sources of Water Loss	Yearly Volume ML	Yearly Cost $
Data Handling Errors	±3 ML	± $5,600
Unauthorized Consumption	4 ML	$7,300
Customer Metering Inaccuracies	24 ± 12 ML	$45,000 ± $22,000
TOTAL	**28 ± 13 ML**	**$52,000 ± $24,000**

Real losses are typically valued at the production cost to treat and deliver water to the leak location.

A unit cost of $50 per ML is estimated for chlorination, UV disinfection and pumping and is assumed for real losses. The cost of real losses is estimated in Table 3-7:

Table 3-7: Costs Associated with Real Losses

System	Yearly Volume ML	Yearly Cost $
Westshore	895 ± 449 ML	$45,000 ± $22,000
Sooke	316 ±14 ML	$16,000 $1,000
TOTAL	**1,211 ± 449 ML**	**$61,000 ± $22,000**

3.10 Performance Indicators (AWWA M36 TASK 10)

Infrastructure Leakage Index

The Infrastructure leakage index is the ratio of current annual real losses (CARL) to unavoidable annual real losses (UARL). The ILI is a highly effective performance indicator for comparing and benchmarking the performance of utilities in operational management of real losses. Table 3-8 presents the components used in the calculation of the ILI for each system.

Table 3-8: ILI Calculation

SYSTEM	Lm (km)	Nc (#)	Lp (km)	P (mHead)	UARL (ML/Year)	% of Total	CARL Est.	ILI Est.
JDFWD-Westshore	381	18,071	181	50	471	97%	895	1.9
RWS – Westshore Area	41	0	0	60	16	3%	31	1.9
TOTAL Westshore	482	18,119	181		487	100%	926	1.9
Sooke	132	4,415	44	50	128	100%	316	2.5

An ILI of 1.9-2.5 represents a well-run distribution system with little room for additional leak reduction. As the ILI approaches 1, costs increase to achieve loss reductions because of the level of effort to locate smaller leaks in the system and maintain the levels.

It is estimated that a $40,000 annual increase in bottom-up leak analysis and detection for the Westshore system and $15,000 for the Sooke system may lower the ILI to approximately 1.5 for both systems. Considering only the operational costs of treatment and pumping, decreasing the ILI to 1.5 with a $55,000 investment translates to a:

- 190 ML loss reduction for the Westshore system at a net operational cost increase of $31,000; and
- 120 ML loss reduction for the Sooke system at a net operational cost increase of $9,000.

The above is not a fully developed business case for leak detection programs but does indicate that a business case for additional leak detection works is not yet warranted given the CARL.

The following recommendations are made:

- Complete a detailed top down water audit every 5 years as well as internally produced expedient audits on a yearly basis. The expedient audit is meant to update the yearly system input volume, billed authorized consumption and other easily obtained components of the audit without detailed assessment of the data inputs. Calculate each systems ILI annually.
- At a future date, when justified by increased water loss in either of the JDFWD systems as identified by the yearly water audits, the CRD should develop a water loss management plan at an estimated one time capital budget of $50,000.

  The future water loss management plan should consider how loss reduction strategies and tools affect:

  - asset life expectancy;
  - break frequency reduction and annual repair cost budget;
  - continuity of service and levels of service;
  - reduction of financial risk related to property damage;
  - deferral of capital projects such as treatment plant expansions; and
  - sustainability goals.

3.11 The Water Balance (AWWA M36 TASK 11)

The water balances for the JDFWD and Sooke systems are presented in Figures 3-2 and 3-3 respectively.

<table>
<tr><td rowspan="12">System Input Volume
8,359 ± 443 ML</td><td rowspan="4">Authorized Consumption
7,299 ML</td><td rowspan="3">Billed Authorized Consumption
7,190 ML</td><td>Billed Water Exported
161 ML</td><td rowspan="3">Revenue Water
7,190 ML</td></tr>
<tr><td>Billed Metered Consumption **7,029 ML**</td></tr>
<tr><td>Billed Unmetered Consumption
0 ML</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
109 ML</td><td>Unbilled Metered Consumption
68 ML</td><td rowspan="9">Non-revenue Water
1,169 ±443 ML</td></tr>
<tr><td>Unbilled Unmetered Consumption
41 ML
(includes 31ML of RWS Real Losses)</td></tr>
<tr><td rowspan="8">Water Losses
1,060 ML ± 443 ML</td><td rowspan="3">Apparent Losses
165 ML ± 74 ML</td><td>Unauthorized Consumption
21 ML</td></tr>
<tr><td>Customer Metering Inaccuracies
144 ML ± 72 ML</td></tr>
<tr><td>Systematic Data Handling Errors
± 18 ML</td></tr>
<tr><td rowspan="5">Real Losses
895 ML
± 443 ML</td><td>Leakage on Transmission and Distribution Mains
Not Quantified Separately</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
Not Quantified Separately</td></tr>
<tr><td>Leakage on Service Connections up to point of Customer metering
Not Quantified Separately</td></tr>
</table>

Figure 3-1: AWWA M36 Water Balance Results – JDFWD-Westshore

<table>
<tr><td rowspan="9">System Input Volume
1,545 ML ±5ML</td><td rowspan="4">Authorized Consumption
1,201 ML</td><td rowspan="3">Billed Authorized Consumption
1,186 ML</td><td>Billed Water Exported
0 ML</td><td rowspan="3">Revenue Water
1,186 ML</td></tr>
<tr><td>Billed Metered Consumption **1,186 ML**</td></tr>
<tr><td>Billed Unmetered Consumption
0 ML</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
15 ML</td><td>Unbilled Metered Consumption
13 ML</td><td rowspan="7">Non-revenue Water
359 ML ±5ML</td></tr>
<tr><td>Unbilled Unmetered Consumption
2 ML</td></tr>
<tr><td rowspan="5">Water Losses
344 ML ±5ML</td><td rowspan="3">Apparent Losses
28 ML ±13 ML</td><td>Unauthorized Consumption
4 ML.</td></tr>
<tr><td>Customer Metering Inaccuracies
24 ML ±12 ML
Best Estimate = ML</td></tr>
<tr><td>Systematic Data Handling Errors
±3 ML</td></tr>
<tr><td rowspan="3">Real Losses
316 ML ±14 ML</td><td>Leakage on Transmission and Distribution Mains
Not Quantified Separately</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks
Not Quantified Separately</td></tr>
<tr><td>Leakage on Service Connections up to point of Customer metering
Not Quantified Separately</td></tr>
</table>

Figure 3-2: AWWA M36 Water Balance Results – JDFWD-Sooke

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Section 4

Asset Management

4. Asset Management

The scope of the asset management tasks covered in this section is limited to the lifecycle cost analysis and replacement planning of water meters, and does not include pipework, vaults/enclosures, meter reading equipment or other assets owned by the JDFWD except where noted. Meters have significantly shorter life expectancies than other tangible assets at meter sites. The renewal timing of other assets at meter sites is likely to be concurrent with watermain replacement.

Customer Billing Meters

The CRD completed a residential water meter replacement program that tested 413 of the oldest retail water meters for the purpose of developing a sustainable residential water meter replacement program for the JDFWD. The staff report recommended a replacement frequency of 1,000 meters per year of a 23-year replacement frequency an estimated budget of $500,000 per year (2014 dollars).

The decision was carried at the July 8, 2014 JDFWD Commission meeting to approve the replacement program, pending ratification of the 2015 budget. The budget planned for this project was reallocated to unexpected higher priority needs in 2015 and since then new budget has not been allocated to the replacement program.

The staff report recommendations are well founded. It is recommended that the residential meter replacement program be re-instated in 2018.

A financial analysis was completed to determine the optimum meter replacement frequency for all meter size categories within the inventory and validate the current meter replacement program budget.

Non-Billing Distribution System Meters

A replacement program for the 31 non-billing distribution system meters was developed based on a 30-year life-cycle.

Finally, lifecycle costs were assessed and a prioritized replacement program was developed.

4.1 Optimum Meter Replacement Frequency

Per the AWWA M6 "Water Meters - Selection, Installation, Testing, and Maintenance" manual, a water supplier should develop a meter replacement program based on testing of a representative sample of residential meters that establishes an accuracy versus age relationship. It is noted that the likely lowest cost replacement frequency will be less than 15 years, however local factors such as water chemistry and soil conditions will affect the mechanical decline and therefore optimum replacement frequency.

AWWA best practices also suggest that meter replacement should occur once a meter has passed 5,500 to 6,400 cubic metres due to wear of the mechanical components. The average 15-19mm meter passes 240 cubic metres per year resulting in an estimated service life of approximately 25 years.

Figure 4-1 shows a typical cost curve for meter replacement. It can be seen that replacing meters at a high frequency results in less apparent loss as a result of meter inaccuracy. However, a high replacement frequency means higher replacement costs. Figure 4-2 overlays this typical cost curve with the value of recoverable apparent losses. The third curve shown is the addition of the two costs curves, known as the total cost curve. The economic level of apparent losses is the level of losses at the minimum point on this curve which determines the optimum meter replacement frequency.

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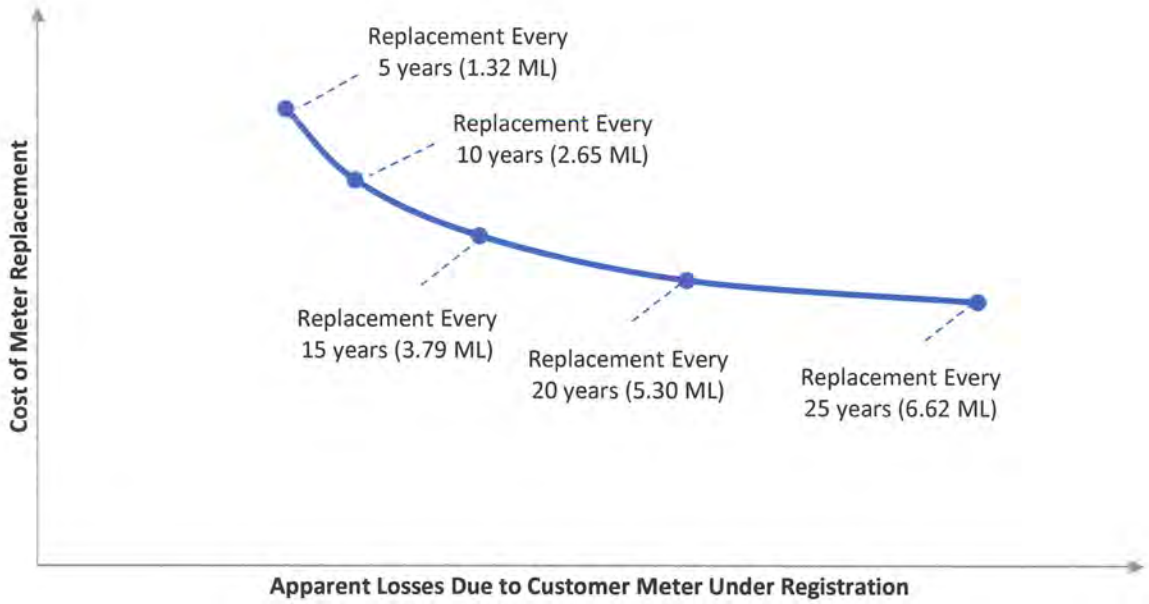

Figure 4-1: Theoretical Cost Curve for Meter Replacement from AWWA M36 Manual (2007)

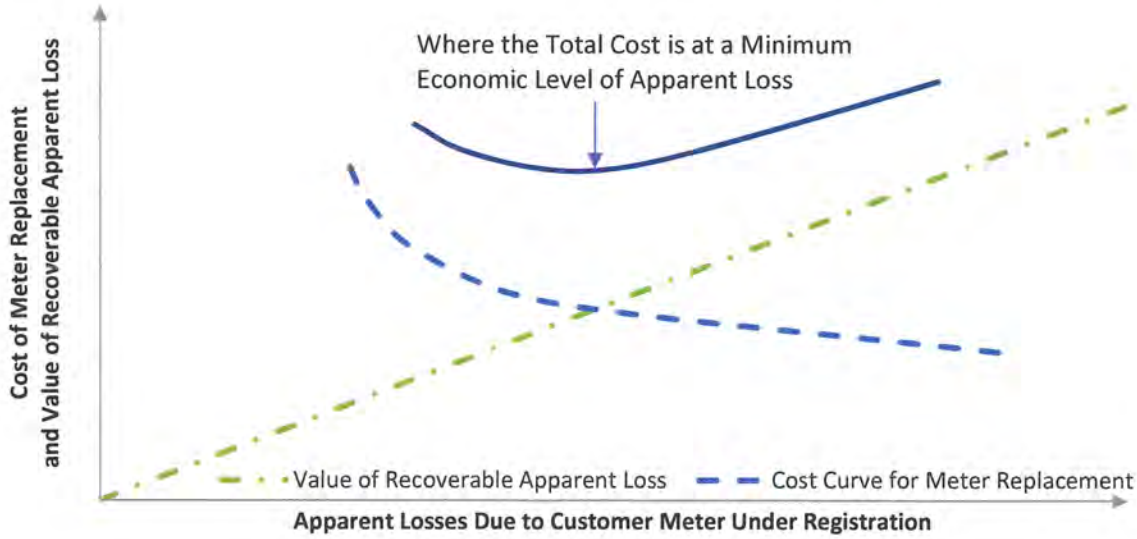

Figure 4-2: Economic Balance for Reduction of Apparent Losses through Meter Replacement (Theoretical - AWWA M36)

4.2 Sources of Apparent Metering Losses

Meters are subject to wear and loss of accuracy with continued use. Another common source of meter inaccuracy occurs when meters are oversized for the flow profile that they encounter. Many meter types fail to accurately measure low flow rates, therefore meters frequently experiencing low flows will be less accurate than appropriately specified meters.

The degree of inaccuracy in the meter population depends on:

1. The amount of cumulative flow that meters have registered;
2. The aggressiveness of the water in creating internal corrosion (meter age based deterioration); and
3. The degree of upkeep and renewal of the population.
4. Appropriate sizing and installation of meters (changes in customer use, is a reason for meter under registration);

Residential Meter Testing and Accuracy Estimation

Residential meter testing, completed by the CRD for its meter replacement program, was completed as per the AWWA M6 Manual of Water Supply Practices testing procedures. Meters were tested at low (0.25 GPM), medium (2 GPM) and high (12 GPM) flow rates in accordance with the procedure.

The majority of meters tested were 20 years old and therefore the rate at which meters wear must be assumed. Given the test results for the average 20-year-old meter, the following meter wear and accuracy assumptions were made:

- meters are assumed to remain in "as new" condition for the first 4-5 years;
- A linear relationship for wear and accuracy depletion over time is assumed after 5 years; and
- Linear accuracy depletion is based on 20-year-old meters having an average accuracy of 96.6% as per the test results.

Large Meter Sizing and Accuracy Estimation

KWL completed a high-level meter sizing review found that meters 75mm-150mm diameter generally appear to be appropriately sized. The review found that more attention should be taken in right-sizing residential customers where a larger 25mm or 50mm service is requested or warranted by the building code. It is noted that the required service size, as calculated by the BC building code fixture unit count method, is intended for sizing of the service piping and not sizing of the meter.

The average accuracy/age relationship for residential meters was used for financial analysis of the larger meters in the inventory.

Actual accuracy will depend on the factors listed above, including the flow regime for each meter. Use of the average residential meter accuracy for larger meters is deemed appropriate provided the variability of factors, including flow regime, present for large meter customers.

4.3 Meter Replacement Financial Analysis

The following financial analysis is done to determine the replacement frequency that offers the lowest average cost per year of use. Table 4-1 provides the inputs used in the analysis for each meter size. Meter replacement cost estimates were developed based on recent related project work and

manufacturer cost quotations assuming a like for like replacement. Table 4-2 provides the cost estimates for meter cost, parts and labour used in the analysis.

Table 4-1: Inputs to the Financial Analysis by Meter Size Category

Meter Size Category	Average Yearly Use (m^3)	Estimated Meter Replacement Cost	Cost of Apparent Losses $/m³	# of Meters
15-19mm	240	$250	$1.877	21190
25-40mm	907	$750	$1.877	679
50-75mm	3455	$1,300	$1.877	650
100mm	2480	$2,600	$1.877	44
150mm	1240	$4,600	$1.877	42
200-250mm	8080	$6,600	$1.877	13

Table 4-2: Estimated Meter Replacement Costs

Meter Size (mm)	Meter Cost	Parts/Labour	Total Replacement Cost
15-19	$100	$150	$250
25-40	$550	$200	$750
50-75	$1000	$300	$1,300
100	$2,200	$400	$2,600
150	$4,000	$600	$4,600
200-250	$6,000	$600	$6,600

The volume of yearly unregistered water use can be estimated given the accuracy of the meters and the average yearly flow rate through the meter population. The analysis is based on the annual distribution of both capital meter replacement costs and meter inaccuracy costs (apparent losses). The capital replacement costs per year of use will decrease as the number of years increases, however as meter accuracy declines the cost of lost revenues increases (Figure 4-2).

The cost of lost revenues for metering inaccuracies is the average unit cost charged to customers, $1.877/m³.

Table 4-3 gives the annual average cost of water meters for each year of use from installation to 50 years of use. The goal is to find the replacement frequency that offers the minimum annual cost, with replacement being required due to decreasing meter accuracy and increasing lost revenues.

Table 4-3: Financial Analysis - Annual Average Cost of Water Meters to 50 Years of Use (Minimum Average Cost of Service Highlighted to Show Optimal Replacement Frequency for Each Meter Category)

Estimated Meter Accuracy					15-19mm				25-40mm				50-75mm				100mm				150mm				200-250mm			
Meter Age	Average of Low Flow %	Average of Medium Flow %	Average of High Flow %	Average of Overall Weighted Average	Meter Cost	Cost of Use	Accumulative Cost	Average Cost / Year	Meter Cost	Cost of Use	Accumulative Cost	Average Cost / Year	Meter Cost	Cost of Use	Accumulative Cost	Average Cost / Year	Meter Cost	Cost of Use	Accumulative Cost	Average Cost / Year	Meter Cost	Cost of Use	Accumulative Cost	Average Cost / Year	Meter Cost	Cost of Use	Accumulative Cost	Average Cost / Year
0	99.0%	100.0%	99.0%	99.9%	$250	$1	$251	$251.3	$750	$5	$755	$754.8	$1,300	$18	$1,318	$1,318.2	$2,600	$13	$2,613	$2,613.0	$4,600	$7	$4,607	$4,606.5	$6,600	$42	$6,642	$6,642.5
2	99.0%	100.0%	99.0%	99.9%		$1	$253	$126.3		$5	$760	$379.8		$18	$1,336	$668.2		$13	$2,626	$1,313.0		$7	$4,613	$2,306.5		$42	$6,685	$3,342.5
4	99.0%	100.0%	99.0%	99.9%		$1	$254	$63.4		$5	$764	$191.1		$18	$1,354	$338.6		$13	$2,639	$659.8		$7	$4,620	$1,154.9		$42	$6,727	$1,681.8
6	98.0%	99.8%	98.9%	99.5%		$4	$258	$43.0		$16	$780	$130.0		$61	$1,415	$235.9		$44	$2,683	$447.1		$22	$4,641	$773.6		$142	$6,870	$1,145.0
8	97.0%	99.5%	98.7%	99.2%		$7	$265	$33.2		$27	$807	$100.9		$104	$1,519	$189.9		$74	$2,757	$344.6		$37	$4,679	$584.8		$242	$7,112	$889.0
10	95.2%	99.3%	98.6%	98.8%		$11	$276	$27.6		$42	$849	$84.9		$159	$1,678	$167.8		$114	$2,871	$287.1		$57	$4,736	$473.6		$371	$7,483	$748.3
12	93.4%	99.0%	98.4%	98.4%		$15	$291	$24.3		$56	$905	$75.4		$214	$1,891	$157.6		$154	$3,025	$252.0		$77	$4,812	$401.0		$500	$7,983	$665.3
14	91.6%	98.8%	98.3%	97.9%		$19	$310	$22.1		$71	$976	$69.7		$269	$2,161	$154.3		$193	$3,218	$229.8		$97	$4,909	$350.6		$629	$8,612	$615.2
16	89.8%	98.6%	98.1%	97.5%		$23	$332	$20.8		$85	$1,061	$66.3		$324	$2,485	$155.3		$233	$3,450	$215.6		$116	$5,025	$314.1		$758	$9,371	$585.7
18	88.0%	98.3%	98.0%	97.1%		$26	$359	$19.9		$100	$1,161	$64.5		$379	$2,864	$159.1		$272	$3,723	$206.8		$136	$5,161	$286.7		$887	$10,258	$569.9
20	86.2%	98.1%	97.8%	96.6%		$30	$389	$19.4		$114	$1,275	$63.8		$436	$3,300	$165.0		$313	$4,036	$201.8		$157	$5,318	$265.9		$1,020	$11,278	$563.9
22	84.4%	97.8%	97.7%	96.2%		$34	$423	$19.2		$129	$1,404	$63.8		$491	$3,791	$172.3		$353	$4,388	$199.5		$176	$5,494	$249.7		$1,149	$12,427	$564.8
24	82.6%	97.6%	97.5%	95.8%		$38	$461	$19.2		$143	$1,547	$64.5		$546	$4,338	$180.7		$392	$4,781	$199.2		$196	$5,690	$237.1		$1,278	$13,704	$571.0
26	80.8%	97.3%	97.4%	95.4%		$42	$503	$19.3		$158	$1,705	$65.6		$602	$4,939	$190.0		$432	$5,212	$200.5		$216	$5,906	$227.2		$1,407	$15,111	$581.2
28	79.0%	97.1%	97.2%	94.9%		$46	$548	$19.6		$172	$1,878	$67.1		$657	$5,596	$199.9		$471	$5,684	$203.0		$236	$6,142	$219.4		$1,536	$16,647	$594.5
30	77.2%	96.9%	97.1%	94.5%		$49	$598	$19.9		$187	$2,065	$68.8		$712	$6,308	$210.3		$511	$6,195	$206.5		$255	$6,397	$213.2		$1,665	$18,312	$610.4
32	75.4%	96.6%	97.0%	94.1%		$53	$651	$20.3		$201	$2,266	$70.8		$767	$7,075	$221.1		$551	$6,745	$210.8		$275	$6,673	$208.5		$1,794	$20,106	$628.3
34	73.6%	96.4%	96.8%	93.7%		$57	$708	$20.8		$216	$2,482	$73.0		$822	$7,897	$232.3		$590	$7,336	$215.8		$295	$6,968	$204.9		$1,923	$22,029	$647.9
36	71.8%	96.1%	96.7%	93.2%		$61	$769	$21.4		$230	$2,712	$75.3		$877	$8,775	$243.7		$630	$7,965	$221.3		$315	$7,283	$202.3		$2,052	$24,081	$668.9
38	70.0%	95.9%	96.5%	92.8%		$65	$834	$21.9		$245	$2,957	$77.8		$933	$9,707	$255.5		$669	$8,635	$227.2		$335	$7,617	$200.5		$2,181	$26,261	$691.1
40	68.2%	95.7%	96.4%	92.4%		$69	$903	$22.6		$259	$3,216	$80.4		$988	$10,695	$267.4		$709	$9,344	$233.6		$354	$7,972	$199.3		$2,310	$28,571	$714.3
42	66.4%	95.4%	96.2%	92.0%		$72	$975	$23.2		$274	$3,490	$83.1		$1,043	$11,738	$279.5		$749	$10,092	$240.3		$374	$8,346	$198.7		$2,439	$31,010	$738.3
44	64.6%	95.2%	96.1%	91.5%		$76	$1,051	$23.9		$288	$3,778	$85.9		$1,098	$12,836	$291.7		$788	$10,880	$247.3		$394	$8,740	$198.6		$2,568	$33,578	$763.1
46	62.8%	94.9%	95.9%	91.1%		$80	$1,131	$24.6		$303	$4,081	$88.7		$1,153	$13,989	$304.1		$828	$11,708	$254.5		$414	$9,154	$199.0		$2,697	$36,275	$788.6
48	61.0%	94.7%	95.8%	90.7%		$84	$1,215	$25.3		$317	$4,398	$91.6		$1,208	$15,197	$316.6		$867	$12,575	$262.0		$434	$9,588	$199.7		$2,826	$39,100	$814.6
50	59.2%	94.5%	95.6%	90.3%		$88	$1,303	$26.1		$332	$4,730	$94.6		$1,263	$16,461	$329.2		$907	$13,482	$269.6		$453	$10,041	$200.8		$2,955	$42,055	$841.1

The following general recommendations are made for the purpose of allocating a yearly replacement budget:

- A 23-year replacement frequency offers the lowest annual cost per year for 15mm, 19mm, and 100mm meters;
- A 21-year replacement frequency offers the lowest annual cost per year for 25 - 40mm and 200 - 250mm meters;
- A 15-year replacement frequency offers the lowest annual cost per year for 50 - 75mm meters; and
- A 43-year replacement frequency offers the lowest annual cost per meter for 150mm meters.

It is noted that the actual optimum replacement frequency is more dependent on the volumes registered by the meter and not the age. The reason why 150mm meters have an average optimum replacement frequency of 43 years is due to the large number of 150mm used as fire-flow only meters, thus not registering much volume. Similarly, 50mm and 75mm meters have the shortest optimum replacement frequency due to the high volumes they register.

4.4 Recommendations for Billing Meter Selection and Replacement

The following recommendations are made with regards to specifying meters for new developments:

- Create new section in CRD's Manual of Engineering Standards and Specifications for meter selection and sizing. This section should be based on AWWA M22 methodology.
- Provide a spreadsheet in CRD's Manual of Engineering Standards and Specifications for the right-sizing of meters. This will make both the calculation, completed by developers, and review, by CRD staff, easier.
- Specify that multi-phased developments have meter chamber sized for full build-out but size meter to match each phase of the development (developer to replace meter as necessary as phasing progresses).

The following recommendations are made with regards to replacement of existing meters:

- A meter sizing calculation should be done at the time of all replacements.
- Review and track changes in registered consumption. Utilize the yearly billing records to highlight meters that are potentially under-registering and use this data, along with meter age to prioritize replacements.

4.5 Cost Estimates for Non-Billing Distribution System Meters

Table 4-4 provides cost estimates for replacement of non-billing distribution system meters. The costs are based on the following assumptions:

- all stations will at a minimum require two short sections of piping to be replaced on either side of the meter with the inclusion of a flange adaptor;
- Allow engineer time ($600) for meter selection, and design retrofit of piping within the station;
- Three operator crew ($100/hr/operator) for one day allowed for meter sizes 50 – 200mm;
- Four-person crew ($100/hr/operator) and excavator ($250/hour) for one day allowed for meters sized 250 – 300mm; and
- Meters with unknown size are assumed to be 200mm diameter.

The unit costs are a Class C opinion of probable cost, are not guaranteed or warranted and are based on recent supplier quotations and assumed average levels of construction and engineering effort and therefore do not consider site specific requirements. It represents the summation of all identifiable project elemental costs and is used for program planning. An additional 30% allowance for construction contingency and 10% allowance for CRD project management are in addition to the costs provided in this section.

Table 4-4: Cost Estimates for Non-Billing Distribution System Meters

Diameter Category (mm)	Meter / Transmitter Cost	Testing and Commissioning	Additional Materials	Labour	TOTAL Scenario 1
40-50	$2,000	$600	$1,000	$2,900	**$6,500**
75	$2,500	$600	$1,000	$2,900	**$7,000**
100	$3,000	$600	$1,000	$2,900	**$7,500**
150	$3,500	$600	$1,500	$2,900	**$8,500**
200	$4,000	$600	$1,500	$2,900	**$9,000**
250	$5,000	$600	$2,000	$5,500	**$13,100**
300	$6,000	$600	$2,500	$5,500	**$14,600**

4.6 Proposed Meter Replacement Strategy and Timing

The total cost of replacement of the meter population and the annual replacement budget, are developed below in Table 4-5. The annual replacement budget is estimated to be $467,000. Approximately 1,000 billing meters and one non-billing distribution system meter are recommended for replacement each year in perpetuity.

Table 4-5: Calculating a Meter Replacement Budget

Meter Size Category (mm)	# of Meters	Replacement Cost	30% Construction and 10% CRD Management	Total Replacement Cost	Yearly Replacement Budget	# of Yearly Meter Replacements
Customer Billing Meters						
15-19	21,190	$250	$100	$7,417,000	$322,000	921
25-40	679	$750	$300	$713,000	$34,000	32
50-75	650	$1,300	$520	$1,183,000	$79,000	43
100	44	$2,600	$1,040	$160,000	$7,000	2
150	42	$4,600	$1,840	$270,000	$6,000	1
200-250	13	$6,600	$2,640	$120,000	$6,000	1
Sub-TOTALS	**22,618**			**$9,863,000**	**$454,000**	**1,000**
Non-Billing Distribution System Meters						
40-50	5	$6,500	$2,600	$46,000	$1,500	0.167
75	2	$7,000	$2,800	$20,000	$700	0.067
100	2	$7,500	$3,000	$21,000	$700	0.067
150	1	$8,500	$3,400	$12,000	$400	0.033
200	19	$9,000	$3,600	$239,000	$8,000	0.633
250	1	$13,100	$5,240	$18,000	$600	0.033
300	1	$14,600	$5,840	$20,000	$700	0.033
Sub-TOTALS	**31**			**$376,000**	**$13,000**	**1**
TOTALS	**22,649**			**$10,239,000**	**$467,000**	**1,001**

At a replacement rate of 1,000 meters per year, the oldest meters in the inventory, installed in 1994, should be removed by 2026 if the meter replacement program is reinstated in 2018. The CRD's meter replacement program also recommended that backflow preventions devices be installed or replaced at the same time as meter replacement. The cost of a residential backflow prevention device is approximately $50 per device, therefore the recommended program budget of $500,000 per year is considered adequate.

4.7 Lifecycle Costs

The optimal frequencies of maintenance activities, and associated annual costs, are dependent on meter type, age, purpose (billing or other), and annual flow through the meter. Validation and calibration procedures will also be faster and less costly where meter installations include provisions for

in-situ calibration, including an adequately sized test port located at least 5 pipe diameters downstream of the meter.

Non-Billing Distribution System Meters

Generalized life cycle meter maintenance activities, estimated costs and recommended frequencies are provided in Table 4-6 for non-billing distribution system meters.

Table 4-6: Meter Life Cycle Activities, Estimated Costs and Frequencies

Activity	Frequency (years)	Cost	Lifecycle Cost	# of Meters	Notes
Inspection	2	$200	$2,400	31	2 operators at $100 per hour for 1 hours (only on years when validation or calibration doesn't occur)
Validation	5	$600	$3,000		2 operators at $100 per hour for 3 hours
Calibration	15	$2,200	$2,200		2 operators at $100 per hour for 6 hours total + $1,000 factory calibration
Lifecycle Cost Per Meter =			**$7,600**	**Total Annual Cost =**	**$7,900**

Customer Billing Meters

It is recommended that the CRD utilize yearly billing records to highlight meters that are potentially under-registering to aid in the prioritization of replacements.

4.8 Operational Best Practice Review

Customer Billing - Water Meters

The CRD's meter replacement program followed best management practices for testing of meters and the recommended replacement frequency is supported by the work presented in this report.

Transmission - Supply Piping

The CRD does not have a formal water loss management plan for any of the three water systems. A water loss management plan establishes the appropriate level of funding, schedules for water loss prevention measures and procedures, the size and makeup of the team, targets for loss reduction, and the tools required, based on levels of loss calculated in the water audit. The CRD does not have equipment and training in acoustic leak detection or a system of monitoring to identify leakage as it occurs.

The following are recommendations for operational monitoring of the supply system:

- Complete a detailed top down water audit every 5 years as well as internally produced expedient audits on a yearly basis. The expedient audit is meant to update the yearly system input volume, billed authorized consumption and other easily obtained components of the audit without detailed assessment of the data inputs. Calculate each systems ILI annually.
- At a future date, when justified by increased water loss in the RWS, SPW or JDFWD systems as identified by the yearly water audits, establish a water loss management plan to complement automated loss monitoring using SCADA. Water loss management should be a joint program

between the Regional, Saanich Peninsula and Juan de Fuca water services. A set of correlating acoustic leak loggers are recommended as they could be deployed on RWS transmission mains when shifts in the daily balance of total water loss are noted and could identify leakage prior to transmission main failure. When not deployed in the RWS, these loggers could be shared with the JDFWD system and SPW system.

4.9 A Roadmap for Water Loss Management

The four general strategies for managing real water losses in water distribution systems are pressure management, active leakage control, asset management and speed and quality of repairs. Figure 5-1 displays how these four management strategies acting to reduce current real losses (water being lost today), the unavoidable real losses (how much water loss cannot be avoided at any cost), and the economic level of real loss or target leakage levels (losses that cannot cost-effectively be avoided). The difference between current real losses and economic level of leakage is the potentially recoverable real loss (red shaded area), the target of a WLMP.

The pillars of loss control are further described as:

- **Active Leakage Control**: Losses are frequently and proactively identified and quantified by monitoring flows and using acoustic leak detection to locate significant leaks. *(The CRD's current level of effort in Active Leakage Control includes the monitoring of flow data)*
- **Speed and Quality of Repairs**: The duration and recurrence of leaks are minimized by promptly repairing new leaks and breaks with good workmanship and appropriate materials. *(The CRD's current level of effort in Speed and Quality of Repairs includes timely response to leakage repairs)*
- **Pressure Management**: Leakage rates vary roughly in direct proportion to system pressure. Systems with higher than optimum pressures can achieve significant and immediate loss reductions through careful and selective reduction that maintains adequate pressures for customer and firefighting needs. Monitoring pressures can also reveal transients (water hammer) that contribute to distribution leaks and breaks. *(The CRD's current level of effort in Pressure Management includes monitoring pressures for abnormalities via SCADA)*
- **Asset Management**: Water distribution infrastructure assets have a finite life span and must be rehabilitated or replaced to maintain acceptable service. As assets approach the end of their useful lives, leak and break frequency and severity increase, causing excessive background leakage and unreliable service. Effort and cost for maintenance, including water loss management, must be balanced against the cost and timing of asset renewal or replacement. Asset management also reduces apparent losses through the timely replacement of meters. *(The CRD's current level of effort for Asset Management includes condition assessment initiatives and asset management initiatives including the scope of this report.)*

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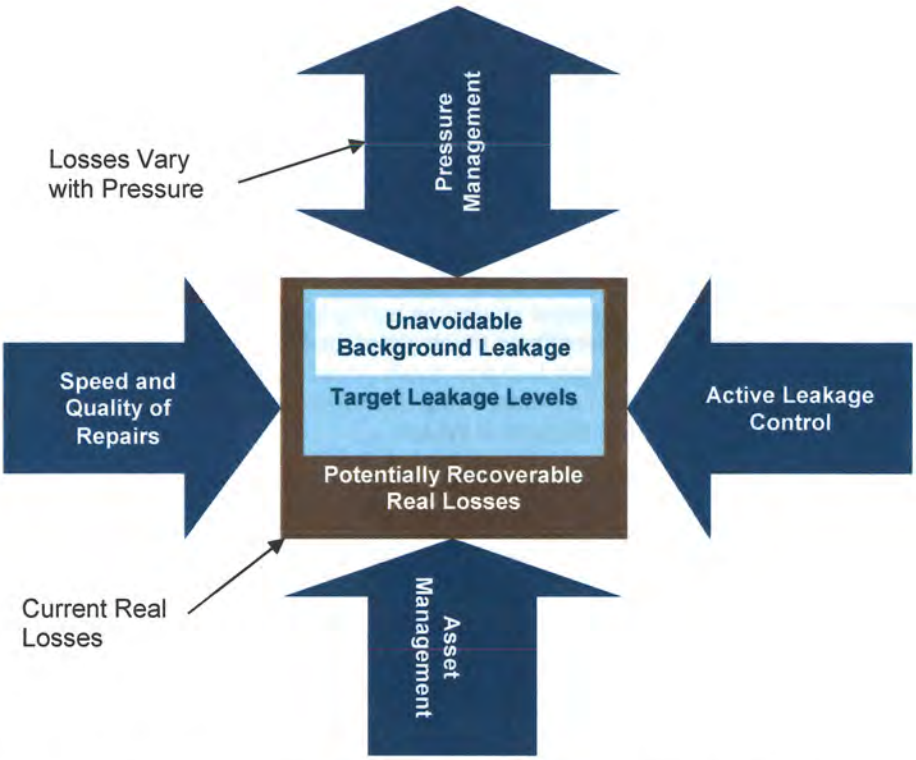

Figure 4-3: The Four Pillar Approach to Managing Water Losses (IWA/AWWA)

To achieve and maintain low leakage volumes, some level of activity may be required in each of the four pillars of loss control. Effective WLM planning requires an appropriate combination of effort on each of the four pillars.

Drawing upon the IWA/AWWA methodology and KWL's experience with other water systems in BC, the methodology for structuring a Water Loss Management Plan is shown in Figure 4-4. The plan involves an iterative process of planning, implementation and review where the water audit is completed to evaluate program performance in the review phase and is completed as the first step to establish targets and budgets.

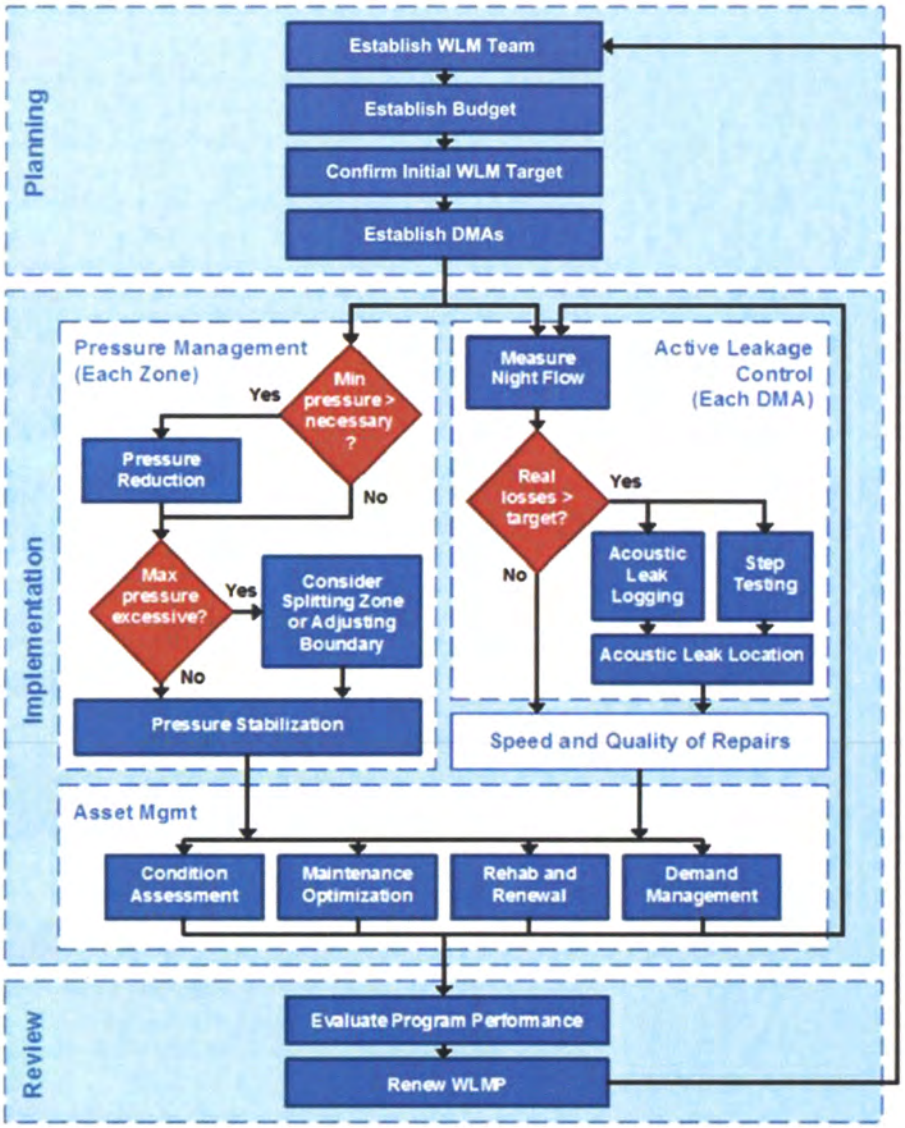

Figure 4-4: Water Loss Management Framework

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Section 5

Conclusions and Recommendations

5. Conclusions and Recommendations

5.1 Conclusions

The following summarizes the key points of the audit with regards to the distribution systems and meter inventory:

- There are approximately 381 km of distribution mains and 181 km of service connections in the Westshore system and 132 km of distribution mains and 44 km of service connections in the Sooke system;
- The JDFWD has 31 non-billing distribution system meters installed at various water system facilities throughout the distribution system. The average age of these meters is 8 years.
- There were approximately 22,600 individual customer billing meters, as of December 31, 2015, in the JDFWD systems.
- The current average age of the meter inventory, as of 2017, is approximately 16 years.
- The CRDs began its customer metering program in 1994; approximately 10,500 of the existing meter inventory were installed in this first year of the program, and are now 23 years old.
- Since 1994, new meters have been added to the system at a rate of approximately 500 meters per year.
- The vast majority of customer billing meters are residential 5/8" diameter meters, representing 91.4% of the inventory and 60% of the 2015 billing volume.
- The highest volume billing meters are 1 ½ ", 2", and 3" meters that collectively represent 3% of the inventory and 30% of the 2015 billing volume. It is, therefore, critical that these meters be systematically reviewed to ensure that they are sized and functioning correctly.
- A meter sizing review was completed for meters 25mm through 150mm in diameter. Meters 40mm, 75mm, 100mm, and 150mm in diameter generally appear to be appropriately sized.
- More attention should be taken in right-sizing residential customers where a 25mm or 50mm service is requested or warranted by the building code fixture unit count. It is noted that the required service size, as calculated by the BC building code fixture unit count method, is intended for sizing of the service piping and not sizing of the meter.

