

REGULAR COUNCIL MEETING – AGENDA

Agenda for the Regular Council Meeting scheduled for
Tuesday, September 18, 2018 at 7:00 p.m. in Council Chambers at
Village Hall, 2697 Sunnyside Road, Anmore, BC



1. Call to Order

2. Approval of the Agenda

Recommendation: That the Agenda be approved as circulated.

3. Public Input

Note: The public is permitted to provide comments to Council on any item shown on this meeting agenda. A two-minute time limit applies to speakers.

4. Delegations

page 1

(a) Robert Bradbury Architect – Rezoning Application – 2307 Sunnyside Road

5. Adoption of Minutes

page 2

(a) Minutes of the Regular Council Meeting held on September 4, 2018

Recommendation: That the Minutes of the Regular Council Meeting held on September 4, 2018 be adopted as circulated.

6. Business Arising from Minutes

7. Consent Agenda

Note: Any Council member who wants to remove an item for further discussion may do so at this time.

Recommendation: That the Consent Agenda be adopted.

page 10

(a) The Office of the Ombudsperson – Quarterly Report: April 1 – June 30, 2018

Recommendation: That the letter dated August 20, 2018 from The Office of the Ombudsperson regarding Quarterly Report: April 1 – June 30, 2018 be received.

- page 16 **(b) District of Ucluelet – Modernization of Utility Taxation**
- Recommendation: That the letter dated August 27, 2018 from District of Ucluelet regarding Modernization of Utility Taxation be received.
- page 21 **(c) Metro Vancouver – Commercial Cannabis Production on Agricultural Land**
- Recommendation: That the letter dated August 28, 2018 from Metro Vancouver regarding Commercial Cannabis Production on Agricultural Land be received.
- page 24 **(d) aKd Resource – Review of the Auditor General for Local Government and Office**
- Recommendation: That the letter dated August 29, 2018 from aKd Resource regarding Review of the Auditor General for Local Government and Office be received.
- page 25 **(e) Council of Senior Citizens' Organizations of BC – Observation of the UN International Day of the Older Person – October 1st**
- Recommendation: That the letter dated September 1, 2018 from Council of Senior Citizens' Organizations of BC regarding Observation of the UN International Day of the Older Person – October 1st be received.
- Recommendation: That Council proclaims October 1, 2018 as International Day of Older Persons in the Village of Anmore.
- 8. Items Removed from the Consent Agenda**
- 9. Legislative Reports**
- page 28 **(a) Tree Management Bylaw – Draft Update**
- Report dated August 29, 2018 from the Manager of Development Services is attached.
- page 46 **(b) Building Bylaw No. 583-2018**
- Recommendation: That Anmore Building Bylaw No. 583-2018 be adopted.
- page 65 **(c) Works and Services Amendment Bylaw No. 584-2018**
- Report dated September 13, 2018 from the Manager of Development Services is attached.

10. Unfinished Business

11. New Business

(a) Stormwater Master Plan

page 70

Stormwater Master Plan, Final Draft Report dated September 14, 2018, is attached.

(b) Rezoning Application – 2307 Sunnyside Road (Cordovado)

page 167

Report dated September 12, 2018 from the Manager of Development Services is attached.

12. Mayor's Report

13. Councillors Reports

14. Chief Administrative Officer's Report

15. Information Items

(a) Committees, Commissions and Boards – Minutes

(b) General Correspondence

page 174

- Email dated August 31, 2018 from Richard Knowles regarding Environmental Assessment of Buntzen Lake WRT Species At Risk (SAR) by Proposal for Race Rowing Club on Buntzen Lake

16. Public Question Period

Note: The public is permitted to ask questions of Council regarding any item pertaining to Village business. A two-minute time limit applies to speakers.

17. Adjournment

Delegation to Council Request Form

Contact Information

Name of presenter: ROBERT BRADBURY, ARCHITECT AIBC

Name of organization: BRADBURY ARCHITECTURE

Mailing Address: #3 350-440 W. HASTINGS ST., VANCOUVER, BC

Phone Number: (604) 831-9451 / (604) 731-7227

Email Address: ROBERT@BRADBURYARCHITECTURE.CA

Presentation Information

Preferred meeting date at which you wish to appear (if known): 18TH SEPTEMBER/18

Number of person(s) expected to attend: 3

Reason(s) for presentation:

- ☒ To provide information RE: 2307 SUNNYSIDE ROAD, ANMORE, BC
- ☐ To request funding
- ☐ To request letter of support
- ☐ Other _____

Resources:

- ☐ Projector and Screen (bring own laptop)
- ☐ Other - NOT REQUIRED -

Please submit the completed form and related presentation materials to the Manager of Corporate Services by 12:00 p.m. on the Thursday prior to the Council Meeting via email to christine.milloy@anmore.com or delivered to village hall.

For questions regarding this process, please phone Christine Milloy at 604-469-9877.

RECEIVED

SEP 06 2018

REGULAR COUNCIL MEETING – MINUTES

Minutes of the Regular Council Meeting held on Tuesday, September 4, 2018
in Council Chambers at Village Hall, 2697 Sunnyside Road, Anmore, BC



ELECTED OFFICIALS PRESENT

Mayor John McEwen
Councillor Ryan Froese
Councillor Ann-Marie Thiele
Councillor Kim Trowbridge
Councillor Paul Weverink

ELECTED OFFICIALS ABSENT

Nil

OTHERS PRESENT

Juli Halliwell, Chief Administrative Officer
Christine Baird, Manager of Corporate Services
Jason Smith, Manager of Development Services
Luke Guerin, Operations Superintendent

1. Call to Order

Mayor McEwen called the meeting to order at 7:00 p.m.

2. Approval of the Agenda

Council agreed to move the letter from Amanda Todd Legacy Society, under item 15(b), to become item 11(e) Light Up Purple for World Mental Health Day.

It was MOVED and SECONDED:

R159/2018

"THAT THE AGENDA BE APPROVED AS AMENDED."

CARRIED UNANIMOUSLY

3. Public Input

Colleen Hackinen, Elementary Road, spoke to item 7(a), commenting that she wrote a letter to the Minister suggesting that the staff who conducted the review in 2002 were misguided, and that it is unfair that Ministry actions have resulted in the Village's current situation; which needs to be resolved expediently. She added that the Village may want to consider appealing the Minister's Order.

Glen Coutts, Elementary Road, spoke to item 7(a), commenting that he was on Council from 1996 to 1999 during the time decisions were made for the development and he believes the Anmore Green developer may have misled the Ministry which in then led to a substandard system. He also spoke to item 9(a), commenting that section 12.1(i) of the proposed Building Bylaw should be modified or the issue addressed under

Occupancy Permits. He also spoke to item 11(b), commenting that it would be desirable for the program to include trails.

4. **Delegations**

Nil

5. **Adoption of Minutes**

(a) **Minutes of the Regular Council Meeting held on July 17, 2018**

It was MOVED and SECONDED:

R160/2018 **“THAT THE MINUTES OF THE REGULAR COUNCIL MEETING
HELD ON JULY 17, 2018 BE ADOPTED AS CIRCULATED.”**

CARRIED UNANIMOUSLY

6. **Business Arising from Minutes**

Nil

7. **Consent Agenda**

It was MOVED and SECONDED:

R161/2018 **“THAT THE CONSENT AGENDA BE ADOPTED WITH ITEM
7(A) REMOVED.”**

CARRIED UNANIMOUSLY

(a) **Ministry of Environment and Climate Change Strategy – Minister’s Order –
Liquid Waste Management Plan**

This item was removed.

(b) **Provincial - Union of British Columbia Municipalities Green Communities
Committee – Climate Action Recognition Program**

R162/2018 **“THAT THE LETTER DATED AUGUST 15, 2018 FROM
PROVINCIAL-UNION OF BRITISH COLUMBIA MUNICIPALITIES
GREEN COMMUNITIES COMMITTEE REGARDING CLIMATE
ACTION RECOGNITION PROGRAM BE RECEIVED.”**

CARRIED UNANIMOUSLY

- (c) Metro Vancouver – Metro Vancouver 2040: Shaping our Future Land Use Designation Amendment Request from the Township of Langley – Williams Neighbourhood Plan

R163/2018 "THAT THE LETTER DATED JULY 26, 2018 FROM METRO VANCOUVER REGARDING METRO VANCOUVER 2040: SHAPING OUR FUTURE LAND USE DESIGNATION AMENDMENT REQUEST FROM THE TOWNSHIP OF LANGLEY – WILLIAMS NEIGHBOURHOOD PLAN BE RECEIVED."

CARRIED UNANIMOUSLY

- (d) Sasamat Volunteer Fire Department Board of Trustees – Meeting Minutes of July 5, 2018

R164/2018 "THAT THE MINUTES OF THE MEETING HELD ON JULY 5, 2018 BY THE SASAMAT VOLUNTEER FIRE DEPARTMENT BOARD OF TRUSTEES BE RECEIVED."

CARRIED UNANIMOUSLY

- (e) Village of Belcarra – Rowing Canada Aviron (RCA) National Training Centre Proposal for Buntzen Lake

R165/2018 "THAT THE LETTER DATED JULY 26, 2018 FROM VILLAGE OF BELCARRA REGARDING ROWING CANADA AVIRON (RCA) NATIONAL TRAINING CENTRE PROPOSAL FOR BUNTZEN LAKE BE RECEIVED."

CARRIED UNANIMOUSLY

- (f) City of Port Moody – Eagle Ridge Hospital Site and Emergency Room Expansion

R166/2018 "THAT THE LETTER DATED JULY 12, 2018 FROM CITY OF PORT MOODY REGARDING EAGLE RIDGE HOSPITAL SITE AND EMERGENCY ROOM EXPANSION BE RECEIVED."

CARRIED UNANIMOUSLY

- (g) District of Houston – Support of the Province of BC's Caribou Recovery Program

R167/2018 “THAT THE LETTER DATED JULY 23, 2018 FROM DISTRICT OF HOUSTON REGARDING SUPPORT OF THE PROVINCE OF BC'S CARIBOU RECOVERY PROGRAM BE RECEIVED.”

CARRIED UNANIMOUSLY

(h) District of Houston – Employer Health Tax Impact on Local Government

R168/2018 “THAT THE LETTER DATED AUGUST 14, 2018 FROM DISTRICT OF HOUSTON REGARDING EMPLOYER HEALTH TAX IMPACT ON LOCAL GOVERNMENT BE RECEIVED.”

CARRIED UNANIMOUSLY

8. Items Removed from the Consent Agenda

(a) Ministry of Environment and Climate Change Strategy – Minister's Order – Liquid Waste Management Plan

It was MOVED and SECONDED:

R169/2018 “THAT THE LETTER DATED AUGUST 17, 2018 FROM MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE STRATEGY REGARDING MINISTER'S ORDER – LIQUID WASTE MANAGEMENT PLAN BE RECEIVED.”

CARRIED UNANIMOUSLY

9. Legislative Reports

(a) Anmore Building Bylaw No. 583-2018

It was MOVED and SECONDED:

R170/2018 “THAT ANMORE BUILDING BYLAW NO. 583-2018 WITH REVISION AS PROVIDED ON TABLE BE READ A FIRST, SECOND AND THIRD TIME, AS AMENDED.”

CARRIED UNANIMOUSLY

10. Unfinished Business

Nil

11. New Business

(a) Award of 2018 Capital Works

It was MOVED and SECONDED:

R171/2018 **“THAT COUNCIL APPROVE THE AWARD OF THE CONTRACT FOR THE 2018 CAPITAL WORKS FOR A TOTAL CONTRACT PRICE OF THREE HUNDRED FIFTY-NINE THOUSAND ONE HUNDRED DOLLARS (\$359,100), INCLUDING GST, TO JACK CEWE LIMITED.”**

CARRIED UNANIMOUSLY

(b) Adopt A Street Program

It was MOVED and SECONDED:

R172/2018 **“THAT COUNCIL RECEIVE THE REPORT DATED AUGUST 23, 2018 FROM THE CHIEF ADMINISTRATIVE OFFICER REGARDING ADOPT-A-STREET PROGRAM AND THE ATTACHMENTS WHICH FORM THE VILLAGE OF ANMORE ADOPT A STREET PROGRAM.”**

CARRIED UNANIMOUSLY

Council requested that lower Sunnyside Road be omitted from the Program Map, due to potential safety concerns as there is no sidewalk on that stretch of road.

(c) Annual Water Quality Report

It was MOVED and SECONDED:

R173/2018 **“TO RECEIVE THE 2017 ANNUAL WATER QUALITY REPORT FOR INFORMATION.”**

CARRIED UNANIMOUSLY

(d) Development Variance Permit No. DVP/48/18 – Bella Terra Investments

It was MOVED and SECONDED:

- R174/2018 **“THAT COUNCIL APPROVE DEVELOPMENT VARIANCE PERMIT NO. 48/18 FOR THE BELLA TERRA DEVELOPMENT, AS RECOMMENDED IN THE REPORT DATED AUGUST 29, 2018.”**

CARRIED UNANIMOUSLY

(e) Light Up Purple for World Mental Health Day

It was MOVED and SECONDED:

- R175/2018 **“THAT COUNCIL PROCLAIMS OCTOBER 10, 2018 AS LIGHT UP PURPLE FOR WORLD MENTAL HEALTH DAY IN THE VILLAGE OF ANMORE.”**

CARRIED UNANIMOUSLY

12. Mayor's Report

Mayor McEwen reported that:

- On August 16, he attended the KFM tour of the business park for the Kwikwetlem First Nation, with local representatives.
- On August 29, he met with the Ministry, fellow Mayors and the Anmore School Trustee at the Trade and Convention Centre regarding preschool spaces and utilization of existing infrastructure.
- On August 30, he and Councillor Weverink viewed The Strand by Townline homes, where the old Port Moody legion was located, and learned what they are doing with providing more affordable housing.
- On September 6, he will attend the 4th Annual Mayor's BBQ at the Port Moody Galleria.
- On September 9, he will be at Ma Murray Day from 12:00 to 5:00 p.m. It should be a great day as a lot of planning has been gone into the event.
- He will attend the UBCM Convention in Whistler next week, and will meet with the Minister of Environment and with BC Hydro while he is there.
- He is getting more concerned about wildfire hazards in the Village due to what is happening throughout the province and the increase in heat and drought over the past two summers. He wants the Village to focus on this issue in the fall.

13. Councillors Reports

Councillor Weverink reported that:

- The Strand block party he attended was very good.
- He is on the Ma Murray Day Organizing Committee, and they held a productive meeting recently. He is looking forward to the event.

- He will attend the UBCM Convention, and he wants to ensure discussions are held regarding ridesharing in Anmore.

Councillor Thiele reported that:

- She and her family are looking forward to Ma Murray Day. It is her kids' favourite day of the year aside from Christmas.
- TransLink is increasing bus service frequency in Anmore from 60 to 30 minutes during the day.
- She thanks the Sasamat Volunteer Fire Department for working diligently through the summer to protect the Village.
- She thanks Anmore residents for being respectful of the burning ban.
- She thanks Christine Baird for actively working with the Village's emergency preparedness file for wildfire response and planning.

14. Chief Administrative Officer's Report

Ms. Halliwell reported that:

- For Ma Murray Day, Ravenswood Drive will be closed and notice will be provided to affected residents.
- There were traffic challenges for Buntzen Lake over the summer, and she will be meeting with BC Hydro at UBCM next week. The Village had two sign boards placed in Port Moody for traffic notification and they will soon be removed. They were found to be unneeded as the Village worked with the City of Port Moody and Metro Vancouver to put out consistent messaging, and will work with those organizations on an approach for next year.
- School is back in session. Coquitlam RCMP did a speed check at Anmore Elementary this morning and they plan to do a speed check at Eagle Mountain Middle tomorrow. Approximately 5% of motorists were found to be speeding, which is low compared to previous years. The Village put in road stenciling on East Road and line painting to help reduce speeding near Eagle Mountain Middle.
- Staff have been working on the Tree Management Bylaw and a draft will be ready to come forward at the September 18, 2018 meeting.
- Nomination period for the election opened at 9:00 a.m. today and will be open until 4:00 p.m. September 14.