The following summarizes the key points of the water audits with regards to system performance:

Westshore System Audit Conclusions

- In 2015, approximately 46,156 ML of water was supplied through the RWS in-line source meters on Mains #4 & #5 downstream of the JGWTP, of which approximately 8,359 ML of water was supplied to the JDFWD-Westshore system. The level of uncertainty in this estimate is ± 443 ML, primarily due to uncertainty attributed to the RWS in-line meters separating the Westshore from the Core area.
- Source meter error from the Main #4 & #5 meters was estimated as ±0.6% based on the range of actual operating flows, and the manufacturer's stated performance for the meter.

- The RWS in-line meters used to determine the total supplied volume to the Westshore were estimated to be over-registering by a total volume of 765 ± 443 ML.
- In 2015, JDFWD-Westshore billed 7,190 ML, approximately 86% of the total water supplied.
- Authorized un-billed consumption is estimated to be 109 ML, of which 68 ML was metered flushing works performed by the CRD, 31 ML is attributed to real losses in the RWS system within the Westshore, and 10 ML is attributed to other authorized municipal unmetered uses.
- Non-revenue water is estimated to be 1,169 ±443 ML approximately 14% of the total water supplied.
- Customer metering accuracy is estimated to be 98 ±1% registration of flow. This equates to 144 ±72 ML. At a retail customer water rate of $1.8101 per cubic meter, this equates to $260,600 ±$130,300. This however does not represent a true revenue loss as the CRD adjusts its rates based on the previous years' consumption and anticipated operating costs for the year.
- Real water losses are estimated to be 895 ± 443 ML which corresponds to an ILI = 1.9. This ILI value is low and represents a well-managed system with little opportunity for loss reduction. There is not a direct business case for a leak detection find and fix program based solely on operational cost savings at this time. Other loss reduction tools and business case parameters should be considered in the future development of a water loss management plan, when justified by increased loss levels.

Sooke System Audit Conclusions

- In 2015, approximately 1,545 ML of water was supplied to the JDFWD-Sooke system. The level of uncertainty in this estimate is ± 5 ML.
- In 2015, JDFWD-Sooke billed 1,186.2 ML, approximately 77% of the total water supplied.
- Authorized un-billed consumption is estimated to be 15 ML, of which 13 ML was metered flushing works performed by the CRD.
- Non-revenue water is estimated to be 359 ±5 ML approximately 23% of the total water supplied.
- Customer metering accuracy is estimated to be 98 ±1% registration of flow. This equates to 24 ±12 ML.
- Real water losses are estimated to be 316 ± 14 ML which corresponds to an ILI = 2.5. This loss volume was validated by bottom up night flow analysis. This ILI value is low and represents a well-managed system with little opportunity for loss reduction. There is not a direct business case for a leak detection find and fix program based solely on operational cost savings. Other loss reduction tools and business case parameters should be considered further in the development of a water loss management plan, when justified by a future water audit showing increased levels of loss.

The following summarizes the key points of a financial analysis for a customer meter replacement program:

- The CRD completed a testing program of 413 of the oldest retail meters in 2012-2014 and approved a customer meter replacement program that was to begin in 2015. The budget approved for the program was reallocated to more urgent priorities and the program has yet to be initiated. The program aimed to replace 1,000 meters per year, adding backflow prevention or replacing existing devices. The program had a budget of $500,000 per year (2014 dollars)

that would continue indefinitely, with the budget adjusted yearly for inflation. The average age of replacement under this program is 25 years.

- The financial analysis completed by KWL concluded the following for the purpose of allocating a yearly replacement budget:
  - A 23-year replacement frequency offers the lowest annual cost per year for 15mm, 19mm, and 100mm meters;
  - A 21-year replacement frequency offers the lowest annual cost per year for 25 - 40mm and 200 - 250mm meters;
  - A 15-year replacement frequency offers the lowest annual cost per year for 50 - 75mm meters; and
  - A 43-year replacement frequency offers the lowest annual cost per meter for 150mm meters.
  - Applying the estimate costs for each meter size at the above noted replacement frequencies, including 30% construction contingency and 10% CRD management allowances, resulted in a recommended program budget of $500,000 per year (2017 dollars) adjusted annually for inflation.

5.2 Recommendations

KWL has the following recommendations based on the findings above:

- Fill data gaps identified in the non-billing distribution system meter inventory. Gaps include meter installation date, model numbers and diameters (Appendix A);
- Create a new section in the CRD's Manual of Engineering Standards and Specifications for meter selection and sizing. This section should be based on AWWA M22 methodology.
- Provide a spreadsheet in the CRD's Manual of Engineering Standards and Specifications for the right-sizing of meters. This will make both the calculation and review by city staff easier.
- Specify that multi-phased developments have meter chamber sized for full build-out but size meter to match each phase of the development (developer to replace meter as necessary as phasing progresses).
- An AWWA M22 meter sizing calculation should be done at the time of all replacements.
- Review and track changes in registered consumption. Utilize the yearly billing records to highlight meters that are potentially under-registering and use this data, along with meter age to prioritize replacements.
- It is recommended that the CRD's residential meter replacement program and $500,000 yearly budget be re-instated in 2018. This budget should cover the cost of adding or replacing backflow prevention devices as well as yearly allowance of $7,900 allocated to inspection, testing and calibration of non-billing distribution system meters. The budget should be adjusted yearly to account for inflation. A 23-year replacement frequency is recommended for standard residential meters (19mm diameter representing 91.4% of the inventory) based on a financial analysis. Shorter replacement frequencies of 21 years for 25 – 40mm diameter meters and 15 years for 50 – 75mm diameter meters are recommended based on the high percentage/volume of billing through these meters.

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- As part of the strategic asset management plan for the Regional Water Supply system budgeted for 2017, conduct a business case analysis for metering of JDFWD connections to the RWS. The analysis should include consideration of the value of:
    - Accurately measuring the volume of RWS bulk sales to JDFWD;
    - Improved zone control for managing real losses in the JDFWD system; and
    - Reducing the number of connections between the RWS and JDFWD systems.
- Complete a detailed top-down water audit every 5 years as well as internally produced audits on a yearly basis. The internal audit is meant to update the yearly system input volume, billed authorized consumption and other easily obtained components of the audit without detailed assessment of the data inputs. The detailed audit should have a budget of $50,000 and $8,000 should be budgeted for yearly expedient audits. These budget numbers are for the combined effort of auditing all three water systems including RWS, SPW, and JDFWD.
- At a future date, when justified by increased water loss in either of the JDFWD systems as identified by the yearly water audits, develop a water loss management plan at an estimated one time capital budget of $50,000. Development of a business case for additional operational costs related to specific water loss management measures including leak detection programs, purchase of equipment and training, district metering and pressure management, should consider:
    - operational cost savings of reduced pumping and treatment costs
    - asset life expectancy;
    - break frequency reduction and annual repair cost budget;
    - continuity of service and levels of service;
    - reduction of financial risk related to property damage;
    - deferral of capital projects such as treatment plant expansions; and
    - sustainability goals.

5.3 Report Submission

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Revision History

Revision #	Date	Status	Revision	Author
Draft Report	15 March, 2017	Draft		RYL
Final Report	13 April, 2017	Final	Revisions to address CRD comments on Draft Submission	RYL
Revised Final Report	20 June, 2017	Final	Highlight the fact that 1 1/2", 2", and 3" meters need to be prioritized for replacement in recommendations.	RYL

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Appendix A

Appendix A: Meter Database (Data Gaps Highlighted)

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APPENDIX A – 25mm – 150mm CUSTOMER ACCOUNTS WITH METERS REGISTERING AVERAGE DAY FLOWS WELL BELOW MANUFACTURERS LOW FLOW ACCURACY

Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
122757	25	0.0007	1	1	1
118269	25	0.0007	1	1	1
144221	25	0.0007	1	1	1
124125	25	0.0008	1	1	1
101275	25	0.0009	1	1	1
118281	25	0.0009	1	1	1
120892	25	0.0009	1	1	1
144366	25	0.0009	1	1	1
120826	25	0.0010	1	1	1
123970	25	0.0012	1	1	1
124201	25	0.0012	1	1	1
107150	25	0.0013	1	1	1
122760	25	0.0014	1	1	1
124130	25	0.0014	1	1	1
138854	25	0.0014	1	1	1
120825	25	0.0016	1	1	1
138808	25	0.0016	1	1	1
123145	25	0.0017	1	1	1
101320	25	0.0018	1	1	1
118498	25	0.0019	1	1	1
120560	25	0.0019	1	1	1
113153	25	0.0021	1	1	0
118501	25	0.0021	1	1	0
119651	25	0.0022	1	1	0
101249	25	0.0022	1	1	0
118499	25	0.0022	1	1	0
123137	25	0.0022	1	1	0
124124	25	0.0022	1	1	0
104995	25	0.0023	1	1	0
122494	25	0.0023	1	1	0
102269	25	0.0024	1	1	0
119764	25	0.0024	1	1	0
122889	25	0.0024	1	1	0

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
124314	25	0.0025	1	1	0
102148	25	0.0025	1	1	0
118450	25	0.0025	1	1	0
117265	25	0.0026	1	1	0
116448	25	0.0027	1	1	0
124827	25	0.0027	1	1	0
120092	25	0.0027	1	1	0
110234	25	0.0028	1	1	0
101372	25	0.0029	1	1	0
118716	25	0.0029	1	1	0
128123	25	0.0030	1	1	0
115830	25	0.0030	1	1	0
118284	25	0.0031	1	1	0
138817	25	0.0031	1	1	0
141619	25	0.0031	1	1	0
138850	25	0.0032	1	1	0
116932	25	0.0032	1	1	0
118713	25	0.0032	1	1	0
117764	25	0.0032	1	1	0
119140	25	0.0032	1	1	0
113714	25	0.0033	1	1	0
116933	25	0.0033	1	1	0
123140	25	0.0033	1	1	0
118292	25	0.0033	1	1	0
119661	25	0.0033	1	1	0
101699	25	0.0034	1	1	0
110219	25	0.0034	1	1	0
118282	25	0.0034	1	1	0
120936	25	0.0035	1	1	0
116007	25	0.0035	1	1	0
115120	25	0.0036	1	1	0
118685	25	0.0036	1	1	0
138815	25	0.0036	1	1	0
101348	25	0.0036	1	1	0
141633	25	0.0036	1	1	0

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
118714	25	0.0037	1	1	0
119800	25	0.0037	1	1	0
119652	25	0.0037	1	1	0
143796	25	0.0037	1	1	0
104987	25	0.0039	1	1	0
107152	25	0.0039	1	1	0
119655	25	0.0039	1	1	0
107154	25	0.0039	1	1	0
124664	25	0.0040	1	1	0
118682	25	0.0040	1	1	0
120330	25	0.0041	1	1	0
144446	25	0.0041	1	1	0
144773	25	0.0041	1	1	0
101659	25	0.0042	1	0	0
117332	25	0.0042	1	0	0
123151	25	0.0042	1	0	0
108611	25	0.0043	1	0	0
120926	25	0.0043	1	0	0
120885	25	0.0043	1	0	0
128124	25	0.0043	1	0	0
116417	25	0.0044	1	0	0
104307	25	0.0045	1	0	0
138813	25	0.0045	1	0	0
122495	25	0.0045	1	0	0
119761	25	0.0046	1	0	0
120828	25	0.0046	1	0	0
107155	25	0.0047	1	0	0
122101	25	0.0047	1	0	0
118480	25	0.0047	1	0	0
101102	25	0.0048	1	0	0
118360	25	0.0049	1	0	0
144219	25	0.0049	1	0	0
107153	25	0.0049	1	0	0
119604	25	0.0049	1	0	0
104992	25	0.0049	1	0	0

Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
117103	25	0.0049	1	0	0
117403	25	0.0049	1	0	0
124825	25	0.0049	1	0	0
116450	25	0.0049	1	0	0
119765	25	0.0049	1	0	0
120972	25	0.0049	1	0	0
120971	25	0.0050	1	0	0
144320	25	0.0050	1	0	0
115743	25	0.0050	1	0	0
121158	25	0.0051	1	0	0
120331	25	0.0052	1	0	0
123139	25	0.0052	1	0	0
144214	25	0.0053	1	0	0
118280	25	0.0053	1	0	0
119605	25	0.0053	1	0	0
101321	25	0.0054	1	0	0
119377	25	0.0054	1	0	0
101332	25	0.0054	1	0	0
105382	25	0.0054	1	0	0
118500	25	0.0055	1	0	0
120342	25	0.0055	1	0	0
118816	25	0.0055	1	0	0
120052	25	0.0056	1	0	0
133374	25	0.0056	1	0	0
119471	25	0.0057	1	0	0
102085	25	0.0057	1	0	0
101575	25	0.0058	1	0	0
101600	25	0.0058	1	0	0
101686	25	0.0058	1	0	0
138819	25	0.0058	1	0	0
118502	25	0.0059	1	0	0
119474	25	0.0059	1	0	0
118293	25	0.0060	1	0	0
122034	25	0.0060	1	0	0
144447	25	0.0061	1	0	0

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
122035	25	0.0061	1	0	0
115497	25	0.0061	1	0	0
121746	25	0.0062	1	0	0
122989	25	0.0062	1	0	0
119606	25	0.0062	1	0	0
117811	25	0.0063	1	0	0
118299	25	0.0063	1	0	0
122497	25	0.0063	1	0	0
120056	25	0.0063	1	0	0
120381	25	0.0063	1	0	0
117282	25	0.0064	1	0	0
120053	25	0.0065	1	0	0
120050	25	0.0065	1	0	0
118717	25	0.0066	1	0	0
122033	25	0.0066	1	0	0
122222	25	0.0066	1	0	0
118715	25	0.0066	1	0	0
116841	25	0.0067	1	0	0
101410	25	0.0068	1	0	0
107848	25	0.0068	1	0	0
117531	25	0.0068	1	0	0
120469	25	0.0068	1	0	0
141540	25	0.0068	1	0	0
116548	25	0.0069	1	0	0
118365	25	0.0069	1	0	0
119716	25	0.0069	1	0	0
120054	25	0.0069	1	0	0
138812	25	0.0070	1	0	0
120764	25	0.0071	1	0	0
119273	25	0.0071	1	0	0
119376	25	0.0071	1	0	0
122573	25	0.0071	1	0	0
115498	25	0.0072	1	0	0
120845	25	0.0072	1	0	0
122031	25	0.0072	1	0	0

Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
119476	25	0.0072	1	0	0
119653	25	0.0072	1	0	0
144408	25	0.0072	1	0	0
116449	25	0.0072	1	0	0
120192	25	0.0072	1	0	0
118200	25	0.0073	1	0	0
118684	25	0.0073	1	0	0
120309	25	0.0073	1	0	0
105920	25	0.0074	1	0	0
120925	25	0.0074	1	0	0
110232	25	0.0074	1	0	0
116429	25	0.0074	1	0	0
107158	25	0.0075	1	0	0
119762	25	0.0075	1	0	0
138809	25	0.0076	1	0	0
138827	25	0.0076	1	0	0
117492	25	0.0077	1	0	0
139265	25	0.0077	1	0	0
118446	25	0.0077	1	0	0
117422	25	0.0078	1	0	0
138852	25	0.0078	1	0	0
124633	25	0.0079	1	0	0
109434	25	0.0080	1	0	0
119607	25	0.0080	1	0	0
101203	25	0.0081	1	0	0
124663	25	0.0081	1	0	0
117678	25	0.0082	1	0	0
119378	25	0.0082	1	0	0
120901	25	0.0082	1	0	0
120813	25	0.0082	1	0	0
120816	25	0.0082	1	0	0
101173	25	0.0083	1	0	0
116598	25	0.0083	1	0	0
116597	25	0.0084	1	0	0
119274	25	0.0084	1	0	0

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
117225	25	0.0085	1	0	0
120126	25	0.0085	1	0	0
110233	25	0.0086	1	0	0
120891	25	0.0086	1	0	0
138853	25	0.0086	1	0	0
114945	25	0.0086	1	0	0
120700	25	0.0086	1	0	0
118298	25	0.0086	1	0	0
105409	25	0.0088	1	0	0
119654	25	0.0088	1	0	0
122496	25	0.0088	1	0	0
100642	25	0.0088	1	0	0
117364	25	0.0089	1	0	0
122113	25	0.0090	1	0	0
110340	25	0.0090	1	0	0
118433	25	0.0091	1	0	0
104993	25	0.0091	1	0	0
119862	25	0.0091	1	0	0
119719	25	0.0092	1	0	0
117391	25	0.0092	1	0	0
120500	25	0.0094	1	0	0
120376	25	0.0095	1	0	0
121151	25	0.0095	1	0	0
116355	25	0.0096	1	0	0
122102	25	0.0096	1	0	0
102091	25	0.0097	1	0	0
107157	25	0.0097	1	0	0
120042	25	0.0097	1	0	0
120494	25	0.0097	1	0	0
101185	25	0.0098	1	0	0
102175	25	0.0099	1	0	0
121062	25	0.0099	1	0	0
107161	25	0.0100	1	0	0
116791	25	0.0100	1	0	0
122454	25	0.0100	1	0	0

Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
101520	25	0.0100	1	0	0
144207	25	0.0100	1	0	0
108758	25	0.0101	1	0	0
119807	25	0.0101	1	0	0
120043	25	0.0102	1	0	0
120266	25	0.0102	1	0	0
113701	25	0.0102	1	0	0
119372	25	0.0102	1	0	0
120059	25	0.0102	1	0	0
121908	25	0.0102	1	0	0
122498	25	0.0102	1	0	0
120322	25	0.0102	1	0	0
110146	25	0.0103	1	0	0
114818	25	0.0103	1	0	0
103840	25	0.0103	1	0	0
113734	25	0.0104	1	0	0
120051	25	0.0104	1	0	0
102087	40	0.0043	1	1	1
113778	40	0.0050	1	1	0
101559	40	0.0068	1	1	0
116843	50	0.0010	1	1	1
121035	50	0.0010	1	1	1
120650	50	0.0010	1	1	1
119574	50	0.0012	1	1	1
119100	50	0.0015	1	1	1
120003	50	0.0015	1	1	1
121023	50	0.0015	1	1	1
123022	50	0.0017	1	1	1
119101	50	0.0023	1	1	1
101305	50	0.0024	1	1	1
111150	50	0.0031	1	1	1
128200	50	0.0035	1	1	1
123294	50	0.0040	1	1	1
119542	50	0.0042	1	1	1
116832	50	0.0045	1	1	1

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
120938	50	0.0050	1	1	1
102137	50	0.0051	1	1	1
102252	50	0.0054	1	1	1
123046	50	0.0057	1	1	1
123951	50	0.0059	1	1	1
133238	50	0.0061	1	1	1
118938	50	0.0062	1	1	1
120852	50	0.0070	1	1	0
119581	50	0.0075	1	1	0
120911	50	0.0076	1	1	0
122929	50	0.0076	1	1	0
132997	50	0.0077	1	1	0
119830	50	0.0080	1	1	0
116003	50	0.0085	1	1	0
102150	50	0.0087	1	1	0
117193	50	0.0087	1	1	0
120566	50	0.0092	1	1	0
122774	50	0.0094	1	1	0
123059	50	0.0095	1	1	0
120567	50	0.0100	1	1	0
110898	50	0.0109	1	1	0
114244	50	0.0110	1	1	0
102241	50	0.0113	1	1	0
104258	50	0.0114	1	1	0
133159	50	0.0115	1	1	0
101558	50	0.0117	1	1	0
120953	50	0.0118	1	1	0
107552	50	0.0120	1	1	0
102421	50	0.0120	1	1	0
122713	50	0.0120	1	1	0
141746	50	0.0126	1	1	0
118404	50	0.0127	1	0	0
120978	50	0.0128	1	0	0
101288	50	0.0132	1	0	0
116420	50	0.0135	1	0	0

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
110650	50	0.0138	1	0	0
116382	50	0.0141	1	0	0
121433	50	0.0144	1	0	0
120319	50	0.0148	1	0	0
120363	50	0.0148	1	0	0
102183	50	0.0154	1	0	0
116970	50	0.0155	1	0	0
117453	50	0.0156	1	0	0
101546	50	0.0158	1	0	0
121797	50	0.0161	1	0	0
102317	50	0.0162	1	0	0
116819	50	0.0163	1	0	0
124253	50	0.0170	1	0	0
101204	50	0.0172	1	0	0
119705	50	0.0173	1	0	0
123043	50	0.0181	1	0	0
118858	50	0.0184	1	0	0
102265	50	0.0184	1	0	0
120406	50	0.0184	1	0	0
102192	50	0.0185	1	0	0
119582	50	0.0186	1	0	0
101516	50	0.0187	1	0	0
141921	50	0.0187	1	0	0
122322	50	0.0189	1	0	0
120170	50	0.0191	1	0	0
118150	50	0.0191	1	0	0
116893	50	0.0192	1	0	0
128130	50	0.0192	1	0	0
120276	50	0.0194	1	0	0
104856	50	0.0196	1	0	0
141297	50	0.0196	1	0	0
102279	50	0.0198	1	0	0
118288	50	0.0200	1	0	0
117494	50	0.0201	1	0	0
118988	50	0.0205	1	0	0

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Account Number	Meter Diameter (mm)	2015 ADD (L/s)	ADD<0.25xMinFlow (1 = Yes, 0 = No)	ADD<0.10xMinFlow (1 = Yes, 0 = No)	ADD<0.05xMinFlow (1 = Yes, 0 = No)
101368	50	0.0209	1	0	0
117804	50	0.0214	1	0	0
101458	50	0.0214	1	0	0
113589	50	0.0214	1	0	0
118942	50	0.0214	1	0	0
101187	50	0.0218	1	0	0
121125	50	0.0219	1	0	0
117801	50	0.0220	1	0	0
120955	50	0.0226	1	0	0
105750	50	0.0232	1	0	0
101569	50	0.0233	1	0	0
116920	50	0.0234	1	0	0
120526	50	0.0237	1	0	0
133140	50	0.0239	1	0	0
120258	50	0.0245	1	0	0
101336	50	0.0247	1	0	0
121124	50	0.0247	1	0	0
117752	50	0.0251	1	0	0
123004	50	0.0252	1	0	0
120257	50	0.0260	1	0	0
120928	50	0.0278	1	0	0
101193	50	0.0281	1	0	0
102212	50	0.0285	1	0	0
115695	75	0.2524	1	1	0
117185	75	0.2524	1	0	0
121826	100	0.6309	1	0	0
115612	150	0.1844	1	0	0

#	Station Name	Street	Functional Loc.	Cost Center	Equipment	Description	Acquistion date	Manufacturer	Model number	ManufSerialNo.	SIZE	Type
1	RES SKIRT		S200-WS-RS01017-ES0101	101047	6012793	Meter, Mag, Flow, 250mm	11/08/2008	ABB	DE41F	019336	250	Magnetic
2	PRS LATORIA	835 Latoria Rd	S200-WS-SP01015-CH0101	101045	6006362	Meter	13/02/2007	Sensus Technologies Inc	W-2000			Mechanical
3	PRS NICKLAUS SOUTH	2344 Nicklaus Dr	S200-WS-SP01050-ES0101	101045	6012238	Meter, Mag, Flow, 200mm	16/09/2013	Endress+Hauser	Promag W	F701A716000	200	Magnetic
4	PRS LATORIA SOUTH	Latoria Blvd	S200-WS-SP01051-ES0101	101045	6012746	Meter, Mag, Flow	01/01/2015	Endress+Hauser	ProMag 53	J6022916000		Magnetic
5	PST PELICAN	411 Pelican Dr	S200-WS-SP02009-ES0101	101046	6006641	Meter, Mag, Flow, 40mm	02/04/2007	ABB Instrumentation	MM/GEU00403L200U302	P/63540/1/1	40	Magnetic
6	PST IRON MINE HILL	1297 Silver Spray Drive	S200-WS-SP02012-ES0101	101046	6012577	Meter,Mag,Flow,50mm, Pump Room	15/12/2010	ABB	FEP3251	3K620000041837	50	Magnetic
7	PST BEAR MOUNTAIN	835 Bear Mountain Parkway	S200-WS-SP02013-ES0101	101046	6006671	Meter, Mag, Flow, 300mm, D/S pumps		ABB Instrumentation		140134	300	Magnetic
8	PST NICKLAUS	1191 Muirfield Place	S200-WS-SP02014-ES0101	101046	6006687	Meter, Mag, Flow		ABB Instrumentation	FEV125200V151A	3K220000088085		Magnetic
9	PST SILVERSTONE FIRE	2666 Silverstone Way	S200-WS-SP02020-ES0101	101046	6006740	Meter, Mag, Flow		ABB Instrumentation	MM/GEU02003LG00U3000			Magnetic
10	PST FLATMAN FIRE	948 Flatman Ave	S200-WS-SP02023-ES0101	101046	6006768	Meter, Mag, Flow, 50mm		ABB Instrumentation	MMGEU00503L200 U3020		50	Magnetic
11	PST GLEN FOREST	1093 Glen Forest Way	S200-WS-SP02025-BL0101	101046	6006785	Meter,Turbo, Flow, 75mm		Rockwell Meters Inc	W350DRS	1218454	75	Mechanical
12	PST AYUM	5015B Ayum Rd	S200-WS-SP02030-ES0101	101046	6011249	Meter, Mag, Flow, 75mm		Endress+Hauser	50W80-HLOAIRC2BAAW	98004C16000	75	Magnetic
13	PST SUNRIVER	2449 Sunriver Way	S200-WS-SP02034-ES0101	101046	6006872	Meter, Mag, Flow	01/11/2005	ABB Instrumentation	DE41F	177523-10		Magnetic
14	PST HELGESEN	2215 Otter Point Rd	S200-WS-SP02038-ES0101	101046	6010648	Meter, Mag, Flow, 100mm		ABB			100	Magnetic
15	PST HELGESEN	2215 Otter Point Rd	S200-WS-SP02038-ES0101	101046	6010647	Meter, Mag, Flow, 150mm		ABB			150	Magnetic
16	PST WALFRED (NEW)	925 Walfred Rd	S200-WS-SP02039-ES0101	101046	6011198	Meter, Mag, Flow, 200mm	31/01/2013	ABB	FET3251A0P1B3C0M5	3K620000107247	200	Magnetic
17	PST WALFRED (NEW)	925 Walfred Rd	S200-WS-SP02039-ES0101	101046	6011199	Meter, Mag, Flow, 200mm	31/01/2013	ABB	FEV125200V1S1A1B1A1A	3K22000014853	200	Magnetic
18	WTP IRON MINE HILL	1297 Silver Spray Drive	S200-WS-SP03002-ES0101	101047	6012576	Meter,Mag,Flow,100mm,Injection Chamber	15/12/2010	ABB	FEP3251	3K620000043379	100	Magnetic
19	MET SOOKE @ PARKLAND		S200-WS-SP06041-CH0101	102115	6006962	Meter, By-Pass		Hersey Measurement Company	HD	3107019		Mechanical
20	MET SOOKE @ PARKLAND		S200-WS-SP06041-CH0101	102115	6006961	Meter, Turbo, Compound		Hersey Measurement Company	CT	3107019		Mechanical
21	MET PARKDALE @ WESTHILLS		S200-WS-SP06133-CH0101	102115	6007080	Meter, By-Pass, 50mm	29/05/2009	Sensus Technologies Inc	SRII		50	Mechanical
22	MET PARKDALE @ WESTHILLS		S200-WS-SP06133-CH0101	102115	6007079	Meter, Turbo, Fireline, 200mm	29/05/2009	Sensus Technologies Inc	W3500	64044804A	200	Mechanical
23	MET HOWARD		S205-JD-SP06037-ES0101	101017	6004703	Meter, Mag, Flow	09/09/2004	ABB		P/50289/NKM		Magnetic
24	GF ISLAND HIGHWAY (479)	479 Island Highway	S205-RD-GF01002-BL0101	100986	6006086	Meter - Meter Shop		Sensus Technologies Inc	SRH	1530735		Mechanical
25	GF ISLAND HIGHWAY (479)	479 Island Highway	S205-RD-GF01002-BL0101	100986	6006087	Meter - Warehouse Mechanical	06/06/2003	Sensus Technologies Inc	SRH	1530733		Mechanical
26	GF ISLAND HIGHWAY (479)	479 Island Highway	S205-RD-GF01002-BL0101	100986	6006088	Meter - Wash Bay Strg	04/07/2007	Sensus Technologies Inc	SRH			Mechanical
27	PRS MILLSTREAM @ ATKINS	699 Atkins Ave	S205-WS-SP01003-CH0101	101013	6004063	Meter, Ultrasonic, Flow	15/12/2000	Endress+Hauser	SUPERTROL II	G5350009837		Ultrasonic
28	WTP SOOKE RIVER DISINFECTION	2895 Sooke River Rd	S205-WS-SP03001-ES0101	102029	6004342	Meter, Mag, Flow, U/V #1	01/05/2009	Siemens	7ME652830202N498			Magnetic
29	WTP SOOKE RIVER DISINFECTION	2895 Sooke River Rd	S205-WS-SP03001-ES0101	102029	6004343	Meter, Mag, Flow, U/V #2	02/05/2009	Siemens	7ME652830402N498			Magnetic
30	WTP SOOKE RIVER DISINFECTION	2895 Sooke River Rd	S205-WS-SP03001-ES0101	102029	6004344	Meter, Mag, Flow, U/V #3	01/05/2009	Siemens	7ME652830302N498			Magnetic
31	WTP WILFRED	706 Cains Way	S210-WS-SP03001-ES0101	101991	6012866	Meter, Mag, Flow, 50mm, UV Building	15/04/2014	Endress Hauser	Promag 53	E203E616000	50	Magnetic

Data Required

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Agenda Item 7
REPORT #JWDC 2018-05

REPORT TO JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF TUESDAY, JUNE 5, 2018

SUBJECT **JUAN DE FUCA WATER DISTRIBUTION DEVELOPMENT COST CHARGE PROGRAM UPDATE – FINAL REPORT**

ISSUE

This report is to present the final Development Cost Charge (DCC) program background report, associated bylaw and policy.

BACKGROUND

The Capital Regional District (CRD) retained Urban Systems Ltd. (Urban) in early 2016 to update the current 2011 DCC program and associated Bylaw No. 2758. Since 2011, many of the member communities of the Juan de Fuca Water Distribution service area have undertaken Water Master Planning, Zoning Bylaw updates, and Official Community Plan (OCP) updates and amendments, and servicing concept changes in response to development, which have resulted in changes in growth-related infrastructure requirements and associated financial implications. Through this DCC update, DCC eligible projects and project values were identified and new DCC rates were established for the Juan de Fuca Water Distribution Service (JDFWDS).

Urban Systems has completed the JDF DCC report to align with the DCC best practices guide based on a 20-year time frame and using a Municipal Wide (covers all six municipalities in the service area) program.

Although a portion of East Sooke in the Juan de Fuca Electoral Area is serviced by the JDFWDS, it has not historically been included in the overall DCC program. The western portion of the system (area annexed by Sooke in 2005) was funded, designed and constructed by a developer and the system carries growth related capacity for the service zones. The eastern portion was acquired by the Greater Victoria Water District (and subsequently the CRD) from the Mine Road Utilities Corporation through a transfer resulting from a provincial Order in 1981. Along with the transfer of the assets, there was a Deferred Capacity Trust Fund that was also transferred, which was intended to fund capacity related improvements in the area served by the Copper Mine Road system and Sooke Basin water pipe crossing. Until 2012, each new unit developed in the area paid the $3,000 per unit connection fee, as required under the original order, and subsequently through the GVWD water tariffs and CRD JDF Water Distribution Service Bylaw. In 2012, on the basis that there were no new capacity-related improvements identified for the area, and that the Trust Fund balance was sufficient to fund potential capacity-related projects that arise in the future, the requirement to pay into the fund was discontinued through a bylaw amendment. The current Deferred Capacity Trust Fund balance is approximately $563,000 and is available to fund capacity-related improvements in the Copper Mine Road zones. It is recommended to include the East Sooke area in the next JDFWDS DCC update, when the East Sooke OCP has been adopted.

The following summarizes the changes in the DCC Program from 2011:

- The existing JDFWDS hydraulic water model was updated using the new growth and changes to development areas since 2011. The program is based on the results of new water modelling.
- Land value, construction and soft costs (administration, legal etc.) have risen since 2011. Construction costs in particular have increased substantially due to higher levels of growth in the region and subsequent demand on the construction industry services.
- The CRD regional growth strategy was amended to change the urban containment boundary to include the Centre Mountain area. This occurred as a result of a land transfer and boundary adjustment between the District of Metchosin, Beecher Bay First Nation and the City of Langford. Centre Mountain has been identified as a potential growth area and has been included in the DCC Service area.
- The Langford water service area serving the Westhills Development has been excluded from the DCC service area, as the owner will be constructing water services internal to the development independently.
- Debt Servicing Costs have been updated to reflect current liabilities.
- The DCC reserve amounts have been updated to reflect current reserves held by the CRD.
- Contingencies for project cost estimates have been increased by 5% due to cost uncertainties.
- Municipal assist factor has been decreased from 5% to 1% to reduce the financial burden on the JDF Water Distribution Service customers and account for an increase in initial maintenance costs associated with new infrastructure.

The DCC program was developed by reviewing the previous program to remove existing projects that were completed and identifying new projects through water modelling work and discussions with member municipalities. The majority of existing projects that were not completed were carried forward and the new projects identified were added. The DCC program includes 18 projects, most of which are multi-component projects, including pump stations, water main upsizing and reservoirs that will be constructed over the next 20 years with a total value of approximately $50 million. Further project details are included in the attached Urban Systems background report (Attachment A).

DCC Rates

Updated Development Cost Charge Rates for the JDFWDS as determined by the new update are as follows:

Description	Existing DCC Rate	Proposed DCC Rates
Low Density Residential	$2,655.34 per unit	$2,922 per unit
Medium Density Multi-Family	$2,323.43 per unit	$2,557 per unit
High Density Multi-Family	$1,493.63 per units	$1,644 per unit
Commercial	$9.76 per m^2	$10.74 per m^2
Industrial	$5.29 per m^2	$5.82 per m^2
Institutional	$21.57 per m^2	$23.74 per m^2

These rates are approximately a 10% increase over the 2011 DCC rates.

The existing (2011) DCC rates will apply until an updated DCC bylaw is adopted (Attachment B). Based on the program implementation milestones being completed in a timely matter, the CRD hopes that the project will be fully complete with bylaw adoption by late 2018. The attached Urban Systems report explains how in-stream development applications or projects are assessed DCC charges during the transition period from the old rates to the new rates.

New DCC Credit Policy

New to the DCC program with this update, is the addition of a DCC credit policy, which allows for an owner/developer to receive DCC credits for the construction of eligible JDFWDS DCC projects rather than paying the DCCs due under the bylaw. This eliminates the potential need for front-ender agreements where sufficient funds are not available in the DCC reserve to reimburse the owner/developer for the DCC project expense. A copy of the draft DCC Credit Policy is attached (Attachment C).

DCC Program Stakeholder Information Session

Although there has been a substantial amount of stakeholder engagement over the past two years as the DCC program update has been developed, the CRD is proposing to hold one final stakeholder information session to present program updates, following presentation of this report to the Commission and prior to advancing the Commission's recommendation to the CRD Board.

ALTERNATIVES

Alternative 1

That the Juan de Fuca Water Distribution Commission receive the attached report "Development Cost Charge Update – Final Background Report" as prepared by Urban Systems and direct staff to hold one final stakeholder information session prior to advancing Bylaw No. 4249, "Development Cost Charge Bylaw (Juan de Fuca Water Distribution), No. 1, 2000, Amendment Bylaw No. 9, 2018", to the CRD Board; and

That the Juan de Fuca Water Distribution Commission recommend to the CRD Board:

1. a) That Bylaw No. 4249, "Development Cost Charge Bylaw (Juan de Fuca Water Distribution), No. 1, 2000, Amendment Bylaw No. 9, 2018", be introduced and given first and second reading, and
   b) That the Water DCC Credit Policy be approved, as it relates to Section 21 of Bylaw No. 4249; and

2. That Bylaw No. 4249, "Development Cost Charge Bylaw (Juan de Fuca Water Distribution), No. 1, 2000, Amendment Bylaw No. 9, 2018", be given third reading.

Alternative 2

That the Juan de Fuca Water Distribution Commission request additional information.

IMPLICATIONS

Alternative 1 – In order to finalize the Development Cost Charge update and associated bylaw, the proposed bylaw amendment must be approved by the JWDC and be forwarded to the CRD Board. After third reading of the bylaw, it will then be sent to the Inspector of Municipalities for approval. After the Inspector of Municipalities approves the bylaw, it will be returned to the CRD

Board for final adoption. Acceptance of the report and new bylaw will provide an adjustment in the DCC rate to fund the DCC infrastructure required for growth.

Alternative 2 – Requesting additional information will further delay approval of the program and may have a negative financial impact due to collecting less DCC revenue than what is planned.

CONCLUSION

A detailed review of the DCC program including growth projections, has resulted in additional infrastructure projects to facilitate growth. Due to the additional projects and higher construction costs since 2011, there is a proposed increase of approximately 10% in the proposed JDFWDS DCC rate. JDFWDS DCCs are paid by developers to fund growth (capacity) related JDF water system improvements.

RECOMMENDATIONS

That the Juan de Fuca Water Distribution Commission receive the attached report "Development Cost Charge Update – Final Background Report" as prepared by Urban Systems and direct staff to hold one final stakeholder information session prior to advancing Bylaw No. 4249, "Development Cost Charge Bylaw (Juan de Fuca Water Distribution), No. 1, 2000, Amendment Bylaw No. 9, 2018", to the CRD Board; and

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2. That Bylaw No. 4249, "Development Cost Charge Bylaw (Juan de Fuca Water Distribution), No. 1, 2000, Amendment Bylaw No. 9, 2018", be given third reading.

Submitted by:	Joseph Marr, PEng, Manager, Water Distribution Engineering & Planning
Concurrence:	Ian Jesney, PEng, Senior Manager, Infrastructure Engineering
Concurrence:	Ted Robbins, BSc, CTech, General Manager, Integrated Water Services
Concurrence:	Nelson Chan, CPA, CMA, Chief Financial Officer, Finance & Technology
Concurrence:	Kristen Morley, JD, General Manager, Corporate Services
Concurrence:	Ted Robbins, BSc, CTech, General Manager, Integrated Water Services and Acting Chief Administrative Officer

JM/IJ/TR:mm

Attachments:
A. Development Cost Charge Update – Draft Background Report
B. Bylaw No. 4249, "Development Cost Charge Bylaw (Juan de Fuca Water Distribution), No 1, 2000, Amendment Bylaw No. 9, 2018"
C. Draft Credit Policy

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Capital Regional District

Development Cost Charge Update

Background Report

May 2018

Final

File: 001692.0042.01
#312 - 645 Fort Street, Victoria, BC V8W 1G2 | T: 250.220.7060

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EXECUTIVE SUMMARY

This report presents the proposed Juan de Fuca Water Distribution System (JDFWDS) Development Cost Charges (DCCs) that reflect current growth projections and DCC capital programs for the member communities of the Juan de Fuca Water Distribution Commission in the Capital Regional District. This update was necessitated as significant growth had occurred in the member communities, service area boundaries changed due to OCP amendments and rezoning, changes to the Urban Containment Boundary and servicing concepts changed in response to development.