15. Information Items

(a) Committees, Commissions and Boards – Minutes

Nil

(b) General Correspondence

- Letter dated August 2, 2018 copied from Trans Mountain Expansion Project to Corporation of Delta regarding confirmation of financial responsibilities of a marine oil spill related to the Trans Mountain Expansion Project

- Letter dated August 8, 2018 from Ted and Leigh Ann Littlewood regarding parking issues

16. Public Question Period

Trevor Mueckel, Alpine Drive, asked how long a sign stays up with the Adopt a Street Program. Staff responded that it will stay up as long as someone continues to fund the service.

17. Adjournment

It was MOVED and SECONDED:

R176/2018

"TO ADJOURN."

CARRIED UNANIMOUSLY

The meeting adjourned at 8:04 p.m.

Certified Correct:

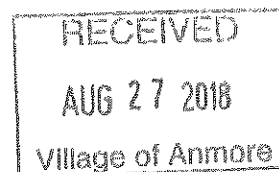
Approved by:

Christine Baird
Manager of Corporate Services

John McEwen
Mayor

August 20, 2018

Ms. Juli Kolby
Chief Administrative Officer
Village of Anmore
2697 Sunnyside Rd.
ANMORE BC V3H 5G9



Dear Ms. Kolby,

RE: Quarterly Report: April 1 – June 30, 2018

I am pleased to provide you with the enclosed documents detailing the complaint files our Office closed for the Village of Anmore between April 1 and June 30, 2018.

Enclosed you will find a detailed report containing the following:

- The number of files our Office closed in the last quarter regarding your organization and the category under which these files were closed.
- A description of our closing categories to assist you in interpreting the data provided.
- If applicable, copies of all closing summaries from investigated files that were closed during the last quarter.
- If applicable, a summary of the topics identified in all complaints that were closed in the last quarter for your organization; this includes both authority-specific topics and general topics for both investigated and non-investigated complaints.

If you have questions about our quarterly reports, or if you would like to sign up for our mailing list to be notified of educational opportunities provided by our Prevention Initiatives Team, please contact us at 250-508-2950 or consult@bcombudsperson.ca.

Yours sincerely,



Jay Chalke
Ombudsperson
Province of British Columbia

Enclosures

1. Enquiries	0
2. Complaints with No Investigation	1
<i>a. Statute barred (FIPPA, Police Act, etc.)</i>	0
<i>b. Not a matter of administration</i>	0
<i>c. Voluntary Referral</i>	1
<i>d. Pre-empted by existing statutory right of appeal, objection or review</i>	0
<i>e. Refused (discretion)</i>	
• More than one year between event and complaint	0
• Insufficient personal interest	0
• Available remedy	0
• Frivolous/vexatious/trivial matter	0
• Can consider without further investigation	0
• No benefit to complainant or person aggrieved	0
• Complaint abandoned	0
• Complaint withdrawn	0
3. Early Resolution Investigations	0
<i>a. Pre-empted by existing statutory right of appeal, objection or review</i>	0
<i>b. Investigation ceased (discretion) - No findings</i>	
• Insufficient personal interest	0
• Available remedy	0
• No benefit to complainant or person aggrieved	0
• Complaint settled	0
4. Complaint Investigations	0
<i>a. Not a matter of administration</i>	0
<i>b. Pre-empted by existing statutory right of appeal, objection or review</i>	0
<i>c. Investigation ceased (discretion) - No findings</i>	
• More than one year between event and complaint	0
• Insufficient personal interest	0
• Available remedy	0
• Frivolous/vexatious/trivial matter	0
• Can consider without further investigation	0
• No benefit to complainant or person aggrieved	0
• Complaint abandoned	0
• Complaint withdrawn	0
• Complaint settled	0

Available remedy

We may decline or discontinue investigation of a complaint where the law or an existing administrative procedure sets out an available process that may provide an adequate remedy for the complaint. This may include review or complaint processes that are established in policy or legislated review or appeal processes with limited grounds that are not considered to be "on the merits" (see "Pre-empted" category above). Before we decline a complaint based on a referral to an available process, we first consider the applicability of that process to the specific issues raised in the complaint as well as whether the complainant has any reasonable basis for not pursuing the referral. Considerations in this regard may include the urgency of the matter or the complainant's capacity to pursue the referral in the circumstances.

Can consider without further investigation

This section is used to discontinue an investigation when, upon consideration of the circumstances and the available evidence, we reach a conclusion that further investigation is not necessary.

Complaint abandoned

We may decline or discontinue investigation of a complaint when the complainant will not respond to our attempts to contact them or where the person refuses to provide appropriate contact information.

Complaint investigations

When we investigate a complaint, we notify the authority being investigated.

This notice includes the essential details of the complaint and the identity of the complainant. Investigations may conclude with a determination that a complaint is not substantiated, or with a negotiated settlement of the complaint, or with public findings and recommendations. We may also exercise discretion to cease investigation for a number of other reasons specified in the *Ombudsperson Act*.

Complaint settled

We may cease investigating a complaint when we have achieved a settlement of the complaint. The *Ombudsperson Act* provides specific authority for the Ombudsperson to consult with authorities to attempt settlement of complaints once an investigation is commenced. When an investigation leads us to conclude that action on the part of the authority is required to resolve the complaint, we try to achieve that resolution by obtaining the voluntary agreement of the authority to settle the complaint. This allows matters to be resolved fairly for the complainant and authority without requiring a formal finding of maladministration.

Complaint withdrawn

We may decline or discontinue investigation of a complaint when the complainant indicates that they do not wish us to proceed with in an investigation. This may be used to close a complaint file when the complainant has achieved a resolution of the matter through their own efforts after filing a complaint with our office.

provision where there are evident difficulties in investigation arising from the delay in the complaint being made to our office.

No benefit to complainant or person aggrieved

We may decline or discontinue investigation of a complaint when we are able to conclude that commencing or continuing an investigation would not benefit the complainant or person aggrieved. This may include circumstances where we are able to conclude based on evidence available before commencing an investigation that the complaint will not be substantiated. It may also include complaints where no corrective action beyond what has already occurred is merited even if investigation may confirm a technical error or other flaw in the administrative process. We may also conclude that there is no benefit to continuing an investigation when all available evidence has been reviewed but is insufficient to support either a determination of fault or error on the part of the public authority that would justify corrective action, or a conclusion that the complaint is not substantiated.

Not a matter of administration

The Ombudsperson has jurisdiction to investigate decisions or recommendations made, acts done or omitted, or procedures used by public authorities. These are referred to as "matters of administration" to distinguish them from the functions of the legislature or the courts. While most complaints about a public authority relate to one of these matters, a small number of complaints are closed on the basis that they do not relate to an identifiable matter of administration.

Not substantiated

When the evidence obtained in a complaint investigation leads us to a clear conclusion that an authority has not acted unfairly with respect to the matter under investigation, we make a finding that the complaint is not substantiated.

Ombudsperson Initiated investigations

The Ombudsperson has the authority to initiate investigations independently from our process for responding to complaints from the public. These investigations may be ceased at the discretion of the Ombudsperson or concluded with formal findings and recommendations.

Pre-empted by existing statutory right of appeal, objection or review

Our jurisdiction to investigate is limited where there is a right of appeal, objection or review on the merits of the case available in respect of the matter complained about. The right itself, as well as the court or tribunal that hears the appeal or objection or conducts the review, must both be established under a statute or regulation. The appeal, objection or review must also be "on the merits" of the case, meaning that processes where the review is limited to errors of law or procedural fairness do not trigger this limitation. As a result the availability of judicial review or internal complaint mechanisms created by policy do not limit our jurisdiction.

Refused/Investigation ceased (discretion)

The Ombudsperson Act sets out a number of circumstances in which we may exercise discretion to either decline to investigate a complaint or discontinue an investigation after it has started.

Notification of change

For the past year, we have sent you enhanced quarterly reports with a summary of the identified topics of complaint for files that were closed during the previous quarter. This data comprises both investigated and non-investigated files. We've recently conducted a comprehensive review of this program, with a view to simplifying the data to ensure it is administratively sustainable, and consistent over time. We have only made minor changes to the summaries below, such as changing "issues tracking" to "complaint topics tracking." Most of the changes that we have made will come into effect in our next quarterly reports. We will provide a more detailed outline of those changes in the next quarterly report. Expect to see some formatting changes, as well as changes to the topics that we track. While we will continue to review our complaint topics tracking on an annual basis, future changes will be limited in scope to ensure that this data has long-term relevance to your organization.

Our complaint topics reports are intended only to provide you with a broad picture of the files we close in our Office. If you would like a more detailed look, please contact our Prevention Initiatives Team: email us consult@bcombudsperson.ca or call us at 250-508-2950.

The tables below summarize all complaint topics we are tracking for your authority and the number of times each topic was reported in relation to all topics reported. In addition to tracking the complaint topics that are specific to your organization, as of October 1, 2017 we also began tracking Administrative Fairness Complaint Topics. We are tracking these topics for all public authorities and have provided you with a summary of your organization's Administrative Fairness Complaint Topics data in the second table below.

Part 1: Complaint Topic Tracking Information **Local Government**

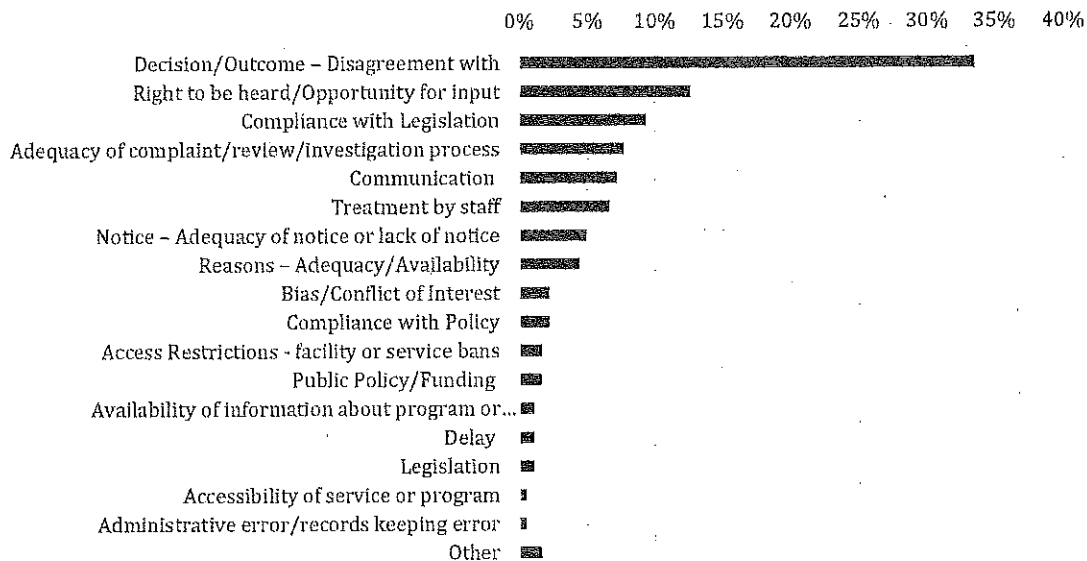
Topic	Number of Times Topic Reported
Bylaw Enforcement	36
Development/Zoning	19
Decision of Council	15
Fees and Charges	10
Consultation	7
Services (e.g., garbage)	7
Building Inspections	4
Employment/Labour Relations Issues	3
Procurement	3
Response to Damages Claim	3
Conflict of Interest	2
Council Member Conduct	2
Official Community Plan	2
Property Taxes	2
Parcel Taxes	1
Advisory Planning Commission	0
Alternative Approval Process	0
Assent Voting	0

Complaint Topics Tracking
April 1 to June 30, 2018

Page 3

Delay	2
Legislation	2
Accessibility of service or program	1
Administrative error/records keeping error	1
Other	3
Total	182

Administrative Fairness Topics:
Local Government



Additional Information:

- Topics listed above were identified through complaint files closed by our Office between April 1 to June 30, 2018.
- We have tracked all topics raised by each complaint file. This includes all investigated complaints, both substantiated and not substantiated. It also includes complaints we did not investigate.
- This information is provided on a confidential basis for quality assurance purposes. It is not intended to be used to identify persons who have reported a complaint to the Office of the Ombudsperson. Section 16 of the *Ombudsperson Act* protects persons making a complaint under the *Act*.
- If you would like to receive more detailed information about complaints we receive or provide any feedback, please contact our office.



27 August 2018

The Honourable Selina Robinson
Minister of Municipal Affairs and Housing
Room 310, Parliament Buildings
Victoria, B.C. V8V 1X4

Dear Minister Robinson,

RE: Modernization of Utility Taxation

At the August 7, 2018 Regular Meeting, District of Ucluelet Council passed the following motion:

THAT Council approve recommendation 1, 2 and 3 of report item, "Modernization of Utility Taxation" which states:

1. *THAT Council submit the following late resolution for consideration at the 2018 UBCM Convention:*

WHEREAS Section 644(2) of the Local Government Act is intended to define the requirements of a 1% annual tax on utilities carrying on business in a municipality;

AND WHEREAS utility company services have expanded beyond electrical light, electric power, telephone, water, gas or television services to include internet and cellular services:

THEREFORE BE IT RESOLVED that the Province initiates the modernization of Section 644(2) of the Local Government Act to include internet and cellular services;

2. *THAT Council send a letter to the Minister of Municipal Affairs & Housing; and*
3. *THAT Council send a letter to all UBCM member municipalities encouraging them to write to the Minister of Municipal Affairs & Housing.*

This motion has been submitted as a late resolution to the 2018 UBCM Convention and we look forward to discussing with you then.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. St. Jacques'.

Dianne St. Jacques
Mayor, District of Ucluelet

Enc; Modernization of Utility Taxation Report

District of Ucluelet . Life on the Edge®

200 Main Street

P.O. Box 999

Ucluelet, BC . V0R 3A0

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f. 250.726.7335

Ucluelet.ca

Info@Ucluelet.ca

16 100%
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COUNCILLOR REPORT TO COUNCIL

Council Meeting: AUGUST 7, 2018

500 Matterson Drive, Ucluelet, BC V0R 3A0

FROM: COUNCILLOR MAYCO NOEL

FILE No: 0410-20

SUBJECT: MODERNIZATION OF UTILITY TAXATION

REPORT No: 18-80

ATTACHMENT(S): SECTION 644 - LOCAL GOVERNMENT ACT

MOTION:

1. **THAT** Council submit the following late resolution for consideration at the 2018 UBCM Convention:

WHEREAS Section 644(2) of the Local Government Act is intended to define the requirements of a 1% annual tax on utilities carrying on business in a municipality;

AND WHEREAS utility company services have expanded beyond electrical light, electric power, telephone, water, gas or television services to include internet and cellular services:

THEREFORE BE IT RESOLVED that the Province initiates the modernization of Section 644(2) of the Local Government Act to include internet and cellular services;
2. **THAT** Council send a letter to the Minister of Municipal Affairs & Housing; and
3. **THAT** Council send a letter to all UBCM member municipalities encouraging them to write to the Minister of Municipal Affairs & Housing.

PURPOSE:

The purpose of this report is to seek Council's support in the District of Ucluelet advocating for the modernization of the 1% utility tax rate in the *Local Government Act* (LGA) to include internet and cellular services.

BACKGROUND:

Section 644 of the LGA provides for the taxation of utility companies (attached as Appendix A). Sub-section 2 requires municipalities to tax utility companies at a rate of 1% on telephone or television services.

Staff have confirmed with a Telus representative that the 1% utility tax applies only to telephone land lines. Many households have replaced their land line telephone with a cellular phone, so while the utility company continues to offer a calling service it is not required to forward 1% of their revenue to municipalities.

Like the telephone, television subscriptions have also decreased due to the internet and online tv streaming services. Internet services are delivered to households using cable and wire – both of which are included in the LGA's definition of a utility company's "specified improvements". However, the legislation is completely silent on the revenue from internet services which are still largely provided by "traditional" telephone and television service providers.

The updating of the LGA to reflect advancements in technology and changes to utility companies' revenue streams is overdue. I would like Council to support my motion to send a resolution for modernizing the 1% utility tax rate to the 2018 UBCM Convention as well as sending a letter to all BC municipalities. Local municipalities are always struggling to find new revenue streams and it appears this is one revenue stream that has been forgotten.

Respectfully submitted: Mayco Noel, Councillor

APPENDIX A - Local Government Act (Excerpt)

Taxation of utility company property

644 (1) In this section:

"specified improvement" means an improvement of a utility company that is

- (a) a pole line, cable, tower, pole, wire, transformer, equipment, machinery, exchange equipment, main, pipe line or structure, other than a building,
- (b) erected or placed in, on or affixed to
 - (i) land in a municipality, or
 - (ii) a building, fixture or other structure in or on land in a municipality, and
- (c) used solely in the municipality or a group of adjoining municipalities by the company for local generation, transmission, distribution, manufacture or transportation of electricity, telephonic communication, water, gas or closed circuit television;

"utility company" means an electric light, electric power, telephone, water, gas or closed circuit television company.

(2) A utility company that is carrying on business in a municipality in which it has specified improvements must be taxed annually by the municipality at the rate of 1% as follows:

- (a) for a telephone or closed circuit television company, on the gross rentals received in the 2nd preceding year from its subscribers for telephone or television service located in the municipality, including telephone interexchange tolls for calls between exchanges in the municipality;
- (b) for any other utility company, on the amount received in the 2nd preceding year by the company for electric light, electric power, water or gas consumed in the municipality, other than amounts received for
 - (i) light, power or water supplied for resale,
 - (ii) gas supplied for the operation of motor vehicles fuelled by natural gas, or

- (iii) gas supplied to any gas utility company, other than a government corporation as defined in the *Financial Administration Act* or a subsidiary of a government corporation.
- (3) Tax under subsection (2) is subject to the same remedies and penalties as taxes under Part 7 [*Municipal Revenue*] of the *Community Charter*.
- (4) A utility company liable to tax under subsection (2) must
 - (a) by October 31 in each year, for the purpose of determining the tax payable in the next year, file with the collector a return of the revenue referred to in that subsection that was received in the preceding year, and
 - (b) pay the tax imposed under subsection (2) in accordance with Division 10 [*Property Tax Due Dates and Tax Notices*] of Part 7 of the *Community Charter*.
- (5) As an exception to subsections (2) and (4), in the case of a company to which this section applies for the first time in the municipality,
 - (a) the company must pay the tax imposed under subsection (2) in the 2nd year of its operation on the basis of revenue earned in the first year, and
 - (b) the report of revenue earned in the first year must be filed before May 8 of the 2nd year of operation.
- (6) Tax imposed on a utility company under subsection (2) is in place of tax that might otherwise be imposed on the specified improvements under section 197 (1) (a) [*municipal property taxes*] of the *Community Charter*, and taxes may not be imposed under that provision on the specified improvements although they may be imposed on those improvements under section 197 (1) (b) [*property taxes for other bodies*] of the *Community Charter*.
- (7) For certainty, all land and improvements of a utility company in a municipality, other than specified improvements, are subject to tax under section 197 [*annual property tax bylaw*] of the *Community Charter*.

Office of the Chair
Tel. 604 432-6215 Fax 604 451-6614

File: CR-12-01
Ref: RD 2018 Jul 27

AUG 28 2018

Mayor John McEwen and Council
Village of Anmore
2697 Sunnyside Road
RR1
Anmore, BC V3H 5G9
VIA EMAIL: john.mcewen@anmore.com

Dear Mayor McEwen and Council:

Re: Commercial Cannabis Production on Agricultural Land

This letter is to inform you of Metro Vancouver's concerns and proposed solutions regarding commercial cannabis production on agricultural land.

At its July 27, 2018 regular meeting, the Board of Directors of the Metro Vancouver Regional District (Metro Vancouver) adopted the following resolutions:

That the MVRD Board write to the Prime Minister of Canada, Premier Horgan of British Columbia, the BC Agriculture Minister and other ministries, BC Environment Office, The Agricultural Land Commission, Canadian Environment Assessment Agency and Local MLAs and Councils requesting:

- a) that all government agencies protect farmland and preserve the productive capacity of land in the Agricultural Land Reserve for uses related to growth of agriculture and food production;*
- b) strengthening the governance of the Agricultural Land Commission and the Agricultural Land Reserve to increase public transparency and public confidence to ensure that land use regulations and land use decisions are preserving agricultural land and encouraging food production and ranching; and*
- c) that cannabis production be prohibited on agricultural land within Metro Vancouver.*

These resolutions were passed after a full discussion about the impacts of cannabis production facilities on community well-being and agricultural land use in British Columbia's largest metropolitan region. Board members also expressed an urgency to address the issues emerging from the new Cannabis Act including the discharge of air contaminants, the increasing cost and competition for agricultural land and future food security for residents.

26320085

METRO VANCOUVER BOARD CONCERNS

Both Metro Vancouver and member municipalities have received numerous odour complaints arising from cannabis production facilities. Significant odours are being emitted from greenhouses previously constructed for food crops and retrofitted for cannabis production. These buildings are not designed and constructed to collect and treat air contaminants. Metro Vancouver Board members expressed concern regarding the ability of existing regulatory programs to prevent the escape of odours from cannabis production as required under the federal *Cannabis Regulations* (SOR/2018-144). Furthermore, the provincial *Farm Practices Protection (Right to Farm) Act*, intended to prevent nuisance complaints, may have implications on the ability of adjacent neighbours and local governments to address persistent and pungent smells arising from the cannabis production operations on agricultural land.

Of equal concern, is the impact on agricultural land values when cannabis operations have unprecedented profitability margins compared to other agricultural products. This situation increases the demand and property values of agricultural land, which makes food production less economically viable in relation to other products. Increasing barriers for food-producing farmers to buy or access agricultural land also puts the region's long term food security at risk.

The Province of British Columbia deserves recognition for responding quickly to concern about the threat of cannabis production operations on soil based agriculture through an amendment to the *Agricultural Land Reserve Use, Subdivision and Procedure Regulation*. Limiting the construction of new structures with concrete foundations for cannabis production is a good first step, but does not fully address issues raised by local governments. The new regulation exempts existing greenhouses being retrofitted for cannabis production, and these have some of the most egregious odour problems and lack the control technologies necessary to manage air contaminants. Also, the regulatory change increases demand for established greenhouses, which will likely displace food crops for lucrative cannabis products. Local food security will be more at risk if the demand for cannabis increases with the expansion of export markets.

The resolutions passed by the Metro Vancouver Board reaffirm support for the use of the Agricultural Land Reserve for food production as directed in the region's growth strategy, *Metro Vancouver 2040: Shaping our Future*. Our members also reiterated their support for strengthening the role of the Agricultural Land Commission to preserve agricultural land and the viability of farming. The prohibition of cannabis production on agricultural land is deemed an appropriate solution considering the legislative constraints and the threat to future food production in this region.

PROPOSED SOLUTIONS

Metro Vancouver Board members also provided some constructive solutions to the current situation. Board members requested enhanced enforcement of existing federal regulations during facility licensing and operation to prevent the escape of odours from cannabis production facilities, which would support regional regulatory efforts authorized under the BC *Environmental Management Act*. Another option is to encourage cannabis production in rural areas of the province that often struggle to create economic development opportunities for their communities, instead of enabling these production facilities in the Lower Mainland where public interface issues are significant and where

competition for agricultural and industrial lands is high. While cannabis production on industrial land is perceived to be more easily enclosed and regulated, it is not desired within some municipalities because of the limited supply of industrial land in the region.

Lastly, we ask that you consider the context of the Metro Vancouver region, which is home to over half of British Columbia's population and some of the most productive agricultural lands in Canada. All governments must consider the long term impacts of new developments and new markets on the feasibility of agricultural land to provide food security for residents far into the future. This means protecting farmland for food production even when other more profitable ventures compete for prime agricultural land.

Thank you for your attention on this important matter.

Yours sincerely,

A handwritten signature in black ink, appearing to be 'GM', with a stylized flourish extending to the right.

Greg Moore
Chair, Metro Vancouver Board

GM/CM/NC/td

26320085

aKd Resource

5124 Brenton Page Road
Ladysmith, BC V9G 1L6
250.245.8734
aKdResource@shaw.ca

August 29, 2018

Mayor John McEwen
and Members of Council
Village of Anmore
2697 Sunnyside Rd
Anmore BC V3H 5G9

RECEIVED

SEP 05 2018

VILLAGE OF
ANMORE 

Dear Mayor McEwen and Council,

Review of the Auditor General for Local Government Act and Office

The legislation that created the Auditor General for Local Government (AGLG) in 2012 requires a five-year review of the *Auditor General for Local Government Act* (the "Act") and the functioning of the office of the Auditor General.

A Working Group has been established by the Ministry of Municipal Affairs and Housing to provide oversight and input into the review. It is made up of representatives from Union of British Columbia Municipalities (UBCM) and Local Government Management Association as well as Ministry staff. The terms of reference are *to conduct a review of how the Office and the Act have achieved their stated objectives to date and determine options for the future.*

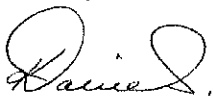
I have been retained by the Ministry of Municipal Affairs and Housing to conduct the review. I have over 25 years of experience as the Chief Administrative Officer (CAO) of both municipal and regional governments in Alberta and British Columbia. I was the CAO for the Regional District of Nanaimo for 13 years and, most recently, retired as the CAO of the Capital Regional District where I worked for seven years.

During the week of September 17 to 21, 2018, the following surveys will be sent out electronically:

- For those local governments that have had a performance audit completed by the AGLG prior to the 2015 UBCM survey, you will be asked for information regarding your experience implementing the recommendations from the audit.
- For those local governments that have had a performance audit completed after 2015, you will be asked for information regarding your experience implementing the recommendations from the audit. You will also receive the 2015 UBCM survey from CivicInfo BC to complete.
- For those that have not had a performance audit, the survey will seek to understand the overall impact and value of the AGLG to your organization.

I greatly appreciate your participation in this review as the more we hear from local governments the more relevant the final recommendations to the Minister can be. If you have any questions once you receive the survey, please contact me at kapow2@shaw.ca.

Sincerely,



Kelly Daniels

cc: Juli Halliwell, Chief Administrative Officer



Council of Senior Citizens'
Organizations of B.C.

www.cosco.bc.ca

September 1, 2018

Dear Mayor and Council,

**Re: Observation of the UN International Day of the Older Person -
October 1st.**

Established in 1950, the Council of Senior Citizens' Organization (COSCO) is an umbrella, volunteer run organization made up of many seniors' organizations and individual associate members. Registered under the Societies Act since 1981, COSCO has grown and now represents approximately 80,000 seniors in BC.

Our mandate is to promote the well-being of seniors and their families, advocating for policies that allow seniors to remain active, independent, and fully engaged in the life of our province. The organization is non-partisan, but politically active, advocating for seniors' needs no matter who is in power. Our motto is "Plan with Seniors not for them".

COSCO invites you, the civic leaders to help celebrate the

International Day of Older Persons (IDOP) 2018

Theme: "Celebrating Older Human Rights Champions"

This is a fitting theme for this year's observation of the IDOP, as 2018 marks the 70th anniversary of the Universal Declaration of Human Rights. Many of the seniors, who have championed these rights over the decades since this declaration, were born around the time of its adoption by the UN. The IDOP 2018 provides the opportunity to acknowledge these seniors contributions re. the issues of human rights and to acknowledge that seniors too should enjoy equally these rights and fundamental freedoms.

Two ways that we ask you to consider to celebrate the IDOP are:

- 1) Publicly proclaim your support of the IDOP 2018
- 2) Prominently display the UN IDOP flag for October 1st 2018

We are pleased that this year, for the first time, the Province of British Columbia has proclaimed and declared that October 1st 2018 shall be known as "International Day of Older Persons" (See attachment). We would like the BC municipal, township and district councils to follow suit. For those councils that are able, declarations are preferred over proclamations as they are ongoing. Please let us know if your council has already made a declaration in the past and if you will be making either an IDOP proclamation or declaration for IDOP 2018.

The UN IDQP flag can be purchased through the Seniors' Voice website <https://seniorsvoice.org> for a cost of \$85 and then can be displayed annually for October 1st. Again, please let us know if you already have a flag or if you plan to buy and display a flag this year and in subsequent years.

Seniors' Voice also has an event page on its website that it is encouraging organizations and people to use to post events held across Canada to celebrate IDQP 2018.

If there is any question about this request, please contact Agnes Jackman at cell# 604-376-5188; 821 20th Street, New Westminster, BC, V3M 4W7; or agnes.jackman@gmail.com.

Thank you for your consideration.

Yours truly,



Agnes Jackman, Board Member, COSCO, for

Gudrun Langolf, President, COSCO
(604) 266-7199
pres@coscobe.org



Canada
Province of British Columbia
A Proclamation

ELIZABETH THE SECOND, by the Grace of God, of the United Kingdom,
Canada and Her other Realms and Territories, Queen, Head of the
Commonwealth, Defender of the Faith

To all to whom these presents shall come — Greeting

WHEREAS the United Nations International Day of Older Persons celebrates the importance of the 70th anniversary of the Universal Declaration of Human Rights, and reaffirms the commitment to promoting the full and equal enjoyment of all human rights and fundamental freedoms by older persons, and

WHEREAS the 2018 theme of the International Day of Older Persons is "Celebrating Older Human Rights Champions", and

WHEREAS older human rights champions today were born around the time of the adoption of the Universal Declaration of Human Rights in 1948, and

WHEREAS growing older does not diminish a person's inherent dignity and fundamental rights, and

WHEREAS more than 40 years after the adoption of the Universal Declaration of Human Rights, issues of human rights for older persons were taken up in 1991 in the formulation of the United Nations Principles for Older Persons, which provided guidance in the areas of independence, participation, care, self-fulfilment and dignity, and

WHEREAS in 2002, governments for the first time agreed to link questions of ageing to other frameworks for social and economic development and human rights, and

WHEREAS the interdependence between older persons' social integration and the full enjoyment of their human rights cannot be ignored, as the degree to which older persons are socially integrated will directly affect their dignity and quality of life;

NOW KNOW YE THAT, We do by these presents proclaim and declare that October 1, 2018 shall be known as

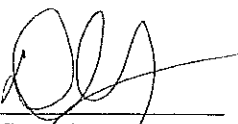
"International Day of Older Persons"

in the Province of British Columbia.

IN TESTIMONY WHEREOF, We have caused these Our Letters to be made Patent and the Great Seal of Our Province of British Columbia to be hereunto affixed.

WITNESS, The Honourable Janet Austin, Lieutenant Governor of Our Province of British Columbia, in Our City of Victoria, in Our Province, this thirteenth day of August, two thousand eighteen and in the sixty-seventh year of Our Reign.

BY COMMAND.



Attorney General
(counter signature for the Great Seal)



Lieutenant Governor



VILLAGE OF ANMORE

REPORT TO COUNCIL

Date: August 29, 2018
Submitted by: Jason Smith, Manager of Development Services
Subject: Draft Tree Management Bylaw

Purpose / Introduction

The purpose of this report is introduce Council to changes that staff are proposing to the Tree Management Bylaw and to request that the draft Bylaw be referred to the Environment Committee for further work and discussion with staff.