Through this DCC Bylaw update, all project costs and growth estimates were reviewed and updated. DCC eligible projects for CRD water services in the JDFWDS were identified through reference to recent infrastructure planning documents.

Updated Development Cost Charge rates for the JDFWDS as determined by this update are provided in **Table ES 1**.

Table ES 1: DCC Rates

	Collection Basis	Water System
Low Density Residential (single family)	Per Lot	$2,922
Medium Density Multi Family (duplex, triplex, fourplex, townhouse	Per Unit	$2,557
High Density Multi-Family (apartments)	Per Unit	$1,644
Commercial	Per floor area in m^2	$10.74
Industrial	Per floor area in m^2	$5.82
Institutional	Per floor area in m^2	$23.74

PART 1. BACKGROUND

The last review of the Capital Regional District's Juan de Fuca Water Distribution System (JDFWDS) Development Cost Charge (DCC) program and rates was completed in 2011 – DCC Bylaw (No. 3805). In 2015, the Capital Regional District (CRD) sought assistance to review and update the CRD Juan de Fuca Water Distribution System Development Cost Charge (DCC) Bylaw No. 4063 (as amended to 2018). Urban Systems assisted the CRD to develop the Bylaw along with successive updates including a review of the current DCC Bylaw in 2011. The original DCC Study, completed in 1999, represents the underlying foundation in structuring the work program and strategy to implement improvements in the water distribution infrastructure to accommodate for growth within the member communities of the Juan de Fuca Water Distribution service area. Since 2011 many of the member communities have undertaken Water Master Planning; Zoning Bylaw Updates; and, Official Community Plan (OCP) updates and amendments. The process to the update of the JDFWDS DCC was completed in the summer of 2018.

The six west shore communities within the JDFWDS, include:

- City of Langford
- City of Colwood
- Town of View Royal
- District of Metchosin
- District of Sooke
- District of Highlands

The process of updating JDFWDS DCC and identifying capital project priorities involved a thorough review of planning documents (Zoning Bylaws and OCPs) for each of the six west shore municipalities, as well as consideration of historical and future population projections and infrastructure needs.

In addition to planning work undertaken by the six municipalities the substantial development interest in these communities was also taken into consideration. Therefore, this study also includes an analysis of the current water distribution network and identified improvements needed to support development in the above communities based on their anticipated rate of growth. Growth projections used in the study are based on estimates provided by Urban Futures and on feedback from CRD staff and staff from each of the six municipalities. The timeframe for consideration is from 2018 – 2037, a 20-year time horizon. This time frame was also coordinated with the water modeling work conducted by GeoAdvice Inc.

The proposed program ensures that the people who will use and benefit from the services provided pay their share of the costs in a fair and equitable manner. The proposed DCC program creates

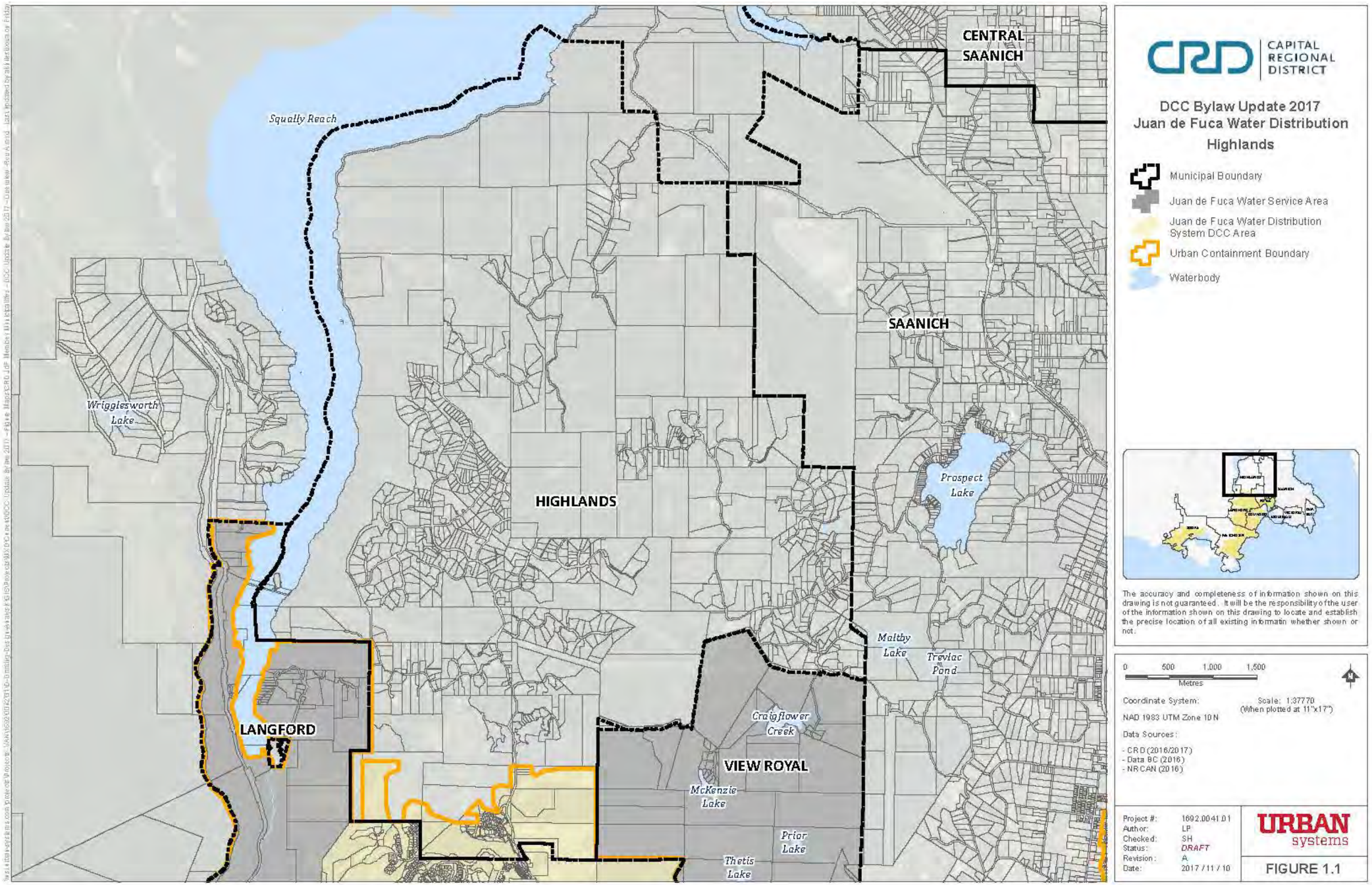
certainty by providing stable charges to the development industry and by allowing the orderly and timely construction of infrastructure. The proposed DCC rate schedule is based on the growth projections, the capital program, and policy decisions. The DCCs apply to single detached residential lots, multiple (medium and high density) residential units, and commercial, industrial and institutional developments.

It should be understood that the JDFWDS water service areas are not entirely subject to DCCs and that only properties located within the JDFWDS DCC Service Area are required to pay DCCs. The difference between these two areas is shown in Figures 1.1 -1.7. Essentially, the JDFWDS water service area covers the entire municipal boundaries of Langford, Colwood, Sooke, View Royal and Metchosin and the southern third of Highlands. The DCC Service Area is applied only in areas where growth is occurring, which more or less follows the CRD Urban Containment Boundary. The JDFWDS water service area and DCC service area are the same for Highlands.

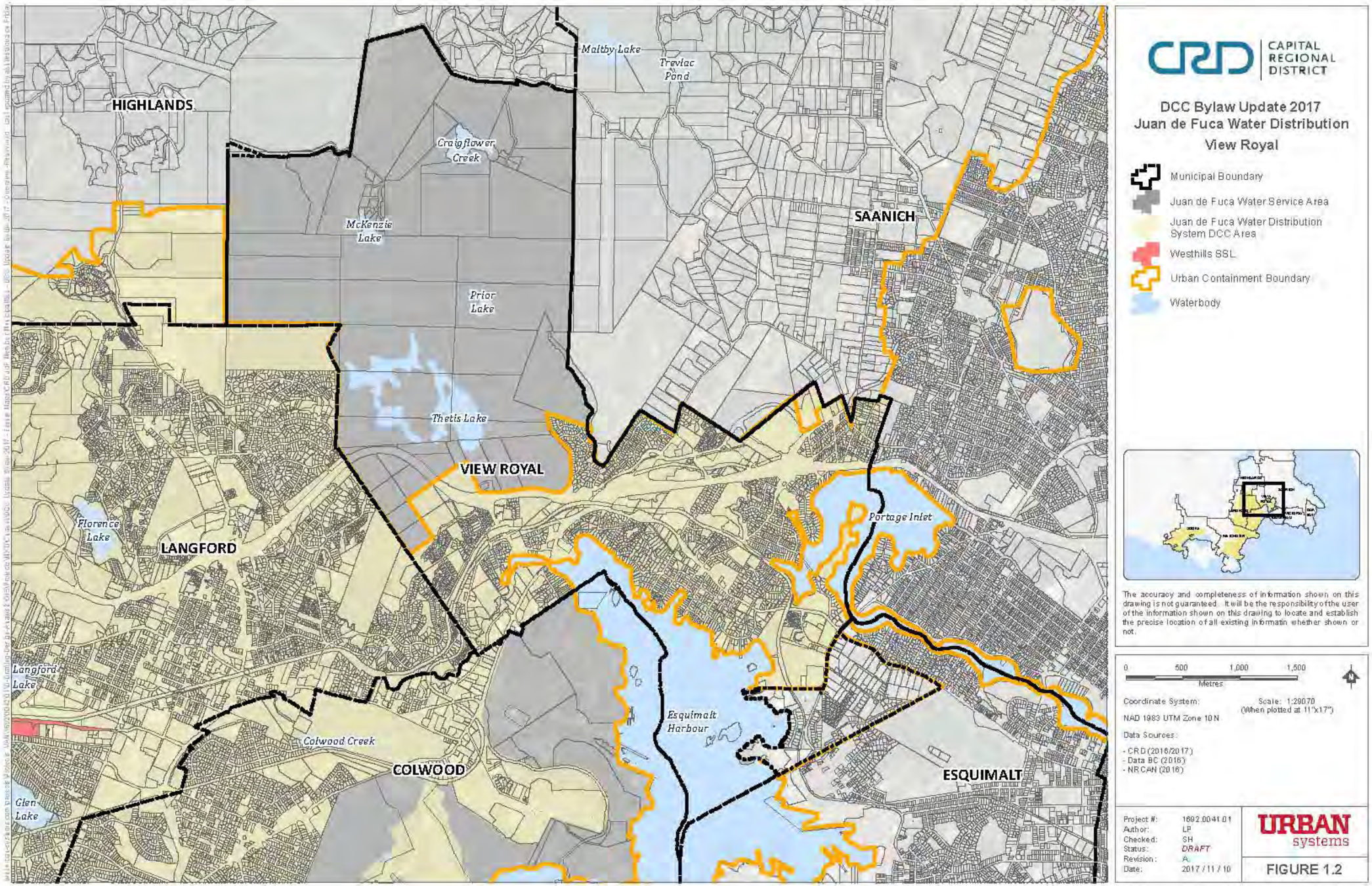
Since the previous The DCC service area boundaries for the communities of Sooke, Colwood, View Royal and Highlands have remained the same as were depicted in the 2011 update. The DCC service areas now also reflect the amended to change to Urban Containment Boundary to include Centre Mountain. This shows the land transfer between the District of Metchosin and the City of Langford. Centre Mountain has been identified as a potential growth area and included in the DCC Service area. A few minor changes to the DCC service area have also been made in Langford.

It should be noted that the material provided in this background report is meant for information only. Reference should be made to the current Bylaw No. #2758 for the specific DCC rates for all development within the JDFWDS until the Board has adopted a new DCC bylaw.

Figures 1.1 – 1.7 show the DCC Service Area boundaries for the six municipalities that are the subject of this review.



URBAN systems



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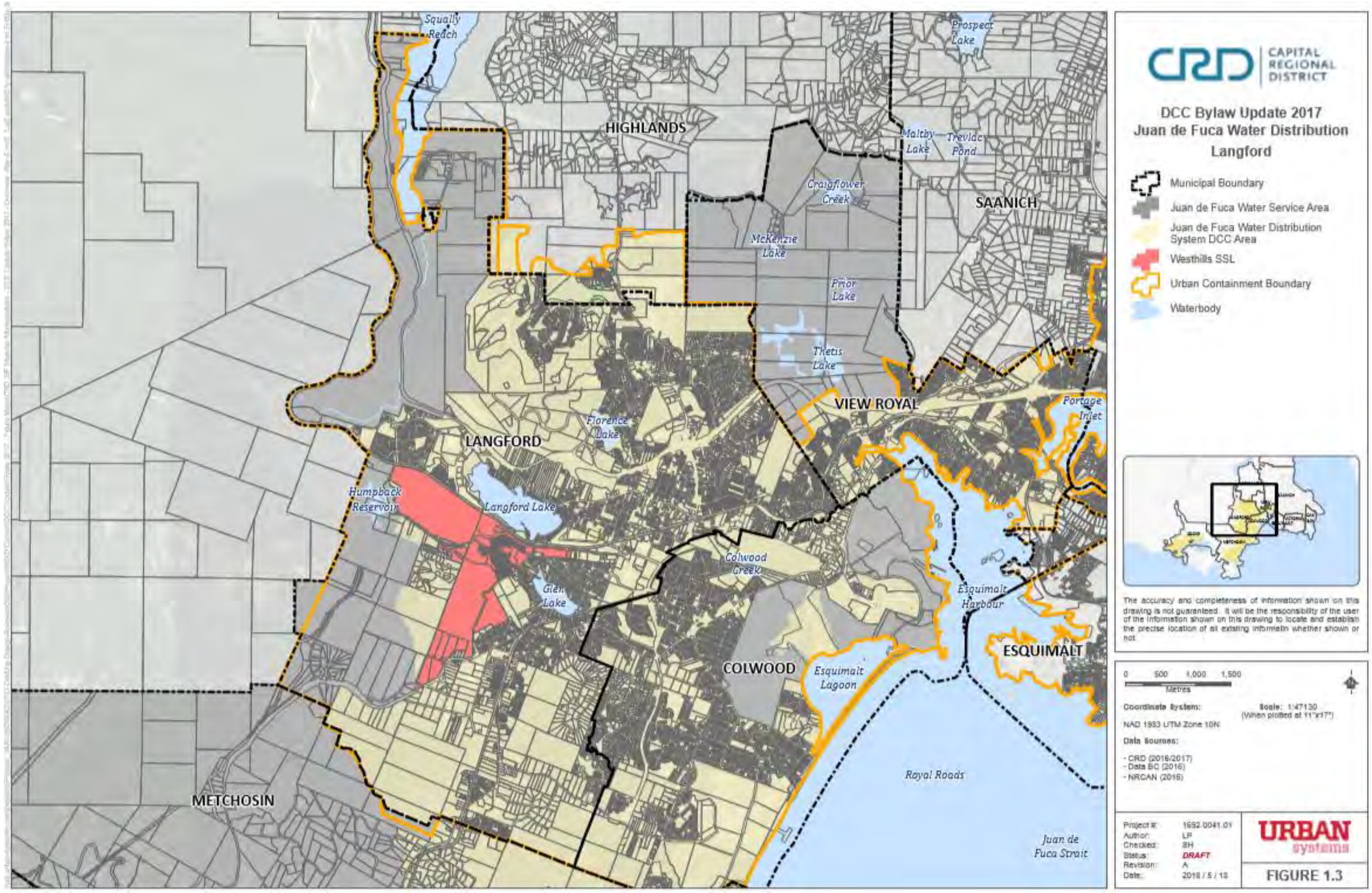

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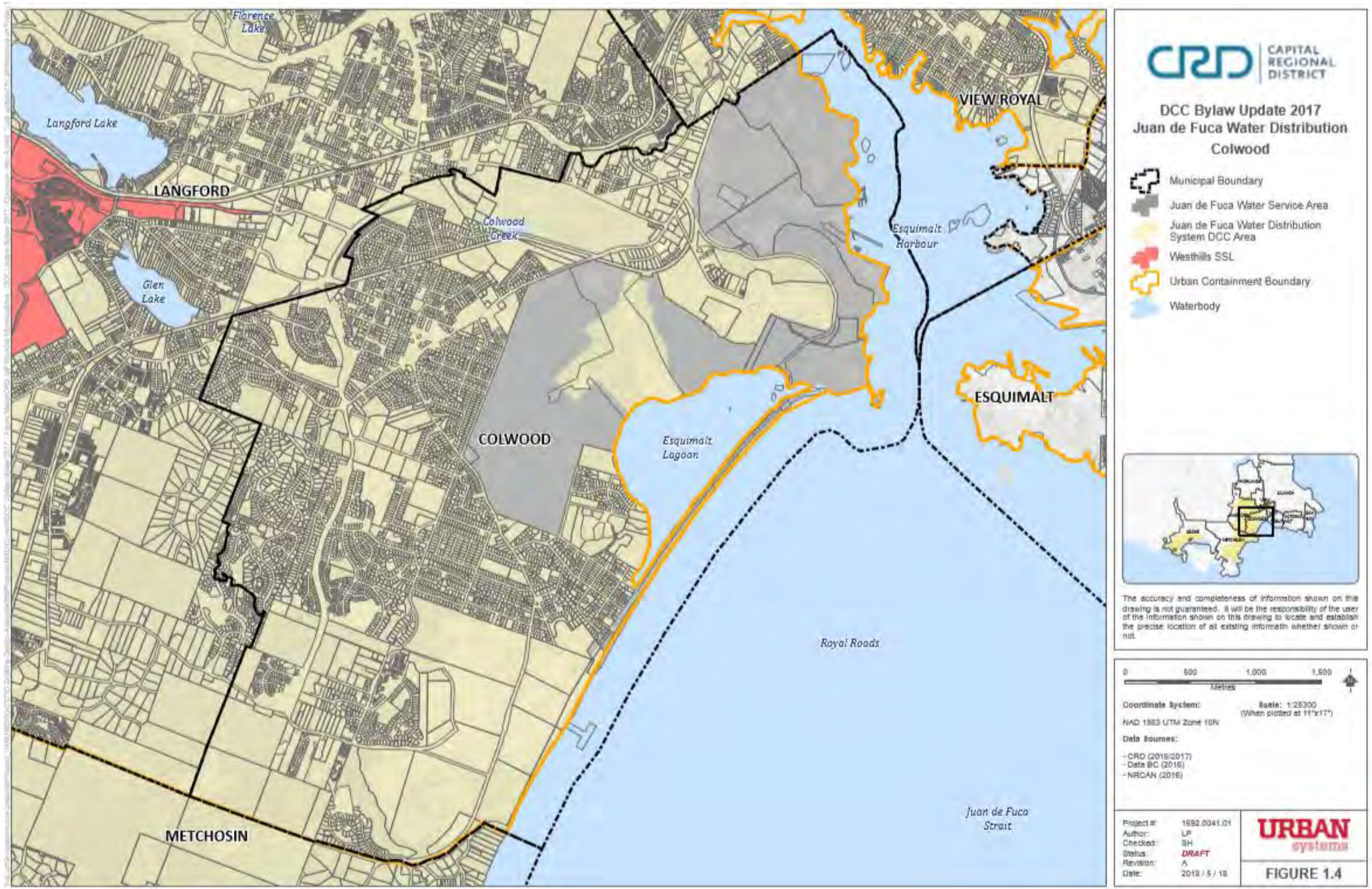

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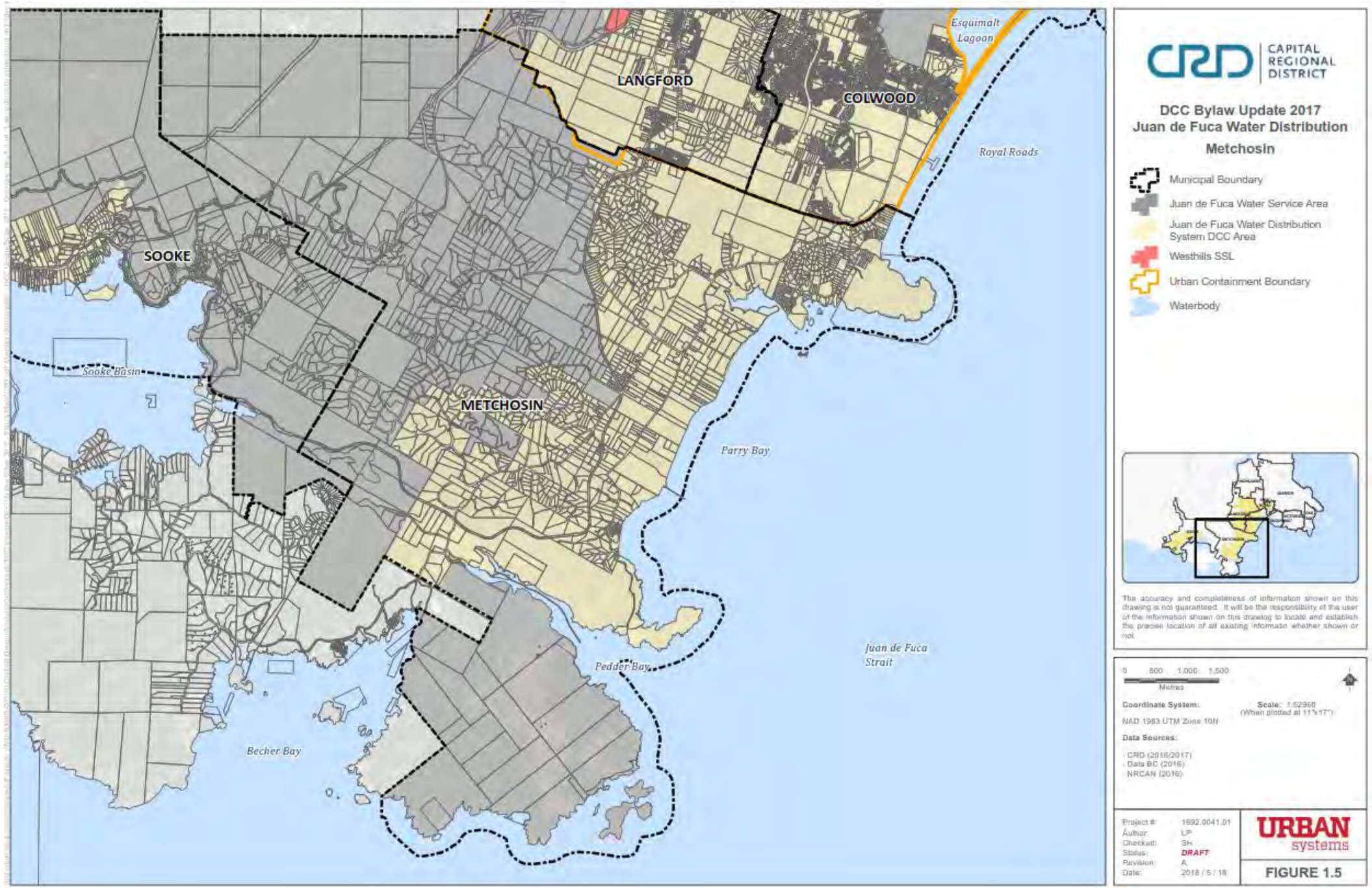

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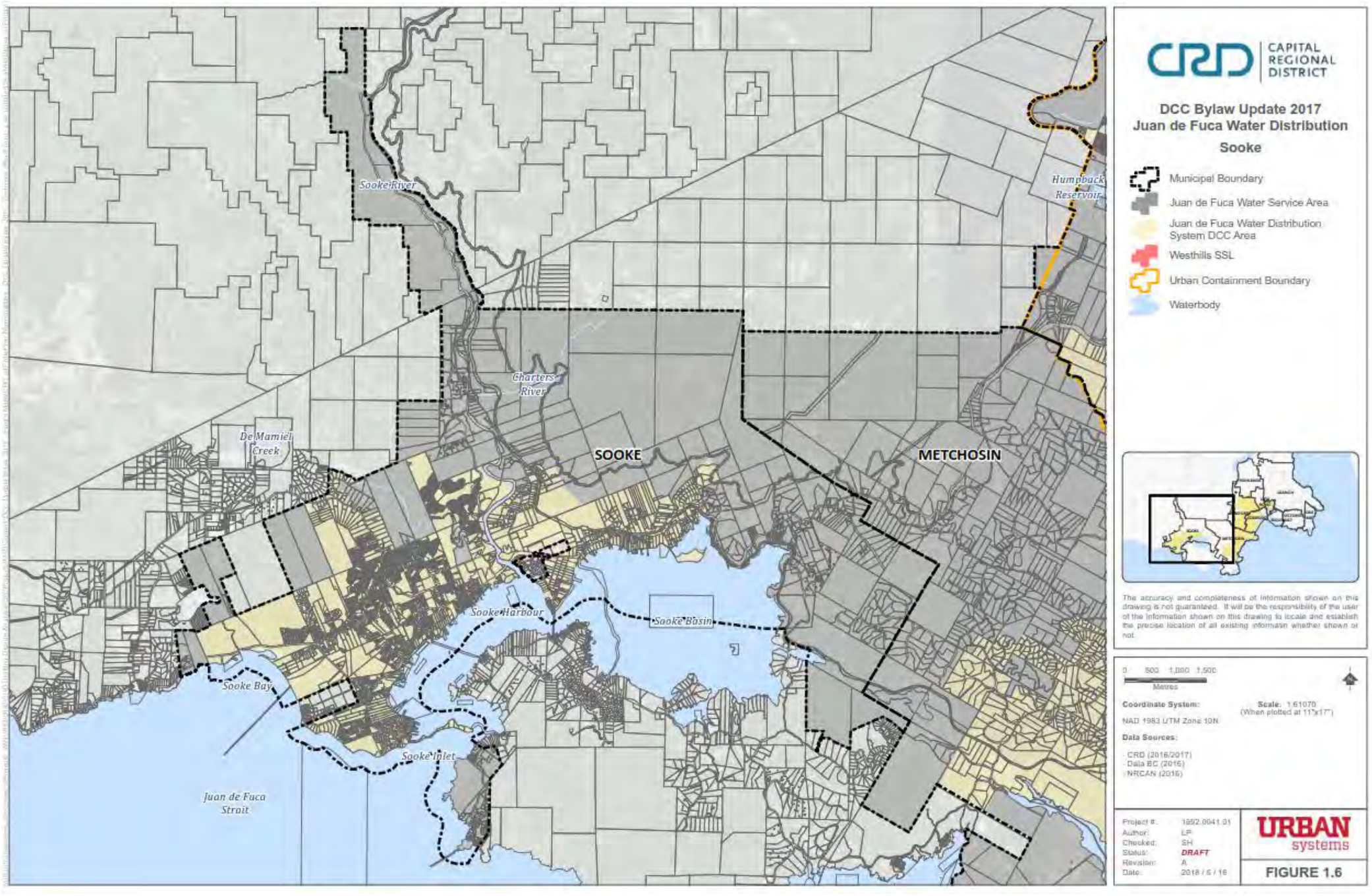

URBAN systems

PART 2. DCC KEY ELEMENTS

The Development Cost Charge Best Practice Guide (prepared by the Ministry of Municipal Affairs and Housing) stipulates key elements that should be considered when determining DCC rates. Table 2.1 outlines the key elements, decisions and supporting rationale used in this update. The table also indicates whether the proposed approach aligns with the Best Practice Guide.

Table 2.1: DCC Key Elements

Key Element	Proposed DCC Update	Rationale	Aligns with Best Practices Guide?
Time Frame	20 Years	• Aligns with OCP and capital planning time frames	✓
Municipal-wide or area-specific charge	Municipal - wide (covers all six municipalities in the JDFWDS)	• All DCC projects are components of Municipal-wide infrastructure systems and therefore provide a municipal-wide benefit	✓
Grant Assistance	None	• No identified DCC projects require grant funding	✓
Developer Contribution	None	• No identified DCC projects include a developer contribution	✓
Interim Financing	Four Projects	The CRD has several long-term debt to obligations that are included as non-capital projects in the DCC program. Long term debt, is summarized as follows: • Bear / Skirt Mountain - $3,392,220 • Silver Creek Debt - $1,571,275 • Project Liability Supply and Distribution Water Mains on Leigh Road - $1,200,000 • Under Loan authorization Bylaw #3164 - The total remaining is $859,340. These debts are described in further detail in **Section 4.2** (below).	–
Benefit Allocation	25% -100%	• Water modeling showed the relative impacts of new growth on infrastructure for projects near existing development. These projects involved upgrading existing infrastructure to provide greater capacity to	✓

		support new growth and include: planned existing system upgrades for water pipes and reservoir storage. • Projects that provide exclusive benefit to new development at 100%	
Municipal Assist Factor	All infrastructure types – 1%	• The CRD is contributing the minimum allowable assist factor to ensure the long-term financial sustainability of the Regional District.	✓
Units of charge	Per lot, per unit and per square metre of total floor area	• *Per lot* for detached dwellings as complete information is available at subdivision approval • *Per unit* for medium (i.e. duplexes, townhouses, triplexes and fourplexes) and high density (apartment) residential dwellings as complete information is available at Building permit approval • *Per square metre of total floor area* for industrial/commercial/institutional uses as impact on infrastructure is expected to correlate with floor space	✓

PART 3. GROWTH PROJECTIONS AND EQUIVALENCIES

3.1 Growth Projection Methodology

While the CRD and its municipalities generally conduct independent growth estimates, they are often aggregated and sometimes vary in terms of date conducted or methodology used. In order to develop the water model, a set of sub-municipal growth estimates for residential, institutional, commercial and industrial land uses were required. For this reason, it was determined that the sub-municipal growth estimates, recently conducted by the CRD for an update to the Regional Transportation Model, would be a suitable starting point for the growth modeling component of the Juan de Fuca Water DCC Update.

The growth estimates, generated by Urban Futures, were based on dividing each of the six west shore municipalities into Transportation Analysis Zones (TAZs), so that a detailed level of analysis could be conducted. As the CRD water model required a similar detailed level of analysis, the growth projections (once verified) and the TAZ boundaries were applied to the CRD water model. As the update to the Regional Transportation Model was undertaken in 2014, the growth projections were validated by verifying them against current municipal planning documents (OCP and Zoning Bylaws) and by conducting in-depth interviews with staff in five of the six municipalities, including:

- City of Colwood;
- City of Langford;[1,2]
- District of Highlands;
- District of Sooke; and,
- District of Metchosin.

The Town of View Royal did not have the opportunity to meet with the CRD and Urban Systems to discuss these estimates in detail; however, they were provided with the updated growth estimates and did not recommend any changes.

[1] Growth projections for the City of Langford, were based on 2016 TAZ data provided by the City. The 2016 TAZ data from the City of Langford was used as it was updated more recently that the CRD data.

[2] Growth estimates for the City of Langford exclude all growth associated with the Westhills Development as this area was removed from the DCC service area at the request of the City.

3.2 Residential Growth Projections

The following is a summary of growth estimates in the six communities, specifically in the DCC areas of the Juan de Fuca Water Distribution System. Development and growth trends are based on a 20-year horizon to the year 2037 using growth estimates provided by Urban Futures.

Population projections used in the study have been reviewed with the respective municipalities and are considered to be reflective of anticipated growth in the community. Table 3.1 summarizes new future development serviced by the Juan de Fuca Water Distribution System for each community to the year 2037. Residential units were acquired through Urban Futures growth estimates, while commercial, industrial and institutional estimates were acquired through discussions with the respective municipalities:

Table 3.1: Land Use Growth Allocations 2037

	Sooke	Langford	Colwood	View Royal	Metchosin	Highlands	Total
Residential (units)*							
Low Density Residential (single family)	945	2,525	1,650	150	60	220	5,550
Medium Density Multi Family (duplex, triplex, fourplex, row house, townhouse)	680	2,697	1,000	384	5	195	4,961
High Density Multi-Family (apartments)	305	3,700	800	528	0	195	5,528
Commercial & Industrial (m^2)							
Commercial	25,000	88,000	190,000	75,000	15,000	60,000	453,500
Industrial	20,000	526,000	6,000	3,000	1,400	74,600	631,000
Institutional							
Institutional	1,550	-	16,700	10,800	4,700	6,500	40,250

The data provided by the CRD does not break out dwellings between single-detached parcels and other ground oriented dwelling such as duplexes, townhouses and row houses; further it does not differentiate between high-density and medium density multi-family units. Therefore, in order to determine the ratio of residential units in each of these categories (low, medium and high) building permit data from BC Stats over the last ten years was reviewed to determine what percentage of ground oriented dwelling were single-detached dwelling and other forms of housing.

3.3 Equivalencies

The equivalencies used in this update are generally the same as those in the 2011 update as there have been no significant changes in expectations regarding relative impact.

Table 3.2: Equivalencies

Land Use	Unit of Development	Equivalent Unit Conversion Factors
Low Density Residential	Per Lot	3.2
Medium Density Multi-family	Dwelling unit	2.8
High Density Multi-family	Dwelling unit	1.8
Commercial	Total floor area (m^2)	0.012
Industrial	Gross floor area (m^2)	0.006
Institutional	Gross floor area (m^2)	0.026

For residential demand, occupancy rates can be used to project demands for water services. For non-residential land uses, equivalent populations per square metre are established. The total equivalent population, determined by applying the equivalent unit conversion factors to the total estimated unit, is 52,003 people.

PART 4. DCC PROJECTS AND COSTS

4.1 DCC Costs

DCC rates are determined by applying the key elements, growth projections and equivalencies described earlier in this report to projects that are DCC eligible and expected to be built within the specified DCC timeframe. Given that most communities in the JDFWDS are experiencing high rates of greenfield development, the majority of projects solely benefit new growth. An overview of the DCC costs by infrastructure type is provided in **Table 4.1**.

Table 4.1: DCC Program Overview and Capital Costs

Service	Total Capital Costs	Benefit Allocation	Municipal Assist Factor	DCC Recoverable Program Costs	Regional District Costs (1)
Water	$57.6 M	25 - 100%	1%	$53.1 M	$4.5 M

Note: (1) Includes municipal assist factor and portion allocated to existing development.

4.2 Provision for Long-term Debt

The CRD has several long-term debt to obligations that are included as non-capital projects under the DCC program. Long term debt, is summarized as follows:

- Bear / Skirt Mountain - Existing Front End Agreement(2009) with the CRD for the construction of the Skirt Mountain Reservoir (included in 2011 DCC program) - $3,392,220
- Silver Creek Debt - Existing Front End Agreement (2009) with the CRD for construction of the Helgesen Pump Station and Water Main (previous DCC project in 2011 DCC program) - $1,571,275
- Project Liability Supply and Distribution on Leigh Road – The City of Langford installed CRD DCC Projects (Supply and Distribution Water Mains on Leigh Road - previous DCC project in 2011 DCC program) as part of the Leigh Road Interchange, however no formal agreement was in place. The project was a DCC eligible project and should be paid back as funds are available - $1,200,000
- Under Loan authorization Bylaw #3164 the CRD borrowed $3.5 million for various DCC Water Projects (included in 2011 DCC program). Annual payments of $251,135 are required for years 2018-2019, $239,509 for 2020, $81,291 for 2021 and $36,270 for 2022. The total remaining is $859,340.

These debts where included in the previous DCC program approved by the Ministry in 2011. The current value of total debt incurred is approximately $ 6.93 million. By agreement, there is no interest payable on the debt. This amount has been included in the DCC calculations.

4.3 Changes in Program from Previous Update

The capital costs and number of projects have changed substantially since the previous DCC update for a number of reasons:

- The CRD water model for the JDFWDS was updated based on new growth estimates and changes in development areas since 2011. This updated program is based on new and up-to-date water modeling provided by GeoAdvice Inc.
- Land, construction and soft costs (e.g., environmental remediation, administration, legal) have risen substantially since 2011. Construction costs in particular have increased substantially due to higher levels of growth in the region and substantial demand for these services. Many tenders for current projects are coming in high and cost estimates have been adjusted to reflect current conditions.
- The CRD Regional Growth Strategy was amended to change the Urban Containment Boundary to include Centre Mountain. This occurred because of a land transfer between the District of Metchosin, Beecher Bay First Nations and the City of Langford. Centre Mountain has been identified as a potential growth area and included in the DCC Service area.
- The Westhills development in Langford has been removed from the DCC service area as the current owner(s) / developers will be constructing water services internal to the development independently.
- Debt servicing costs have been updated to reflect current liabilities.
- The DCC reserve amounts have been updated to reflect current reserves held by the CRD.
- Contingencies for project cost estimates have been increased by 5% due to cost uncertainties.
- Municipal Assist has been decreased from 5% to 1%.

4.4 DCC Projects

The DCC program was developed by reviewing the previous program to remove existing projects and update costs and through extensive water modeling work conducted GeoAdvice Inc. The majority of existing projects were carried forward and new projects were identified through the water model, which evaluated upgrades and projects required to service new growth. The Water DCC Program includes a wide variety of projects including pump stations, water mains, water main upsizing, reservoirs and reservoir upgrades.

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A summary of DCC projects is provided in **Table 4.2**, and DCC calculation, equivalent conversion factors per unit and per square metre are established in **Table 4.3**.