Recommended Options

That Council refer the draft Tree Management Bylaw to the Environment Committee for final comment and direct staff to return to Council with a revised draft for initial readings.

Background

The Environment Committee has made numerous comments and suggestions for improving the Tree Management Bylaw and Council has requested that staff address those comments.

Discussion

Village staff have reviewed the Tree Management Bylaw in conjunction with the comments received from the Environment Committee. In response to those comments and after reflecting on the operational challenges of implementing the Tree Management Bylaw, staff are proposing a series of changes as part of a draft bylaw (attached).

The following substantive changes to the Tree Management Bylaw are being proposed:

- Certified Tree Risk Assessor – the use of a certified tree risk assessor is being proposed to ensure that a qualified person is making the determination on whether a tree is a dangerous tree.
- Removed native vegetation from counting towards 20% tree coverage that is required in the Tree Management Bylaw. This addresses an issue where applicants were cutting trees down and replacing the lost coverage with vegetation (such as salal) rather than trees.

Report/Recommendation to Council

Draft Tree Management Bylaw

August 29, 2018

- The threshold for possible geotechnical review has been lowered from 30% to 20% to ensure any tree cutting on steeper slopes is conducted in a safe manner.
- The requirements for replacement trees has been updated requirements for replacement trees to ensure that they are replaced in a timely manner.
- The undertaking or security for replacement trees has been increased to ensure every effort is made to replace trees that are cut.
- Included consideration of bird nesting requirements to be part of application.

Staff would like to bring the proposed changes to the Environment Committee for further discussion to ensure that their comments are effectively captured. There is a balance that needs to be struck between preserving trees and the semi-rural character of Anmore with an owners ability to utilize their property in a manner that suits them.

Other Options

The following options are provided for Council's consideration:

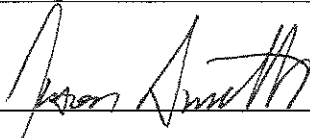
1. That Council refer the draft Tree Management Bylaw to the Environment Committee for final comment and direct staff to return to Council with a revised draft for initial readings
- Or
2. That Council provide further direction to staff on how to proceed with updates to the Tree Management Bylaw.

Financial Implications

There are no financial implications for any of the options presented.

Attachments:

Draft Tree Management Bylaw

Prepared by:

Jason Smith Manager of Development Services

This is a consolidated copy of the following bylaws:

1. Anmore Tree Management Bylaw No. 430-2007
2. Anmore Tree Management Amendment Bylaw No. 469-2009
3. Anmore Tree Management Amendment Bylaw No. 478-2009

This consolidation is prepared for convenience only. Individual copies of the above noted bylaws may be obtained by contacting the Village Hall.

VILLAGE OF ANMORE

BYLAW NO. 430, 2007

A bylaw to manage the cutting and retention of trees on private property

- Section 1: Citation
- Section 2: Definitions
- Section 3: Measurement
- Section 4: Prohibition
- Section 5: General Tree Cutting
- Section 6: Tree Cutting on Lot Sizes of 0.4 Ha. (1 Acre) or Less
- Section 7: Tree Cutting on Lot Sizes of More than 0.4 Ha. (1 Acre)
- Section 8: Tree Cutting on Land to be Subdivided 1.2 Ha. (3 Acres) and Greater
- Section 9: Trees within *Riparian Areas* or a *Wetland*
- Section 10: Removal of *Dangerous Trees*
- Section 11: Tree Removal on Steep Land
- Section 12: Replacement Trees
- Section 13: Application for Tree Cutting Permits
- Section 14: Permit Conditions

Section 15: Professional Reports

Section 16: Reconsideration of a Decision by the Administrator

Section 17: Municipal Works

Section 18: Entry on Property

Section 19: Offence and Penalty

Schedule A: Application for a Tree Permit

Schedule B: Tree Permit Application Fees

Schedule C: Sample Tree Permit

VILLAGE OF ANMORE

BYLAW NO. 430, 2007

A bylaw to manage the cutting and retention of trees on private property

WHEREAS the *Community Charter* authorizes a local government to regulate the cutting and removal of trees in a Municipality;

AND WHEREAS the vision of the Village of Anmore as articulated in the Official Community Plan is to retain the semi rural character of the area;

AND WHEREAS the Village of Anmore considers it in the public interest to avoid clear cutting of land and to provide for the preservation and protection of trees, and the regulation of their cutting and removal;

AND WHEREAS the Village of Anmore is desirous of instituting a permit system as a means of regulating the cutting and removal of trees;

NOW THEREFORE the Municipal Council of the Village of Anmore in open meeting assembled enacts as follows:

1) Citation

This bylaw may be cited for all purposes as "Anmore Tree Management Bylaw No. 430, 2007".

2) Definitions

In this Bylaw:

"Administrator" means the Chief Administrative Officer of the Village of Anmore or his / her authorized designate

"Certified Arborist" means a person holding a current certification of "certified arborist" issued by the International Society of Arboriculture

"Certified Tree Risk Assesor" means a Certified Arborist who has also completed the Tree Risk Assessment Course and passed the Tree Risk Assessment Exam under the authority of the International Society of Arboriculture (ISA)

"Council" means the Council of the Village of Anmore

"Cut Down" means to kill or remove a tree by any means and includes the topping of a tree and the removal of any branch or trunk of a tree having a

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AMENDED BYLAW NO. 469-2009¶
"Committee" means a Committee comprised of the Chief Administrative Officer, the Manager of Public Works and the Municipal Planner. The Committee shall be responsible for the issuance of all permits.¶

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diameter of more than 10 cm (3.9") but does not include the normal pruning of a tree

"Dangerous Tree" means a tree, identified in writing by a Certified Tree Risk Assesor, in such condition that there is a substantial likelihood that all or part of the tree will fail, resulting in the risk of personal injury or property damage;

"Diameter" means the diameter of the tree measured 1.4 m (4.5') above the ground

"Hedge" means a row of trees or shrubs that have been specifically planted closely together so that they form an unbroken line that serves as a solid barrier separating one space from another

"Lot" means the smallest unit as shown on the records of the Land Title Office in which land is held and includes a strata lot created pursuant to the *Strata Title Act*

"Municipality" means the Village of Anmore

"Native Vegetation" means a combination of native trees, groundcover, shrubs and herbaceous plants

"Owner" means the registered owner in fee simple of a lot and the trees growing on it, or a person authorized by the owner or owners in writing

"Permit" means a permit issued pursuant to this Bylaw allowing the permit holder to cut down one or more trees;

"Qualified Environmental Professional" means an applied scientist or technologist registered and in good standing with an appropriate professional organization constituted under a statute of the Province of British Columbia, providing services under that organization's code of ethics, and acting within the individual's area of expertise, and may include a *certified arborist, professional forester*, or a registered professional biologist

"Professional Forester" means a registered member or holder of a special permit granted under Section 14(1) of the *Foresters Act*.

"Real Property" means land, with or without improvements so affixed to the land as to make them in fact and law a part of it.

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¶

(a) . which is dead, dying, severely damaged, unstable or severely leaning and in danger of falling; ¶

¶

which is interfering with, or is in such close proximity to utility wires as to be a danger; ¶

¶

having a trunk or root system which is interfering with, blocking or damaging municipal infrastructure, a septic system, building foundation or other major improvement; or ¶

¶

which is blocking a *watercourse* or reducing its drainage capacity.

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Deleted: "Deciduous Tree" means a seasonal leaf-shedding tree including Western Birch, Trembling Aspen, Big Leaf Maple, Black Cottonwood, Red Alder and other similar species¶

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"Riparian Area" means an area adjacent to a *watercourse* that links aquatic to terrestrial ecosystems, the size of which is determined on the basis of an assessment report provided by a *qualified environmental professional*

"Security" means either cash or an irrevocable letter of credit, in a form acceptable to the Municipality, which is provided to the Municipality to guarantee performance of requirements of this Bylaw

"Tree" means any living, erect, woody plant which is 20 cm (7.8") or more in diameter measured 1.4 m (4.5') above the ground, and for the purpose of this Bylaw does not include a *hedge*.

"Watercourse" means a natural drainage course or source of water, whether usually containing water or not, including a lake, pond, river, stream, creek, spring, ravine, swamp and gulch; and also includes a man-made depression with well-defined banks and a bed 0.6 m (2') or more below the surrounding land serving to give direction to a current of water at least 6 months of the year or having a drainage area of 0.32 square km (0.12 square miles) or more, any of which may be enclosed or in a conduit, but excludes roadside ditches, drainage ditches and irrigation works.

"Wetland" means land that is inundated or saturated by surface or groundwater at a frequency or duration sufficient to support, and that under normal conditions does support, vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, fens, estuaries, and similar areas that are not part of the active floodplain of a stream

3. Prohibition

- (1) No person shall cut down, or cause suffer or permit any *tree* to be cut down, except in accordance with a valid *permit* issued under this Bylaw.

4. Measurement

- (1) The *diameter* of a *tree* having multiple trunks at 1.4 m (4.5') above the ground shall be the sum of:

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Moved down [1]: 3. Measurement

(1) . The *diameter* of a *tree* having multiple trunks at 1.4 m (4.5') above the ground shall be the sum of: ¶

(a) . 100% of the *diameter* of the largest trunk; and¶

(b) . 60% of the *diameter* of each additional trunk. ¶

(2) . The location of a *tree* shall be measured at the point at which the trunk of the *tree* meets the ground. ¶

Deleted: 4. Prohibition

(1) . No person shall cut down or damage, or cause, suffer or permit a *tree* to be cut down or damaged within the Municipality, except where permitted by and carried out in accordance with the terms of this Bylaw. ¶

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Deleted: General Tree Cutting

Deleted: (2) . Despite subsection (1), a *permit* is not required to *cut down* any *tree* where the following circumstances apply: ¶

¶ where, in the opinion of the owner, a *tree* must be *cut down* on an emergency basis because it has been severely damaged by natural causes and poses an imminent danger of falling and injuring persons or property; ¶

¶ (b) . where, in the opinion of the owner, a *tree* must be *cut down* on an emergency basis because it poses an imminent danger of causing damage to municipal infrastructure, a septic field, a building foundation or other major improvement; or¶

¶ (c) . where, in any 12-month period, no more than two (2) *trees* are *cut down* on a *lot* with a *lot* size of 0.4 ha. (1 acre) or less, plus 1 additional *tree* for every additional 0.4 ha. (1 acre) of *lot* area.

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(a) 100% of the diameter of the largest trunk; and

(b) 60% of the diameter of each additional trunk.

(2) The location of a tree shall be measured at the point at which the trunk of the tree meets the ground.

5. Tree Cutting on Lot Sizes of 0.4 Ha (1 Acre) or Less

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(1) Where a *permit* is required to *cut down trees* on a *lot* with a *lot* size of 0.4 ha. (1 acre) or less, such *permit* will only be issued if the applicant demonstrates to the satisfaction of the Municipality that not less than 20% of the *lot* will be covered with existing or replanted *trees* following the proposed *tree cutting*.

Deleted: in combination with *native vegetation*

(2) Where the replanting of trees is necessary to meet the minimum coverage requirements of Section 5.1, an applicant shall, as a condition of a *permit*, replant three (3) *trees*, in accordance with the requirements of Section 11 in combination with *native vegetation*, for every *tree* that is *cut down*, until the minimum coverage requirement is met.

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(3) Notwithstanding Section 5 (2), in the case where less than 20% of the *lot* is covered with existing *trees* and *native vegetation* prior to removal, for every *tree* that is *cut down* or removed, three (3) *trees* in combination with *native vegetation* shall be replanted subject to the requirements of Section 11.

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6. Tree Cutting on Lots Size of More than 0.4 Ha (1 Acre)

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(1) Subject to Section 6 (2), where a *permit* is required to *cut down trees* on a *lot* with a *lot* size greater than 0.4 ha. (1 acre), such *permit* will only be issued if the applicant demonstrates to the satisfaction of the Municipality that not less than 20% of the *lot* will be covered with existing or replanted *trees*.

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(2) The 20% minimum coverage requirement established in Section 6 (1) shall increase by 5% for every 0.4 ha (1 acre) that a *lot* exceeds 0.4 ha (1 acre), to a maximum coverage requirement of 75% of the *lot*.

(3) Where the replanting of trees is necessary to meet the minimum coverage requirements of Section 6, an applicant shall, as a condition of *permit*, replant three (3) *trees*, in accordance with the requirements of Section 11 in combination with *native vegetation*, for

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every *tree* that is *cut down*, until the minimum coverage requirement is met.

7. Tree Cutting on Land to be Subdivided.

- (1) Every applicant for approval of a subdivision, after the Municipality's Approving Officer has issued a Preliminary Layout Review (PLR) letter and prior to final approval of the proposed subdivision, submit to the Village for approval a *Tree and Natural Vegetation Management Plan* relating to the proposed subdivision, prepared at the applicant's cost by a *Qualified Environmental Professional*.
- (2) The *Tree and Natural Vegetation Management Plan* referred to in Section 7 (1) shall identify:
 - (a) tree retention and replanting areas such that each lot created by the subdivision shall have not less than 20% of its area covered by *trees*; and
 - (b) the methods in which the *Tree and Natural Vegetation Management Plan* will be implemented including tree protection during the construction stage and tree management post construction.

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8. Trees within *Riparian Areas* or a *Wetland*

- (1) In this section, a "tree" means any living, erect, woody plant.
- (2) Except as permitted by Section 4 (2) (a) or a permit issued under Section 9, no person shall *cut down a tree* growing within a *riparian area* or a *wetland*.
- (3) The *Administrator* shall issue a permit to *cut down a tree* within a *riparian area* or a *wetland* where:
 - (a) the tree is a *dangerous tree*; or
 - (b) it is necessary to *cut down the tree* to carry out works in or about a *watercourse* or a *wetland* provided that the said works have been authorized by a permit and approved pursuant to *any relevant* federal and provincial requirements.

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9. Removal of *Dangerous Trees*

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- (1) For certainty, unless otherwise exempted under this Bylaw, a permit is required to *cut down a dangerous tree* but the permit fee prescribed in Schedule "B" is waived.
- (2) Every person making application to *cut down a dangerous tree* must submit, at the time of such application, a report from a *Certified Tree Assessor*, confirming that each *tree to be cut down is a dangerous tree* and outlining the reasons for its removal.
- (3) No person who cuts down a dangerous tree shall remove the stumps or roots of the *tree* without the specific written permission of the Municipality.
- (4) Every *owner* shall cause all *trees, hedges, bushes or shrubs* on a *lot* to be trimmed, removed or *cut down* if the Municipality considers that it is:
 - (a) a *dangerous tree*;
 - (b) a hazard to the safety of persons;
 - (c) likely to damage public property; or
 - (d) a nuisance and seriously inconveniencing the public.
- (5) The Municipality may serve upon the *owner* notice that the Municipality will be entitled to take the action required under Section 9 (4) at the expense of the person given the notice, if the *owner* does not take the required action within 14 days of service of the notice.
- (6) If the *owner* given the notice does not take the required action within 14 days of service, the Municipality, by its employees or others, may enter the *real property*, and take the action specified in the notice at the expense of the owner given the notice.
- (7) If the *owner* does not pay the Municipality's costs of carrying out the action specified in the notice on or before December 31 in the year in which the costs were incurred, the costs shall be added to and form part of the taxes payable on the *real property* as taxes in arrear.

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10. Tree Removal on Steep Land

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- (1) In cases where *trees* are proposed to be removed on land with a slope greater than 20%, irrespective of *lot area*, the *Administrator* may require the preparation of a report from a qualified professional geotechnical or hydrological engineer certifying that the proposed

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tree removal will not create a danger from erosion, flooding, or landslip, and should the report from the qualified professional engineer recommend the construction of works necessary to prevent erosion, flooding or landslip, no *permit* shall be issued unless the applicant provides to the Municipality security in the amount of 150% of the cost of the works as estimated by the engineer.

- (2) The applicant shall be responsible for and, at their own expense, execute all work required by the qualified professional engineer in his report in order to prevent erosion, flooding, or landslip or to ensure the stability of the slope.
- (3) Upon completion of the required works and certification by the qualified professional engineer that the works satisfy their requirements to prevent erosion, flooding, or landslip, or to maintain the stability of the slope, the security will be released.
- (4) The works shall be completed within the period specified on the *permit*. Should the works not be completed within the stated period or not be completed according to the qualified professional engineer's recommendations, the Municipality may use the security to complete the works at the applicant's expense.
- (5) Where the Municipality is required to complete the works and the amount of security provided is insufficient, the applicant shall pay the balance forthwith to the Municipality upon receipt of the invoice.

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¶
(b) . for every tree cut down that was a deciduous tree, replant a deciduous tree with a diameter of not less than 7 centimeters; ¶

11. Replacement Trees

- (1) Where tree replacement is either proposed by an applicant or required by this Bylaw or by the *Administrator* as a condition of issuance of a *permit*, the owner or applicant shall within a time period prescribed by the *Administrator*, plant two (2) replacement trees for every tree removed in accordance with the following conditions:

(a) Each replacement tree must be planted within one month of the cutting down or removal of the original tree, except as otherwise authorized by the *Administrator*.

(b) Notwithstanding the definition of tree, each replacement tree must be a minimum height of 4 metres if coniferous or a minimum of 7 centimetres in diameter if deciduous, unless otherwise authorized by the *Administrator*.

(c) water, fertilize and maintain the replacement tree in accordance with sound horticultural practice; and

- (d) provide the Municipality with an undertaking of \$1,000 per replacement tree to a maximum amount of \$10,000 per parcel in order to ensure the replacement trees are maintained in good health and to replace any replacement trees should any not survive during the initial three (3) year period. The undertaking will be returned to the owner of the property after 3 years and confirmation by the Administrator that all of the replacement trees have survived. If the replacement trees are not in good health or have not survived, the undertaking shall be forfeit and retained by the Village.

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- (2) Where any person *cuts down a tree* in contravention of this Bylaw or a *permit* issued pursuant to this Bylaw, that person shall replant five (3) *trees* for every *tree* unlawfully removed in accordance with recommendations contained in the report of a *Qualified Environmental Professional* prepared for the Municipality at the expense of the *owner*, and shall:

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- (a) replant the *trees* within a time period prescribed by the *Administrator*;

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- (b) water, fertilize and maintain the replacement *trees* in accordance with sound horticultural practice; and

- (c) provide the Municipality with an undertaking of \$1000 per replacement to ensure the replacement trees are maintained in good health and to replace any replacement trees should any not survive during the initial three (3) year period. The undertaking will be returned to the owner of the property after 3 years and confirmation by the Administrator that all of the replacement trees have survived. If the replacement trees are not in good health or have not survived, the undertaking shall be forfeit and retained by the Village.

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12. Application for Tree Cutting Permits

- (1) Every application for a *permit* shall be made to the *Administrator* and shall be generally in the form and contain the information as set out in Schedule A of this Bylaw.

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- (2) The fee for a *permit* shall be determined as generally set out in Schedule B of this Bylaw and shall be paid upon application for a *permit*.

- (3) In considering an application for a *permit*, the *Administrator* will consider and assess the following and other factors relating to the proposed application:

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- compliance with the requirements of this Bylaw,
- the need for replacement trees,
- the need for drainage, noise or dust control measures,
- significant topographic and hydrographic features and other site information;
- compliance with Provincial bird nesting regulations;
- risk of contamination of watercourses, and
- risk of flooding, erosion and landslip,

and may, in relation to any of the aforementioned factors, request that the applicant provide one or more reports, at the applicant's expense, from a *Qualified Environmental Professional* in consideration of the *permit* application.

- (4) No application for a *permit* shall be complete unless the application contains all applicable information required in the application form and otherwise under this Bylaw, and the prescribed fee has been paid.
- (5) A *permit* is valid for the period specified on the *permit* that shall not exceed 90 days.

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Annual allowance to cut down 2 trees per year per parcel

- (6) A *permit to cut down trees* shall be in the form as set in Schedule C.
13. Permit Conditions

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- (1) The *Administrator* may, as a condition of issuance of a *permit*, require, among other things, that:

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- (a) replacement *trees* be planted as specified in Section 11; or
- (b) stumps remain in place in order to assist in the prevention of erosion in areas where trees were cut that are over 20% slope.

- (2) The *Administrator* may suspend, revoke or cancel a *permit* if he or she considers that work or activity being carried out is in violation of any of the terms, restrictions, requirements, or conditions of the permit or any provision of this Bylaw, or that injury or damage, whether or not intentional, has occurred or is likely to occur to the remaining trees, vegetation or to adjacent properties.

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14. Professional Reports

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Where the *Administrator* considers that there is a risk of flooding, erosion, landslip or contamination of a *watercourse*, the *Administrator* may require an applicant for a *permit* to submit, at the applicant's expense, a report prepared by a *Qualified Environmental Professional* or a qualified professional geotechnical or hydrological engineer.

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15. Municipal Works

Nothing contained in this Bylaw shall apply to a *tree* growing on a highway, park, right of way or easement belonging to the Municipality nor to any public utility works where the works are carried out by or under the authority of the Municipality.

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¶
(1) . The applicant for a *permit* that is subject to a decision of the *Committee* may request that Council reconsider the decision or any conditions attached to the decision. ¶

¶
(2) . A request for reconsideration under this section shall: ¶

¶
(a) . be made in writing; and¶

¶
(b) . be submitted to the *Committee* within 30 days of the date of the *Committee's* decision. ¶

¶
(3) . Following receipt of an application for reconsideration under this section, the *Administrator* shall notify the applicant of the time, date and place that the application will be placed before the Council. ¶

¶
(4) . Notification from the *Administrator* in accordance with subsection (3) shall: ¶

¶
(a) . state that the reconsideration by the Council at the time, date and place specified will include a reasonable opportunity to be heard or make written submission on the matter either in person, or through an agent, or both; and ¶

¶
(b) . be mailed or otherwise delivered to the applicant at least 10 days before the date set for reconsideration by the Council. ¶

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16. Inspection and Authority to Enter Upon a Property

(1) Every officer and employee of the Village is authorized to enter onto any property at all reasonable times and upon reasonable notice in order to ascertain whether the requirements of this bylaw are being met and regulations observed.

(2) No person may obstruct or attempt to obstruct any person from enforcing this bylaw, including any person enforcing this bylaw by inspected a property pursuant to section (1) of this bylaw.

(3) Where the *Administrator* considers that a contravention to this Bylaw, or any permit, the *Administrator* may notify the owner in writing of the contravention and require that measures be taken to remedy the contravention within a certain time period.

(4) A person to whom a notice is delivered under subsection 16(3) must fully comply with any requirements stated in the notice, within the time period stated therein, or if not stated, within 30 days of the date of the notice.

17. Offence and Penalty

(1) Any person who contravenes any provision of this Bylaw by doing, causing, suffering or permitting any act which it forbids or by failing to carry out any action which is required to be done, is guilty of an offence and is liable on summary conviction to a fine of not less than \$1,000 and not more than \$10,000, and where the offence is a continuing one, each day that the offence is continued, shall constitute a separate offence.

- (2) Without limiting the generality of Section 17 (1), any person who cuts down a tree in violation of this Bylaw is guilty of an offence and, in addition to any other penalty imposed under this Bylaw, is liable on summary conviction to a fine of \$2000 for each *tree* unlawfully cut down, for a first offence, and for each subsequent offence, to a fine of not less than \$5000.00 for each *tree* unlawfully cut down.
- (3) Any person who contravenes a condition of a *permit* issued under this Bylaw by doing, causing, suffering or permitting any act which it forbids or by failing to carry out an action which is required to be done, commits an offence and is liable on summary conviction to a fine of not less than \$2000.00 for each contravention, for a first offence, and for each subsequent offence, to a fine of not less than \$5000.00 for each contravention.
- (4) It shall be an offence under this Bylaw for any owner or occupier of land or any person acting under the authority of any *owner* or occupier to hire, permit or suffer another person to cut down or damage a *tree*, or do any other act prohibited by this Bylaw.

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READ A FIRST TIME this XXX day of October, 2018.

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READ A SECOND TIME this XXX day of October, 2018.

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READ A THIRD TIME this XXX day of March, 2018.

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RECONSIDERED AND FINALLY ADOPTED this XXX day of March, 2018.

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Mayor

Manager of Corporate Services

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SCHEDULE A**VILLAGE OF ANMORE****Application for a Tree Permit**

1. I, _____ of _____ make application to cut down and remove those trees located at _____ and legally described as _____ identified and shown on the sketch of the property attached to this application.
2. Attached and forming part of this application is an accurate plan of the property drawn to a scale of _____ correctly showing:
 - a) the location, species, and diameter of the trees proposed for removal;
 - b) the location of any watercourses, wetlands, or steep slopes; and
 - c) a report from a Certified Arborist, Professional Forester, or Registered Professional Biologist that confirms that not less than 20% of the lot will be covered with existing or replanted *trees* in combination with *native vegetation*, and increasing 5% for every 0.4 ha (1 acre) above a 0.4 ha (1 acre) lot, including the submission of a Replanting Plan if applicable.
3. Enclosed is a cheque payable to the Village of Anmore in the amount of \$500.00 in accordance with the requirement of Schedule B of the Bylaw.

Dated the _____ day of _____, 200__.

Signature of Owner

NOTE: Where the Applicant is not the registered owner, the Application will not be accepted unless the Village receives a signed letter from the registered owner authorizing the Applicant to apply for the Permit and acknowledging that the registered owner will be responsible for compliance with all of the provisions of the Tree Management Bylaw.

AMENDED BY BYLAW NO. 469-2009

SCHEDULE B

TREE PERMIT APPLICATION FEES

Tree Permit: \$500.00

SCHEDULE C**VILLAGE OF ANMORE****Sample Tree Permit**

Tree Permit No. 200__ - ____

1. This Permit is issued pursuant to Village of Anmore Tree Management Bylaw No, 430, 2007 and applies to the following land:

Civic Address: _____

Legal Description: _____

2. This Permit authorizes the cutting and removal of only the trees identified in Schedule 1 of this Permit, subject to the following conditions:

a) _____;

b) _____; and

c) _____.

3. Any tree authorized to be cut or removed by this Permit shall only be cut or removed in strict compliance with the provisions of Village of Anmore Tree Management Bylaw No, 430, 2007.

Dated the _____ day of _____, 200__.

Administrator

I, _____, certify that I shall be responsible for the removal of trees to be in strict compliance with the Village of Anmore Tree Management Bylaw No. 430, 2007.

Registered Owner_____
Date

ANMORE BUILDING BYLAW NO. 583-2018

A bylaw to regulate the construction of buildings and
other structures in the Village of Anmore
in accordance with the British Columbia Building Code

Adopted: DRAFT as at SEPTEMBER 4, 2018

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PART 1 – INTRODUCTORY PROVISIONS

1.1 **WHEREAS** the Province of British Columbia has enacted the *British Columbia Building Code* to govern standards in respect of the construction, alteration, repair and demolition of buildings and structures in municipalities and regional districts in the Province;

AND WHEREAS the Province of British Columbia, by enactment, has authorized Council to regulate the construction, alteration, repair or demolition of buildings and structures by bylaw, for the health, safety and protection of persons and property;

NOW THEREFORE the Municipal Council of the Village of Anmore in open meeting assembled enacts the following.

1.2 This Bylaw may be cited for all purposes as "Anmore Building Bylaw No. 583-2018".

1.3 The headings in this Bylaw have been inserted for reference only. Text in *italics* are defined terms.

1.4 Words and phrases used in this Bylaw have the same meaning as those defined in subsection article 1.4.1. of Division A of the *Building Code*.

PART 2 – DEFINITIONS

2.1 In this Bylaw:

agent	means a person acting under the authority of the owner and who has completed and submitted an <i>Owner Authorization Form</i> ;
building	means a structure used or intended for supporting or sheltering any use or occupancy, either of a temporary or permanent nature;
<i>Building Code</i>	means the <i>British Columbia Building Code</i> as adopted by the Minister by regulation under the <i>Building Act</i> , SBC 2015 c. 2;
<i>Building Official</i>	means the person designated by the Village as the Building Inspector or other person designated by the Village under the <i>Building Act</i> ;
building permit	means a permit approved and issued by the Village in a prescribed form to allow for construction to occur;
building review	means a limited review by the <i>Building Official</i> of representative elements of a structure under construction;

<i>building value</i>	means the current value of all construction related to a development, including, but not limited to, site preparation, labour and materials, documentation preparation, materials testing, consulting and management fees, contractor's profit and overhead, sales taxes, and insurance;
<i>construction</i>	means any activity related to the construction or demolition of a structure and includes the placement or removal of fill on a parcel of land;
<i>Council</i>	means the municipal council of the Village of Anmore;
<i>Letters of Assurance</i>	means the schedules as specified in the <i>Building Code</i> which outline the core responsibilities of the registered professionals;
<i>occupancy</i>	means the use or intended use of a <i>building</i> or part thereof for the shelter or support of persons, animals or property;
<i>occupancy permit</i>	means the permission or authorization in writing by the <i>Building Official</i> to occupy a <i>building</i> ;
<i>owner</i>	means the registered owner of a parcel as filed in the Land Title Office;
<i>Owner Authorization Form</i>	means a Village prescribed form signed and dated by an owner, authorizing an agent to act on their behalf;
<i>parcel</i>	means land designated as a separate and distinct parcel of land on a registered subdivision plan or description filed in the records of the Land Title Office;
<i>permit</i>	permit means a <i>building permit</i> and/or <i>trade permit</i> approved and issued by the Village;
<i>Part 3 building (complex building)</i>	means a class of <i>building</i> as defined by the <i>Building Code</i> as being other than a <i>Part 9 building</i> , and one that typically requires engagement of registered professionals for architectural, structural, mechanical, plumbing, electrical, and geotechnical elements of the construction;
<i>Part 9 building (simple building)</i>	means a class of <i>building</i> as defined by the <i>Building Code</i> which requires only selective engagement of registered professionals;
<i>registered professional</i>	means an architect or professional engineer registered in British Columbia with their respective professional association;
<i>structure</i>	means construction of any kind, whether affixed to, supported by or sunken into land, including, but not limited to, buildings, platforms, elevated tanks, poles, towers and antennae, swimming pools, tents and fabric structures,

	decks over 600 mm above finished grade, retaining walls and other structures over 1.2 m in height;
trade permit	means a plumbing permit, sprinkler permit, or lawn irrigation permit;
Village	means the Village of Anmore;
Zoning Bylaw	means the Anmore Zoning Bylaw.

PART 3 – SEVERABILITY

- 3.1 If any portion of this Bylaw is for any reason held invalid by a court of competent jurisdiction, such decision shall not affect the validity of the remaining portions of the Bylaw.

PART 4 – PURPOSE

- 4.1 This Bylaw has been enacted for the purpose of regulating construction within the Village. The activities undertaken by or on behalf of the Village pursuant to this Bylaw are for the purpose of promoting the health, safety and protection of persons and property.
- 4.2 The activities undertaken by or on behalf of the Village pursuant to this Bylaw are not intended to include, nor does the purpose of this Bylaw extend to:
- (a) the protection of persons, owners or constructors from economic loss;
 - (b) the assumption by the Village or the *Building Official* of any responsibility for ensuring that any person, owner, or any employees, constructors or designers retained by the owner, build or construct in compliance with the *Building Code*, the requirements of this Bylaw or other applicable enactments;
 - (c) providing any person a warranty of design, materials or workmanship with respect to any *building* for which a *building permit* or *occupancy permit* is issued;
 - (d) providing a warranty or assurance that construction undertaken pursuant to permits issued by the Village is free from latent, or any, defects; and
 - (e) providing a warranty or assurance that any design or construction undertaken pursuant to permits issued by the Village complies with the *Building Code*, the requirements of this Bylaw or other applicable enactments.