Table 4.2: Water Projects and Cost Estimates

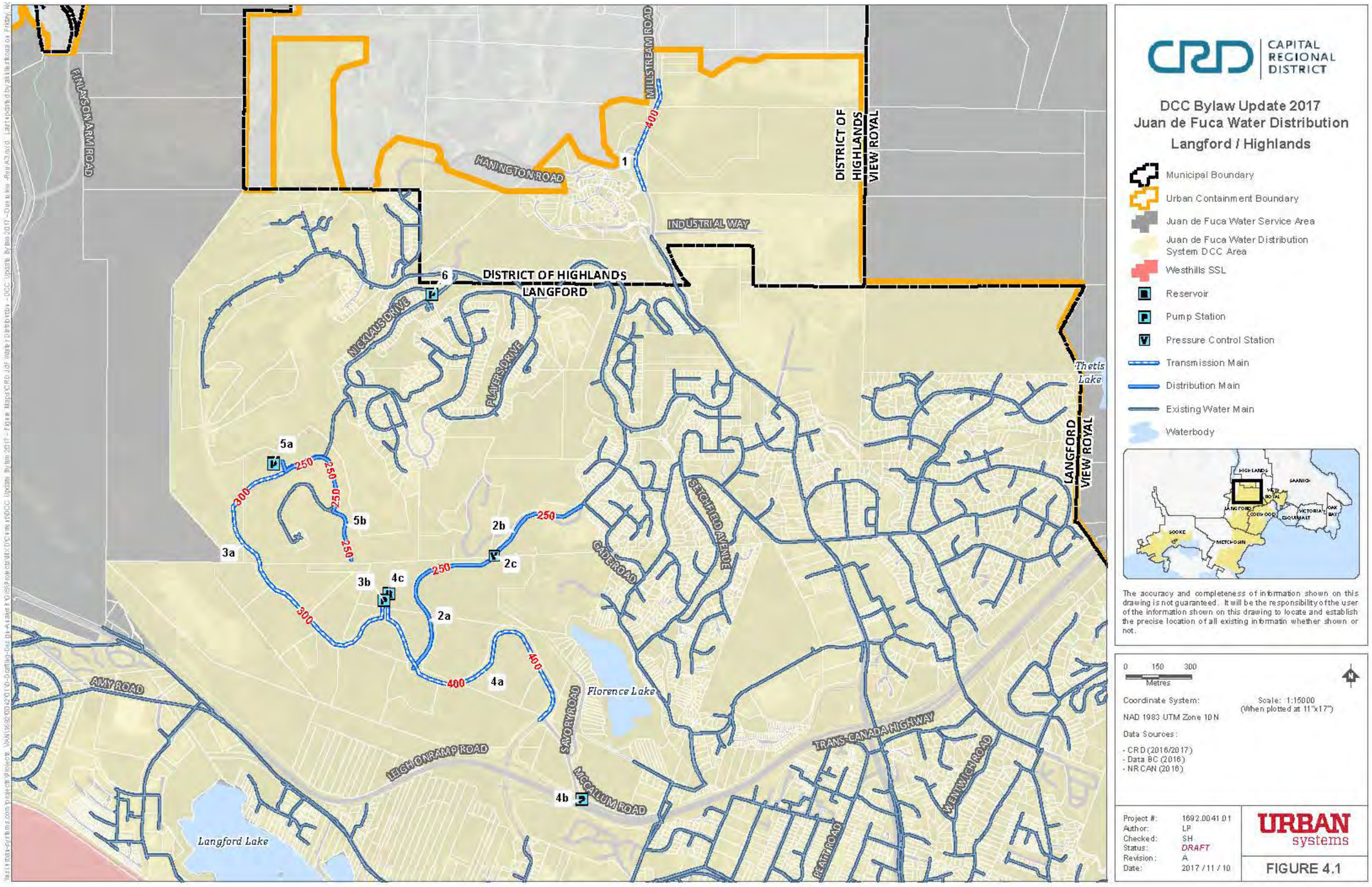
Item	Estimated Project Year See Notes [1],[2],[3],[4]	Developer Driven vs. Planned Existing System Upgrades for Growth	Municipality	Project	Description	Map Reference	Base Cost ($2017)	Engineering (15%)	Project Admin (5%)	Contingency (25%)	Cost Estimate (A) (see Note 5)	DCC Benefit Factor (B)*	Benefit to New Development (C = A x B)	Municipal Assist Factor 1% (D = C x 0.01)	DCC Recoverable (E = C - D)	CRD Responsibility F = (A - E)
1	2018	Planned Existing System Upgrades for Growth	Highlands	Hi-West Developments	New Pipe	1	$857,000	$128,550	$42,850	$214,250	$1,242,650	100%	$1,242,650	$12,427	$1,230,224	$12,427
2	Medium-Term	Developer Driven	Langford	Echo Valley Drive	Distribution Main	2a	$401,000	$60,150	$20,050	$100,250	$581,450	100%	$581,450	$5,815	$575,636	$5,815
						2b	$238,000	$35,700	$11,900	$59,500	$345,100	100%	$345,100	$3,451	$341,649	$3,451
					PRV	2c	$150,000	$22,500	$7,500	$37,500	$217,500	100%	$217,500	$2,175	$215,325	$2,175
3	2020	Developer Driven	Langford	South Skirt Pump Station	Transmission Main (see Note 6)	3a	$717,241	$107,586	$35,862	$179,310	$1,040,000	100%	$1,040,000	$10,400	$1,029,600	$10,400
	2023				Pump Station 7	3b	$1,170,000	$175,500	$58,500	$234,000	$1,638,000	100%	$1,638,000	$16,380	$1,621,620	$16,380
4	2020	Developer Driven	Langford	South Skirt Tank 4	Transmission Main (see Note 6)	4a	$800,000	$120,000	$40,000	$200,000	$1,160,000	100%	$1,160,000	$11,600	$1,148,400	$11,600
	2018				Pump Station 6	4b	$1,650,000	$247,500	$82,500	$412,500	$2,392,500	100%	$2,392,500	$23,925	$2,368,575	$23,925
	Medium-Term				Tank 4 (see Note 7)	4c	$1,724,138	$258,621	$86,207	$431,034	$2,500,000	100%	$2,500,000	$25,000	$2,475,000	$25,000
	2018				Distribution Main (see Note 9)	4d	$338,000	$50,700	$16,900	$84,400	$490,000	100%	$490,000	$4,900	$485,100	$4,900
5	Medium-Term	Developer Driven	Langford	Bear Mountain Pump Station 3	Pump Station	5a	$1,289,000	$193,350	$64,450	$322,250	$1,869,050	100%	$1,869,050	$18,691	$1,850,360	$18,691
	Medium-Term	Developer Driven	Langford	Distribution Pipe	New Pipe	5b	$336,000	$50,400	$16,800	$84,000	$487,200	100%	$487,200	$4,872	$482,328	$4,872
6	2018	Planned Existing System Upgrades for Growth	Langford	Nicklaus Pump Station	Pump Station Upgrade	6	$70,000	$10,500	$3,500	$17,500	$101,500	100%	$101,500	$1,015	$100,485	$1,015
7	Medium-Term	Developer Driven	Langford	Walfred Servicing	DI watermain	7	$1,224,000	$183,600	$61,200	$306,000	$1,774,800	100%	$1,774,800	$17,748	$1,757,052	$17,748
8	Long-term	Planned Existing System Upgrades for Growth	Langford	Fulton Reservoir	Reservoir Upgrade	8a	$1,630,000	$244,500	$81,500	$407,500	$2,363,500	85%	$2,008,975	$20,090	$1,988,885	$374,615
	Long-term	Planned Existing System Upgrades for Growth	Langford		Fire Pump Upgrade	8b	$1,240,000	$186,000	$62,000	$310,000	$1,798,000	85%	$1,528,300	$15,283	$1,513,017	$284,983
	Long-term	Planned Existing System Upgrades for Growth	Langford		Distribution Piping	8c	$94,000	$14,100	$4,700	$23,500	$136,300	85%	$115,855	$1,159	$114,696	$21,604
9	Medium-Term	Developer Driven	Langford	Centre Mountain	New Pump Station	9a	$1,500,000	$225,000	$75,000	$375,000	$2,175,000	100%	$2,175,000	$21,750	$2,153,250	$21,750
	Medium-Term	Developer Driven	Langford		Supply Pipe	9b	$754,000	$113,100	$37,700	$188,500	$1,093,300	100%	$1,093,300	$10,933	$1,082,367	$10,933
	Medium-Term	Developer Driven	Langford		New Reservoir	9c	$5,480,000	$822,000	$274,000	$1,370,000	$7,946,000	100%	$7,946,000	$79,460	$7,866,540	$79,460
	Medium-Term	Developer Driven	Langford		Distribution Pipe	9d	$651,000	$97,650	$32,550	$162,750	$943,950	100%	$943,950	$9,440	$934,511	$9,440
10	Medium-Term	Developer Driven	Colwood	Mary Anne Pump Station	Pump Station	10a	$950,000	$142,500	$47,500	$237,500	$1,377,500	100%	$1,377,500	$13,775	$1,363,725	$13,775
	Medium-Term	Developer Driven	Colwood	Mary Anne PS Pipe	New Pipe	10b	$61,000	$9,150	$3,050	$15,250	$88,450	100%	$88,450	$885	$87,566	$885
	Medium-Term	Developer Driven	Colwood	Mary Anne PS Pipe Upgrade	Pipe Upgrade	10c	$202,000	$30,300	$10,100	$50,500	$292,900	100%	$292,900	$2,929	$289,971	$2,929
11	Medium-Term	Planned Existing System Upgrades for Growth	View Royal	Christie Point	Pipe Upgrade	11	$371,000	$55,650	$18,550	$92,750	$537,950	100%	$537,950	$5,380	$532,571	$5,380
12	Long-term	Developer Driven	Sooke	Spartree Way	PRV Spartree	12	$172,500	$25,875	$8,625	$43,125	$250,125	100%	$250,125	$2,501	$247,624	$2,501
13	Long-term	Planned Existing System Upgrades for Growth	Sooke	HENLYN 180M HGL	Distribution Main	13	$673,000	$100,950	$33,650	$168,250	$975,850	44%	$429,374	$4,294	$425,080	$550,770
14	2021 - New Pipe Portions Medium-Term - New Pipe Long-term - Henlyn Tank	Planned Existing System Upgrades for Growth	Sooke	Henlyn 180M HGL	Distribution Main	14a	$750,000	$112,500	$37,500	$187,500	$1,087,500	100%	$1,087,500	$10,875	$1,076,625	$10,875
					Transmission Main	14b	$497,000	$74,550	$24,850	$124,250	$720,650	100%	$720,650	$7,207	$713,444	$7,207
							$580,000	$87,000	$29,000	$145,000	$841,000	100%	$841,000	$8,410	$832,590	$8,410
					Henlyn Tank	14c	$3,900,000	$585,000	$195,000	$975,000	$5,655,000	100%	$5,655,000	$56,550	$5,598,450	$56,550
15	Medium-Term	Planned Existing System Upgrades for Growth	Sooke	PRV Mountain Heights	PRV	15	$150,000	$22,500	$7,500	$37,500	$217,500	100%	$217,500	$2,175	$215,325	$2,175
16	Medium-Term	Planned Existing System Upgrades for Growth	Sooke	Otter Point Road	Pipe Upgrade	16a	$1,456,000	$218,400	$72,800	$364,000	$2,111,200	25%	$527,800	$5,278	$522,522	$1,588,678
						16b	$25,000	$3,750	$1,250	$6,250	$36,250	100%	$36,250	$363	$35,888	$363
17	Long-term	Planned Existing System Upgrades for Growth	Sooke	Grant Road	Pipe Upgrade	17a	$19,000	$2,850	$950	$4,750	$532,150	48%	$255,432	$2,554	$252,878	$279,272
							$348,000	$52,200	$17,400	$87,000	$504,600	58%	$292,668	$2,927	$289,741	$214,859
							$533,000	$79,950	$26,650	$133,250	$772,850	58%	$448,253	$4,483	$443,770	$329,080
						17b	$618,000	$92,700	$30,900	$154,500	$896,100	58%	$519,738	$5,197	$514,541	$381,559
18	Long-term	Planned Existing System Upgrades for Growth	Sooke	Throup Road	New Pipe	18a	$454,000	$68,100	$22,700	$113,500	$658,300	100%	$658,300	$6,583	$651,717	$6,583
						18b	$194,000	$29,100	$9,700	$48,500	$281,300	100%	$281,300	$2,813	$278,487	$2,813
						18c	$133,000	$19,950	$6,650	$33,250	$192,850	100%	$192,850	$1,929	$190,922	$1,929
						18d	$181,000	$27,150	$9,050	$45,250	$262,450	100%	$262,450	$2,625	$259,826	$2,625

19				Bear Mountain Debt	(see Note 8)	n/a	$3,392,220	N/A	N/A	N/A	$3,392,220	100%	$3,392,220	$33,922	$3,358,298	$33,922
20				Interest on Loan Authorization Bylaw #3164 2011-2022		n/a	$859,340	N/A	N/A	N/A	$859,340	100%	$859,340	$8,593	$850,747	$8,593
21				Project Liability Supply and Distribution on Leigh Road		n/a	$1,200,000	N/A	N/A	N/A	$1,200,000	100%	$1,200,000	$12,000	$1,188,000	$12,000
22				Silver Creek Debt		n/a	$1,571,275	N/A	N/A	N/A	$1,571,275	100%	$1,571,275	$15,713	$1,555,562	$15,713
							$41,603,715	$5,187,132	$1,729,044	$8,586,620	$57,611,110		$53,646,955	$536,470	$53,110,486	$4,500,625

Note [1] - This does not represent the exact priority of project development, just the estimates development phasing.
Note [2] - Project timing and rebates for projects constructed are subject to actual reserve funds available
Note [3] - All projects are available for DCC credit if they meet the requirements of Capital Regional Districts DCC Credit Policy
Note [4] Medium-term = years 2024 to 2029 | Long-term = years 2030 and beyond
Note [5] - Cost Estimates include 15% Engineering, 5% Project Admin and 25% contingency
Note [6] - Revised to better reflect actual construction costs realized in 2017
Note [7] – Bolted Steel Tank
Note [8] – Bear Mountain Debt as of August 2017, as of October 2017 balance is $3.15 Million
Note [9] – Balance of project expenditures to be funded in 2018 up to approved budget of $3.99 million

Table 4.3: Water Project DCC Calculations

A: Water DCC Calculation				
Equivalent Population Estimates	**New Units**		**Person per unit (residential)/ Equivalent Population/m^2 (other land uses)**	
Single-Family	per lot	5,550	3.2	17760
Medium Density Residential	per unit	4,961	2.8	13891
Multi-Family	per unit	5,528	1.8	9951
Commercial	per square metres gross floor area	453,500	0.012	5335
Industrial	per square metres gross floor area	631,000	0.006	4019
Institutional	per square metres gross floor area	40,250	0.026	1046
			Total Equivalent Population:	**52003**
Total Equivalent Population	52,003	(a)		
B: Unit Water DCC Calculation				
Net Waterworks DCC Program Recoverable		53,110,486	(b)	
Existing DCC Reserve Monies		5,620,000	(c)	
Net Amount to be Paid by DCCs		$47,490,486	(d) = (b) - (c)	
DCC per person		$913.23	(e) = (d) / (a)	
C: Resulting Water DCCs				**Person per unit (residential)/ Equivalent Population/m^2 (other land uses)**
Single-Detached		$2,922	per lot	3.2
Medium Density Residential		$2,557	per unit	2.8
High Density Residential		$1,644	per unit	1.8
Commercial		$10.74	per square metre gross floor area	0.012
Industrial		$5.82	per square metre gross floor area	0.006
Institutional		$23.74	per square metre gross floor area	0.026



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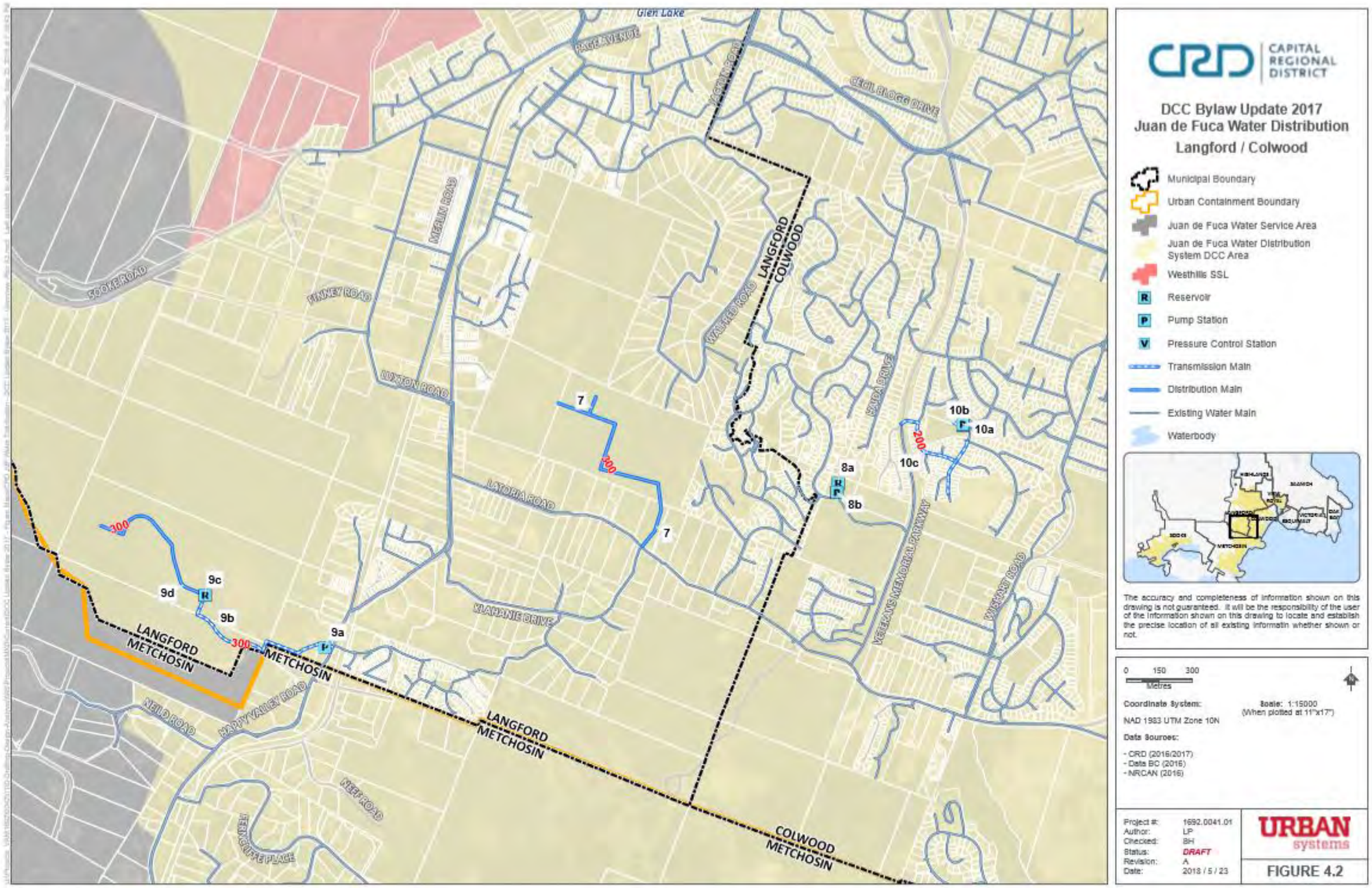

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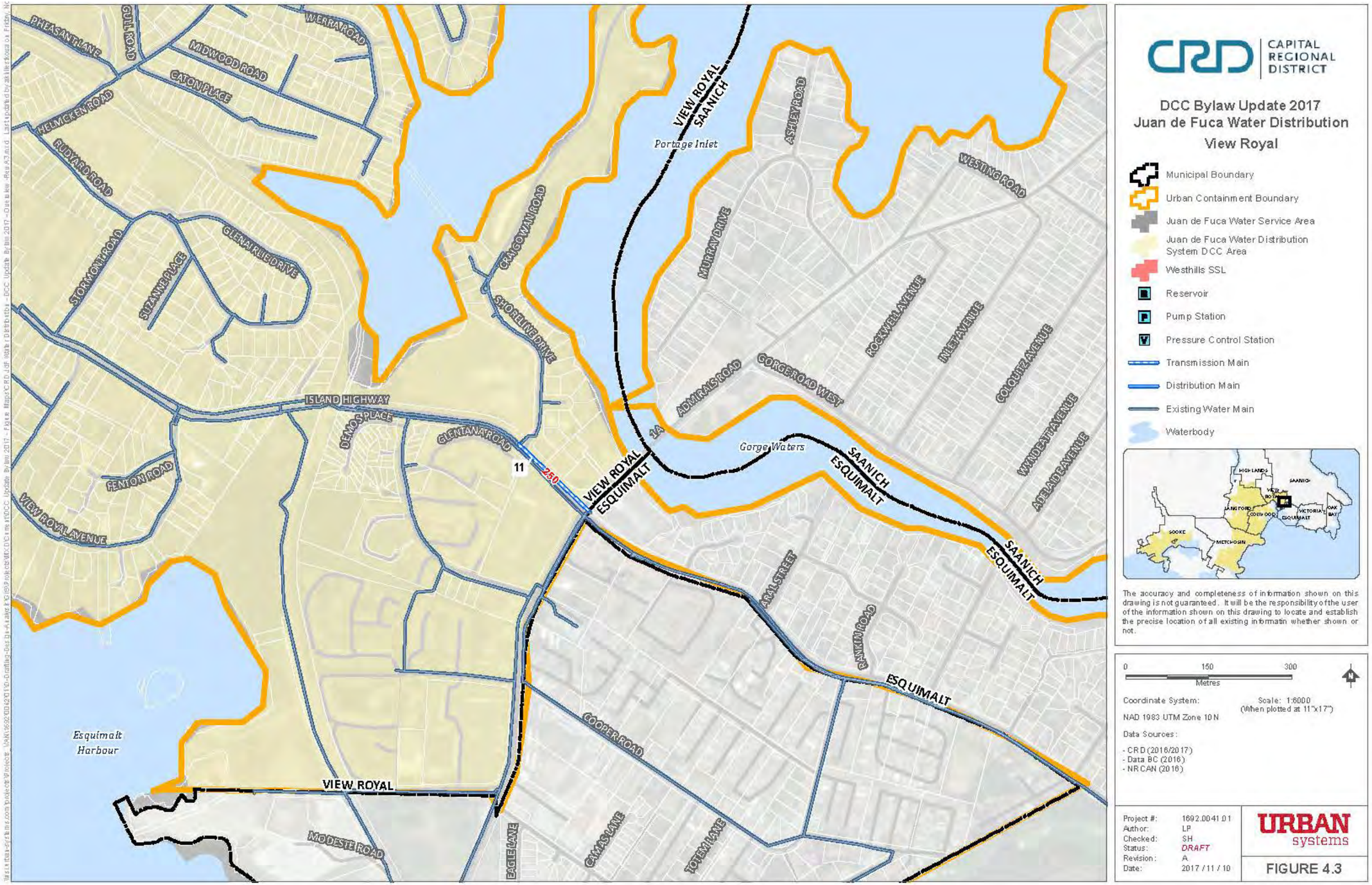

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PART 5. DCC RATES

A summary of proposed DCC rates for all land use categories are shown in **Table 5.1** (below).

Table 5.1: Proposed DCC Rates

Land Use	Unit	Proposed Rate (2018)
Low Density Residential (single family)	per lot	$2,922
Medium Density Multi Family (duplex, triplex, fourplex, townhouse)	per unit	$2,557
High Density Multi-Family (apartments)	per unit	$1,644
Commercial	per m^2 of total floor area	$10.74
Industrial	per m^2 of total floor area	$5.82
Institutional	per m^2 of total floor area	$23.74

A comparison of current (2011) and proposed DCC rates is provided in **Table 5.2** (below). As shown by **Table 5.2**, the average increase in DCC rates in all categories is approximately **10%**.

Table 5.2: DCC Rate Comparison

Land Use	Unit	Previous Rate (2011)	Proposed Rate (2018)	Difference	Percent Change (%)
Low Density Residential	per lot	$2,655	$2,922	$267	(+10%)
Medium Density Multi-family	per unit	$2,323	$2,557	$234	(+10%)
High Density Multi-family	per unit	$1,494	$1,644	$150	(+10%)
Commercial	per m^2 of total floor area	$9.76	$10.74	$0.98	(+10%)
Industrial	per m^2 of total floor area	$5.29	$5.82	$0.53	(+10%)
Institutional	per m^2 of total floor area	$21.57	$23.74	$2.17	(+10%)

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PART 6. STAKEHOLDER CONSULTATION

Although the LGA does not require a public participation process, the Best Practice Guide does suggest that an opportunity for public participation be included as part of the formulation of the Water DCC program. The purpose of such a process is to allow those who are interested in or affected by the proposed Water DCCs to offer comments and input. The Best Practice Guide does not set a recommended format to be followed for public participation; instead, the type of public participation to be used is decided by the Regional District itself.

Over the past two years the Capital Regional District has completed a substantial amount of stakeholder engagement, which has included one on one meetings with five of the six JDFWDS municipalities as well as several meetings with the development community. CRD staff and their consultants have maintained a continuous open dialog with developer stake-holders and have explored several development scenarios with the City of Langford.

Upon completion of the DCC program the revised DCC rates were made available to the public for review and comment.

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PART 7. DCC IMPLEMENTATION

7.1 Bylaw Exemptions

The *Local Government Act (LGA)* is clear that a DCC cannot be levied if the proposed development does not impose new capital cost burdens on the Regional District, or if a DCC has already been paid in regard to the same development. However, if additional further expansion for the same development creates new capital cost burdens or uses up capacity, the DCCs can be levied for the additional costs.

The *LGA* further restricts the levying of the DCC at the time of application for a building permit if:

- The building permit is for a church or place of public worship as per the *Community Charter*; or
- The value of the work authorized by the building permit does not exceed $50,000 or a higher amount as prescribed by bylaw; or
- Unit size is no larger than 29 sq.m. and only for residential use.

Changes to the legislation now allow local governments to charge DCCs on residential developments of fewer than four self-contained dwelling units, as long as such a charge is provided for in the local government's DCC bylaw. The CRD is choosing to eliminate the exemption for residential developments of fewer than four self-contained dwelling units and charge DCCs for development of three self-contained dwelling units or less.

7.2 DCC Waivers and Reductions

Changes to the *Local Government Act* in 2008 provide local governments the discretionary authority to waive or reduce DCCs for certain types of development to promote affordable housing and low impact development. The CRD considered providing waivers/reductions and has chosen to continue to not provide any waivers/reductions.

7.3 Collection of Charges – Building Permit and Subdivision

Local governments can choose to collect DCCs at subdivision approval or building permit issuance. The CRD will require collection of DCCs for detached residential developments at time of subdivision approval. All other development will be levied DCCs at time of building permit. Of the two possible collection times, subdivision approval occurs earlier in the process. Collecting DCCs early will allow the CRD to ensure timely provision of infrastructure and services. For medium and high density residential developments DCCs will be collected at building permit when total number of units is known. DCCs for other commercial, industrial and institutional uses will also be collected

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at building permit when the total floor area is known; collecting DCCs based on floor area will result in more equitable distribution of growth costs.

7.4 Collection of DCCs on Redeveloped or Expanded Developments

When an existing building or development undergoes an expansion or redevelopment there is usually a need for additional DCC related infrastructure. The new developer/ builder should pay the applicable DCCs based on the additional floor area for attached dwellings, multiple dwellings, commercial, industrial or institutional land uses at the DCC rates in the current DCC bylaw. In essence, the CRD is giving a DCC credit for the existing development or building. DCCs are only levied on the new development/ building area.

If a single family residential unit is replaced by another single family residential unit then no additional DCCs are payable. If a lot is subdivided into two, for example, to construct two small lot single family residential units, then DCCs are payable on the one additional single family residential lot.

7.5 In-Stream Applications

The new DCC rates will be in force immediately after the updated Development Cost Charge Bylaw is adopted; however, the Local Government Act (LGA) provides special protection from rate increases for development applications that are submitted prior to the adoption date.

In-stream protection applies to both building permit and subdivision applications received prior to the adoption of the new DCC Bylaw. Protection is also extended to rezoning and development permit applications that are submitted prior to the adoption of the new DCC Bylaw and that will result in a building permit within 12 months of the adoption of the Bylaw. Division 19, Sections 511 and 568 of the LGA outline the criteria that must be met in order for an application to qualify for in-stream protection.

If an application meets the required criteria and is submitted prior to the adoption of the new DCC Bylaw, it will be provided protection from rate increases for a period of twelve months after the adoption date.

7.6 Rebates and Credits

The CRD has established a policy or practise to guide staff in the collection of DCCs and the use of DCC credits and rebates as stipulated in the *LGA*. There may be situations in which it is not in the best interests of the CRD to allow an owner to build DCC services outside of their subdivision or development. Building such services may start or accelerate development in areas where the Regional District is not prepared to support. Therefore, policies for DCC credits, rebates and latecomer agreements have been drafted to assist staff in these development financing processes.

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7.7 DCC Monitoring and Accounting

In order to monitor the DCC Program, the CRD should enter all of the projects contained in the DCC program into its tracking system. The tracking system would monitor the status of the project from the conceptual stage through to its final construction. The tracking system would include information about the estimated costs, the actual construction costs, and the funding sources for the projects. The construction costs would be based on the tender prices received, and the land costs based on the actual price of utility areas and or other land and improvements required for servicing purposes. The tracking system would indicate when projects are completed, their actual costs, and would include new projects that are added to the program.

7.8 DCC Reviews

To keep the DCC program as current as possible, the CRD should review its program annually. Based on its annual review, the CRD may make minor amendments to the DCC rates. Typically, a major amendment to the DCC program and rates is needed every 2 to 5 years.

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APPENDIX A

Pubic Consultation Materials

Results of Public Consultation will be included after consultation is completed

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APPENDIX B

Existing Capital Regional District Development Cost Charge Bylaw No. 2758

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CAPITAL REGIONAL DISTRICT
BYLAW NO. 2758
(As amended by Bylaw Nos. 2960, 3100, 3218, 3432, 3805, 3893, 3904

Consolidated version authorized in accordance with Bylaw No. 3014,
CRD Consolidation Authorization Bylaw No. 1, 2002

DEVELOPMENT COST CHARGES BYLAW
(JUAN DE FUCA WATER DISTRIBUTION), NO. 1, 2000

A Bylaw to Impose Development Cost Charges

For technical enquiries, please contact CRD Water Services,
479 Island Highway, Victoria, BC, V9B 1H7

For reference to original bylaws and amendments, or for further details,
please contact the Administration Department, Capital Regional District,
625 Fisgard Street, Victoria, BC, V8W 2S6

CAPITAL REGIONAL DISTRICT

BYLAW NO. 2758

****

A BYLAW TO IMPOSE DEVELOPMENT COST CHARGES

****

WHEREAS

A. The District may impose development cost charges for the purposes of providing funds for the capital costs of water facilities in the service areas;

B. The development cost charges imposed by this bylaw are related to the capital costs attributable to projects included in the capital expenditure program of the District under the terms and conditions of sections 933, 934 and 935;

Bylaw 2960

C. The Board has considered the future land use patterns and development and the phasing of works and services;

D. The Board is of the opinion that the development cost charges imposed by this bylaw:

(a) Are not excessive in relation to the capital costs of prevailing standards of service;
(b) Will not deter development;
(c) Will not discourage the construction of reasonably priced housing or the provision of reasonably priced serviced land;

E. The development cost charges imposed under this bylaw will be collected by the Member Municipalities on behalf of the District, where applicable;

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

PART 1 GENERAL PROVISIONS

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1. This bylaw may be cited as the "Development Cost Charges Bylaw (Juan de Fuca Water Distribution), No. 1, 2000."

2. The following schedules attached to this bylaw form an integral part of this bylaw and are enforceable in the same manner as this bylaw.
   a) Schedule A – Service Area Langford;
   b) Schedule B – Service Area Langford;
   c) Schedule C – Service Area Sooke;
   d) Schedule D – Service Area View Royal;
   e) Schedule E – Service Area Colwood;
   f) Schedule F – Service Area Metchosin;
   g) Schedule G – Service Area Highlands;
   h) Schedule H – Development Cost Charge Rates. ***Bylaw 3904***

3. This bylaw applies to all applications for subdivision and for issuance of a building permit for parcels located in any of the service areas.

PART 2 DEFINITIONS

4. In this bylaw, unless the context otherwise requires:

APPROVING OFFICER means the person appointed under the *Land Title Act* within a *Member Municipality* or the *District* to perform the duties and responsibilities of that position.

BOARD means the elected board of the *District*.

BUILDING PERMIT means any permit authorizing the construction, alteration or extension of a building or structure in a *Member Municipality* or the *Electoral Area*.

COMMERCIAL means land zoned for commercial uses under a zoning bylaw enacted by a *Member Municipality* or the *District*.

COMMISSION means the Juan de Fuca Water Distribution Commission.

COMPREHENSIVE DEVELOPMENT includes any *development* that is comprised of any two or more *residential uses*, *non-residential u*ses or both.

COUNCIL means the elected council of a *Member Municipality*.

DEVELOPER means a person liable to pay *development cost charges* under this bylaw.

DEVELOPMENT COST CHARGES OR DCC means the applicable rates prescribed in Schedule H.
Bylaw 3904

DISTRICT means the Capital Regional District.

DWELLING UNIT OR UNIT means a room, a suite of rooms or a building or structure that is used or intended to be used as a self-contained private residence for one household that may contain eating, living, sleeping and sanitary facilities.

ELECTORAL AREA includes any Electoral Area of the *District*, which is under the jurisdiction of the *Commission* and is located within any of the *service areas*.

ELEMENTARY SCHOOL means any public or private facility built for the purpose of teaching students up to and including a Grade 7 equivalency in the province of British Columbia.

HIGH DENSITY MULTI-FAMILY means any *multi-family residential* development which has a gross density of more than 50 *dwelling units* per hectare.

INSTITUTIONAL means any development providing for the assembly of persons for religious, charitable, philanthropic, cultural, civic or recreational purposes; including but not limited to auditoriums, youth centres, social halls, group camps and churches.

INSTITUTIONAL RESIDENTIAL means any short term or long term facilities which are operated by the government, a public agency or a private agency to provide food and accommodations in addition to providing care, assistance or supervision of the residents, including but not limited to nursing homes, community care facilities, convalescent homes, half-way houses, detention centres and correctional institutions.

INDUSTRIAL means land zoned for industrial uses under a zoning bylaw enacted by a *Member Municipality* or the *District*.

GENERAL MANAGER means the person appointed by the *Board* to perform the duties and responsibilities of the General Manager, Regional Water Supply and his/her designate.

MEDIUM DENSITY MULTI-FAMILY means any multi-family residential development which has a gross density of not more than 50 dwelling units per hectare.

Bylaw 2960

MEMBER MUNICIPALITY means the City of Colwood, the District of Highlands, the District of Langford, the District of Metchosin, the District of Sooke and the Town of View Royal and any municipality subsequently incorporated in the *Electoral Area.*

Bylaw 3904

MULTI-FAMILY RESIDENTIAL means a parcel which is used or may be used for four or more *dwelling units* or a building containing four or more *dwelling units.*

MUNICIPAL CHARGES means *development cost charges* imposed by a bylaw of a *Member Municipality*.

NON RESIDENTIAL USE means the use of any building, structure or any portion thereof that is not a *residential use*, including but not limited to *commercial, industrial, institutional, institutional residential, elementary school* and *secondary school*.

RESIDENTIAL USE means *single family residential, two family residential, three family residential, multi-family residential, medium density multi-family and high density multi-family* uses.

SECONDARY SCHOOL means any public or private facility built for the purpose of teaching students beyond a Grade 7 equivalency in the province of British Columbia.

SERVICE AREA means an area which is located in a *Member Municipality* or the *Electoral Area* and is set out in the attached Schedules to this bylaw.

SINGLE FAMILY RESIDENTIAL means a parcel which is used or may be used for one *dwelling unit* or any building containing one *dwelling unit.*

THREE FAMILY RESIDENTIAL means a parcel which is used or may be used for three *dwelling units* or any building containing three *dwelling units*.

TWO FAMILY RESIDENTIAL means a parcel which is used or may be used for two *dwelling units* or any building containing two *dwelling units*.

WATER FACILITY means any work, service or plant for storing, conveying, disposing or treating water.

PART 3 DEVELOPMENT COST CHARGES

5. (1) A person who applies for and obtains approval of a subdivision of residential land other than Medium Density Multi-Family or High Density Multi-Family in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule H prior to subdivision of the land.

Bylaw 3904

(2) A person who obtains a building permit in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule H prior to the issuance of the building permit.

Bylaw 3904

(3) A *development cost charge* is not payable where the development is subject to an exemption, waiver or reduction under the *Local Government Act* or another enactment of the Province or the *District.*

Bylaw 2960, 3893

6. *Development cost charges* imposed under this bylaw shall be calculated in accordance with the rates prescribed in Schedule H.

Bylaw 3893, 3904

7. In calculating the *development cost charges* under this part, the *development cost charges* for a *comprehensive development* shall be calculated separately for each part of the *comprehensive development* designated respectively to *residential uses and non residential uses* and shall be the sum total of the *development cost charges* for each of those uses, calculated in accordance with Schedule H.

Bylaw 3904

8. A *developer* shall pay the *development cost charges* to the *Member Municipality* or the *District*, according to the location of the parcel in respect of which the *development cost charges* are payable, at the following times:

(a) prior to final approval, if the application is made for subdivision only; or

(b) prior to issuance of a *building permit,* if the application is made for a *building permit* only or for both *subdivision* and for a *building permit*.

9. The *development cost charges* under this bylaw may not be paid by installments unless a regulation under the Municipal Act applies to the *development*.

10. If the *developer* does not pay the *development cost charges* as required under this bylaw, the amount becomes a debt owing to the *District* and shall be charged at interest at the rate set out under the *Taxation (Rural Area) Act* on the amount outstanding.

PART 4 COLLECTION AND REMITTANCE OF DEVELOPMENT COST CHARGES

11. Each *Member Municipality* shall collect the *development cost charge* payable under this bylaw at the time prescribed in section 8 (as renumbered).

Bylaw 3893

12. If a *developer* of a *subdivision* intends to build less than the number of *dwelling units* permitted by the applicable zoning bylaw on any parcel in the *subdivision*, the *developer* may pay the *DCC* for the number of units intended to be built, as long as

    (a) the *developer* registers, under section 219 of the Land Title Act, a restrictive covenant in favour of the Capital Regional District;

    (b) the restrictive covenant contains a covenant by the owner of the parcel agreeing to pay the *DCC* for any one or more dwelling units in addition to those intended to be built at the time of *subdivision,* at the time of issuance of a building permit for any of those additional, units;

    (c) the *DCC* payable under (b) is the *DCC* in force at the time of the application for the building permit for any additional *dwelling unit*; and

    (d) the restrictive covenant must be registered in priority to all other financial charges registered against the title to any affected parcel. .

13. A *Member Municipality* shall not approve a *subdivision* or issue a *building permit* for any *development* unless the *development cost charges* imposed under this bylaw have been paid in accordance with Part 3.

14. Each *Member Municipality* shall establish and maintain a separate account for the *DCC* monies collected under this bylaw and deposit and hold these monies in that separate account, in trust for the *District*, until the *DCC* monies are remitted to the *District*.

15. Within 30 days of the first business day of each month, each *Member Municipality* shall remit to the *District* the total amount of the *development cost charges* collected by the *Member Municipality* during the previous month.

16. Each *Member Municipality* shall provide to the *District* with the remittance of the *DCC* monies a statement of account in a form approved by the *General Manager* which sets out the following information:

    (a) the date and amount of *development cost charges* collected and the amount still outstanding under installment payments and the dates for payment;

    (b) the number and type of use of *residential uses*;

    (c) the amount and type of use of *non residential uses*;

    (d) the location of parcels and *dwelling units* against which *DCC*s were levied;

(e) the location of parcels and *dwelling units* against which *DCC*s were not levied and the reason for the exemption; and

(f) any other information that the *General Manager* deems necessary.

17. Each *Member Municipality* shall retain, for a period of eleven years, sufficient records to support the statements and payments referred to in this part.

18. The *District* may, at any time subject to first giving reasonable notice to any *Member Municipality*, inspect any and all records of the *Member Municipality* relating to the information required by this bylaw, the calculation, the collection and remittance by the *Member Municipality* of the *development cost charges* levied under this bylaw, and the calculations and remittance by the *Member Municipality* of any payments required under this bylaw.

19. Each *Member Municipality* shall permit any employee or agent of the *District* to inspect the records referred in this part and to make and take away copies of those records.

20. If a *Member Municipality* chooses not to collect any portion of *development cost charges* payable under this bylaw or to remit to the *District* any *development cost charges* collected in the manner prescribed by this bylaw, the *Member Municipality* shall pay to the *District* on demand an amount equal to the *development cost charges* that the *Member Municipality* should have collected or remitted under this bylaw.

PART 5 AUTHORIZATION

21. The *General Manager* may prescribe any form, statement, notice, practice, procedure or other administrative requisites required under this bylaw, after prior consultation with the staff of *Member Municipalities*.

PART 6 SEVERABILITY

22. If any portion of this bylaw is held to be invalid by a court of competent jurisdiction, the invalid portion shall be severed and the remainder of the bylaw shall be deemed to have been enacted without the invalid portion.

PART 7 EFFECTIVE DATE

23. This bylaw shall come into effect thirty days after the date of final adoption of this bylaw.

READ A FIRST TIME THIS	10th	day of	May	2000.
READ A SECOND TIME THIS	10th	day of	May	2000.
READ A THIRD TIME THIS	10th	day of	May	2000.

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APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS	20th	day of	July	2000.
ADOPTED THIS	9th	day of	August	2000.