PART 5 – SCOPE AND APPLICATION

- 5.1 This Bylaw applies to the design, construction and occupancy of new and existing buildings or structures in the Village.

PART 6 – GENERAL PROHIBITIONS

- 6.1 No person shall commence or continue any construction unless the *Building Official* has issued a permit for the work.
- 6.2 No person shall carry out any construction that is at variance with the permit or approved plans unless that variance has been approved in writing by the *Building Official*.
- 6.3 No person shall submit false or misleading information to the *Building Official* in relation to any application for a permit or any construction undertaken pursuant to this Bylaw.
- 6.4 No person shall, unless authorized in writing by the *Building Official*, alter, cover, remove or in any way tamper with any notice, permit or certificate posted upon or affixed to a building, pursuant to this Bylaw.
- 6.5 No person shall occupy or use any building unless a valid occupancy permit has been issued by the *Building Official* nor shall any person occupy or use any building contrary to the terms of any occupancy permit issued, or any notice given, by the *Building Official*.
- 6.6 No person shall obstruct the *Building Official* or another person authorized by the Village to carry out an inspection or other administration of this Bylaw.

PART 7 – THE BUILDING OFFICIAL

- 7.1 The provisions under this Part of the Bylaw are administrative duties only and create no obligation to enforce or administer the provisions of this Bylaw.
- 7.2 The *Building Official* may approve the issuance of building permits and trade permits if satisfied that the work to which any permit relates is in compliance with the *Building Code* and this Bylaw.
- 7.3 The *Building Official*:
 - (a) may enter any lot or unoccupied building at any reasonable time for the purpose of determining that the provisions of this Bylaw and other Village bylaws have been fulfilled;
 - (b) may enter an occupied dwelling upon providing written notice to the occupant 24 hours in advance of entry; and
 - (c) shall carry identification confirming his/her status as the *Building Official*.
- 7.4 The *Building Official* may refuse to process a permit application where the application is voided under section 12.4 of this Bylaw or where the submitted documentation

does not demonstrate compliance with the *Building Code* or any other applicable enactment.

7.5 The *Building Official* may suspend or revoke a permit for one or more of the following reasons:

- (a) violation of any of the conditions under which the permit was issued;
- (b) violation of any provisions of this or any other bylaw;
- (c) violation of any provisions of the *Building Code*;
- (d) when information or circumstances are later found to exist which would have been cause for refusing such permit had they been known at the time the building permit was issued; or
- (e) if any person has prevented or obstructed, or sought or attempted to prevent or obstruct, the entry of the *Building Official* onto the lot or into the building, when in the course of carrying out his or her duties in relation to the administration of this Bylaw.

7.6 The *Building Official* may order the correction:

- (a) of any construction that is in contravention of the approved permit and plans, of this Bylaw or another Village bylaw;
- (b) of any construction that is not in compliance with the *Building Code*; or
- (c) of an unsafe condition.

7.7 The *Building Official* may post a Stop Work Order where work is proceeding in contravention of either the *Building Code* or this Bylaw.

7.8 Where a person occupies a building or part of a building in contravention of this Bylaw, the *Building Official* may post a No Occupancy Notice.

7.9 Where, due to particular site conditions, size or complexity of a development or aspects of developments, the *Building Official* may request professional certification from a registered professional that the plans, the construction and supporting documents comply with the *Building Code* and other enactments respecting safety.

7.10 Where the *Building Official* considers that the construction would be on land which is subject to or is likely subject to flooding, mud or debris flows, erosion, land slip, rock falls, subsidence or avalanche, the *Building Official* may request a report from a professional engineer or geoscientist that verifies whether or not the land may be used safely for the intended use. If the registered professional determines that the land may be used safely for the intended use, and in accordance with conditions specified in the report, the permit may only be issued if:

- (a) the owner covenants with the Village to use the land only in the manner certified for safe use and to reimburse the Village for any expenses that may be incurred by the Village as a result of a breach of the covenant; and
- (b) the covenant is registered on title.

PART 8 – THE OWNER

- 8.1 It is the sole responsibility of the owner in collaboration with their contractor(s) to carry out the construction in accordance with the permit and approved plans, the *Building Code*, this Bylaw and other applicable enactments.
- 8.2 The owner shall:
- (a) obtain required permits prior to the commencement of construction activity;
 - (b) pay the applicable permit fees and damage deposits as specified in the Anmore Fees and Charges Bylaw;
 - (c) retain the services of registered professionals when required by the *Building Code* and this Bylaw;
 - (d) post and maintain the *building permit* placard in a visible location on site with the address and *building permit* number shown;
 - (e) have the approved *building permit* plans on site and available to the *Building Official*;
 - (f) allow the *Building Official* to enter any lot, *building* or premises at any reasonable time, for the purpose of administering this Bylaw;
 - (g) call for field reviews at stages specified in Part 18 of this Bylaw and retain records of those field reviews on site;
 - (h) provide on-site washroom facilities;
 - (i) notify the Village when a *registered professional* is no longer engaged.
- 8.3 The owner shall ensure that Village property and services abutting the owner's lot are free from debris, dirt and damage throughout the construction period as well as maintain a clean building site.
- 8.4 The owner to whom a *building permit* is issued shall be responsible for the cost of repair of any damage to Village property that occurs as a result of the construction. Where the cost of any repair work to Village property or services exceed the deposit amount held by the Village, the owner shall submit to the Village an amount equal to the excess costs incurred by the Village in repairing the damages.
- 8.5 The owner of a lot on which a Stop Work Order has been posted, and every other person, shall cease all construction activities on the lot immediately. No work shall be done on the lot unless agreed to by the *Building Official* in writing, as necessary to remove hazards or to mitigate undue damage arising from exposure to the elements. Work on the site, in general, may only resume once compliance has been achieved in respect of all applicable provisions of this Bylaw and the *Building Official* has rescinded in writing the Stop Work Order.

PART 9 – REGISTERED PROFESSIONALS

- 9.1 Letters of Assurance shall be submitted to the Village in accordance with provisions of the *Building Code* and this Bylaw:

- 9.2 Where Letters of Assurance have been submitted in support of a *building permit* application, the *Building Official* will rely exclusively upon the certification of the registered professional that the design and field reviews of the construction comply with the *Building Code* and other applicable enactments. The *building permit* signed by the owner will constitute written notice of acceptance of this reliance of professional certification.
- 9.3 When a registered professional provides Letters of Assurance in support of a *building permit*, the professional shall also provide written evidence of professional liability insurance to the *Building Official*, in the amount specified in the Anmore Fees and Charges Bylaw.
- 9.4 Notwithstanding Part 18 of this Bylaw neither the granting of a *building permit*, or the acceptance of the designs submitted, or any *building reviews* completed by the *Building Official*, shall in any way relieve the owner and the registered professionals of full responsibility for ensuring that the construction be in substantial compliance with the requirements of the *Building Code*, this Bylaw and other applicable enactments.
- 9.5 The Village may request third party certification or peer review of professional certification where, in the opinion of the *Building Official*, this review is warranted. Costs associated with the third party review shall be borne by the owner and/or the registered professional.

PART 10 – THE CONTRACTOR

- 10.1 A contractor and any sub-trades that they employ shall:
- (a) hold a valid Village business licence;
 - (b) carry insurance in an amount specified by the Village; and
 - (c) carry out the work in accordance with the permits and approved plans, and in accordance with the *Building Code* and Village bylaws.

PART 11 – REQUIRED PERMITS

- 11.1 Permits must be obtained whenever construction regulated under this Bylaw is to be undertaken.
- 11.2 An owner shall obtain a *building permit*:
- (a) prior to carrying out any construction or demolition;
 - (b) prior to moving a *building*;
 - (c) prior to installing mechanical equipment or carrying out construction related to mechanical equipment; or
 - (d) prior to excavation and placement and/or removal of soil.

11.3 An owner shall obtain a trade permit where:

- (a) plumbing work is undertaken as regulated by the *BC Plumbing Code*, including cross-connection control;
- (b) fire sprinkler work is undertaken as regulated by the *Building Code*; or
- (c) lawn irrigation work is undertaken.

11.4 An owner shall obtain an occupancy permit prior to occupancy of a new or substantially renovated *building*.

PART 12 – BUILDING PERMIT APPLICATIONS

12.1 An application for a *building permit* shall include the following:

- (a) a completed *building permit* application form;
- (b) 3 sets of architectural and structural design drawings, at a legible scale, plus a digital record copy. In the case of a *Part 3 building permit* application, additional plans are required to include mechanical, plumbing, electrical and geotechnical disciplines;
- (c) a copy of the Title Certificate for the lot on which the construction is proposed, and be dated no more than 30 days prior to the date of application;
- (d) a topographical survey completed by a BC Land Surveyor and dated within 6 months of building permit application. Information to include parcel boundaries, road access, driveway crossings, covenant and rights of way information, improvements, contours and or spot elevations, and other topographical details including swales, ditches, creeks and trees;
- (e) a completed Owner Authorization Form, where an agent is making an application on behalf of an owner;
- (f) a copy of all covenants registered against the property, where the Village is a named party;
- (g) Letters of Assurance from a professional engineer, for structural and geotechnical components;
- (h) evidence of minimum liability insurance coverage for registered professionals, as specified in the Anmore Fees and Charges Bylaw;
- (i) a copy of sewerage record filing or satisfactory evidence of an existing sewerage system connection;
- (j) confirmation of warranty and licencing coverage for the builder in accordance with the Home Owner Protection Act;
- (k) confirmation of an existing and suitable potable water service connection;
- (l) an erosion and sediment control plan with certification from a Qualified Environmental Professional (QEP);
- (m) the application fee as specified in the Anmore Fees and Charges Bylaw.

- 12.2 Where the *Building Official* considers that the site conditions, size or complexity of a development, or other aspect of a development so warrants, the *Building Official* may require that a registered professional be engaged and provide Letters of Assurance.
- 12.3 The *Building Official* may waive the requirement to provide any of the submission requirements where such documentation is not necessary for the application under consideration.
- 12.4 A building permit application shall be voided and the plan-processing portion of the permit fee forfeited when the permit cannot be issued within 180 days of the date of building permit application.

PART 13 – BUILDING PERMITS - GENERAL

- 13.1 The *Building Official* shall issue a building permit when:
- (a) a completed building permit application, including all required supporting documentation has been received and approved;
 - (b) the information submitted as part of the building permit application adequately demonstrates that the proposed work will substantially conform with the *Building Code*, this Bylaw and other applicable enactments;
 - (c) all applicable fees and securities have been paid.
- 13.2 The Village may retain the services of a third party registered professional to complete plan review and/or inspections as required.
- 13.3 Except for a demolition permit, which is valid for a period of thirty days, a building permit shall be valid for a period of 24 months from the date of issuance.
- 13.4 Notwithstanding section 13.3 of this Bylaw, a building permit will lapse and the rights of the owner under the permit shall terminate if the building foundation is not poured within six months from the date of issuance of the permit.
- 13.5 The *Building Official* may extend the validity of a building permit for a period of 6 months upon payment of the extension fee, as set out in the Anmore Fees and Charges Bylaw.
- 13.6 The *Building Official* may issue a building permit for a portion of a building before the documentation for the entire building has been accepted, provided sufficient information has been provided to the Village to demonstrate to the *Building Official* that the portion of the building accepted for construction substantially complies with the *Building Code*, this Bylaw and other applicable enactments, and the permit fee applicable to that portion of the building has been paid. Notwithstanding the issuance of said permit, the requirements of this Bylaw apply to the remainder of the building as if a permit for any other portion of the building had not been issued.

- 13.7 A building permit shall not be issued under this Bylaw if a building or other structure, the use of which does not conform to the provisions of the Zoning Bylaw, is damaged or destroyed to the extent of 75% or more of its value above its foundations as determined by the Building Official, and it must not be repaired or reconstructed, except for a conforming use in accordance with the Zoning Bylaw, in which case a permit may be issued for the repair or reconstruction that is a conforming use in accordance with the Zoning Bylaw.
- 13.8 Separate building permits are required for multiple buildings on a parcel.

PART 14 - TRADE PERMITS

- 14.1 An application for a plumbing permit shall be made by a trade certified plumber and shall include:
- (a) a completed application form;
 - (b) fees as specified in the Anmore Fees and Charges Bylaw; and
 - (c) evidence of an active Anmore business licence.
- 14.2 An application for a sprinkler permit shall include:
- (a) a completed application form;
 - (b) plans and calculations to show compliance with the applicable National Fire Protection Association standards;
 - (c) Letter of Assurance from a registered professional; and
 - (d) fees as specified in the Anmore Fees and Charges Bylaw.
- 14.3 An application for a lawn irrigation permit shall include:
- (a) a completed application form; and
 - (b) a cross-connection control device to protect the potable water supply.

PART 15 – FEES, DEPOSITS AND PENALTIES

- 15.1 Permit and field review fees, deposits, security and liability insurance coverage amounts shall be paid and/or provided prior to the issuance of a permit as stipulated in the Anmore Fees and Charges Bylaw.
- 15.2 Building permit fees are calculated based on the building value determined by the Building Official. Where an owner disputes the valuation completed by the Building Official, the owner may retain the services of a registered quantity surveyor to complete an alternate building value, which may be used to determine fees.
- 15.3 When an application is cancelled, the plans and related documents submitted to the Village with the application may be destroyed.

- 15.4 A portion of the building permit fees may be refunded when a valid permit is surrendered and cancelled before any construction begins, provided:
- (a) the refund shall be not more than 50% of the original permit fee; and
 - (b) where construction has begun, no refund shall be made.
- 15.5 For each stage of construction, as set out in Part 18 of this Bylaw, where more than two building reviews by the Building Official are necessary, a rescheduling fee shall be paid for each additional building review, as per the Anmore Fees and Charges Bylaw.
- 15.6 Every person who commences construction without first obtaining a permit as required by this Bylaw, shall, in addition to the normal permit fee payable, pay an additional charge equal to 100% of the permit fee.
- 15.7 Following completion of construction, the amount of the damage deposit not used by the Village for repairs to Village property or services shall be returned to the party from whom the damage deposit was received.
- 15.8 Fees relating to a Stop Work Order shall be paid prior to the release of the Stop Work Order.
- 15.9 Fees relating to any plan amendment shall be paid prior to construction.

PART 16 - OFF-SITE WORKS

- 16.1 All off site work related to the construction shall be pre-approved by the Village and shall be completed in accordance with good engineering practice and with the Anmore Works and Services Bylaw.
- 16.2 Contractors operating on Village property must carry minimum insurance levels, as specified in the Anmore Works and Services Bylaw.
- 16.3 All work on Village property shall be completed by the Village unless otherwise authorized.
- 16.4 Any unfinished or substandard work or damages to municipal property may be rectified and/or completed by the Village at the expense of the owner. Where the cost of any work carried out by the Village exceeds the deposit amount held by the Village, the owner shall submit to the Village an amount equal to the excess costs incurred by the Village in carrying out the work;
- 16.5 All off site work is to be completed prior to the issuance of an occupancy permit or final inspection.

PART 17 – DRAINAGE AND FILL CONDITIONS

- 17.1 Where the *Building Official* designates that a given lot must have a zero increase in the rate of storm water run-off for any development, a professional engineer shall design and carry out field reviews of the construction as it relates to necessary on-site facilities and/or detention, in order to maintain a zero increase in the rate of run-off and provide a professional assurance that a zero increase in the rate of run-off will be achieved.
- 17.2 Where fill is placed upon a lot for any reason, the owner shall construct drainage controls to prevent an increase in the discharge of storm water run-off onto adjacent properties. Any fill used must be clean and free of building debris and be deposited in accordance with all Village bylaws.