Christopher M. Causton
CHAIR

Sheila M. Norton
SECRETARY

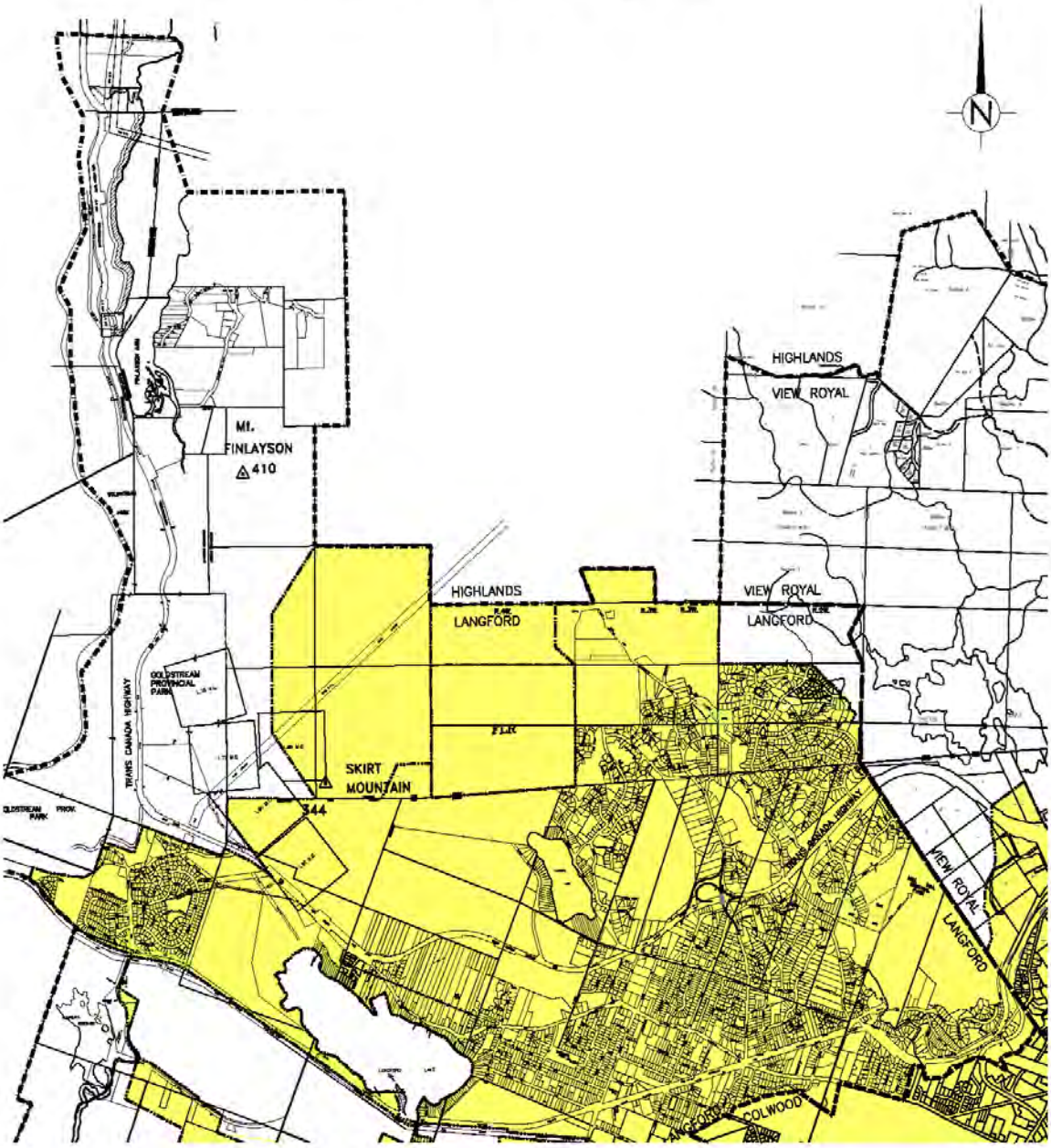
This Bylaw is a copy of *Development Cost Charges Bylaw (Juan de Fuca Water Distribution), No. 1, 2000*, consolidated under section 139 of the *Community Charter* and is printed on the authority of the Corporate Officer of the CRD.

Sonia Santarossa, Corporate Officer

142

Schedule A - Langford

Bylaw 3100, 3432



SERVICE AREA

CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

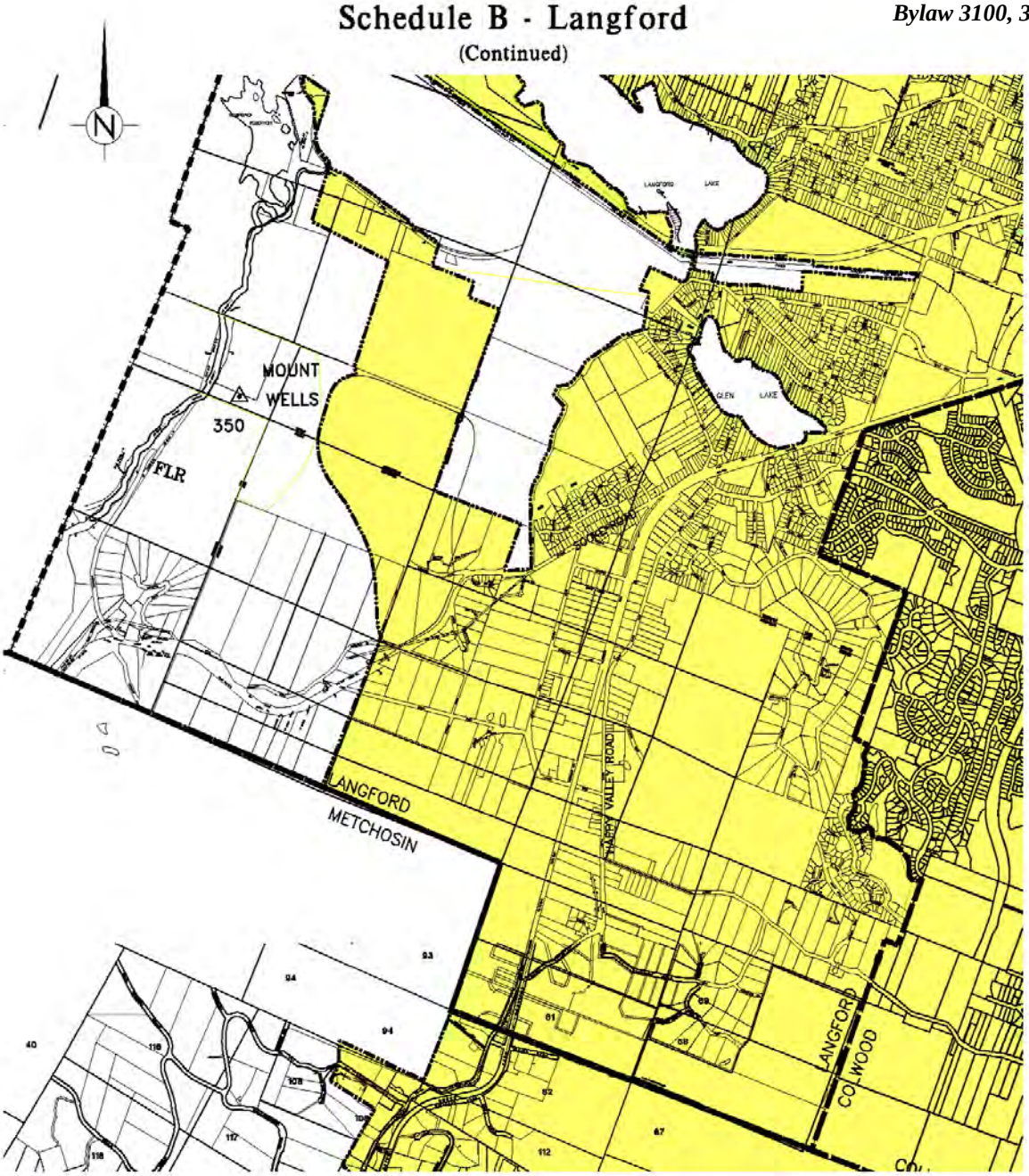
April 25, 2007

143

Schedule B - Langford

Bylaw 3100, 3432

(Continued)



SERVICE AREA

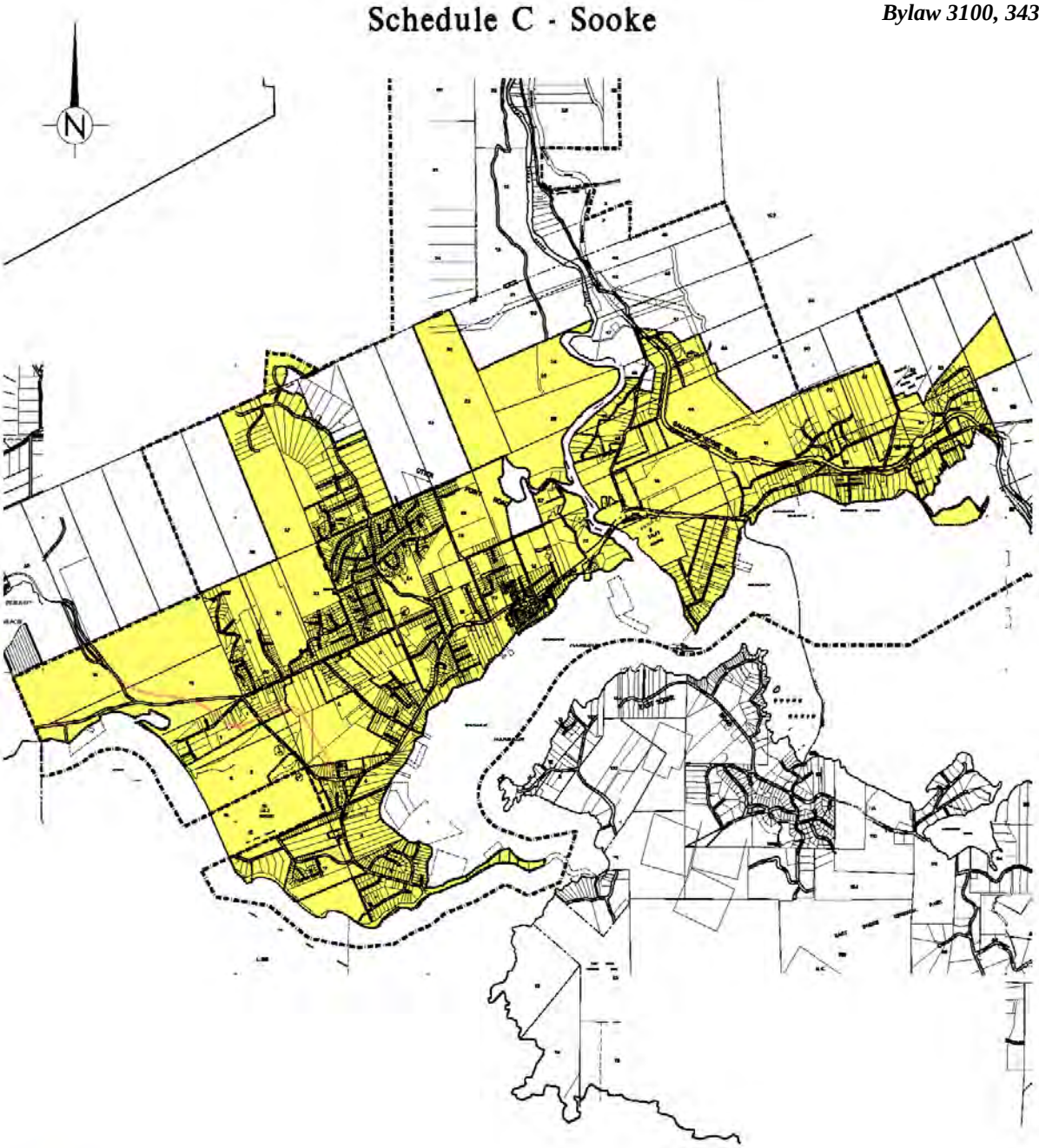
CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

April 25, 2007

144

Schedule C - Sooke

Bylaw 3100, 3432



SERVICE AREA

CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

April 25, 2007

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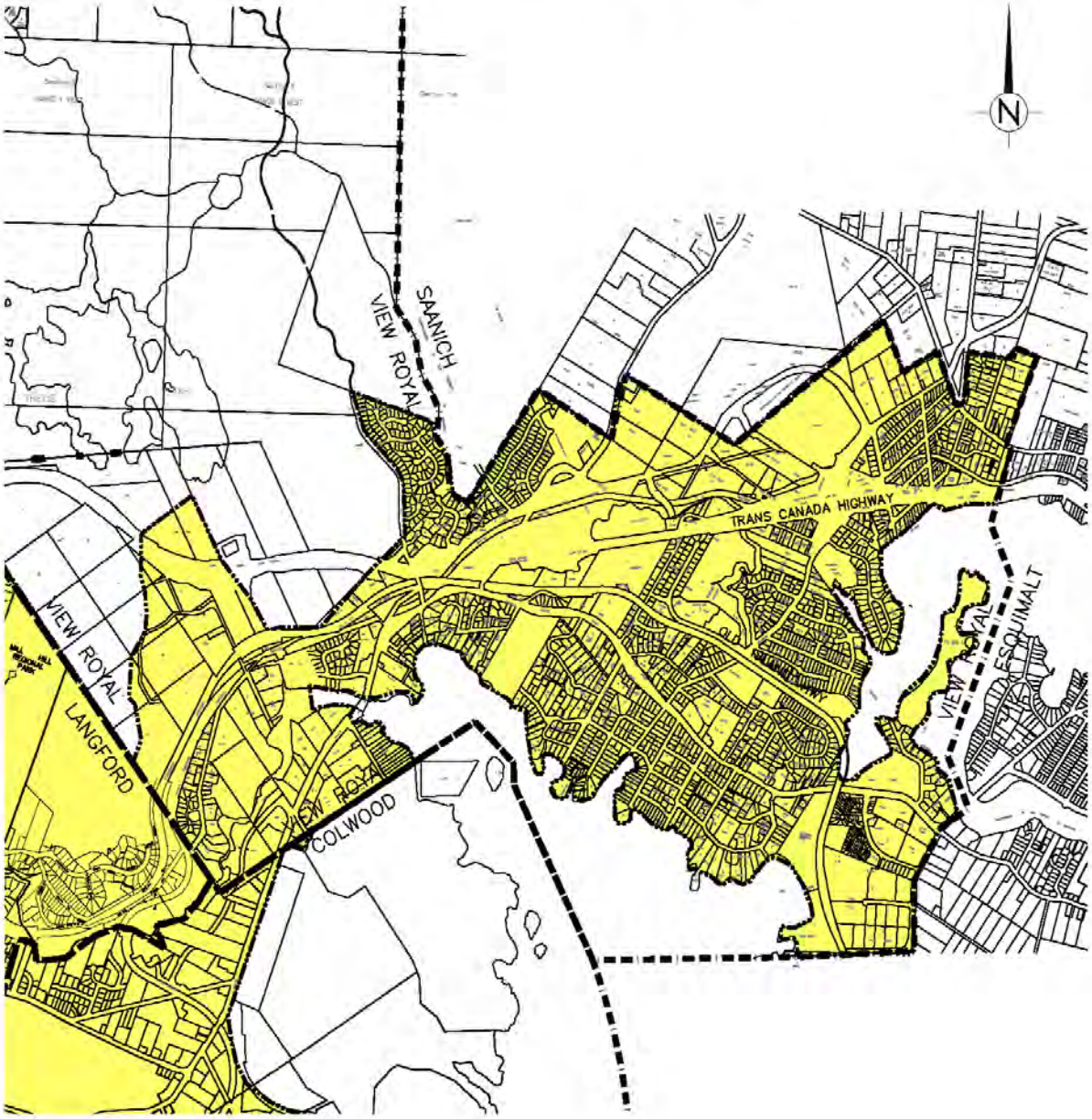
Schedule D - View Royal

Bylaw 3100, 3432



SERVICE AREA

CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

April 25, 2007

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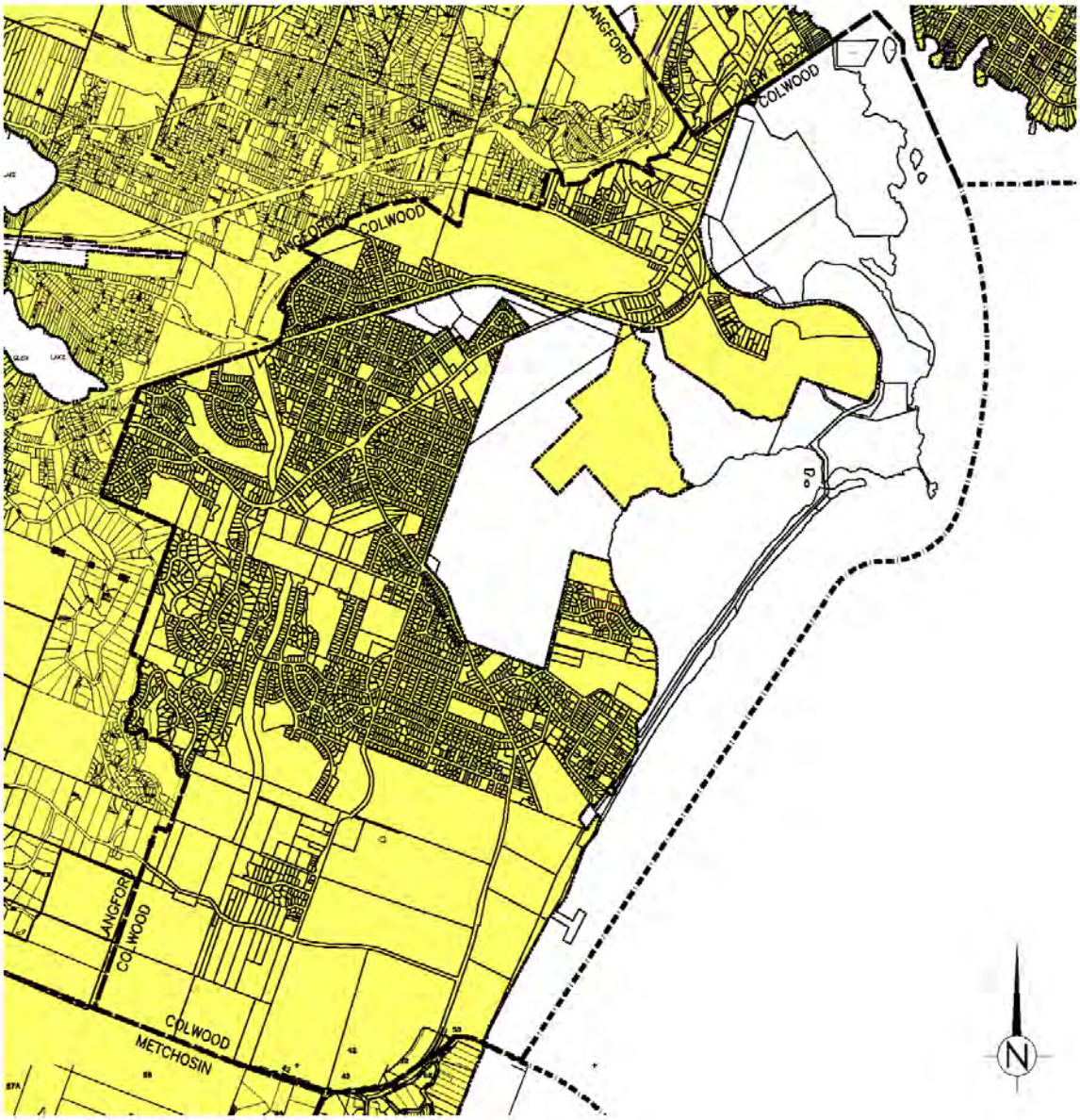
Schedule E - Colwood

Bylaw 3100, 3432



SERVICE AREA

CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

April 25, 2007

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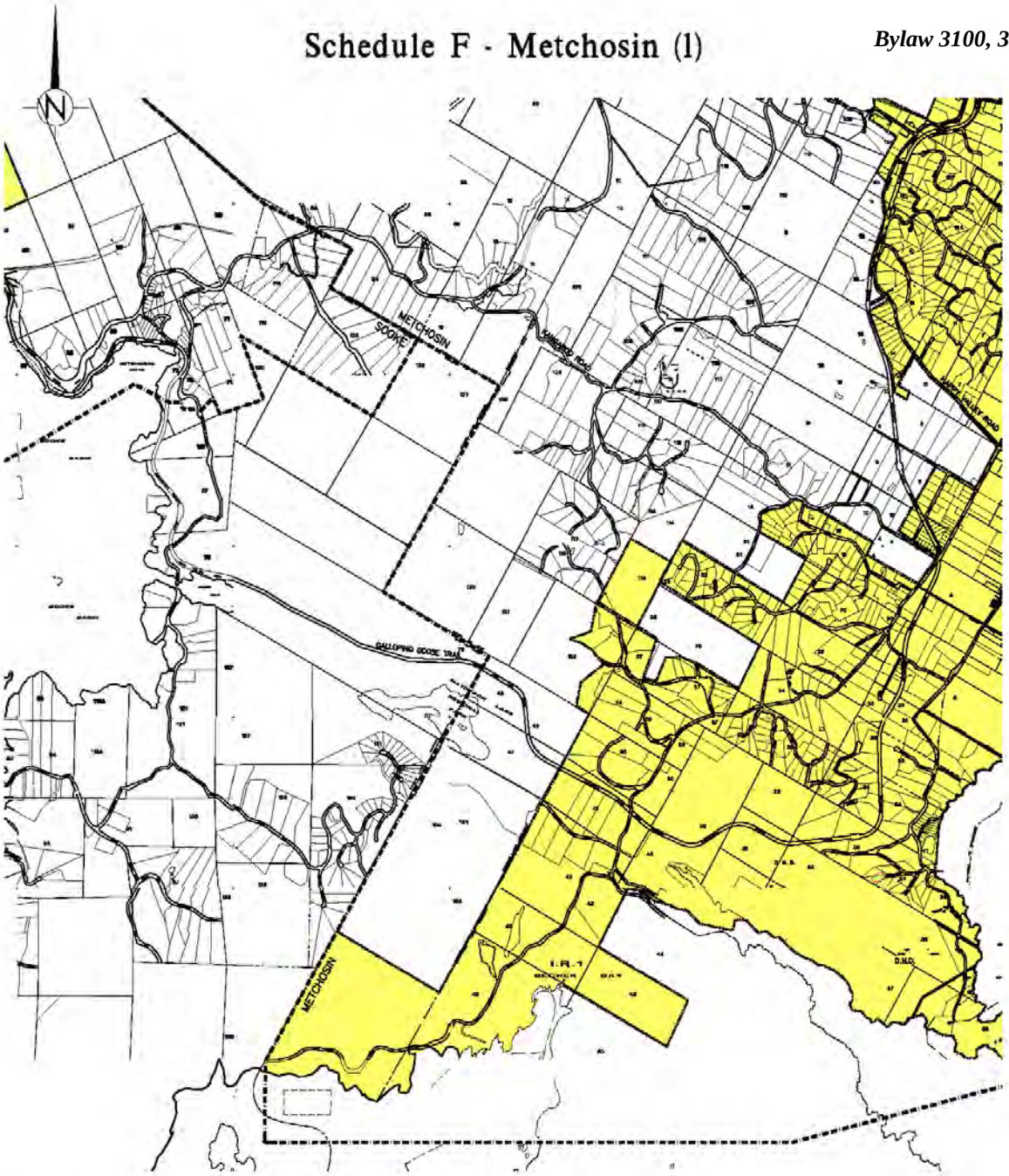
Schedule F - Metchosin (1)

Bylaw 3100, 3432



SERVICE AREA

CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

April 25, 2007

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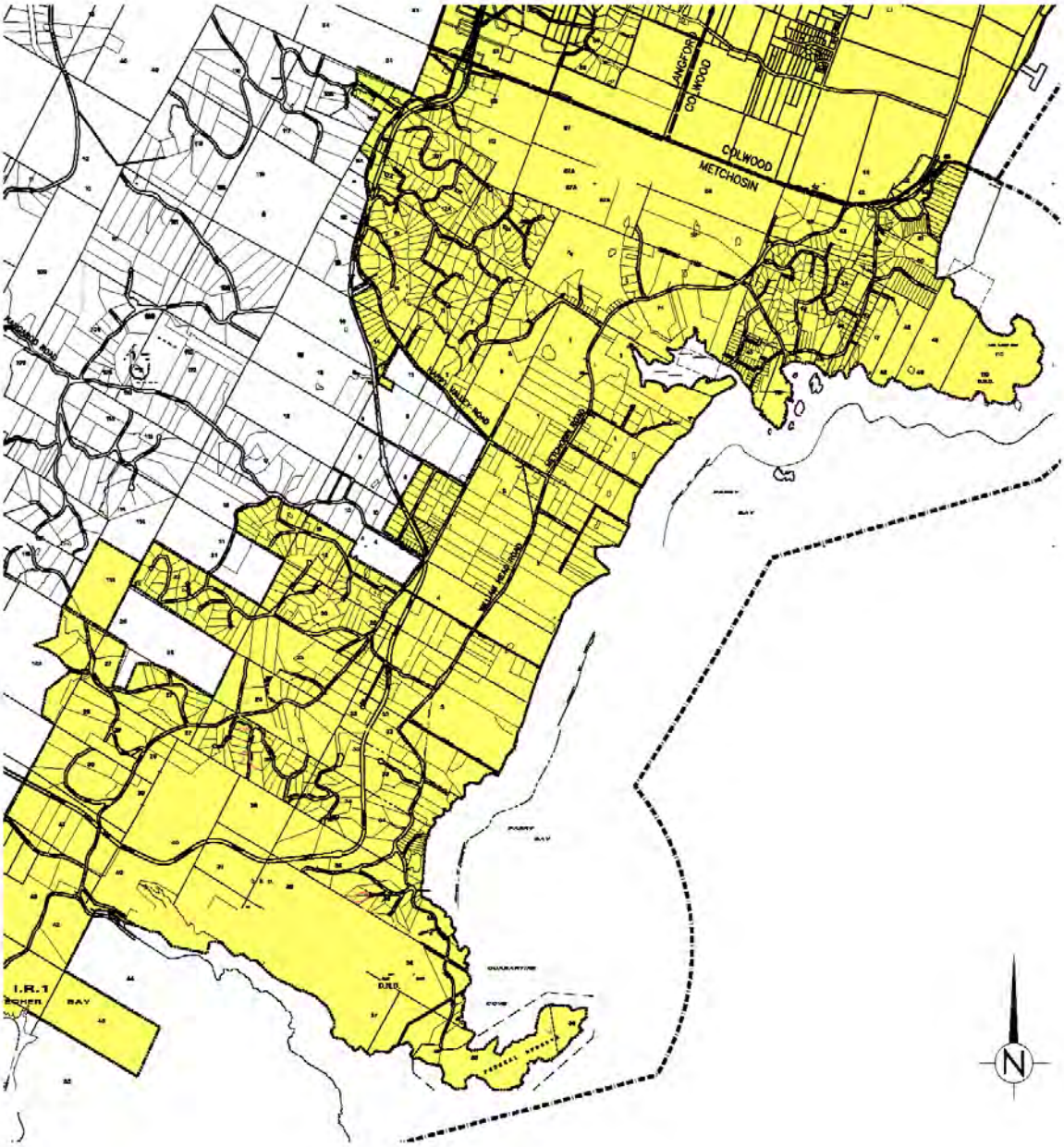
Schedule F - Metchosin (2)

Bylaw 3100, 3432



SERVICE AREA

CRD - Bylaw No. 3432
Development Cost Charges,
Juan de Fuca Water Distribution

April 25, 2007

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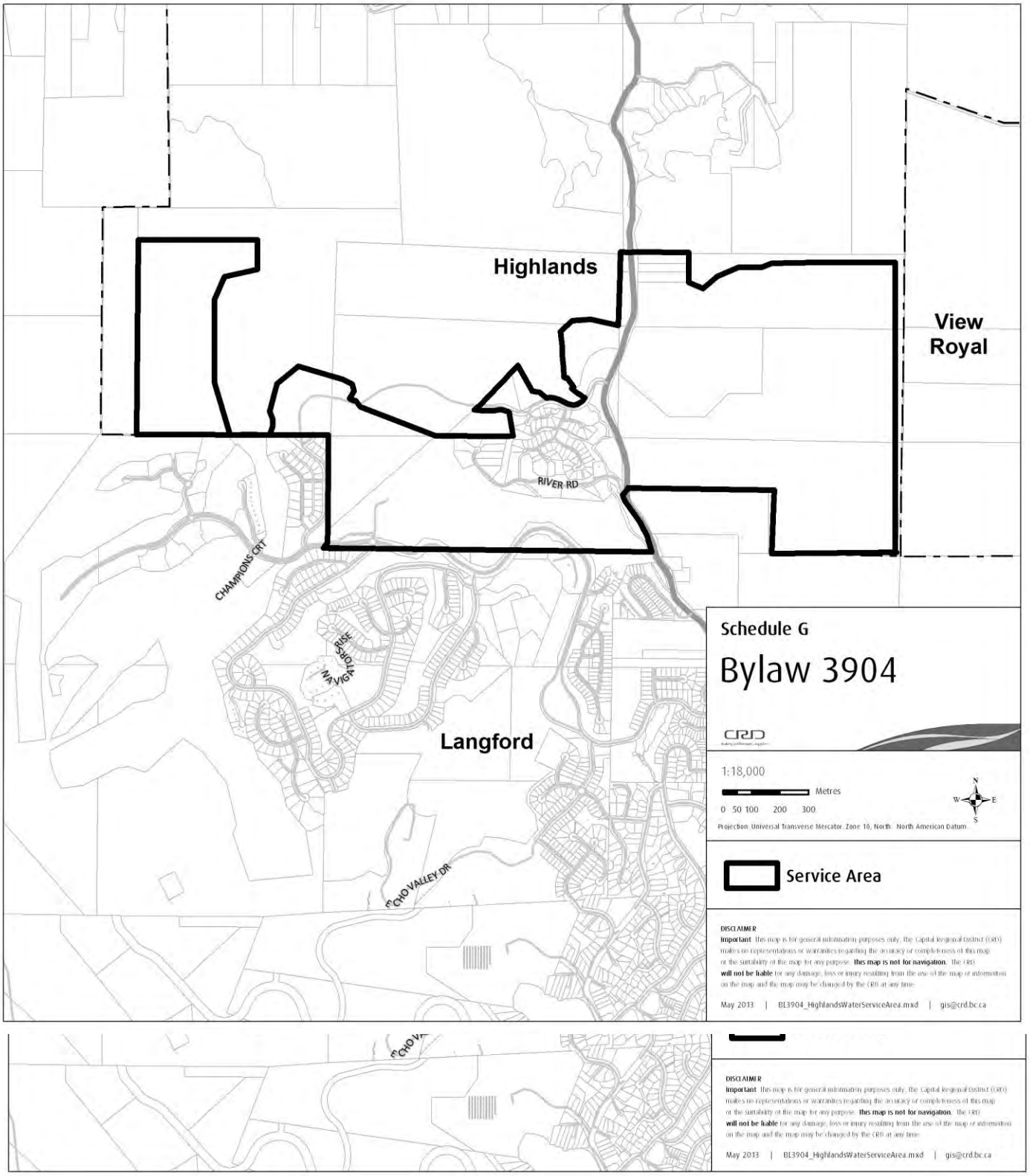
Bylaw 3904

Schedule G – Highlands



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SCHEDULE H

Bylaws 3100, 3218, 3432, 3805, 3893, 3904

Development Cost Charge Rates

Description	Prescribed DCC Rates
Residential	$2,655.34 per unit [1]
Medium Density Multi-Family	$2,323.43 per unit [1]
High Density Multi-Family	$1,493.63 per unit [1]
Commercial	$9.76 per m^2 [2]
Industrial	$5.29 per m^2 [2]
Institutional	$21.57 per m^2 [2]
Institutional Residential	$1,037.24 per bed
Elementary or Middle School	$129.42 per student based on capacity
Junior or Senior Secondary School	$175.09 per student based on capacity
Tourist or Travelling Public Accommodation	$298.73 per sleeping room

[1] To be built or that may be built on a parcel, in the case of a development cost charge payable on subdivision

[2] of floor space to be built on a parcel

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APPENDIX C

Proposed Development Cost Charge Amendment Bylaw No. 4249

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CAPITAL REGIONAL DISTRICT
BYLAW NO. 4249

****

A BYLAW TO AMEND BYLAW 2758
"DEVELOPMENT COST CHARGES BYLAW (JUAN DE FUCA WATER DISTRIBUTION), NO. 1, 2000"

****

The Board of the Capital Regional District in open meeting assembled enacts as follows:

1. Bylaw No. 2758, "Development Cost Charges Bylaw (Juan de Fuca Water Distribution), No. 1, 2000", is hereby amended as follows:

   (a) By deleting section 2 in its entirety and replacing it with the following:

   2. The following schedules attached to this bylaw form an integral part of this bylaw and are enforceable in the same manner as this bylaw.
      a) Schedule A – Service Area Langford ("Schedule A");
      b) Schedule B – Service Area Sooke ("Schedule B");
      c) Schedule C – Service Area View Royal ("Schedule C");
      d) Schedule D – Service Area Colwood ("Schedule D");
      e) Schedule E – Service Area Metchosin ("Schedule E");
      f) Schedule F – Service Area Highlands ("Schedule F");
      g) Schedule G – Development Cost Charge Rates ("Schedule G").

   (b) By deleting Schedule A and Schedule B in their entirety and inserting Schedule A attached hereto and forming a part of this Bylaw.

   (c) By deleting Schedule C in its entirety and replacing it with Schedule B attached hereto and forming a part of this Bylaw.

   (d) By deleting Schedule D in its entirety and replacing it with Schedule C attached hereto and forming a part of this Bylaw.

   (e) By deleting Schedule E in its entirety and replacing it with Schedule D attached hereto and forming a part of this Bylaw.

   (f) By deleting Schedule F in its entirety and replacing it with Schedule E attached hereto and forming a part of this Bylaw.

   (g) By deleting Schedule G in its entirety and replacing it with Schedule F attached hereto and forming a part of this Bylaw.

   (h) By deleting Schedule H in its entirety and replacing it with Schedule G attached hereto and forming a part of this Bylaw.

   (i) By deleting the definition "**ELEMENTARY SCHOOL**" in its entirety;

   (j) By deleting the definition "**INSTITUTIONAL RESIDENTIAL**" in its entirety;

   (k) By adding the definition "**LOW DENSITY RESIDENTIAL** means a parcel which is used or may be used for one *dwelling unit* or any building containing one *dwelling unit."*

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(l) By deleting the definition "**MEDIUM DENSITY MULTI-FAMILY"** and replacing it with the following:

MEDIUM DENSITY MULTI-FAMILY means any multi-family residential development which has two *dwelling units* or more per parcel and a gross density of not more than 50 *dwelling units* per hectare.

(m) By deleting the definition "**MULTI-FAMILY RESIDENTIAL**" and replacing it with the following:

MULTI-FAMILY RESIDENTIAL means a parcel which is used or may be used for two or more *dwelling units* or a building containing two or more *dwelling units*.

(n) By deleting the definition "**NON RESIDENTIAL USE**" and replacing it with the following:

NON RESIDENTIAL USE means the use of any building, structure or any portion thereof that is not a residential use, including but not limited to *commercial, industrial and institutional*.

(o) By deleting the definition "**RESIDENTIAL USE**" and replacing it with the following:

RESIDENTIAL USE means *low density residential, multi-family residential, medium density multi-family and high density multi-family* uses.

(p) By deleting the definition "**SECONDARY SCHOOL**" in its entirety;

(q) By deleting the definition "**SINGLE FAMILY RESIDENTIAL**" in its entirety;

(r) By deleting the definition "**THREE FAMILY RESIDENTIAL**" in its entirety;

(s) By deleting the definition "**TWO FAMILY RESIDENTIAL**" in its entirety;

(t) Deleting section 5 in its entirety and replacing it with the following:

5. (1) A person who applies for and obtains approval of a subdivision of residential land other than Medium Density Multi-Family or High Density Multi-Family in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule G prior to subdivision of the land.

(2) A person who applies for and obtains a building permit for a Medium Density Multi-Family or High Density Multi-Family *dwelling unit* in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule G prior to the issuance of the building permit.

(3) A person who applies for and obtains a building permit for the construction, alteration or extension of a building that will, after the construction, alteration or extension, contain fewer than four (4) self-contained dwelling units and be put to no other use than the residential use in those dwelling units; must pay the *development cost charge* as outlined in Schedule G.

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(4) A person who obtains a *Commercial, Industrial or Institutional* building permit in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule G prior to the issuance of the building permit.

(5) A *development cost charge* is not payable where the development is subject to an exemption, waiver or reduction under the *Local Government Act* or another enactment of the Province or the *District.*

(u) Deleting section 6 in its entirety and replacing it with the following:

6. *Development cost charges* imposed under this bylaw shall be calculated in accordance with the rates prescribed in Schedule G.

(v) Deleting section 7 in its entirety and replacing it with the following:

7. In calculating the *development cost charges* under this part, the *development cost charges* for a *comprehensive development* shall be calculated separately for each part of the *comprehensive development* designated respectively to *residential uses and non residential uses* and shall be the sum total of the *development cost charges* for each of those uses, calculated in accordance with Schedule G.

(w) By renumbering sections 21 to 23 to sections 23 to 24, respectively.

(x) By adding section 21 as follows:

21. DCC credits shall only be issued in accordance with a DCC credit policy approved by the *District.*

2. This Bylaw may be cited as “Development Cost Charges Bylaw (Juan de Fuca Water Distribution), Bylaw No. 1, 2000, Amendment Bylaw No. 9, 2018".

READ A FIRST TIME THIS	th day of	June	2018
READ A SECOND TIME THIS	th day of	June	2018
READ A THIRD TIME THIS	th day of	June	2018
APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS	th day of	_____	2018
ADOPTED THIS	day of		2018

_____ _____

CHAIR CORPORATE OFFICER

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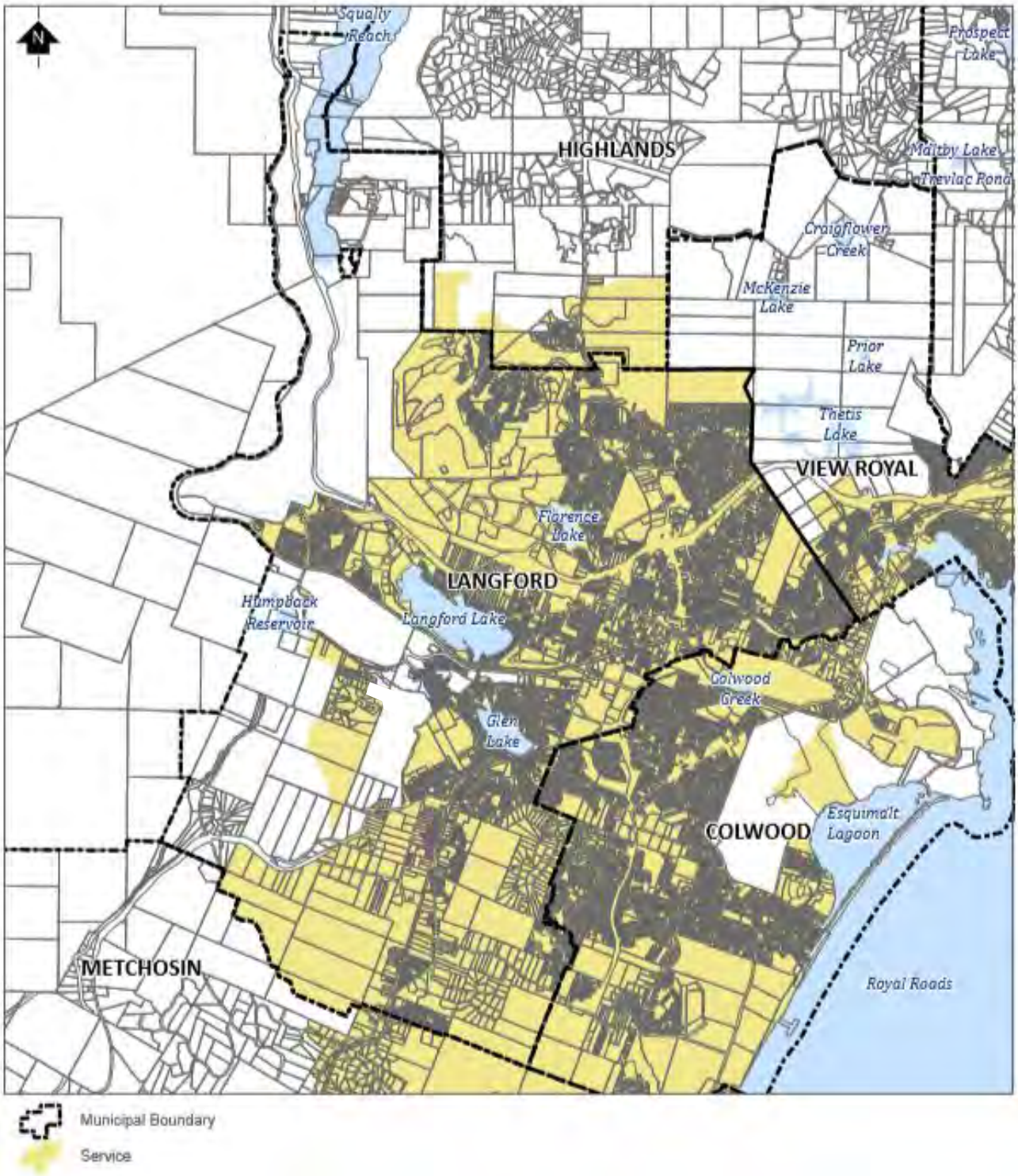
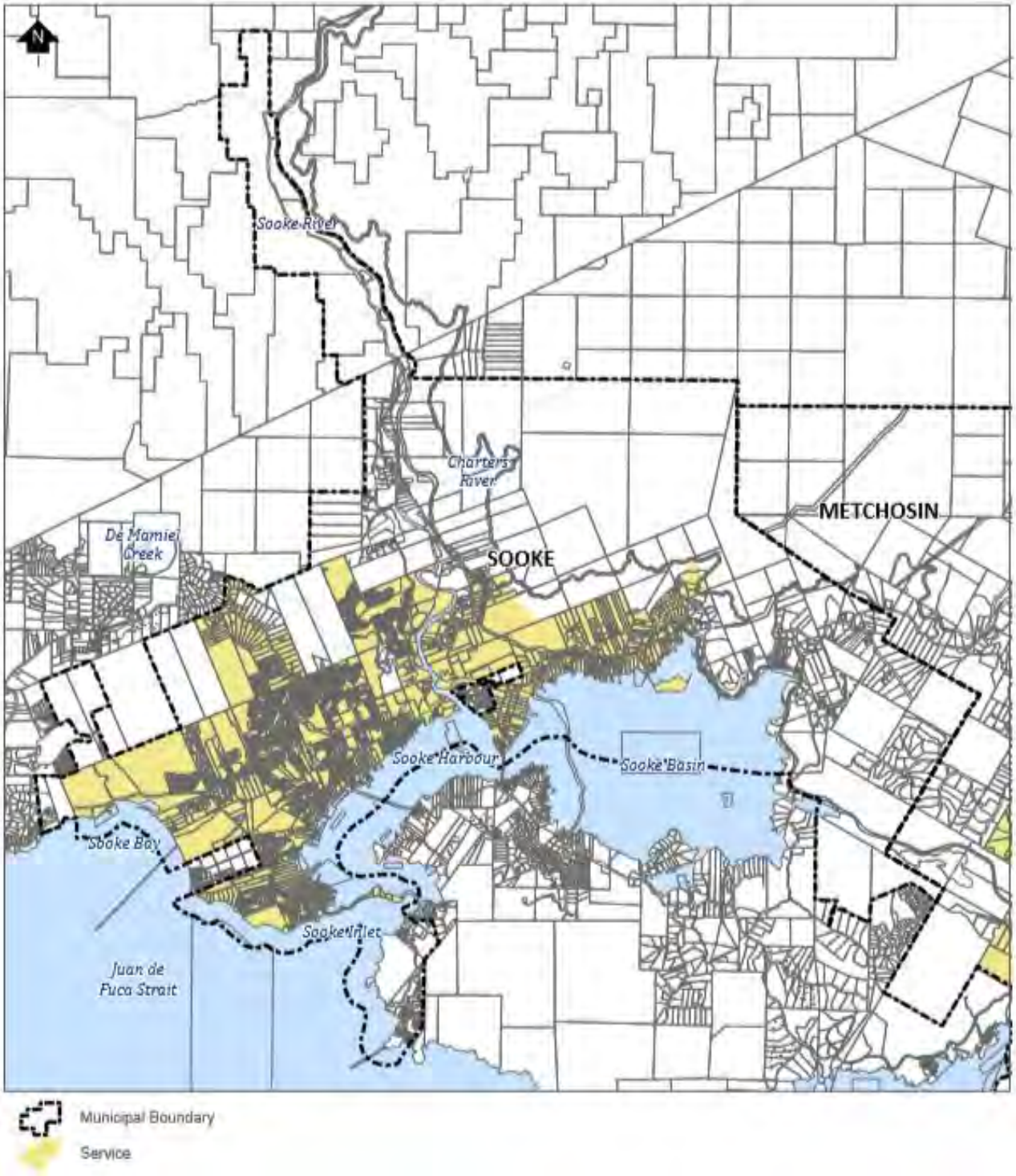
Schedule A – Langford



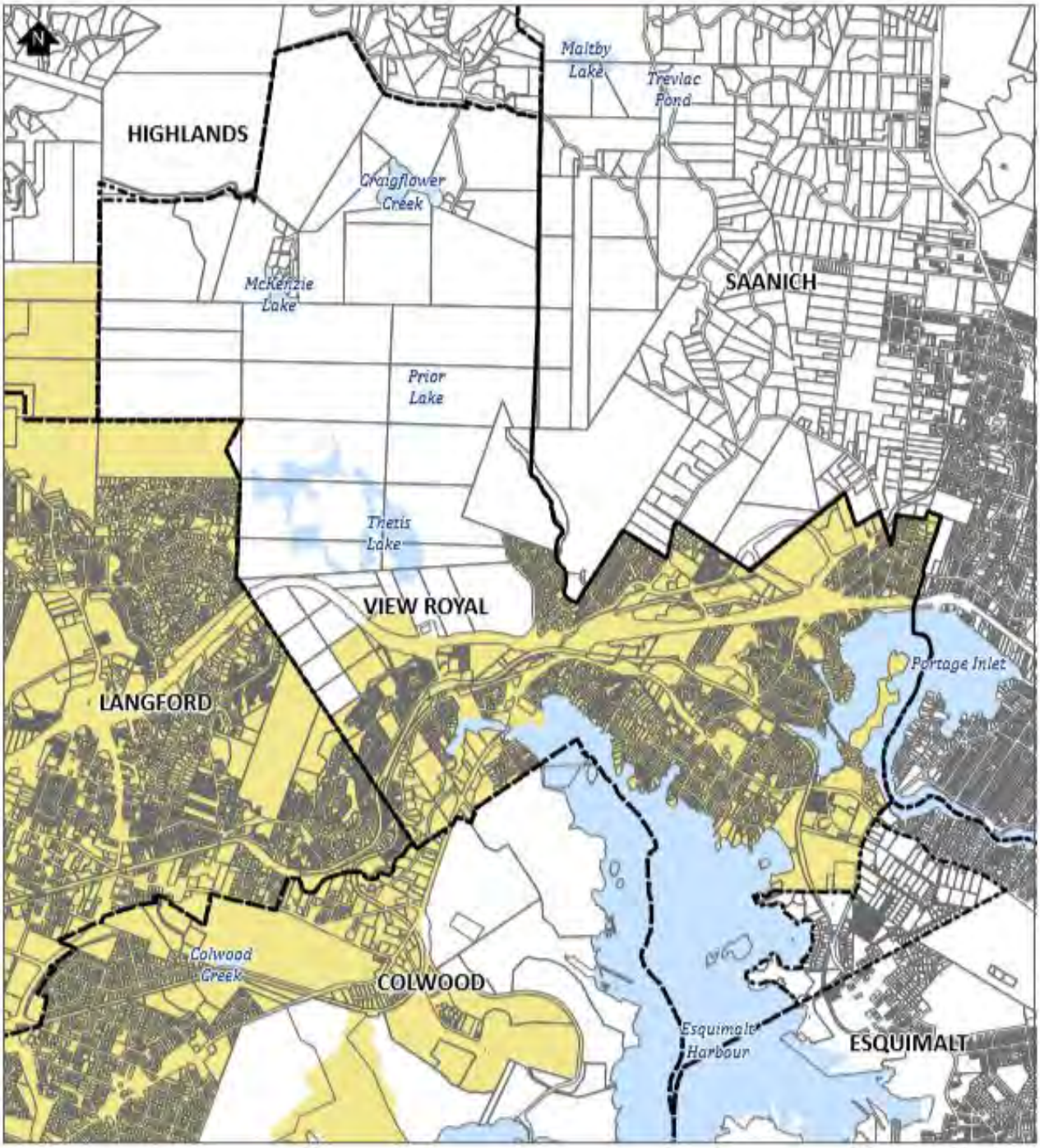
156

Schedule B – Sooke



157

Schedule C – View Royal



Municipal Boundary

Service

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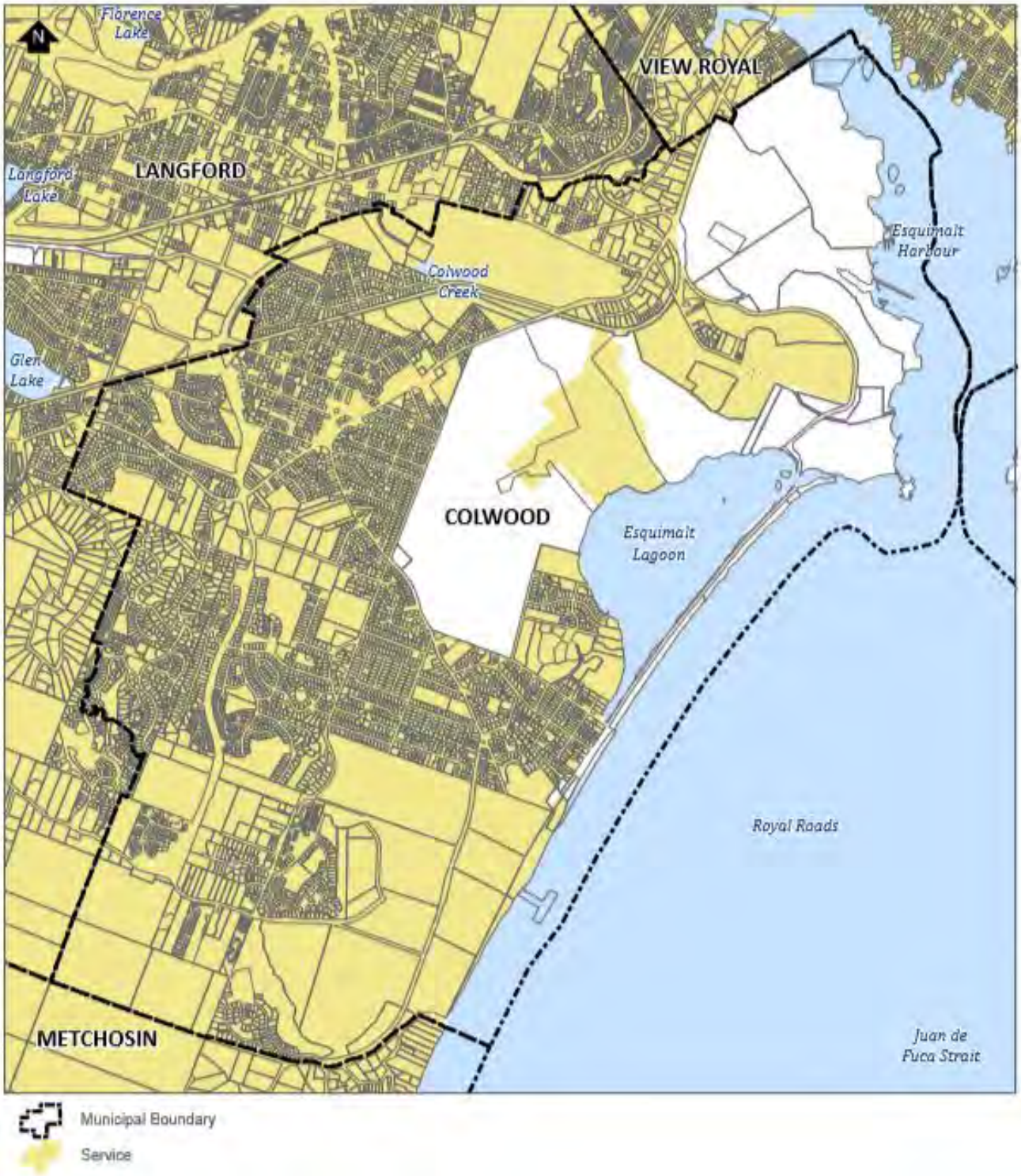
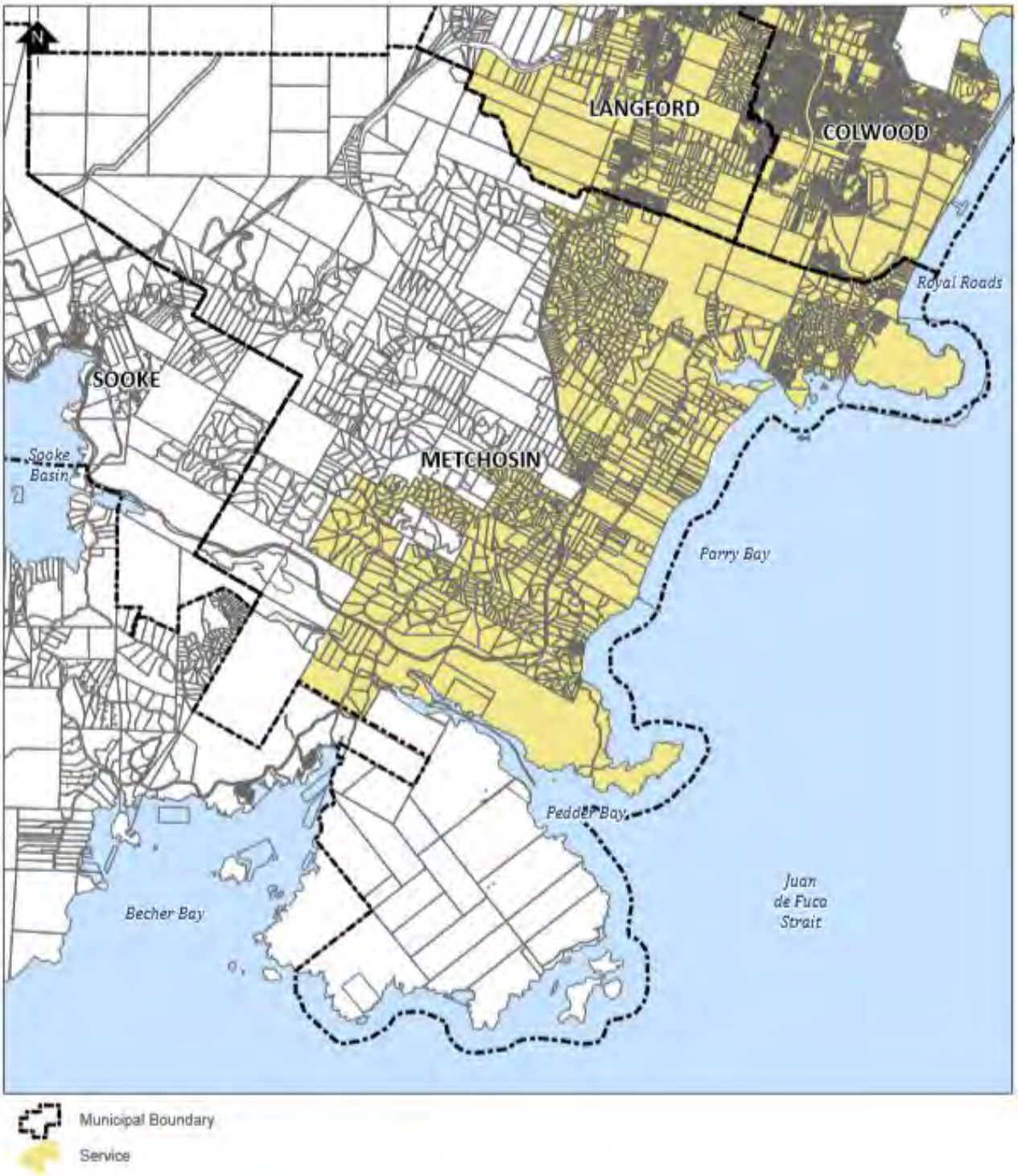
Schedule D – Colwood



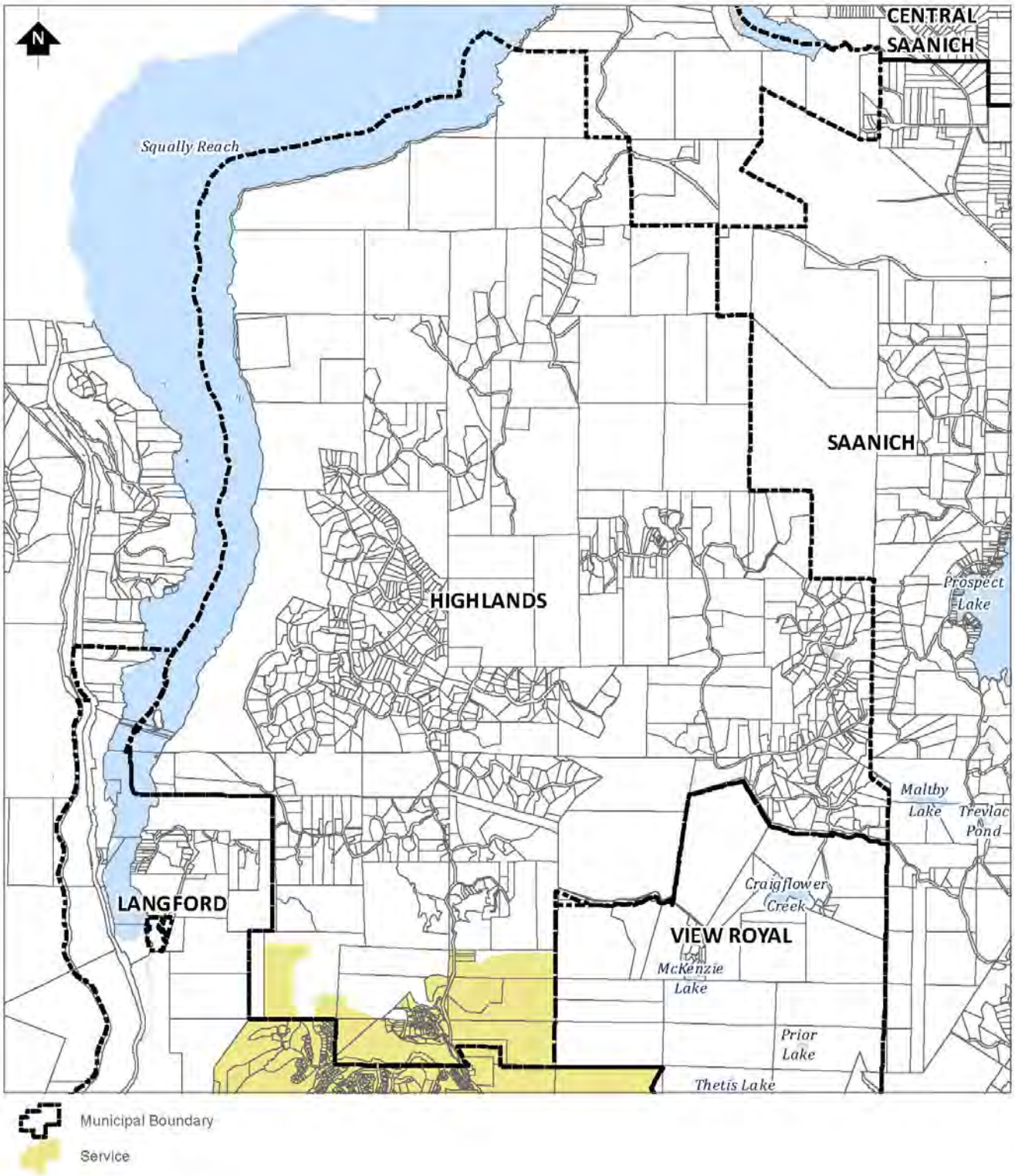
159

Schedule E – Metchosin



160

Schedule F – Highlands



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SCHEDULE G

Development Cost Charge Rates

Description	Prescribed DCC Rates
Low Density Residential	$2,922 per lot
Medium Density Multi-family	$2,557 per unit
High Density Multi-family	$1,644 per unit
Commercial	$10.74 per m^2
Industrial	$5.82 per m^2
Institutional	$23.74 per m^2

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ATTACHMENT B

CAPITAL REGIONAL DISTRICT
BYLAW NO. 4249

****

A BYLAW TO AMEND BYLAW 2758
"DEVELOPMENT COST CHARGES BYLAW (JUAN DE FUCA WATER DISTRIBUTION), NO. 1, 2000"

****

The Board of the Capital Regional District in open meeting assembled enacts as follows:

1. Bylaw No. 2758, "Development Cost Charges Bylaw (Juan de Fuca Water Distribution), No. 1, 2000", is hereby amended as follows:

   (a) By deleting section 2 in its entirety and replacing it with the following:

   2. The following schedules attached to this bylaw form an integral part of this bylaw and are enforceable in the same manner as this bylaw.
      a) Schedule A – Service Area Langford ("Schedule A");
      b) Schedule B – Service Area Sooke ("Schedule B");
      c) Schedule C – Service Area View Royal ("Schedule C");
      d) Schedule D – Service Area Colwood ("Schedule D");
      e) Schedule E – Service Area Metchosin ("Schedule E");
      f) Schedule F – Service Area Highlands ("Schedule F");
      g) Schedule G – Development Cost Charge Rates ("Schedule G").

   (b) By deleting Schedule A and Schedule B in their entirety and inserting Schedule A attached hereto and forming a part of this Bylaw.

   (c) By deleting Schedule C in its entirety and replacing it with Schedule B attached hereto and forming a part of this Bylaw.

   (d) By deleting Schedule D in its entirety and replacing it with Schedule C attached hereto and forming a part of this Bylaw.

   (e) By deleting Schedule E in its entirety and replacing it with Schedule D attached hereto and forming a part of this Bylaw.

   (f) By deleting Schedule F in its entirety and replacing it with Schedule E attached hereto and forming a part of this Bylaw.

   (g) By deleting Schedule G in its entirety and replacing it with Schedule F attached hereto and forming a part of this Bylaw.

   (h) By deleting Schedule H in its entirety and replacing it with Schedule G attached hereto and forming a part of this Bylaw.

   (i) By deleting the definition "**ELEMENTARY SCHOOL**" in its entirety;

   (j) By deleting the definition "**INSTITUTIONAL RESIDENTIAL**" in its entirety;

   (k) By adding the definition "**LOW DENSITY RESIDENTIAL** means a parcel which is used or may be used for one *dwelling unit* or any building containing one *dwelling unit."*

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(l) By deleting the definition "**MEDIUM DENSITY MULTI-FAMILY"** and replacing it with the following:

MEDIUM DENSITY MULTI-FAMILY means any multi-family residential development which has two *dwelling units* or more per parcel and a gross density of not more than 50 *dwelling units* per hectare.

(m) By deleting the definition "**MULTI-FAMILY RESIDENTIAL**" and replacing it with the following:

MULTI-FAMILY RESIDENTIAL means a parcel which is used or may be used for two or more *dwelling units* or a building containing two or more *dwelling units*.

(n) By deleting the definition "**NON RESIDENTIAL USE**" and replacing it with the following:

NON RESIDENTIAL USE means the use of any building, structure or any portion thereof that is not a residential use, including but not limited to *commercial, industrial and institutional*.

(o) By deleting the definition "**RESIDENTIAL USE**" and replacing it with the following:

RESIDENTIAL USE means *low density residential, multi-family residential, medium density multi-family and high density multi-family* uses.

(p) By deleting the definition "**SECONDARY SCHOOL**" in its entirety;

(q) By deleting the definition "**SINGLE FAMILY RESIDENTIAL**" in its entirety;

(r) By deleting the definition "**THREE FAMILY RESIDENTIAL**" in its entirety;

(s) By deleting the definition "**TWO FAMILY RESIDENTIAL**" in its entirety;

(t) Deleting section 5 in its entirety and replacing it with the following:

5. (1) A person who applies for and obtains approval of a subdivision of residential land other than Medium Density Multi-Family or High Density Multi-Family in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule G prior to subdivision of the land.

(2) A person who applies for and obtains a building permit for a Medium Density Multi-Family or High Density Multi-Family *dwelling unit* in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule G prior to the issuance of the building permit.

(3) A person who applies for and obtains a building permit for the construction, alteration or extension of a building that will, after the construction, alteration or extension, contain fewer than four (4) self-contained dwelling units and be put to no other use than the residential use in those dwelling units; must pay the *development cost charge* as outlined in Schedule G.

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(4) A person who obtains a *Commercial, Industrial or Institutional* building permit in a *service area* within a *Member Municipality* or the *Electoral Area* must pay the *development cost charge* applicable under Schedule G prior to the issuance of the building permit.

(5) A *development cost charge* is not payable where the development is subject to an exemption, waiver or reduction under the *Local Government Act* or another enactment of the Province or the *District.*

(u) Deleting section 6 in its entirety and replacing it with the following:

6. *Development cost charges* imposed under this bylaw shall be calculated in accordance with the rates prescribed in Schedule G.

(v) Deleting section 7 in its entirety and replacing it with the following:

7. In calculating the *development cost charges* under this part, the *development cost charges* for a *comprehensive development* shall be calculated separately for each part of the *comprehensive development* designated respectively to *residential uses and non residential uses* and shall be the sum total of the *development cost charges* for each of those uses, calculated in accordance with Schedule G.

(w) By renumbering sections 21 to 23 to sections 23 to 24, respectively.

(x) By adding section 21 as follows:

21. DCC credits shall only be issued in accordance with a DCC credit policy approved by the *District.*

2. This Bylaw may be cited as “Development Cost Charges Bylaw (Juan de Fuca Water Distribution), Bylaw No. 1, 2000, Amendment Bylaw No. 9, 2018".

READ A FIRST TIME THIS	th day of	June	2018
READ A SECOND TIME THIS	th day of	June	2018
READ A THIRD TIME THIS	th day of	June	2018
APPROVED BY THE INSPECTOR OF MUNICIPALITIES THIS	th day of	_____	2018
ADOPTED THIS	day of		2018

_____ _____

CHAIR CORPORATE OFFICER

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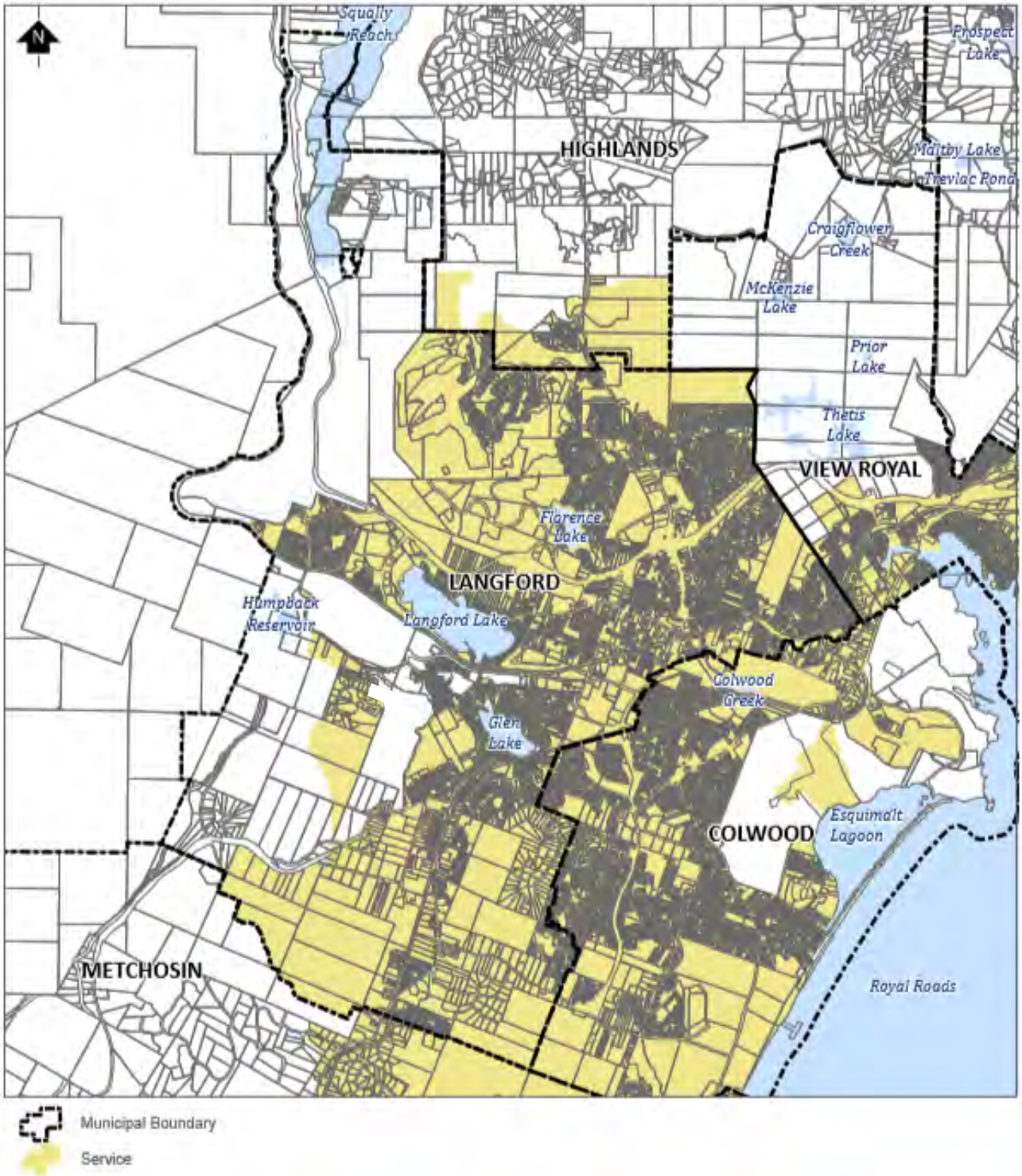
Schedule A – Langford



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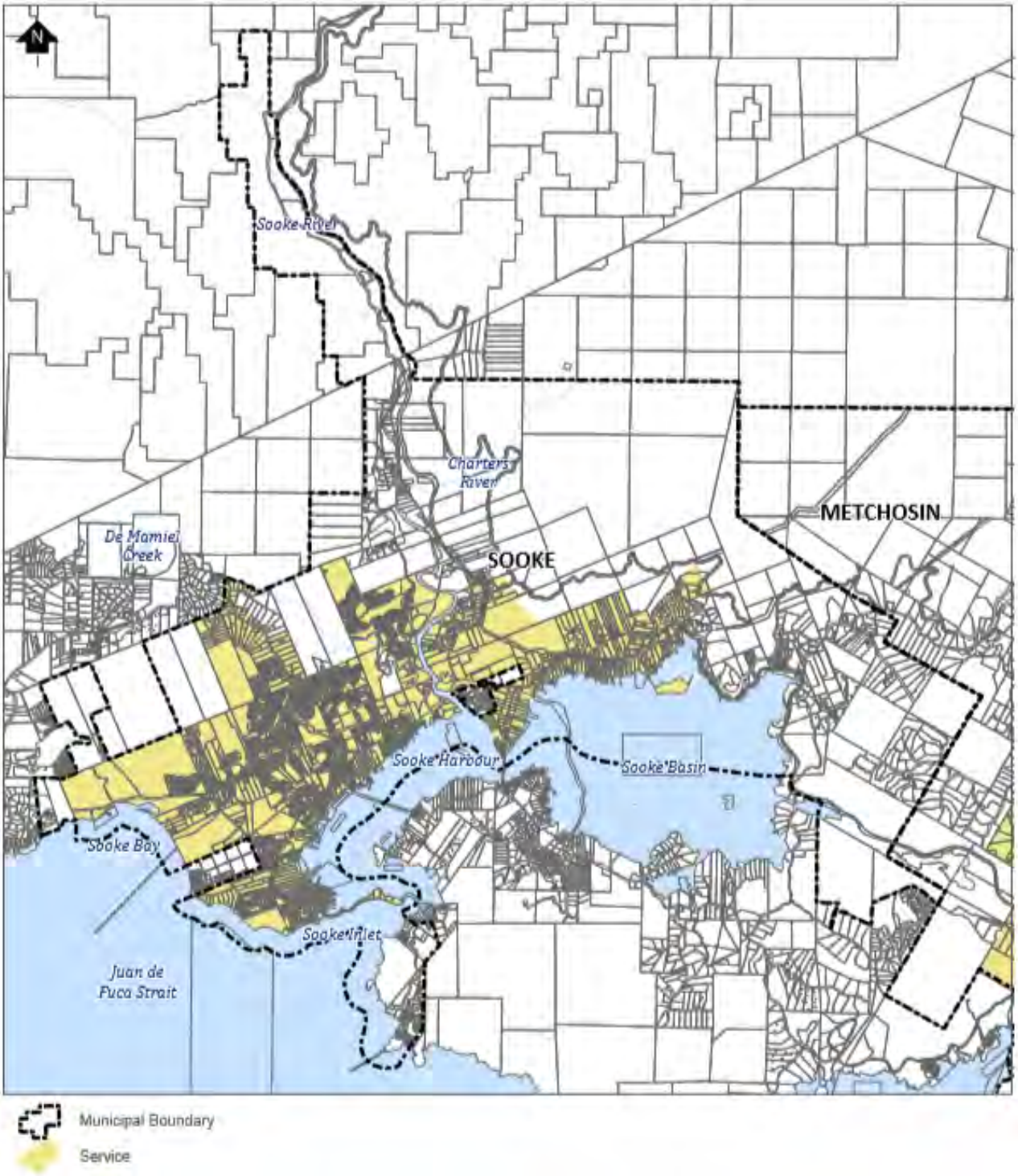
Schedule B – Sooke



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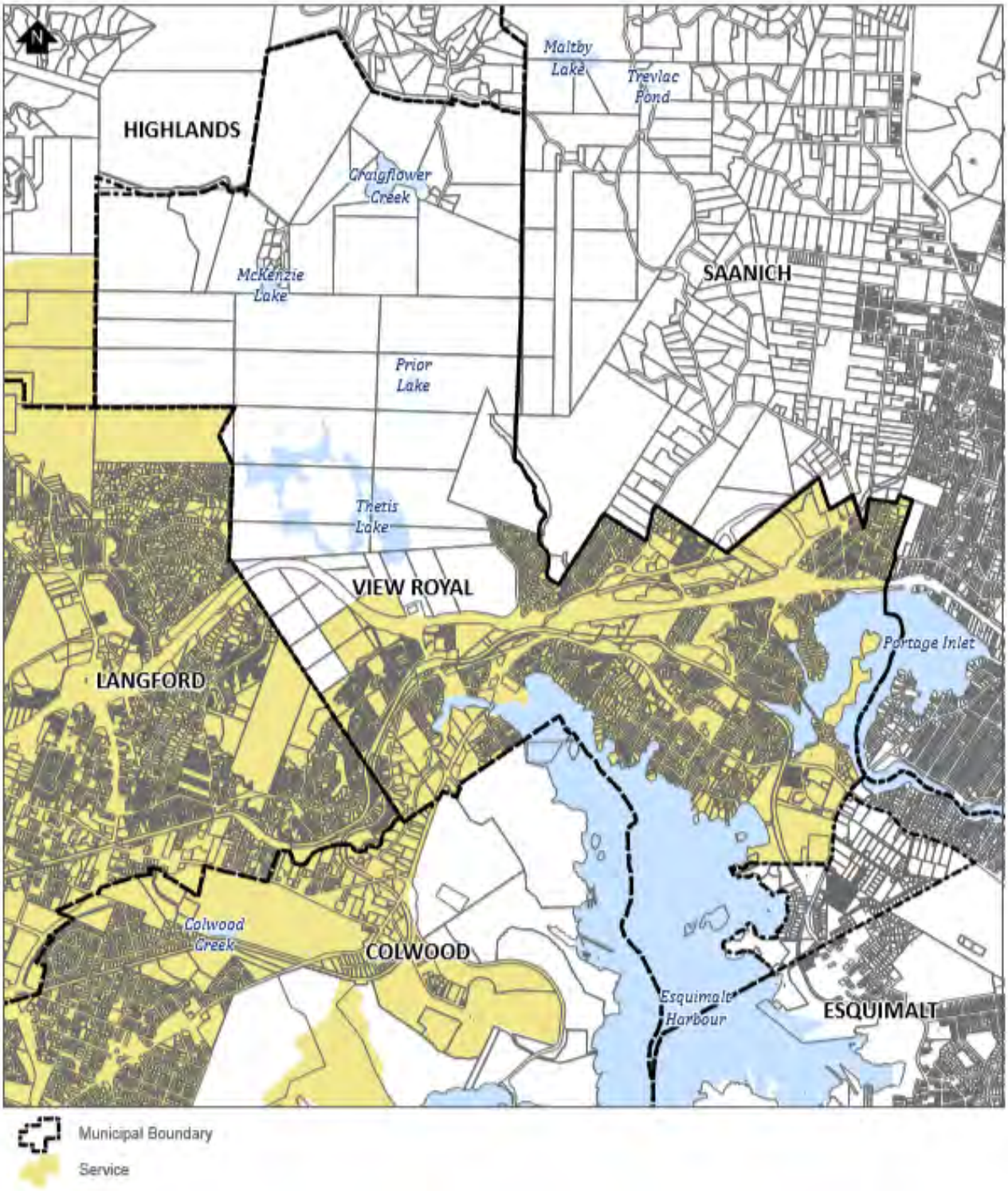
Schedule C – View Royal



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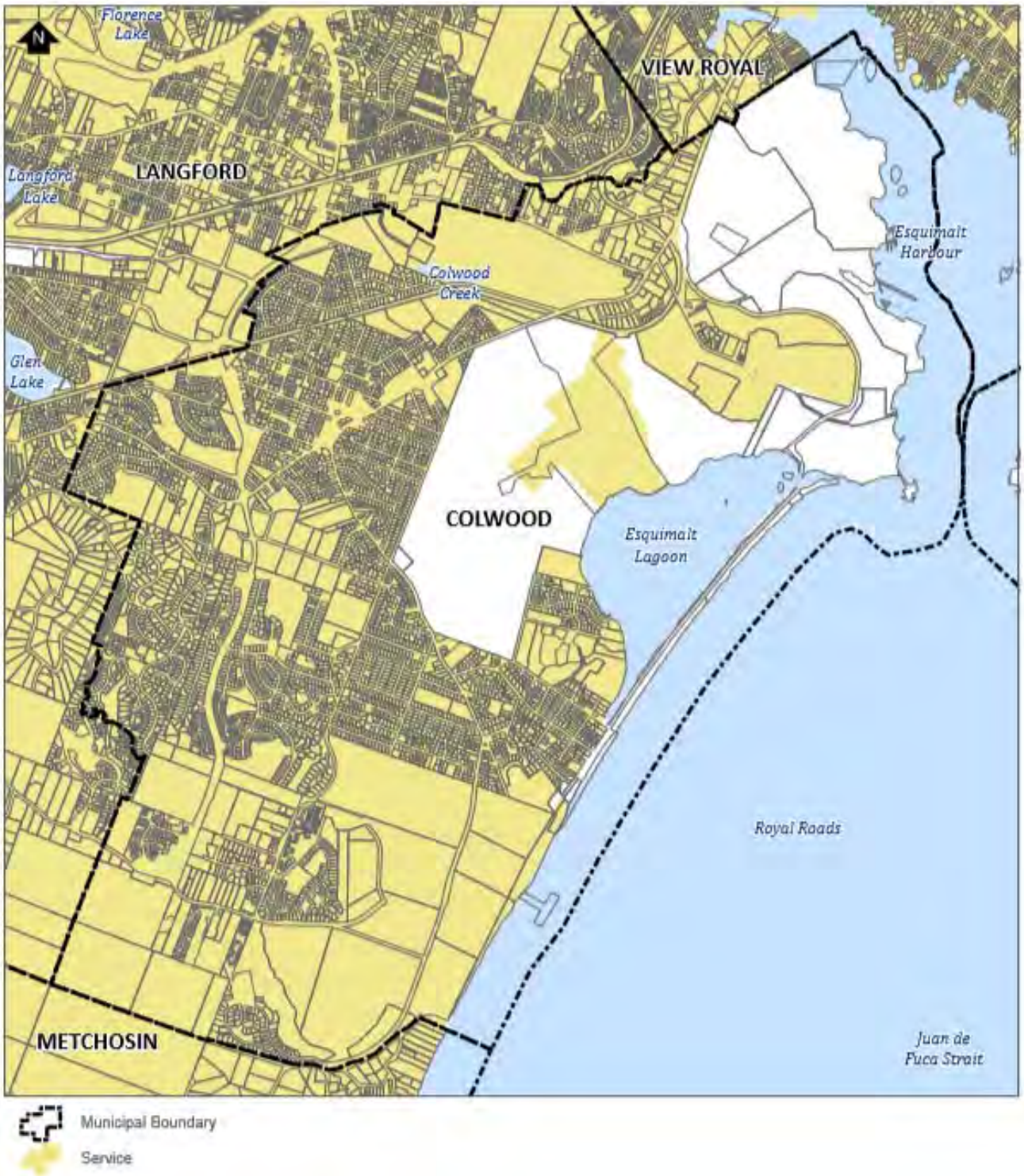
Schedule D – Colwood