PART 18 – CONSTRUCTION

- 18.1 A preconstruction site meeting is required prior to the issuance of a building permit to confirm the installation of tree barriers and that environmental and sediment control measures are in place, and to complete a municipal infrastructure assessment.
- 18.2 Except for a Part 3 building, the *Building Official's* acceptance of the following stages of construction is required before commencement of the subsequent stage:
- (a) excavation, but prior to the placement of formwork;
 - (b) forms for the footings or foundation walls, but prior to the placement of concrete;
 - (c) damp proofing or water proofing, but prior to concealment
 - (d) perimeter foundation drainage, storm drainage and below grade drain, waste and vent (DWV) piping, but prior to backfilling;
 - (e) site services, to include water, sewer and storm installation;
 - (f) preparation of the subgrade, but prior to pouring the concrete floor slab;
 - (g) rough plumbing of building sprinkler and lawn irrigation installation;
 - (h) rough grade, surface drainage and retaining walls, but prior to framing;
 - (i) framing, sheathing, exterior doors, windows and roof membrane completed, including the installation of any fire stopping, bracing, chimney and duct work construction, rough wiring, gas venting and rough plumbing, but before installation of the insulation or the application of an interior or exterior finish which would conceal such work;
 - (j) insulation and vapour barrier applied, but prior to any interior or exterior finish applied that would conceal the insulation and vapour barrier; and
 - (k) final plumbing, sprinkler installation and lot grading;
 - (l) final building when the building is substantially complete and ready for occupancy, but before occupancy of any part of the building; and
 - (m) final public works and project completion.
- 18.3 The owner shall give at least one business day notice to the Village when requesting that the *Building Official* attend the site. The *Building Official* will endeavor to complete building reviews as scheduled, but the Village shall not be under any

obligation to attend on a specified day. No aspect of the work shall be concealed until the *Building Official* has accepted that aspect of the work in writing.

- 18.4 Where a registered professional provides *Letters of Assurance* in accordance with this Bylaw and the *Building Code*, the Village shall rely exclusively on field reviews undertaken by the registered professional as assurance that the design and construction of the components of the drawings and supporting documents prepared by the registered professional in support of the application for the permit, substantially comply with the *Building Code* and other applicable enactments.
- 18.5 The *Building Official* may attend the site from time to time to observe the progress of the construction and to monitor the field reviews completed by a registered professional.
- 18.6 Changes to the approved plans must be approved in writing by the *Building Official* prior to construction.

PART 19 – OCCUPANCY PERMITS

- 19.1 No person shall use or occupy a building or part of a building until an occupancy permit has been issued by the Village.
- 19.2 At the discretion of the *Building Official*, a provisional occupancy permit may be issued for a maximum period of 60 days where the work authorized by the permit is substantially complete and there are no life or fire safety issues. A bond shall be paid to the Village based on the value of the outstanding work. The bond shall be refunded to the owner upon satisfactory completion of the outstanding work.

PART 20 – DEMOLITION

- 20.1 A person seeking a building permit for demolition must submit the following information to the *Building Official*:
- (a) completion of a building permit application;
 - (b) payment of the applicable fees and securities as required by the *Anmore Fees and Charges Bylaw*;
 - (c) payment for utility service disconnections (if applicable); and
 - (d) evidence of registration with *Worksafe BC* as a demolition contractor.
- 20.2 Unless a building permit has been issued for new construction, the owner must ensure that:
- (a) the site is regraded;
 - (b) measures are implemented to prevent water accumulation or erosion; and
 - (c) there are no life safety hazards.

PART 21 – RETAINING STRUCTURES

- 21.1 An owner shall obtain a building permit for the construction or alteration of retaining structures where:
- (a) the vertical height is greater than 1.22 m, as measured from grade to top of the wall; or
 - (b) tiered retaining structures are spaced less than twice the vertical height of the immediate lower retaining structure.
- 21.2 Prior to the issuance of a building permit, sealed engineering plans and Letters of Assurance prepared by a registered professional must be submitted to the Building Official.

PART 22 – SWIMMING POOLS

- 22.1 An owner must obtain a building permit for the construction of a swimming pool, and shall provide the following documentation/information:
- (a) a site plan showing the pool location relative to the property lot lines and buildings;
 - (b) sealed engineering plans with Letters of Assurance prepared by a registered professional;
 - (c) details of water supply, drainage and backflow prevention.
- 22.2 Effluent from the pool must drain to a dedicated rock pit.
- 22.3 All pools require the construction of fencing that completely surround the swimming pool with a minimum height of 1.5 m and will not allow a spherical object of 100 mm to pass through. The fence shall include self-closing and self-latching gates, buildings or other structures. Latches shall be located 900mm above grade.

PART 23 – MOVING A BUILDING

- 23.1 Except for new manufactured housing, a building is not permitted to be moved without first obtaining a building permit.
- 23.2 A building is not permitted to be moved into the Village without first obtaining approval by resolution of Council:

PART 24 – SEDIMENT AND EROSION CONTROL

- 24.1 Prior to the issuance of a building permit and any land clearing, building or construction activity:
- (a) sediment and erosion control (ESC) measures must be installed;

- (b) an ESC plan, as specified in the Anmore Erosion and Sediment Control Bylaw, must be submitted and accepted by the Village; and
- (c) a letter of supervision shall be submitted by a qualified professional as specified in the provincial Riparian Area Regulation.

PART 25 – BC ENERGY STEP CODE

- 25.1 Owners may achieve a higher energy standard than that specified in the *Building Code* by electing to comply with the BC Energy Step Code.

PART 26 – BUILDING ADDRESSING

- 26.1 Every owner or occupier of a *parcel* must place a permanent civic address in a conspicuous place on the property, and be clearly visible from the street.
- 26.2 The *Building Official*, at his discretion may renumber or alter the assigned numbers in respect of any *building* on any *parcel*, including those already in existence.
- 26.3 The *Building Official* may, on the issuance of a building permit, assign a house number related to the *building* authorized by the permit.
- 26.4 Prior to the start of construction, after obtaining a building permit, the owner shall post the civic address at a conspicuous place on the site.

PART 27 – CLIMATIC DATA

- 27.1 Refer to Schedule A for climatic data values.

PART 28 – ENFORCEMENT

- 28.1 Any person who:
- (a) contravenes, violates or fails to comply with any provision of this Bylaw;
 - (b) fails or neglects to do anything required under this Bylaw; or
 - (c) permits, suffers or allows an action or thing to be done in contravention of this Bylaw, or of any permit, notice or order issued under this Bylaw, commits an offence, and where the offence is a continuing one, each day that the offence is continued constitutes a separate offence.
- 28.2 Upon conviction of an offence under this Bylaw, the person who committed the offence shall be liable to a fine of up to ten thousand dollars (\$10,000); and shall be liable on summary conviction to the penalties prescribed in the Offence Act.

PART 29 – EFFECTIVE DATE

29.1 Anmore Building and Plumbing Code Administration Bylaw No. 381-2004 and all amendments thereto are hereby repealed on adoption of this Bylaw.

29.2 This Bylaw comes into force and effect on the date of adoption.

READ a first time the day of

READ a second time the day of

READ a third time the day of

ADOPTED the day of

MAYOR

MANAGER OF CORPORATE SERVICES

Certified as a true and correct copy of "Anmore Building Bylaw No. 583-2018".

DATE

MANAGER OF CORPORATE SERVICES

SCHEDULE A
CLIMATIC DATA

DESIGN ELEMENT	DESIGN VALUE
January 2.5% Design Temperature	-7° C
January 1.0% Design Temperature	-9° C
July 2.5 % Design Drybulb Temperature	25° C
July 2.5% Design Wetbulb Temperature	17° C
Annual Total Degree-Days Below 18°C	3100
Maximum Fifteen-Minutes Rainfall	2 mm
Maximum One-Day Rainfall	150 mm
Annual Total Precipitation	2100 mm
Moisture Index	2.07
Driving Rain Wind Pressures, 1/5	160 Pa
Snow Load, Ss	2.9 kPa
Snow Load, Sr	0.7 kPa
Hourly Wind Pressure 1/10	0.36 kPa
Hourly Wind Pressure 1/50	0.47 kPa

SEISMIC DATA

DESIGN ELEMENT	DESIGN VALUE
Sa (0.2)	0.93
Sa (0.5)	0.63
Sa (1.0)	0.32
Sa (2.0)	0.17
PGA	0.46

FROST PROTECTION

DESIGN ELEMENT	DESIGN VALUE
Minimum Depth	460 mm

NB: These values have been derived from the BC Building Code and are provided for convenience only.



VILLAGE OF ANMORE

REPORT TO COUNCIL

Date: September 13, 2018

Submitted by: Jason Smith, Manager of Development Services

Subject: Works and Services Bylaw Amendment – Water Pressure Requirement

Purpose / Introduction

The purpose of this report is to propose an amendment to the Works and Services Bylaw to reduce the fire flow requirements for cluster housing.

Recommended Options

That Anmore Works and Services Amendment Bylaw No. 584-2018 be read a first, second and third time.

Background

The Village has a Works and Services bylaw (the Bylaw) whose purpose is to establish standards for all public infrastructure. Staff are currently working on a larger update to bylaw to reflect current best practices.

During the course of reviewing active subdivision applications a challenge was identified in the Bylaw that placed, in staff's view, an unreasonable requirement on the proponent and brought into question whether this requirement was too high and would result in the Village having increased operation and maintenance costs for overbuilt infrastructure.

Discussion

Staff have asked our Engineering Consultant to review the material and make a recommendation. Their analysis and recommendation are attached (Attachment 1). They recommend that the design fire flow and interim fire flow requirements for cluster housing be changed to 67 and 45 litres/sec. Their recommendations have been incorporated into a draft amendment bylaw (Attachment 2)

Report/Recommendation to Council

Works and Services Bylaw Amendment – Water Pressure Requirement
September 13, 2018

Other Options

The following options are provided for Council's consideration:

1. That Anmore Works and Services Amendment Bylaw No. 584-2018 be read a first, second and third time;

or

2. That Council request further information from staff.

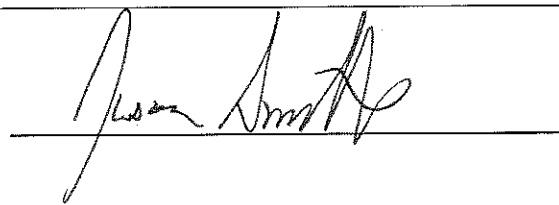
Financial Implications

There are no financial implications for any of the options proposed.

Attachments:

1. Design Brief from ISL Engineering dated September 12, 2018
2. Anmore Works and Services Amendment Bylaw No. 584-2018

Prepared by:



Jason Smith

Manager of Development Services



Inspiring sustainable thinking

Design Brief



#503, 4190 Lougheed Hwy., Burnaby, BC V5C 6A8 T: 604.629.2696 F: 604.629.2698

To: **Village of Anmore**
 Attention: **Jason Smith**
 Reference: **Bella Terra – Fire Flow demand**
 From: **Chris Boit**

Date: **September 12, 2018**Project No.: **31766**

ISL Engineering has been asked to review PLR application for the Village of Anmore. As part of this process, ISL reviews developer's submission against the requirements of the Works and Services Bylaw.

A significant portion of the Bylaw refers to the requirements of a water distribution system; an essential design component of the water system is the required fire flows. Fire Flows typically determine the size and complexity of the water system, ie the higher the flow requirement, the larger and complex the system becomes. Its important to understand that there is a direct correlation between complexity and O&M costs. It is therefore in the Village's interest to keep the system as simple and small as possible, while providing adequate flows to ensure Public Safety.

Table 2.2.1.4 FIRE FLOW & DESIGN REQUIREMENTS

Land Use	Zoning	Design Fire Flow (F) litres/sec.	Interim Fire Flow (f) litres/sec.
<u>Residential</u>			
Urban			
Single Family	RS-1	60	45
Cluster Housing	RS-2, RS-3	120	90
Suburban			
Extensice Rural & Recreational A-1		60	45
Campgrounds		60	45
School	(Any Zone)	120	90
Institutions	P-1	90	65
Commercial &, Industrial			
Isolated Commercial		90	65
Small Grp. Commercial		120	90

1- Extract from Works and Services Bylaw - Fire Flow and design requirements



Table 2.2.1.4 highlights the requirements for Fire Flows within the Village of Anmore. In particular it refers to Cluster housing as RS-2, RS-3 that require fire flows of 120 l/s. Typically, Fire Flows of 120 l/s are reserved for Town homes or apartments. It is ISL's opinion that this flow be reviewed, as this flow requirement will become problematic to achieve if the Village wishes to pursue Hillside development, because the head pressures have to increase to compensate for the elevation increase, ie we have to push water uphill.

Based on the above ISL conducted a review of the surrounding municipalities for their required fire flows and found the following:

Municipality	Fire Flow Requirement
Port Moody	Single Family – 60 l/s and Fire Underwriters' Survey - Water Supply for Public Fire Protection 1999
City of Coquitlam	Fire Underwriters' Survey - Water Supply for Public Fire Protection 1999
City of Port Coquitlam	Single Family – 60 l/s and Fire Underwriters' Survey - Water Supply for Public Fire Protection 1999
District of North Vancouver	Single Family Residential and all neighborhood zones (RS3, RS4, RS5) – 60 l/s and Fire Underwriters' Survey - Water Supply for Public Fire Protection 1999

It should be noted that the above municipalities do not follow the same zoning densities (others are higher) as Anmore and therefore best judgement has been used on the above table.

It is clear that the above municipalities require 60 l/s for single family dwellings and they must meet the requirements as set out in the Fire Underwriter Survey.

It would be ISL's recommendation that the Village revise their Fire Flow Demands for Cluster housing from 120 l/s to meeting the requirements as set out by the Fire Underwriters' Survey - Water Supply for Public Fire Protection 1999. The FUS document is a robust document that ensures the public safety is a priority, while providing Engineers/Municipalities flexibility to determine an appropriate Fire Flow Demand for their developments.

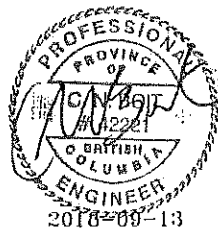
Given the current zoning bylaws within Anmore, the FUS states "for groupings of detached one family dwellings and small two-family dwellings not exceeding 2 stories in height", a fire flow of 4,000 liters/min (67 L/s) may be used for dwellings with exposure distances between 3 – 10 m." this description is consistent with the majority of developments within Anmore.

Based upon the above research and industry standards, we believe the removing the Cluster Housing Fire Flows from 120 l/s to meeting the standards of Fire Underwriters' Survey - Water Supply for Public Fire Protection 1999, is appropriate and would not compromise the public safety.

We hope this clarifies the situation

Regards

Christopher Boit, P.Eng
Senior Engineer,
VoA Engineering consultant



VILLAGE OF ANMORE

BYLAW NO. 584-2018

A bylaw to amend Anmore Works and Services Bylaw No. 242, 1998

WHEREAS the Local Government Act authorizes a local government to amend its bylaws from time to time;

NOW THEREFORE the Municipal Council of the Village of Anmore, in open meeting assembled, enacts as follows:

1. That this bylaw may be cited for all purposes as "Anmore Works and Services Amendment Bylaw No. 584-2018".
2. That Anmore Works and Services Bylaw No. 242, 1998 be amended by changing the fire flow and design requirements for cluster housing in Table 2.2.1.4 from a design fire flow of 120 to 67 and by changing the interim fire flow from 90 to 45.