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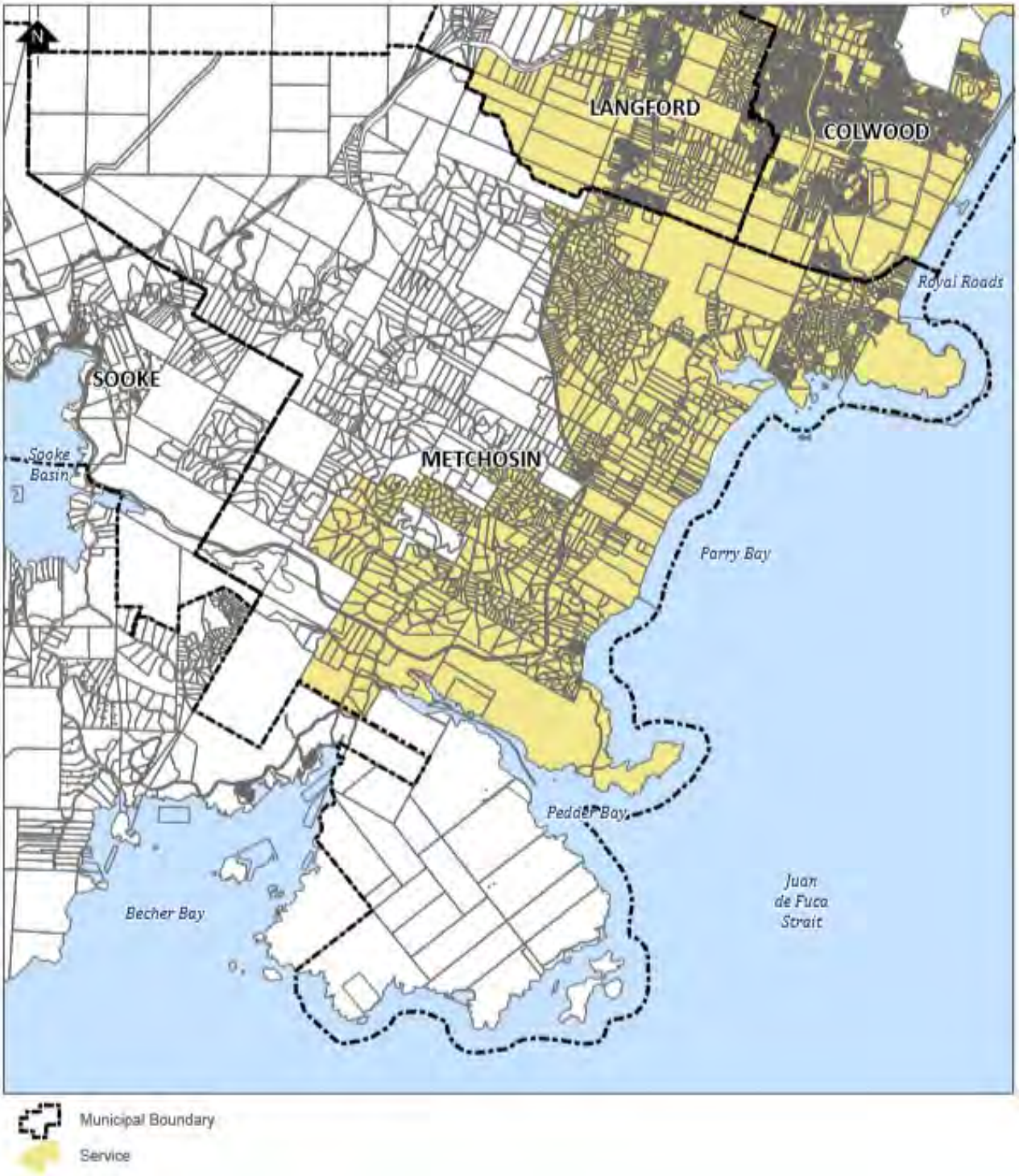
Schedule E – Metchosin



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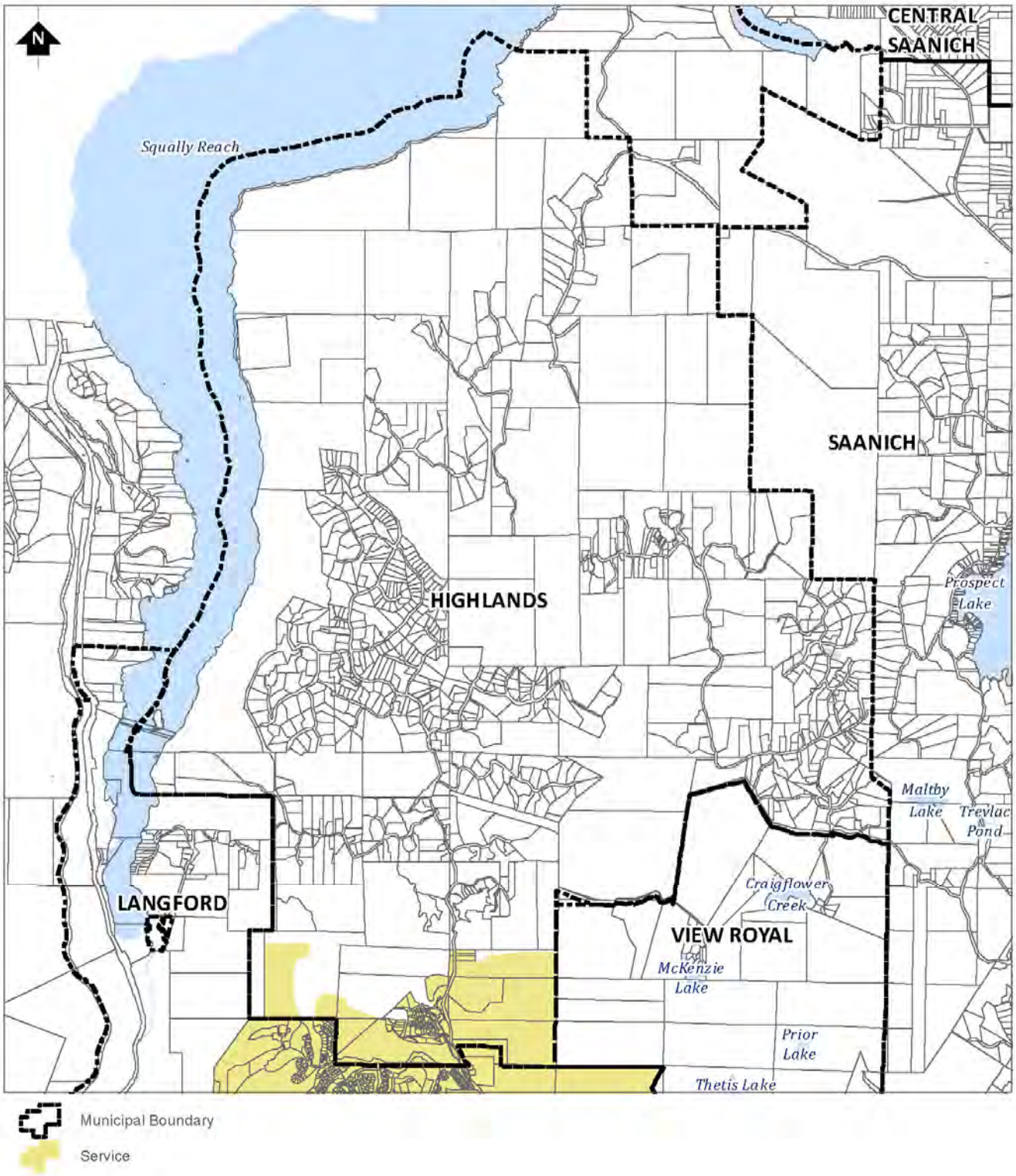
Schedule F – Highlands



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SCHEDULE G

Development Cost Charge Rates

Description	Prescribed DCC Rates
Low Density Residential	$2,922 per lot
Medium Density Multi-family	$2,557 per unit
High Density Multi-family	$1,644 per unit
Commercial	$10.74 per m^2
Industrial	$5.82 per m^2
Institutional	$23.74 per m^2

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ATTACHMENT C

Draft CRD Water DCC Credit Policy:

Policy No:

Whereas the Regional District has adopted Bylaw #### establishing a Development Cost Charge Program for the Regional District;

And

Whereas the Regional District will provide the Owner/Developer Development Cost Charge (DCC) credit for works performed as a condition of Building Permit or Subdivision Approval and in accordance with this Policy.

1. **Definitions/Terms:**

   a. **Owner** - Is defined as the registered owner(s) of the property. The Owner may also be the Developer.

   b. **Developer** - Is defined as the person or corporation representing the owner of the property. The Developer may also be the Owner.

   c. **DCC Project** - Is defined as that listed in the current Capital Regional District Development Cost Charge Bylaw as listed in Schedule G.

   d. **DCC Credits** - Exclude applicable taxes. Any DCC credits must be applied for upon Application for Building Permit or Subdivision.

   e. **Professional Engineer of Record** - Is a member in good standing of the Association of Professional Engineers & Geoscientists of BC who has provided a Letter of Engagement to the Capital Regional District confirming that they are the Owner and/or Developer's engaged engineer for the civil works on the DCC Project.

   f. **DCC Project Value** - Is the value estimated for the DCC Project including engineering, project administration and contingency as shown in the DCC Background Report.

   g. **DCC Project Cost** - Is the actual cost to construct the DCC works including engineering and project administration as certified by the Professional Engineer of Record and confirmed by the Senior Manager of Engineering.

2. DCC credit is available to any Owner/Developer that has performed a DCC Project:

   a. For the lesser of the total DCC Project Cost or DCC Project Value, or portion thereof, to a maximum of the DCC's payable in the relevant category for the DCC Project; and

   b. Provided that a Certificate of Completion has been issued by the Professional Engineer of Record for the DCC Project; and

   c. The credits may be applied over the life of the development in accordance with the example in **Table 2.0** below.

3. In the event the costs exceed the DCC credit available the Regional District is not obligated to reimburse the Owner/Developer unless the project is eligible for a latecomers agreement for the balance of the costs, in accordance with s.507 of the Local Government Act.

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4. The Regional District will no longer entertain front-ender agreements with Owner/Developer(s).

5. If DCCs payable exceed the amount of the DCC credit, the Owner/Developer must pay the DCC in accordance with the Regional District's DCC bylaw.

Table 1.0 Typical DCC balance sheet

DCC Project	DCC Project Cost	DCC Payable under Bylaw	Actual DCCs Payable	DCC Credit Balance
Pump Station A	$400,000	$500,000	$100,000	$0
Pump Station B	$700,000	$500,000	$0	$200,000
Pump Station C	$500,000	$500,000	$0	$0

Table 2.0 Phased development balance sheet example

DCC Project	DCC Project Cost	DCC Payable under Bylaw	Actual DCCs Payable	DCC Credit Balance
Pump Station D	$500,000			$500,000
Phase 1 – 100 lots		$250,000	$0	$250,000
Phase 2 – 80 lots		$200,000	$0	$50,000
Building 1 – 50 units		$100,000	$50,000	$0

6. The maximum time limit for DCC Credit availability for DCC Projects performed is 15 years as long as the DCC Project remains on the DCC Project List within the DCC Bylaw. The beginning of the time limit is triggered either at time of subdivision or building permit as applicable. The Regional District will leave any constructed DCC Project on the DCC Project List and include this as part of the DCC calculation for up to 15 years if there are any outstanding DCC Credits that can still be used or until the time limit expires.

7. Unused DCC credits can be applied to other development lands in the Juan de Fuca Water Distribution System as long as the Owner(s) is exactly the same legal entity and it is within the time limit of the original DCC credit establishment.

8. The Regional District will establish a tracking system to ensure the transparent counting and administration of DCC Credits.

9. If land is required to construct a DCC Project and such land is dedicated and/or secured as a condition of rezoning or subdivision the DCC Project Cost may not include the cost of land.

10. If land is required to construct a DCC Project and such land is not dedicated and/or secured as a condition of rezoning or subdivision, the DCC Project Cost may include the cost of land based on the actual per square metre cost to the Owner/Developer of acquiring the land.

11. The Regional District will allow a DCC Credit for an Owner/Developer who has paid the cost or a portion of the cost of a DCC Project instead of providing the DCC Project directly. An Owner/Developer may request such a credit by providing the following:

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a. A statutory declaration in the form attached to this policy as Statutory Declaration A, sworn by the Owner/Developer who is requesting the credit or an authorized representative of the Owner/Developer; and

b. A statutory declaration in the form attached to this policy as Statutory Declaration B, sworn by the Owner/Developer who provided the DCC Project or an authorized representative of the Owner/Developer.

12. The DCC bylaw will be updated every 5 years (subject to approval by the Inspector of Municipalities) in order to update project costs and review project necessity.

13. This policy is effective the date of adoption of the Juan de Fuca Development Cost Charge Bylaw by the Regional Board.

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STATUTORY DECLARATION A

CANADA PROVINCE OF BRITISH COLUMBIA	))))	IN THE MATTER OF SECTION 565(2) OF THE LOCAL GOVERNMENT ACT AND CAPITAL REGIONAL DISTRICT DEVELOPMENT COST CHARGE BYLAW NO. ####

I,_____ , of _____ , Capital Regional District, in the Province of British Columbia, DO SOLEMNLY DECLARE:

1. I am the owner of land in the Capital Regional District within Juan de Fuca Water Distribution System legally described as _____ (the "Land").

2. I have applied to subdivide or develop the Land and the subdivision or development of the Land imposes a capital cost burden on the Regional District in relation to water.

3. On [insert date of payment] I paid to [insert name of owner who constructed DCC Project] the amount of $ _____ as a contribution towards the cost of [identify DCC Project].

4. I make this Statutory Declaration for the purpose of requesting the Regional District to allow a setoff of the amount specified in paragraph 3 against development cost charges for which I am liable in respect of the development of the Land under the Regional District 's development cost charge bylaw.

AND I MAKE this solemn declaration, conscientiously believing it to be true and knowing that it is Of the same force and effect as if made under oath and by virtue of the Canada Evidence Act

SWORN BEFORE ME at the Capital Regional District, in the Province of British Columbia, this _____ day of _____, 201_.	)	_____ [Insert name of owner]
_____ A Commissioner for Taking Affidavits in the Province of British Columbia	)	_____ [insert name of owner]

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STATUTORY DECLARATION B

CANADA PROVINCE OF BRITISH COLUMBIA	))))	IN THE MATTER OF SECTION 565(2) OF THE LOCAL GOVERNMENT ACT AND CAPITAL REGIONAL DISTRICT DEVELOPMENT COST CHARGE BYLAW NO. ####

I, _____, of _____, Capital Regional District, in the Province of British Columbia, DO SOLEMNLY DECLARE:

1. In respect of the development of land in the Capital Regional District within Juan de Fuca Water Distribution System I provided [insert description of DCC Project] (the "DCC Project") and I am entitled to a total credit of [insert total original DCC credit amount approved by the Regional District] towards development cost charges for [water facilities] that may be imposed under the Regional District 's development cost charge bylaw.

2. On [insert date of payment] I received a payment of $_____ from [insert name of owner who has paid the cost of the DCC Project or a portion of the cost] (the "Contributing Owner") towards the cost of the DCC Project.

3. I make this Statutory Declaration for the purpose of requesting the Regional District to allow a setoff of the amount specified in paragraph 2 against development cost charges that are payable by the Contributing Owner under the Regional District's development cost charge bylaw.

4. I acknowledge that the DCC credit that I am requesting the Regional District to allow will reduce the amount of DCC credits to which I am entitled under Section 565(2) of the Local Government Act in respect of the DCC Project, by an equivalent amount.

AND I MAKE this solemn declaration, conscientiously believing it to be true and knowing that it is Of the same force and effect as if made under oath and by virtue of the Canada Evidence Act

SWORN BEFORE ME at the Capital Regional District, in the Province of British Columbia, this _____ day of _____, 201_.	)	_____ [Insert name of owner]
_____ A Commissioner for Taking Affidavits in the Province of British Columbia	)	_____ [insert name of owner]

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Making a difference...together

Agenda Item 8
REPORT #JWDC 2018-06

REPORT TO THE JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF TUESDAY, JUNE 5, 2018

SUBJECT **SKIRT MOUNTAIN WATER RESERVOIR AGREEMENT - DISSOLUTION AGREEMENT**

ISSUE

A dissolution agreement is required to dissolve the Skirt Mountain Water Reservoir Agreement.

BACKGROUND

In 2009, the Capital Regional District (CRD) entered into an agreement with Bear Mountain Development Holdings Ltd. and Bear Mountain Master Partnership (Attachment 1) for the purpose of constructing a concrete water reservoir on Skirt Mountain in order to expand the water supply system to service Bear Mountain.

This agreement, through assignments, is now held by Bear Mountain Adventures Ltd. (BMA).

The agreement gave BMA $4,773,240.50 in development cost charge credits. These credits have been reduced over time as development occurred and, as of the end of 2017, the balance remaining is $3,148,874.44.

Aside from the financial constraint, the other main constraint in the agreement is that the development lands serviced by the reservoir that lie outside the Bear Mountain development are under the control, with regard to domestic water supply, of BMA until such time as the development cost charge balance related to the agreement is zero.

Other developments that can be serviced by the Skirt Mountain Reservoir have been proceeding and various options, with respect to accessing reservoir capacity, have been considered respecting the agreement. The two key options have been:

- Establishing a Local Service Area (LSA) that puts all of the developers serviced by the Skirt Mountain Reservoir under one service area for the purpose of funding all of the additional infrastructure required to fully service the area, as well as pay off the balance of the agreement forementioned.
- Using development cost charge reserves to pay out the balance of the agreement and using development cost charge reserves to fund the additional infrastructure required to fully service the area. This option was approved by the Commission at the May 1, 2018 meeting as providing the most benefit to the water system while not having potentially negative impacts on the development community.

To proceed with the approved option above, an agreement between the CRD and Bear Mountain Adventures Ltd. is required to reimburse the balance and dissolve the Skirt Mountain Water Reservoir Agreement. A draft of this agreement is attached. (Attachment 2)

ALTERNATIVES

Alternative 1

That the Juan de Fuca Water Distribution Commission direct staff to proceed with executing the dissolution agreement substantially in the form attached (Attachment 2), subject to agreement with Bear Mountain Adventures Ltd.

Alternative 2

That the Juan de Fuca Water Distribution Commission request staff for further information.

IMPLICATIONS

Alternative 1 – Approval of this alternative will give control over the domestic water supplied by the Skirt Mountain Water Reservoir to the CRD with no negative impacts on the development community.

Alternative 2 – Requesting more information will delay the process further, leave the domestic water supplied by the Skirt Mountain Water Reservoir not in the control of the CRD and may have negative impacts on developers due to delays in supplying water.

CONCLUSION

In order to proceed with development servicing on Skirt Mountain, and gain control over the domestic water capacity supplied by the Skirt Mountain Water Reservoir, it is has been recommended by the Commission to dissolve the existing Skirt Mountain Water Agreement between the CRD and BMA. The agreement (Attachment 2) to dissolve the Skirt Mountain Water Agreement has been prepared and requires approval by the Commission.

RECOMMENDATION

That the Juan de Fuca Water Distribution Commission direct staff to proceed with executing the dissolution agreement substantially in the form attached (Attachment 2), subject to agreement with Bear Mountain Adventures Ltd.

Submitted by:	Ian Jesney, P.Eng., Senior Manager, Infrastructure Engineering
Concurrence:	Ted Robbins, BSc, CTech, General Manager, Integrated Water Services

IJ/TR:mm

Attachments:
1. Agreement with Bear Mountain Development Holdings Ltd. and Bear Mountain Master Partnership
2. Agreement to dissolve the Skirt Mountain Water Agreement

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ATTACHMENT 1

Original in Vault.

SKIRT MOUNTAIN WATER RESERVOIR AGREEMENT

File No._____

THIS AGREEMENT made in triplicate

COPY

BETWEEN:

CAPITAL REGIONAL DISTRICT
479 Island Highway, Victoria, B. C., V9B 1H7

(the "District")

AND:

BEAR MOUNTAIN DEVELOPMENT HOLDINGS LTD.
(formerly LGB9 Development Corporation),
113 – 1325 Bear Mountain Parkway, Victoria British Columbia, V9B 6T8

("LGB9")

AND:

BEAR MOUNTAIN MASTER PARTNERSHIP
113 – 1325 Bear Mountain Parkway, Victoria, British Columbia, V9B 6T8

("BMMP")

WHEREAS:

A. LGB9 as bare trustee for BMMP (LGB9 and BMMP are collectively referred to as the "Owner"), is the registered owner of, or the party empowered in writing by the registered owner to develop, the lands and premises situate in the Province of British Columbia in the City of Langford and more particularly known as "Bear Mountain".

B. In order to continue with the development of "Bear Mountain", it was necessary to construct a three cell concrete water reservoir on Skirt Mountain located on the lands more particularly described as:

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PID: 009-858-652
Section 83, Highland District, Except Part in Plan VIP75509, VIP77878, VIP78873, VIP80330, VIP82040 and VIP82483

(the "Skirt Mountain Water Reservoir")

in order to expand the District's water supply system for the purpose of servicing "Bear Mountain" ;

C. The Owner has completed the construction of the Skirt Mountain Water Reservoir;

D. The District has issued a Construction Completion Certificate with reference to the construction of the Skirt Mountain Water Reservoir and the Skirt Mountain Water Reservoir and land has been transferred by the Owner and has become the property of the District;

E. As the Owner wished to construct the Skirt Mountain Reservoir using its own contractor, the District agreed to negotiate a sole source contract. By resolution at its meeting on May 1, 2007 the Juan de Fuca Water Distribution Commission approved the sole source contract for construction of the Skirt Mountain Water Reservoir, supply pipeline and upgrades to Pump Station No. 2. (hereinafter called the 'Works').

F. As the District did not have sufficient funds available from development cost charge revenues to construct the Skirt Mountain Reservoir, supply pipeline and upgrades to Pump Station No. 1, and the Owner wished to proceed with construction of the Works, the Owner agreed to fund the Works and to negotiate an agreement with the District for reimbursement of the cost of the Works.

NOW THEREFORE BE IT KNOWN THAT in consideration of the mutual covenants hereinafter set forth, the parties hereto agree as follows:

Expansion of CRD Water Supply System

1. The District agrees that the Owner has expanded the District's water supply system for the purpose of servicing Bear Mountain by the construction of the Works and the Owner

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confirms and covenants that all works related to the expansion of the water supply system and the design and construction of the Works has been done in accordance with the specifications of the District, and more particularly, without restricting the generality of the foregoing, in accordance with the District's Water Department's Engineering Specifications and Standard Drawings in force from time to time;

2. The Owner and the District agree that the cost involving the installation and/or construction of the Works as approved by the District is the following amount:

Reservoir Cost	$4,372,737.00
Approved Change Orders	$ 28,403.75
Water Supply Line	$ 330,545.00
Pump Station No. 2	$ 41,554.75
	$4,773,240.50

(the "Works Cost").

Catchment Area and Reimbursent Payments

3. The District agrees that the catchments area for the Skirt Mountain Water Reservoir (the "Catchment Area") includes all of the lands forming Bear Mountain which have been created from the parent parcels set out on the attached Schedule "A" with the only exceptions being Phases 1, 2, 3, 8, 9 and "The Gates" which were serviced by the CRD water reservoir constructed in Phase 3.

4. The District acknowledges that, as at the date of this agreement, the Owner has paid the District's Water Development Cost Charges as outlined on the attached Schedule "B" to this agreement (the "Current Bear Mountain Water DCC Payments") for development in the Catchment Area.

5. The District agrees to pay to the Owner, as reimbursement for the Works Cost,

   (a) upon execution of this agreement, the Current Bear Mountain Water DCC Payments, and

   (b) no later than ninety (90) days after payment of development costs charges

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collected by the City of Langford from the Owner and others on account of development in the Catchment Area after the date of this agreement and transmitted by the City to the District (the "Future Bear Mountain Water DCC Payments"), sufficient of the Future Bear Mountain Water DCC Payments to pay the Works Costs remaining after the Current Bear Mountain Water DCC Payments have been paid to the Owner.

6. The District and the Owner agree that interest shall not be payable by the District on the amount of the Works Costs outstanding and owing to the Owner from time to time by the District.

7. Prior to reimbursement of the Bear Mountain Water DCC Payments to the Owner by the District, the Owner shall first provide to the District a statutory declaration declaring that all contractors and subcontractors have been paid and that no builder's liens have been filed against the Works.

Expansion of Catchment Area

8. In the event a third party requests use of any of the constructed three cells which form part of the Works for the purpose of providing water service to lands other than those identified as part of the Catchment Area, the Owner and the District agree that this agreement will be revised to add the additional lands and on such terms as mutually agreed to by the parties, which agreement shall not be unreasonably withheld.

Indemnification

9. Nothing contained in this agreement, including the review of any plans or specifications of the constructed Works by any employee of the District, shall relieve the Owner and its servants and agents from full liability for damages incurred by the Owner, the District or any third party as a result of any faulty design, or defects in workmanship or materials in relation to the Reservoir, or any damages resulting from such faults or defects.

10. The Owner shall be responsible for and releases and agrees to indemnify and save harmless the District from and against any claims, demands, losses, costs, liens, damages, actions, suits or other proceedings based upon or occasioned by the faults or defects referred to in section 7 of this agreement, or attributable to the execution or performance

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of this agreement or failure to perform this agreement.

11. The Owner and its insurer may not settle or compromise any claim, demand, suit or action and any damages, compensation and costs paid or incurred by the District without the written consent of the District and all such claims, demands, suits or actions recovered by the Owner shall be a debt due to the District recoverable by action or by off-set against any money due by the District to the Owner.

12. Nothing in this agreement shall be construed so as to make the District liable to pay the Owner's contractor for any of the Works.

General Provisions

13. This agreement shall not be assignable by any party without the written consent of the other, such consent not to be unreasonably withheld.

14. A power or discretion exercisable by the General Manager may be exercised by his designate.

15. Any notice, approval or request given under this agreement may be given if served personally upon an officer of the party for whom it is intended or mailed by prepaid registered mail addressed to the parties as follows:

to the District:

General Manager
Capital Regional District Water Services
479 Island Highway
Victoria, B. C., V9B 1H7

to the Owner:

Bear Mountain Development Holdings Ltd. and
Bear Mountain Master Partnership
113 – 1325 Bear Mountain Parkway
Victoria, B.C., V9B 6T8

or at such other address as a party may advise by notice in writing.

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16. (1) The date of receipt of any notice, approval or request shall be deemed to be the date of delivery of the notice, approval or request if served personally, or on the third business day following the date of mailing.

(2) Where there is a mail strike, slow down or other labour dispute which might affect mail delivery of any notice, approval or request, then the notice, approval or request shall only be effective if actually delivered to an officer of the party for whom it is intended or to the specified address of such party.

17. If any portion of this agreement is held or declared by a Court of competent jurisdiction to be void or unenforceable, that portion shall be severed from the balance of this agreement and the balance of this agreement shall survive and be enforceable.

18. This agreement shall enure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

IN WITNESS WHEREOF the parties hereto have executed this agreement.

BEAR MOUNTAIN DEVELOPMENT HOLDINGS LTD.
Per:

LEN BARRIE

BEAR MOUNTAIN MASTER PARTNERSHIP
Per:

LEN BARRIE

CAPITAL REGIONAL DISTRICT
Per:

J.A. (Jack) Hull, MBA, P. Eng.
General Manager, CRD Water Services

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SCHEDULE "A"

Catchment Area
Parent Parcels

Parcel Identifier: 002-115-093
Lot "A", Section 3, Ranges 3 and 4 West, Highland District, Plan 27507

Parcel Identifier: 025-088-106
Section 3, Range 4W, Highland District, Except That Part in Plan 27507

Parcel Identifier: 009-853-103
Section 81, Highland District, Except Plan VIP72556

Parcel Identifier: 009-858-636
Section 82, Highland District

Parcel Identifier: 009-858-652
Section 83, Highland District

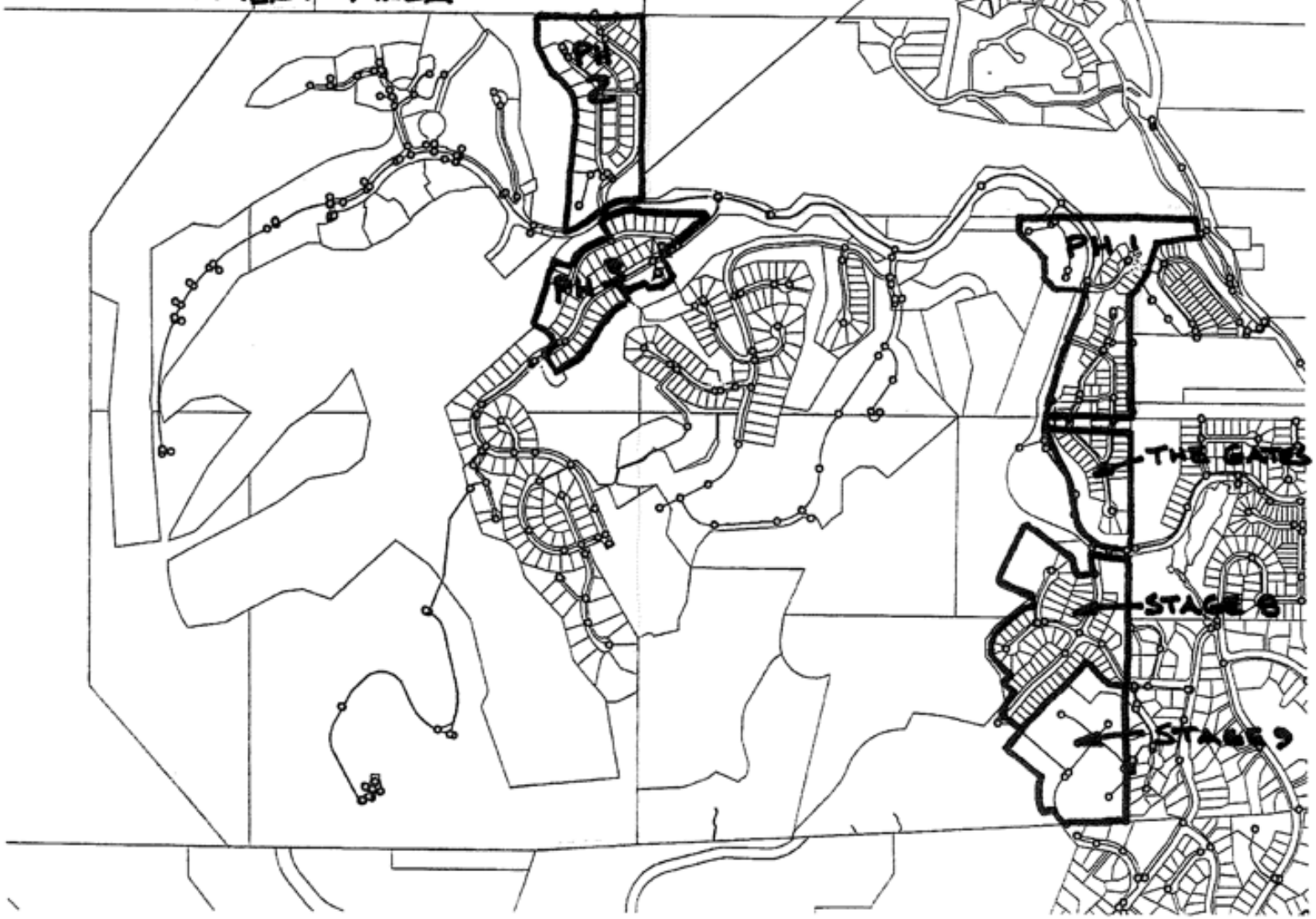
Parcel Identifier: 009-853-081
Section 84, Highland District Except That Part in Plan VIP72556

Excluding:

Phase 1 – VIP75449
Phase 2 – VIP76197
Phase 3 - VIP76988
The Gates - VIP81472
Stage 8 – VIP 83430
Stage 9 – VIP 84683

SCHEDULE "A"
CATCHMENT AREA

JUNE 3, 2009



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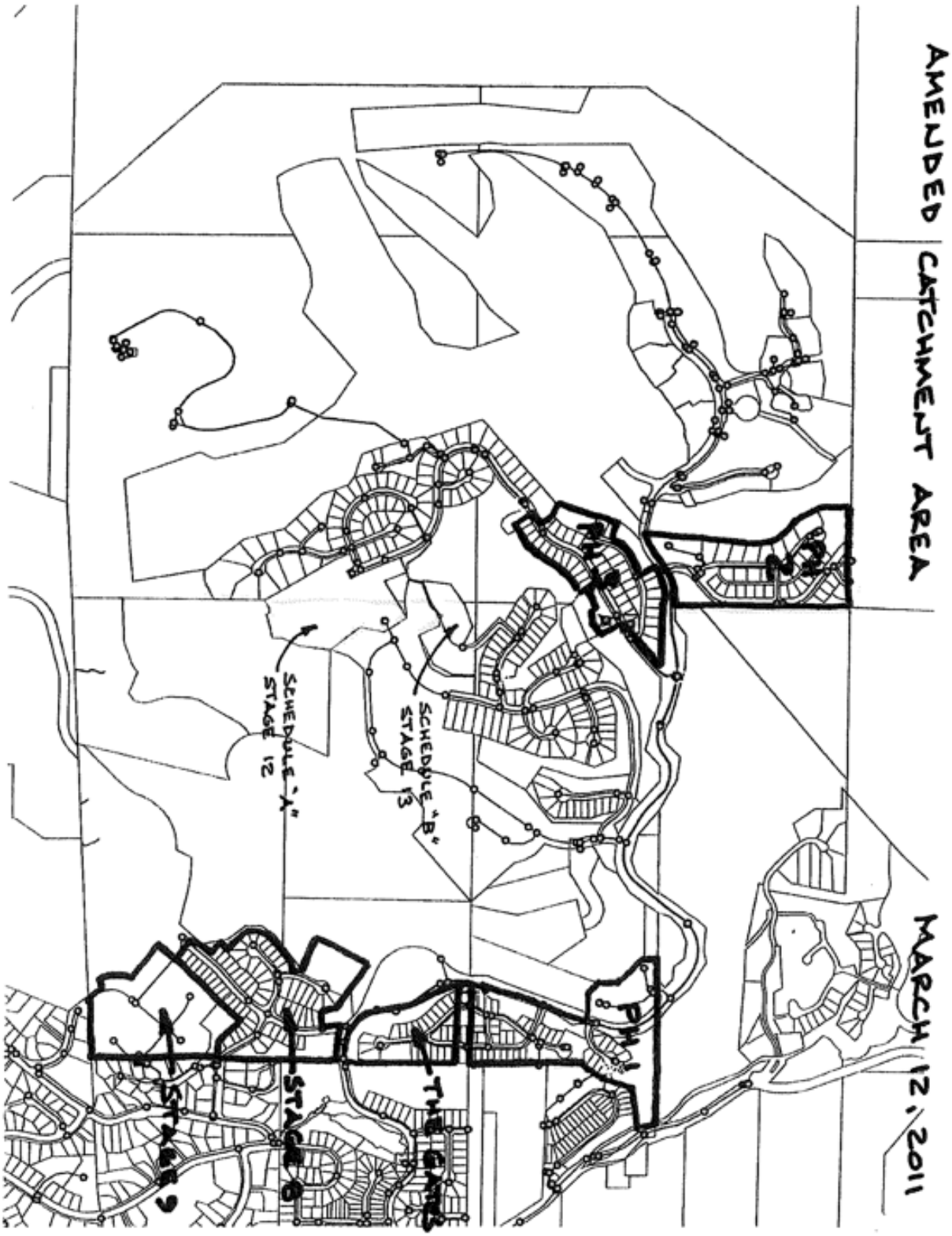
AMENDED CATCHMENT AREA
MARCH 12, 2011
SCHEDULE "A"
STAGE 12
SCHEDULE "B"
STAGE 13
STAGE 6
STAGE 6
STAGE 6

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ATTACHMENT 2

AGREEMENT

THIS AGREEMENT made this ____ day of _____, 2018.

BETWEEN:

CAPITAL REGIONAL DISTRICT
625 Fisgard Street
Victoria, BC V8W 2S6

(hereinafter called the "**Regional District**")

OF THE FIRST PART

AND:

Bear Mountain Adventures Ltd.
224 West 5th Avenue,
Vancouver, BC V5Y 1J4

(hereinafter called the "**BMAL**")

OF THE SECOND PART

W H E R E A S:

A. By an Agreement made on or about the 3rd day of June 2009 the Regional District entered into an Agreement (the "**DCC Frontender Agreement**") with Bear Mountain Development Holdings Ltd. and Bear Mountain Master Partnership (collectively the "Original Owner")which has been subsequently assigned to Bear Mountain Adventures Ltd., to provide for the construction of an expansion to the Regional District's water supply system for the purpose of servicing the lands and premises situate in the Province of British Columbia, in the City of Langford, and more particularly known as "Bear Mountain" through the construction of a concrete water reservoir on Skirt Mountain located on lands more particularly described as:

PID 009-858-652

Section 83, Highland District, Except Parts in Plans VIP75509, VIP77878, VIP77873, ViP80330, VIP82040, VIP82483, VIP82960, VIP88981, VIP88983, EPP33056 and EPP80460

(the "**Skirt Mountain Reservoir Lands**")

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in addition to a water supply pipeline and upgrades to pump station No. 2

(collectively the "**Works**");

B. The Regional District and Bear Mountain Adventures Ltd., the assignees of the Original Owner, wish to provide at this time for the repayment to the assignees of the Original Owner of a portion of the cost of the Works pursuant to section 566 of the *Local Government Act* and terminate the DCC Frontender Agreement.

NOW THIS AGREEMENT WITNESSES that in consideration of the premises, the terms and conditions hereinafter contained, and for other good and valuable consideration the receipt and sufficiency of which are hereby acknowledged, the parties covenant and agree each with the other as follows:

1. The Regional District agrees to pay Bear Mountain Adventures Ltd. as assignees of the Original Owner, the sum of $3,148,874.44 (the expected balance as of June 30, 2018)_less any additional payments to Bear Mountain Adventures Ltd. from the Regional District in the interim period prior to the execution date of this agreement_____, (the "**Reimbursement Amount**");

2. The timing for payment shall be by April 30, 2019 and is subject to CRD Board Approval and availability of funds in the Juan De Fuca Development Cost Charge reserve fund.

3. Payment shall also be subject to confirmation that all water infrastructure related to the connection to the Skirt Mountain Reservoir Lands have acceptable access agreements by way of location in a public road ROW or in a SRW or covered by an acceptable access easement agreement.

4. Upon payment of the Reimbursement Amount:

   (a) the DCC Frontender Agreement, attached to this Agreement as Schedule "A", shall be considered to be at an end, and Bear Mountain Adventures Ltd., for themselves and on behalf of the Original Owner shall release and save harmless the Regional District from any and all liability for repayment or any credit whatsoever of any monies collected under the *Local Government Act* as development cost charges, it being acknowledged and agreed by Bear Mountain Adventures Ltd. that the payment of the Reimbursement Amount under this Agreement represents a full and complete reimbursement of the costs of the Works that may be owed to Bear Mountain Adventures Ltd. for themselves or on behalf of the Original Owner or to any other person; and

   (b) Bear Mountain Adventures Ltd. for themselves, their successors and assigns shall indemnify and save harmless the Regional District of and from all claims, demands, deductions, costs, charges, expenses and amounts of any kind (collectively "claims" made or asserted by any person) arising from or in connection to the DCC Frontender Agreement, including, without limitation, any claims arising under section 565 of the *Local Government Act*.

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5. Bear Mountain Adventures Ltd. warrant and represent to the Regional District that they have the full authority to enter into this Agreement and to deal with all matters relating to the DCC Frontender Agreement.

6. NOTICE

It is hereby mutually agreed that:

(a) any notice required to be given under this Agreement will be deemed to be sufficiently given:

i. to be delivered at the time of delivery; and

ii. if mailed from any government post office in the province of British Columbia by prepaid registered mail addressed as follows:

if to Capital Regional District:

625 Fisgard Street
Victoria, BC V8W 2S6
Attention: Ted Robbins

if to Bear Mountain Adventures Ltd.:

224 West 5th Avenue
Vancouver, BC V5Y 1J4
Attention: Dan Matthews

Unless otherwise specified herein, any notice required to be given under this Agreement by any party will be deemed to have been given if mailed by prepaid registered mail, or sent by facsimile transmission, or delivered to the address of the other party set forth on the first page of this Agreement or at such other address as the other party may from time to time direct in writing, and any such notice will be deemed to have been received if mailed or faxed, 72 hours after the time of mailing or faxing and, if delivered, upon the date of delivery. If normal mail service or facsimile service is interrupted by strike, slow down, force majeure or other cause, then a notice sent by the impaired means of communication will not be deemed to be received until actually received, and the party sending the notice must utilize any other such services which have not been so interrupted or must deliver such notice in order to ensure prompt receipt thereof.

7. TIME

Time is to be the essence of this Agreement.

8. BINDING EFFECT

This Agreement will enure to the benefit of and be binding upon the parties hereto and their respective heirs, administrators, executors, successors, and permitted assignees.

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9. WAIVER

The waiver by a party of any failure on the part of the other party to perform in accordance with any of the terms or conditions of this Agreement is not to be construed as a waiver of any future or continuing failure, whether similar or dissimilar.

10. HEADINGS

Section and paragraph headings are inserted for identification purposes only and do not form a part of the Agreement.

11. LANGUAGE

Wherever the singular, masculine and neuter are used throughout this Agreement, the same is to be construed as meaning the plural or the feminine or the body corporate or politic as the context so requires.

12. CUMULATIVE REMEDIES

No remedy under this Agreement is to be deemed exclusive but will, where possible, be cumulative with all other remedies at law or in equity.

13. LAW APPLICABLE

This Agreement is to be construed in accordance with and governed by the laws applicable in the Province of British Columbia.

IN WITNESS WHEREOF the parties hereto have set their hands and seals as of the day and year first above written.

CAPITAL REGIONAL DISTRICT)
by its authorized signatory(ies):)
)
_____)
Authorized Signatory)
)
_____)
Authorized Signatory)

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SIGNED, SEALED AND DELIVERED)
in the presence of:)
)
_____)
Witness Name:) _____
)
_____)
Address)
)
_____)
Occupation)

Bear Mountain Adventures Ltd. by its authorized)
signatory(ies):)
)
_____)
Authorized Signatory)
)
_____)
Authorized Signatory)

SIGNED, SEALED AND DELIVERED)
in the presence of:)
)
_____)
Witness Name:) _____
)
_____)
Address)
)
_____)
Occupation)

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Schedule "A"

DCC Frontender Agreement

Original in Vault.

SKIRT MOUNTAIN WATER RESERVOIR AGREEMENT

File No._____

THIS AGREEMENT made in triplicate

COPY

BETWEEN:

CAPITAL REGIONAL DISTRICT
479 Island Highway, Victoria, B. C., V9B 1H7

(the "District")

AND:

BEAR MOUNTAIN DEVELOPMENT HOLDINGS LTD.
(formerly LGB9 Development Corporation),
113 – 1325 Bear Mountain Parkway, Victoria British Columbia, V9B 6T8

("LGB9")

AND:

BEAR MOUNTAIN MASTER PARTNERSHIP
113 – 1325 Bear Mountain Parkway, Victoria, British Columbia, V9B 6T8

("BMMP")

WHEREAS:

A. LGB9 as bare trustee for BMMP (LGB9 and BMMP are collectively referred to as the "Owner"), is the registered owner of, or the party empowered in writing by the registered owner to develop, the lands and premises situate in the Province of British Columbia in the City of Langford and more particularly known as "Bear Mountain".

B. In order to continue with the development of "Bear Mountain", it was necessary to construct a three cell concrete water reservoir on Skirt Mountain located on the lands more particularly described as:

PID: 009-858-652
Section 83, Highland District, Except Part in Plan VIP75509, VIP77878, VIP78873, VIP80330, VIP82040 and VIP82483

(the "Skirt Mountain Water Reservoir")

in order to expand the District's water supply system for the purpose of servicing "Bear Mountain" ;

C. The Owner has completed the construction of the Skirt Mountain Water Reservoir;

D. The District has issued a Construction Completion Certificate with reference to the construction of the Skirt Mountain Water Reservoir and the Skirt Mountain Water Reservoir and land has been transferred by the Owner and has become the property of the District;

E. As the Owner wished to construct the Skirt Mountain Reservoir using its own contractor, the District agreed to negotiate a sole source contract. By resolution at its meeting on May 1, 2007 the Juan de Fuca Water Distribution Commission approved the sole source contract for construction of the Skirt Mountain Water Reservoir, supply pipeline and upgrades to Pump Station No. 2. (hereinafter called the 'Works').

F. As the District did not have sufficient funds available from development cost charge revenues to construct the Skirt Mountain Reservoir, supply pipeline and upgrades to Pump Station No. 1, and the Owner wished to proceed with construction of the Works, the Owner agreed to fund the Works and to negotiate an agreement with the District for reimbursement of the cost of the Works.

NOW THEREFORE BE IT KNOWN THAT in consideration of the mutual covenants hereinafter set forth, the parties hereto agree as follows:

Expansion of CRD Water Supply System

1. The District agrees that the Owner has expanded the District's water supply system for the purpose of servicing Bear Mountain by the construction of the Works and the Owner

confirms and covenants that all works related to the expansion of the water supply system and the design and construction of the Works has been done in accordance with the specifications of the District, and more particularly, without restricting the generality of the foregoing, in accordance with the District's Water Department's Engineering Specifications and Standard Drawings in force from time to time;

2. The Owner and the District agree that the cost involving the installation and/or construction of the Works as approved by the District is the following amount:

Reservoir Cost	$4,372,737.00
Approved Change Orders	$ 28,403.75
Water Supply Line	$ 330,545.00
Pump Station No. 2	$ 41,554.75
	$4,773,240.50

(the "Works Cost").

Catchment Area and Reimbursent Payments

3. The District agrees that the catchments area for the Skirt Mountain Water Reservoir (the "Catchment Area") includes all of the lands forming Bear Mountain which have been created from the parent parcels set out on the attached Schedule "A" with the only exceptions being Phases 1, 2, 3, 8, 9 and "The Gates" which were serviced by the CRD water reservoir constructed in Phase 3.

4. The District acknowledges that, as at the date of this agreement, the Owner has paid the District's Water Development Cost Charges as outlined on the attached Schedule "B" to this agreement (the "Current Bear Mountain Water DCC Payments") for development in the Catchment Area.

5. The District agrees to pay to the Owner, as reimbursement for the Works Cost,

   (a) upon execution of this agreement, the Current Bear Mountain Water DCC Payments, and

   (b) no later than ninety (90) days after payment of development costs charges

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collected by the City of Langford from the Owner and others on account of development in the Catchment Area after the date of this agreement and transmitted by the City to the District (the "Future Bear Mountain Water DCC Payments"), sufficient of the Future Bear Mountain Water DCC Payments to pay the Works Costs remaining after the Current Bear Mountain Water DCC Payments have been paid to the Owner.

6. The District and the Owner agree that interest shall not be payable by the District on the amount of the Works Costs outstanding and owing to the Owner from time to time by the District.

7. Prior to reimbursement of the Bear Mountain Water DCC Payments to the Owner by the District, the Owner shall first provide to the District a statutory declaration declaring that all contractors and subcontractors have been paid and that no builder's liens have been filed against the Works.

Expansion of Catchment Area

8. In the event a third party requests use of any of the constructed three cells which form part of the Works for the purpose of providing water service to lands other than those identified as part of the Catchment Area, the Owner and the District agree that this agreement will be revised to add the additional lands and on such terms as mutually agreed to by the parties, which agreement shall not be unreasonably withheld.

Indemnification

9. Nothing contained in this agreement, including the review of any plans or specifications of the constructed Works by any employee of the District, shall relieve the Owner and its servants and agents from full liability for damages incurred by the Owner, the District or any third party as a result of any faulty design, or defects in workmanship or materials in relation to the Reservoir, or any damages resulting from such faults or defects.

10. The Owner shall be responsible for and releases and agrees to indemnify and save harmless the District from and against any claims, demands, losses, costs, liens, damages, actions, suits or other proceedings based upon or occasioned by the faults or defects referred to in section 7 of this agreement, or attributable to the execution or performance

of this agreement or failure to perform this agreement.

11. The Owner and its insurer may not settle or compromise any claim, demand, suit or action and any damages, compensation and costs paid or incurred by the District without the written consent of the District and all such claims, demands, suits or actions recovered by the Owner shall be a debt due to the District recoverable by action or by off-set against any money due by the District to the Owner.

12. Nothing in this agreement shall be construed so as to make the District liable to pay the Owner's contractor for any of the Works.

General Provisions

13. This agreement shall not be assignable by any party without the written consent of the other, such consent not to be unreasonably withheld.

14. A power or discretion exercisable by the General Manager may be exercised by his designate.

15. Any notice, approval or request given under this agreement may be given if served personally upon an officer of the party for whom it is intended or mailed by prepaid registered mail addressed to the parties as follows:

to the District:

General Manager
Capital Regional District Water Services
479 Island Highway
Victoria, B. C., V9B 1H7

to the Owner:

Bear Mountain Development Holdings Ltd. and
Bear Mountain Master Partnership
113 – 1325 Bear Mountain Parkway
Victoria, B.C., V9B 6T8

or at such other address as a party may advise by notice in writing.

16. (1) The date of receipt of any notice, approval or request shall be deemed to be the date of delivery of the notice, approval or request if served personally, or on the third business day following the date of mailing.

(2) Where there is a mail strike, slow down or other labour dispute which might affect mail delivery of any notice, approval or request, then the notice, approval or request shall only be effective if actually delivered to an officer of the party for whom it is intended or to the specified address of such party.

17. If any portion of this agreement is held or declared by a Court of competent jurisdiction to be void or unenforceable, that portion shall be severed from the balance of this agreement and the balance of this agreement shall survive and be enforceable.

18. This agreement shall enure to the benefit of and be binding upon the parties hereto and their respective successors and assigns.

IN WITNESS WHEREOF the parties hereto have executed this agreement.

BEAR MOUNTAIN DEVELOPMENT HOLDINGS LTD.
Per:

LEN BARRIE

BEAR MOUNTAIN MASTER PARTNERSHIP
Per:

LEN BARRIE

CAPITAL REGIONAL DISTRICT
Per:

J.A. (Jack) Hull, MBA, P. Eng.
General Manager, CRD Water Services

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SCHEDULE "A"

Catchment Area
Parent Parcels

Parcel Identifier: 002-115-093
Lot "A", Section 3, Ranges 3 and 4 West, Highland District, Plan 27507

Parcel Identifier: 025-088-106
Section 3, Range 4W, Highland District, Except That Part in Plan 27507

Parcel Identifier: 009-853-103
Section 81, Highland District, Except Plan VIP72556

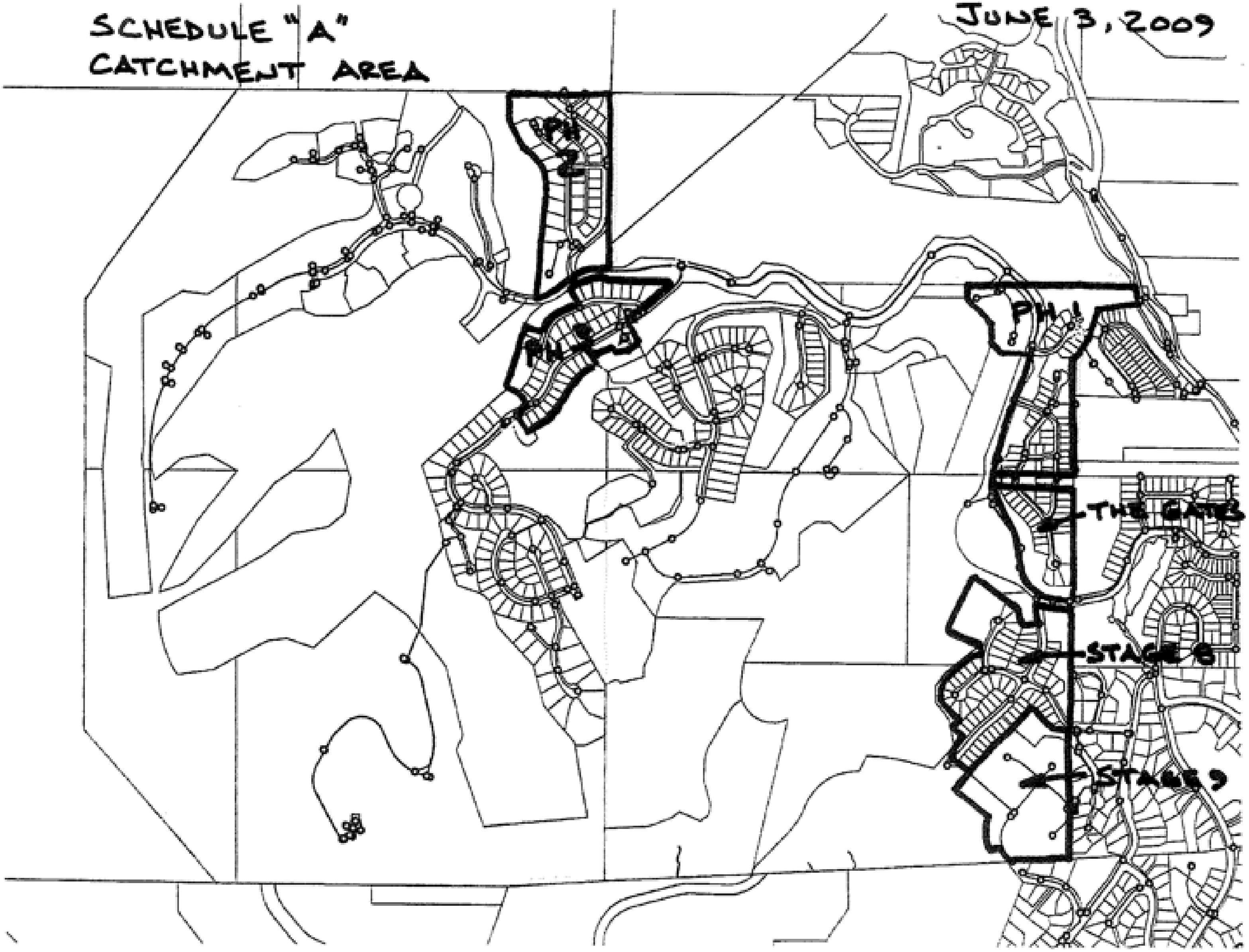
Parcel Identifier: 009-858-636
Section 82, Highland District

Parcel Identifier: 009-858-652
Section 83, Highland District

Parcel Identifier: 009-853-081
Section 84, Highland District Except That Part in Plan VIP72556

Excluding:

Phase 1 – VIP75449
Phase 2 – VIP76197
Phase 3 - VIP76988
The Gates - VIP81472
Stage 8 – VIP 83430
Stage 9 – VIP 84683


SCHEDULE "A"
CATCHMENT AREA
JUNE 3, 2009
PH 2
PH 3
PH 1
THE GATES
STAGE 8
STAGE 9

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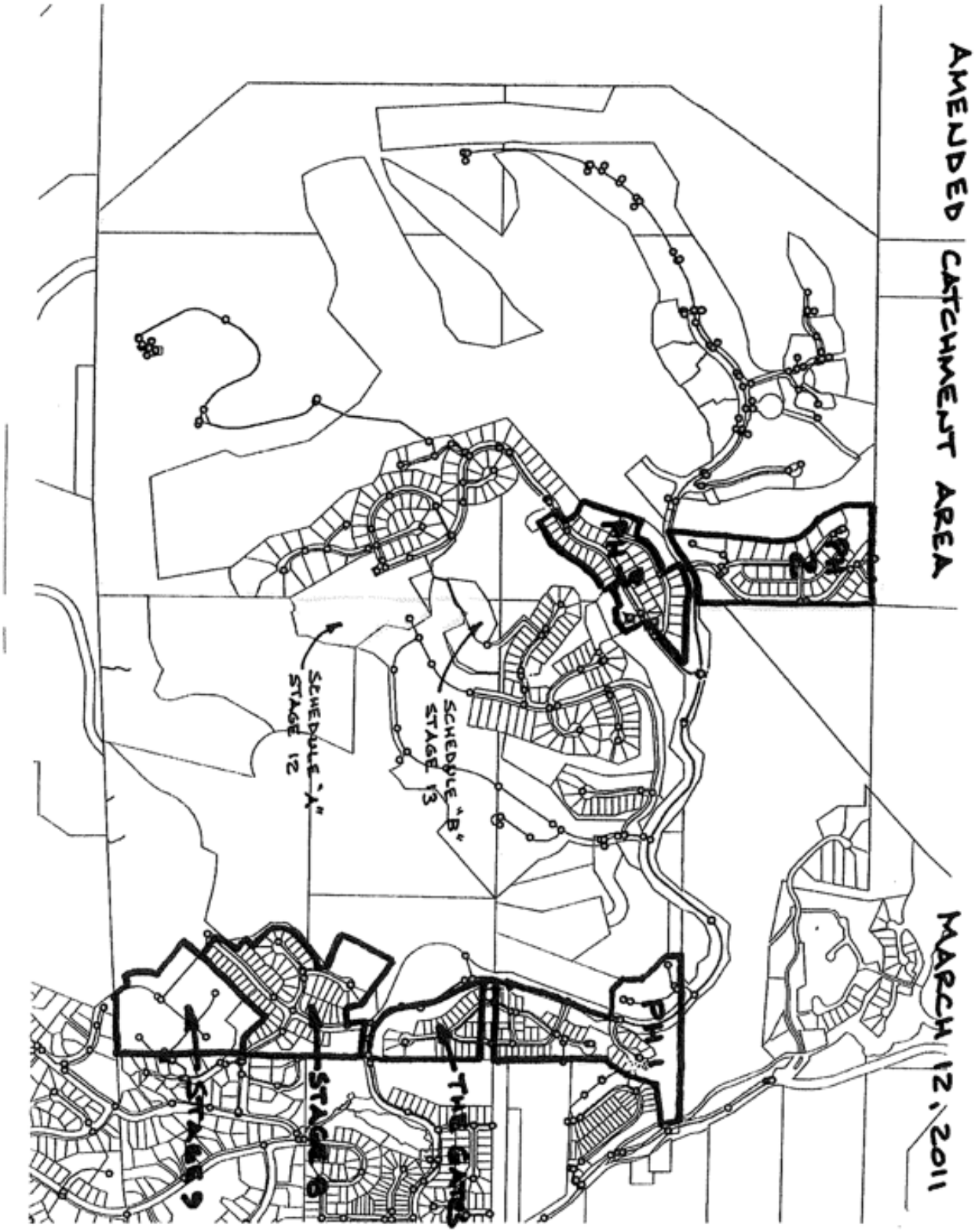
AMENDED CATCHMENT AREA
MARCH 12, 2011
SCHEDULE "A"
STAGE 12
SCHEDULE "B"
STAGE 13
STAGE 9
STAGE 8
THE PARKS

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Making a difference...together

Agenda Item 9
REPORT #JWDC 2018-07

REPORT TO JUAN DE FUCA WATER DISTRIBUTION COMMISSION
MEETING OF TUESDAY, JUNE 5, 2018

SUBJECT **ELECTRONIC BILLING IMPLEMENTATION**

ISSUE

The Juan de Fuca Water Distribution electronic billing option is now available for customers.

BACKGROUND

Integrated Water Services engaged with Information Technology and GIS Services department in a project to provide electronic billing (e-billing) to its' customers. On May 12, 2018 the project was launched and is now operational.

The project scope included utility billing system improvements to provide the e-billing option and align current billing processes and practices, as well as ensuring legislative compliance regarding electronic billing. The project also included customer account data cleansing as well as (electronic and paper) bill enhancements.

The CRD website was also updated to accommodate e-billing by providing customers the ability to register, view their current account balance, as well as opt in or out of electronic billing which is in compliance with Canadian Anti-Spam legislation. Through the website location customers can now update their email address, as well as change their invoice delivery method updating the billing system with their request in real time. Customers require the information from the latest invoice in order to sign up and register. See attached screen shots with website information (Attachment A).

The new functionality provides better visibility and transparency regarding customer billing information, and provides greater flexibility and control for the customer, as well as allows multiple owners of a property to now register and receive electronic billing.

Customers are being informed of the newly available service via an insert included with their invoice in their current billing cycle (Attachment B). The insert outlines the process for signing up for electronic billing through the CRD website. Approximately 5,500 customers have been advised from the latest billing cycle of May 24. All Juan de Fuca water distribution customers (approximately 24,000 accounts) will be informed by mid-July. Supplementary website information and promotion of the e-billing option will take place in the Fall after all of the customers have received their bill with the e-billing information.

It is anticipated that there will be strong uptake of the e-billing option across the service area, which will result in a reduction of the postage and handling costs related to paper bills. The current annual postage and handling expense related to paper bills is over $120,000.

RECOMMENDATION

That the Juan de Fuca Water Distribution Commission receive the staff report for information.

Submitted by:	Dianne Lazaro, Systems Officer, Enterprise Resource Planning
Concurrence:	Ted Robbins, BSc, CTech, General Manager, Integrated Water Services

DL/TR:mm

Attachment:
A. Website information
B. Insert Introducing Electronic Billing

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ATTACHMENT A

Balance and Payments

CRD Home > Services > Drinking Water > Billing & Accounts > Balance and Payments

Drinking Water

- Billing & Accounts
  - Balance and Payments
  - Information by Area
  - Moving
  - Reading Water Meters
  - Water Leak Adjustments
- Cross Connection Control
- Drinking Water Quality
- Drinking Water Systems
- Engineering Specifications
- Water Conservation
- Water System Maintenance
- Watershed Protection & Stewardship

Register your new utility account to access your balance and sign up for e-Billing

We are pleased to introduce e-Billing to our utility customers. As a result of this new feature, we have made some changes to our system.

1. Your account number has changed. Your new account number is a six digit number starting with **5.** This new account number will be on the top right corner of all invoices received after **May 21, 2018.**

2. You no longer require an access code. Once you register, you can:

- link your new account number
- access your account balance online
- sign up for e-billing

If you have not yet received an invoice with your new account number, you can request your account balance by email or by calling 250.474.9600.

Register Now! Already have an account? Login

How to Pay Your Utility Bill

Online Banking

Select CRD as a payee, enter your account number and pay the amount due. See the list below for your financial institution's payee search terms. **Please note:** You will need to update your online banking information with your new account number.

How do I find CRD in the Bill Payee in my online banking?

Here is a list of banks that have the Capital Regional District as a Bill Payee and how to find us:

Questions?

- Utility Billing FAQ

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ABOUT THE CRD | SERVICES | PARKS, RECREATION & CULTURE | PROJECTS & INITIATIVES | EDUCATION & ENVIRONMENT

CRD Home > Services > Drinking Water > Billing & Accounts > Register

Drinking Water

- Billing & Accounts
  - Balance and Payments
  - Information by Area
  - Moving
  - Reading Water Meters
  - Water Leak Adjustments
- Cross Connection Control
- Drinking Water Quality
- Drinking Water Systems
- Engineering Specifications
- Water Conservation
- Water System Maintenance
- Watershed Protection & Stewardship

Account Registration

Please create an account using the form below. You will receive a verification email upon registering. Please ensure you click the link in the email in order to complete registration.

First name

Last name

Email

Password

Re-type password

Register

* Please ensure that your email address is entered correctly. You will not receive a confirmation email if the address is incorrect.

* Please note: If you already have an online CRD account (for example, with Business Opportunities), you do not need to register. Simply login.

Privacy Policy

Questions?

- Utility Billing FAQ

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E-Billing Frequently Asked Questions

Can't find the information you are looking for below? Contact our billing department.

How do I sign up for e-Billing?

Simply go to www.crd.bc.ca/account and click on "Register your account / Sign up for e-Billing". Create a CRD Profile. Once your profile has been created, you will receive an email asking you to verify your account. You can then log into your new profile, link your account(s) and sign up for e-Billing.

I registered for e-Billing. When will I receive my first e-Bill?

I did not receive a verification email when I registered for e-Billing

How do I update my account information?

Can I view my account balance?

I pay through online banking. Do I need to do anything?

What information do I need to register?

Do I still need an account access code?

What information do I need to link an account?

Can more than one person per property sign up for e-Billing?

I have multiple accounts. cam I receive all my invoices by e-Billing?

Once I sign up for e-Billing will I still get a paper bill?

I am not interested in e-Billing. Can I still receive a paper copy of my bill?

We are pleased to introduce Electronic Billing to our utility customers.

As a result of this new feature, we have made some changes to our system.

1. Your account number has changed. Your new account number is a six digit number starting with **5**. This new account number is on the top right corner of your invoice. If any information on your invoice appears incorrect, please contact us.

2. If you currently pay your CRD utility invoice via online banking, please update with your new CRD utility account information.

3. You no longer require an access code for account balance information.

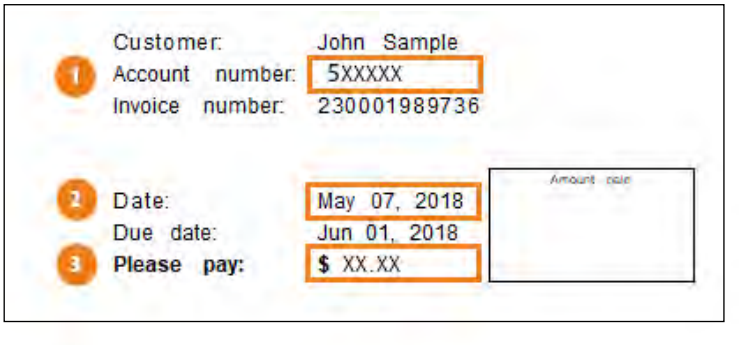
Register your new utility account.

You will only need to register your new account if you wish to:

- Access your account balance, and/or
- Sign up for electronic billing

Simply visit **www.crd.bc.ca/account** and follow the instructions to register your account. The following information from your most recent invoice is required:

1. Your new account number
2. Invoice date
3. Your current account balance



* New account information is on invoices dated May 21, 2018 or later.

Questions?

We are here to help. Call us at **250.474.9601**, or email **waterbilling@crd.bc.ca**.

CRD

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File No. 902-03

CAPITAL REGIONAL DISTRICT - INTEGRATED WATER SERVICES

Water Watch

Issued May 28, 2018

Water Supply System Summary:

1. Useable Volume in Storage:

Reservoir	May 31 5 Year Ave		May 31/17		May 27/18		% Existing Full Storage
	ML	MIG	ML	MIG	ML	MIG	
Sooke	88,308	19,428	90,106	19,823	89,084	19,598	96.1%
Goldstream	8,851	1,947	8,483	1,866	6,764	1,488	68.8%
Total	97,159	21,375	98,589	21,690	95,848	21,086	93.5%

2. Average Daily Demand:

For the month of May	150.0 MLD	32.99 MIGD
For week ending May 27, 2018	175.3 MLD	38.57 MIGD
Max. day May 2018, to date:	193.6 MLD	42.58 MIGD

3. Average 5 Year Daily Demand for May

Average (2013 - 2017)	143.7 MLD [1]	31.61 MIGD [2]

[1]MLD = Million Litres Per Day [2]MIGD = Million Imperial Gallons Per Day

4. Rainfall May:

Average (1914 - 2017):	48.3 mm
Actual Rainfall to Date	7.5 (16% of monthly average)

5. Rainfall: Sep 1- May 27

Average (1914 - 2017):	1544.7 mm
2017 / 2018	1584.9 (103% of average)

6. Water Conservation Action Required:

Stage 1 water conservation bylaw is now in effect. Check our website at www.crd.bc.ca/water for more information. It's time to get your irrigation system ready for Spring. Attend a free irrigation workshop to learn system maintenance and waterwise scheduling. Check our website at www.crd.bc.ca/workshops for more information.

If you require further information, please contact:

Ted Robbins, B.Sc., C.Tech
General Manager, CRD - Integrated Water Services
or
Glenn Harris, Ph D., RPBio
Senior Manager - Environmental Protection

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

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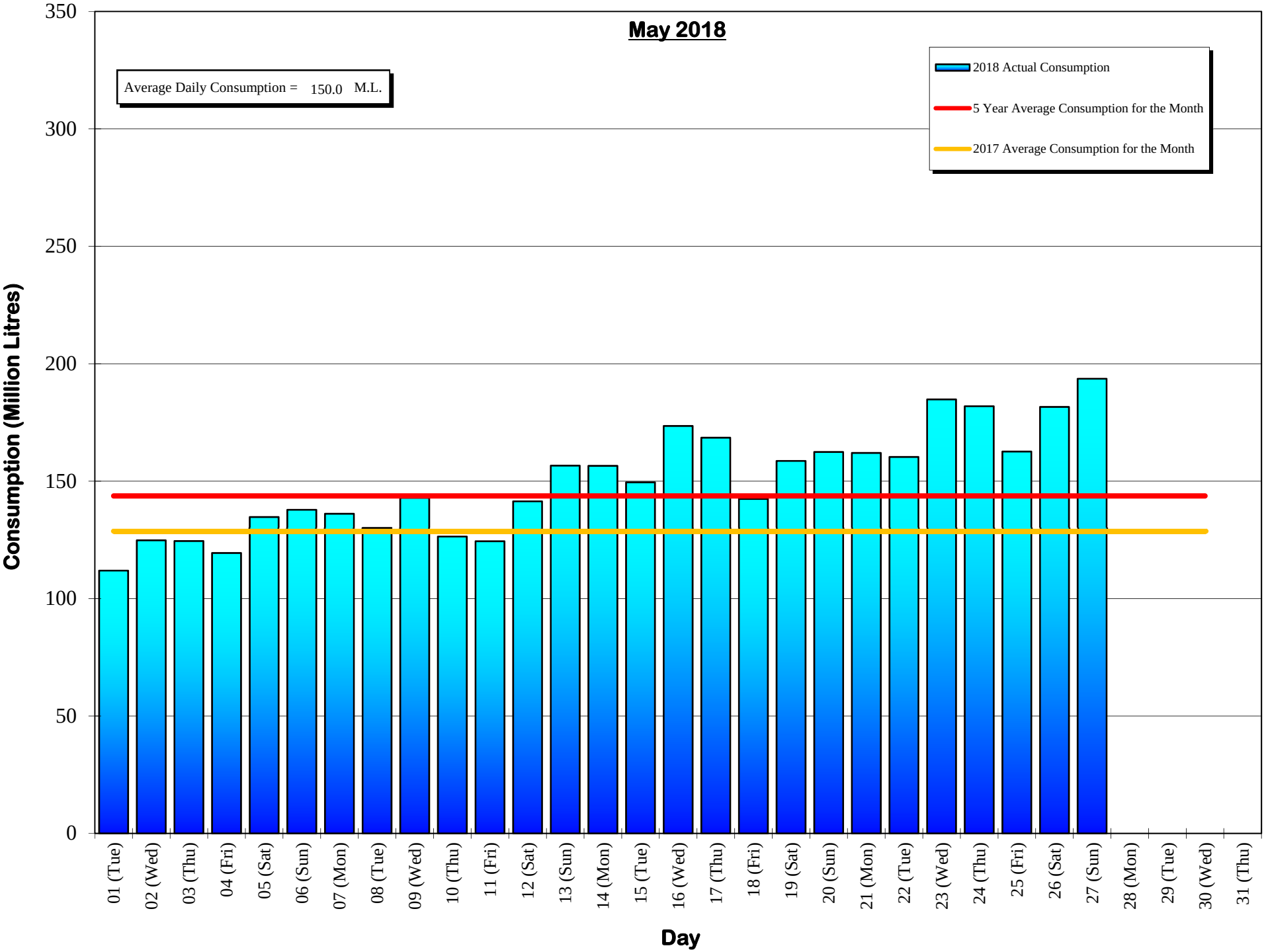

J:\WATERENG\HYDROLGY\AMRIT\MONTHEND.18\H2o watch 2018.xlsxCons. Chart

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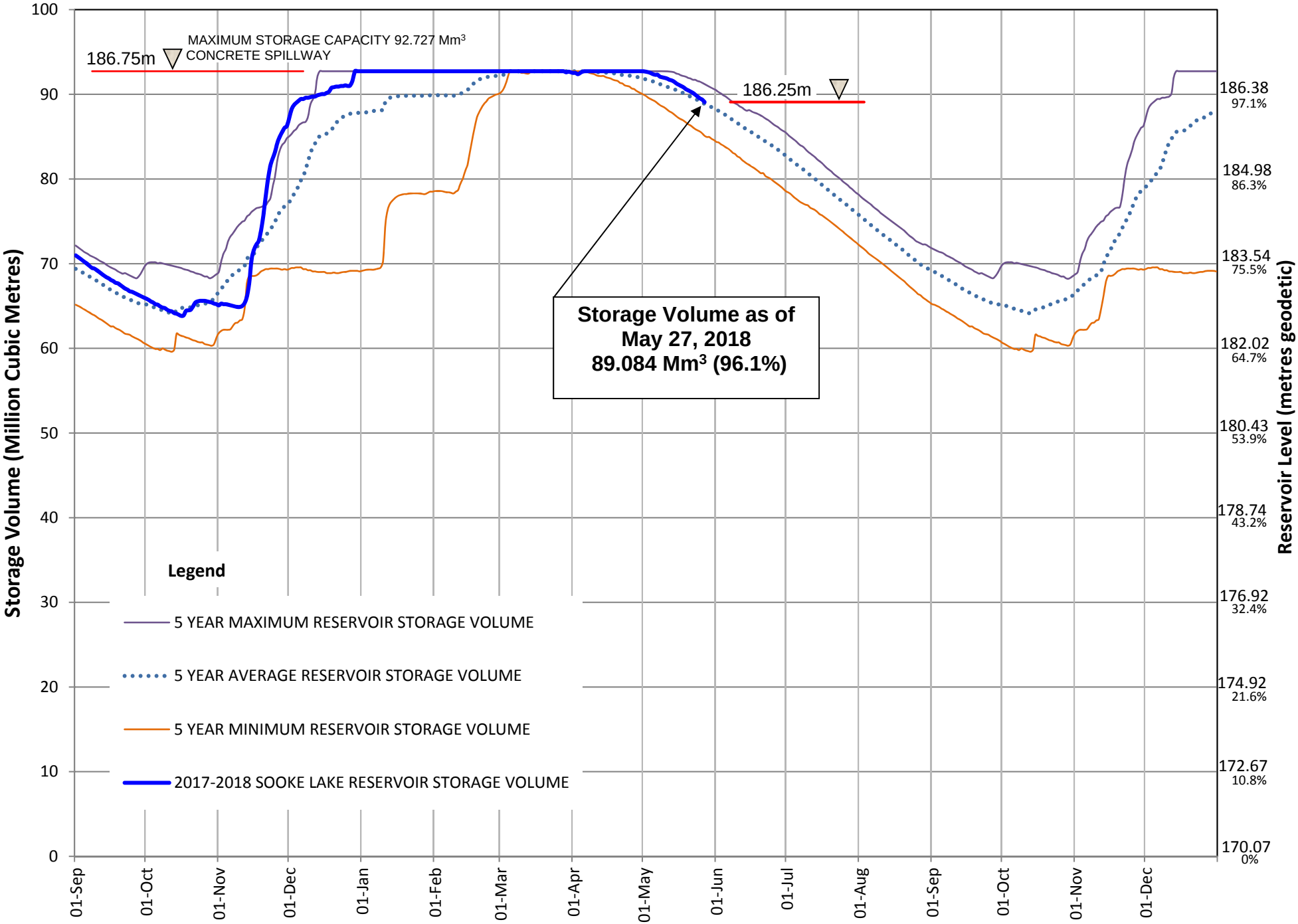
SOOKE LAKE RESERVOIR STORAGE SUMMARY
2017 / 2018



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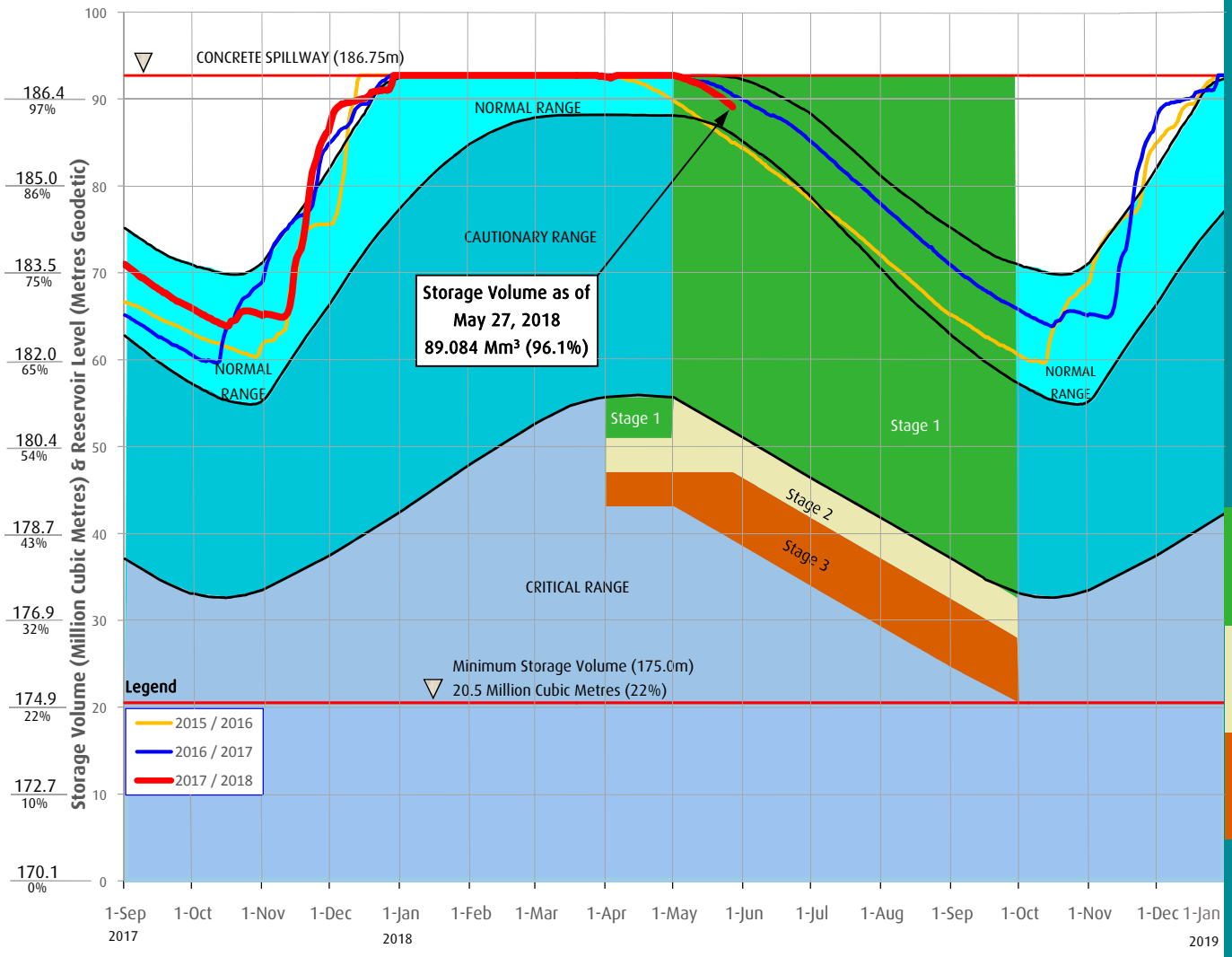
Sooke Lake Reservoir Storage Level

Water Supply Management Plan



FAQs

How are water restriction stages determined?

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

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

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

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

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

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

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

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

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