READ a first time the day of

READ a second time the day of

READ a third time the day of

ADOPTED the day of

MAYOR

MANAGER OF CORPORATE SERVICES

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DATE

MANAGER OF CORPORATE SERVICES



Final Draft Report

Stormwater Master Plan

*Village of Anmore, BC
September 14, 2018*



Project ID: 2017-051-ANM

Prepared for:

Village of Anmore, BC
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Anmore, BC V3H 5G9

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September 14, 2018

Village of Anmore, BC
2697 Sunnyside Road
Anmore, BC V3H 5G9

Attention: Ms. Juli Halliwell

Re: Final Draft Report for the Village of Anmore Stormwater Master Plan

Dear Ms. Halliwell,

GeoAdvice Engineering Inc. is pleased to submit to the Village of Anmore one (1) digital copy of our final draft report for the Village of Anmore Stormwater Master Plan.

If you have any questions, or require clarification on any point made herein, please contact me. It has been a pleasure to work with the Village, and I look forward to continue working with the Village in the future.

Yours truly,

GeoAdvice Engineering Inc.

A handwritten signature in cursive script, reading "Werner de Schaetzen", with a horizontal line underneath.

Werner de Schaetzen, Ph.D., P.Eng.
Project Manager

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project ID: 2017-051-ANM

Document History and Version Control

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1. Executive Summary

The Village of Anmore (Village) retained GeoAdvice Engineering Inc. (GeoAdvice) to develop a Stormwater Master Plan (SMP) that will help direct the orderly expansion and improvement of the Village's stormwater system to meet current and future needs. The key components of the Village's existing stormwater system are summarized in **Table 1.1**.

Table 1.1: Village of Anmore Stormwater System Key Component Summary

Item	Quantity
Count and length of culverts	476 (7.0 km)
Count and length of storm mains	240 (7.7 km)
Count of manholes	158
Count of control manholes	17
Count of detention facilities	20
Current number of residents	2,210 (2016)
Future number of residents	4,000 (2041)

GeoAdvice developed a model of the current stormwater system using PCSWMM (CHI Water Software). The primary data used to develop the hydraulic network included information collected in the field by Urban Systems Ltd. (USL), ground reconnaissance work completed by GeoAdvice, and available asbuilt drawings. The model was calibrated to stream flow monitoring data recorded during the 2018 wet weather season. Once calibrated, a future scenario model was defined based on the land use zoning information from the Village Official Community Plan (OCP) and from additional information provided by ISL Engineering and Land Services Ltd. (ISL).

The data collection and culvert condition assessment were performed throughout a 3-week period from January 15, 2018 to February 2, 2018. USL was tasked to assess all culverts in the Village. **Table 1.2** summarizes the culvert condition rating categories and results.

Table 1.2: Village of Anmore Culvert Condition Ratings

Condition Rating	Number of Culverts
1 - Very Good	184
2 - Good	164
3 - Fair	57
4 - Poor	37
5 - Critical	1

The flow monitoring program consisted of four (4) flow monitoring sites and one (1) rain gauge, for a period of record of about two months from January 2, 2018 to March 7, 2018.

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As agreed with the Village, the drainage model consisted of all pipes, plus the open-channel ditch and creek systems. In addition, some of the larger detention facilities were included; however the on-lot detention facilities, catch basins and swales were excluded from the Village model.

Rather than simulating individual storm events for model calibration, a continuous simulation from January 2, 2018 to March 7, 2018 was run. The model parameters were adjusted in an iterative manner until model results achieved an acceptable correlation with the measured flow data for the storm events identified. Overall, the model shows an acceptable agreement with the measured flows at the four flow stations.

Design storms were then simulated to assess the hydraulic capacity of the existing conveyance system of culverts and storm mains under existing and future OCP land use conditions. Each asset was assessed using a capacity Likelihood of Failure (LoF) rating system. A LoF rating of '1' means it is unlikely to fail, while a LoF of '5' is highly likely to fail. **Table 1.3** and **Table 1.4** summarize the capacity LoF rating results.

Table 1.3: Existing Land Use Capacity LoF Rating Results

Capacity LoF	Number of Storm Mains	Number of Minor System Culverts	Number of Major System Culverts
1	221	398	44
2	27	1	1
3	5	13	1
4	6	0	0
5	4	11	7

Table 1.4: Future Land Use Capacity LoF Rating Results

Capacity LoF	Number of Storm Mains	Number of Minor System Culverts	Number of Major System Culverts
1	210	394	44
2	34	1	1
3	8	14	1
4	7	0	0
5	4	14	7

To assess the risk associated with each culvert and storm main should the asset fail, condition and capacity LoF ratings were analyzed together with its corresponding consequence of failure to develop an overall risk score. A consequence of failure rating of '1' represents the least impact, while a consequence of failure rating of '3' represents the greatest impact.

Table 1.5 summarizes the consequence of failure ratings statistics.

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Table 1.5: Village of Anmore Consequence of Failure Rating Results

Consequence of Failure	Number of Storm Mains	Number of Culverts
1	68	14
2	152	356
3	43	106

Matrices of the relationship between an asset's condition and capacity LoF ratings and its consequence of failure ratings were used to evaluate risks. A risk score of '1' represents the lowest risk while a risk score of '3' represents the highest risk. **Table 1.6** below summarizes the condition and capacity risk score results.

Table 1.6: Condition and Capacity Risk Results

Risk Score	Condition		Existing Land use - Capacity			Future Land use - Capacity		
	Storm Main	Culvert	Storm Main	Minor System Culvert	Major System Culvert	Storm Main	Minor System Culvert	Major System Culvert
1	42	389	253	410	45	251	407	45
2	220	75	9	2	1	11	2	1
3	1	12	1	11	7	1	14	7

A benefit of developing risk scores for the Village's drainage assets is that it provides a decision-making process for near-term and long-term capital planning. Priority ratings were assigned to each asset based on the asset's condition and capacity risk scores. The overall priority rating combines the condition, capacity and consequence failure risk assessments into a single 1 to 5 priority rating. A rating of '1' represents the highest priority and a rating of '5' represents the lowest priority.

Only culverts and storm mains with a condition or capacity risk score of '3' were considered critical and were considered for improvement. **Table 1.7** summarizes the priority rating results.

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Table 1.7: Culverts and Storm Mains Priority Rating Results

Priority	Number of Storm Mains	Number of Minor System Culverts	Number of Major System Culverts
1	0	0	2
2	0	2	3
3	1	9	2
4	0	0	0
5	1	12	1

Recommended improvements were sized to convey the flows simulated under the future land use scenario with consideration of impacts from climate change. **Table 1.8** lists the culvert and storm main improvements triggered by capacity and condition risks. The recommended improvements were grouped into projects based on physical location and flow path. The project ID indicates the priority for each project. The two highest priority projects are included in Project ID 1. A full list of projects with prioritization is provided in **Table 7.1**.

Table 1.8: List of Culvert and Storm Main Improvements

Project ID	Location	Length (m)	Existing Diameter (mm)	Upgrade Diameter (mm)	Conduit Type	Cost Estimate (\$)
1	Sunnyside Rd	60	450 – 800	450 – 1,200 x 2,400	Culvert/Storm	\$109,000
2	East Rd/Creek	112	450 – 900	1,200 – 1,500	Culvert	\$360,000
3	Alpine Dr	47	450	600 – 675	Culvert	\$53,000
4	Sunnyside Rd	28	300 - 650	450 – 675	Culvert	\$22,000
5	East Rd	164	250 – 900	450 – 1,200	Culvert	\$223,000
6	East Rd	59	300 – 900	450 – 1,200	Culvert	\$48,000
7	Spence Way	25	300	450	Culvert	\$10,000
8	Ravenswood Dr	115	300	450 – 600	Culvert/Storm	\$82,000
9	Fern Dr	54	300	450	Culvert	\$23,000
Total		664			Total	\$930,000

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2. Introduction

The Village of Anmore (Village) retained GeoAdvice Engineering Inc. (GeoAdvice) to develop a Stormwater Master Plan (SMP) that will help direct the orderly expansion and improvement of the Village's stormwater system to meet current and future needs.

The project was managed on behalf of the Village by ISL Engineering and Land Services Ltd. (ISL).

Urban Systems Ltd. (USL) developed the culvert inventory component of the SMP. USL completed the culvert surveys that provided the necessary information to develop a hydraulic model of the Village stormwater system. Furthermore, USL completed the culvert condition assessments that were used to determine and prioritize culvert upgrades.

GeoAdvice developed a model of the current stormwater system using PCSWMM (CHI Water Software). The primary data used to develop the hydraulic network included information collected in the field by USL, ground reconnaissance work completed by GeoAdvice, and available asbuilt drawings. The model was calibrated using flow monitoring data recorded during the 2018 wet weather season. Once calibrated, a future scenario was modeled based on the land use zoning information from the Village Official Community Plan (OCP) and from additional information provided by the Village.

2.1. Background

The Village is bounded by Belcarra to the West, Port Moody to the South, Coquitlam to the East, and Electoral Area A to the North. The study area includes all land within the municipal boundary as well as all major creeks that enter and/or exit the Village, which ultimately discharge into the Burrard Inlet and Buntzen Lake. Minor drainage ditches, seeps and overland flow were not incorporated into the hydraulic model, but rather were characterized in the software's hydrology model. The major creeks that flow through the Village municipal boundary include Anmore, Mossom, and Schoolhouse Creeks.

Much of the Village's land area is dedicated as Park or Watershed land use and is currently undeveloped and forested. The local topography consists of steep slopes, mature forests, creeks and wildlife habitat. The stormwater system that services the developed areas consists of a network of culverts, stormwater conduits, ditches and swales. This system currently services a population of about 2,210 (2016) residents. According to the latest OCP, the Village has been experiencing steady growth and is expected to serve about 4,000 residents by 2041.

The key components of the Village's stormwater system are summarized in **Table 2.1** and shown in **Figure 2.1**.

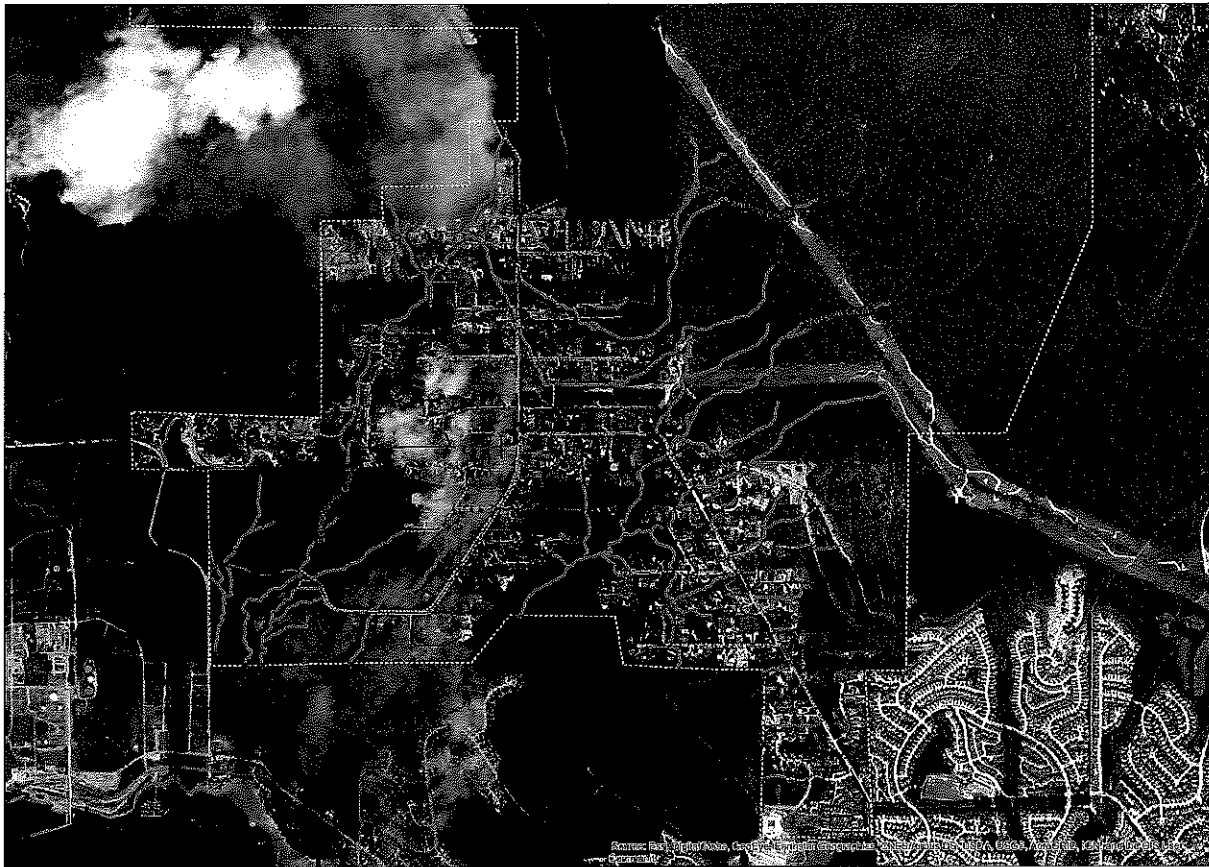
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Table 2.1: Village of Anmore Stormwater System Key Component Summary

Item	Quantity
Count and length of culverts	476 (7.0 km)
Count and length of storm mains	240 (7.7 km)
Count of manholes	158
Count of control manholes	17
Count of detention facilities	20
Current number of residents	2,210 (2016)
Future number of residents	4,000 (2041)



GeoAdvice Engineering Inc.

Legend

- ▼ Outfall
- Culvert
- Storm Main
- Creek
- - - Ditch
- Detention Main
- Village of Anmore Boundary

Village of Anmore
Stormwater System



Project: Stormwater Master Plan
Client: Village of Anmore, BC
Date: April 2018
Created by: RD
Reviewed by: WdS

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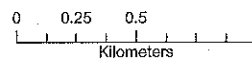


Figure 2.1 82

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2.2. Objectives

The primary objective of this project was to create a Stormwater Master Plan (SMP) that provides a roadmap to direct the orderly expansion and improvement of the Village stormwater system. To meet this objective, a hydrologic and hydraulic model of the Village stormwater system was created using PCSWMM.

The intent of this project was to provide the Village with:

- A hydrologic/hydraulic model of the Village's stormwater system (ditches/culverts and conduits/stormwater structures);
- A culvert inventory suitable for incorporation into the Village's GIS and Asset Management systems; and,
- A Stormwater Master Plan report that:
 - describes the hydraulic condition of the existing stormwater system;
 - describes the physical condition of the existing culvert infrastructure;
 - provides improvement recommendations to accommodate existing and future development, complete with preliminary costing for budgeting purposes; and,
 - provides an integrated plan for future development servicing.

2.3. Project Participants

The SMP was developed through the combined effort of personnel from the Village, ISL, GeoAdvice, USL, and Bot Corp. Key team members are:

Village of Anmore, BC

Juli Halliwell – Chief Administrative Officer

Luke Guerin – Operations Superintendent

Lorne Iveson – Maintenance & Utility Worker II

Lance Fortier – Maintenance & Utility Worker II

ISL Engineering and Land Services Ltd.

Chris Boit, P.Eng. – Project Manager for the Village

GeoAdvice Engineering Inc.

Sean Geyer, EIT – Hydraulic & Hydrologic Modeler, Project Engineer

Jonathan Hung, P.Eng. – Water Resources Engineer

Chuck Linders – Stormwater Modeling Expert, Senior Review

Werner de Schaetzen, Ph.D., P.Eng. – Project Manager

Renaud Dufays – Junior Modeler

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Urban Systems Ltd.

Ricky Banga, BGIS – GIS Analyst and Field Team Member

Cory Sivell – Asset Management Consultant

Wade Turner, GISP – Condition Assessment and Field Survey Coordinator

Glen Shkurhan, P.Eng. – Master Planning Advisor, Senior Review Engineer

Bot Corp Environmental Monitoring

Brian Bot – River, Stream and Sewer Flow Monitoring Specialist

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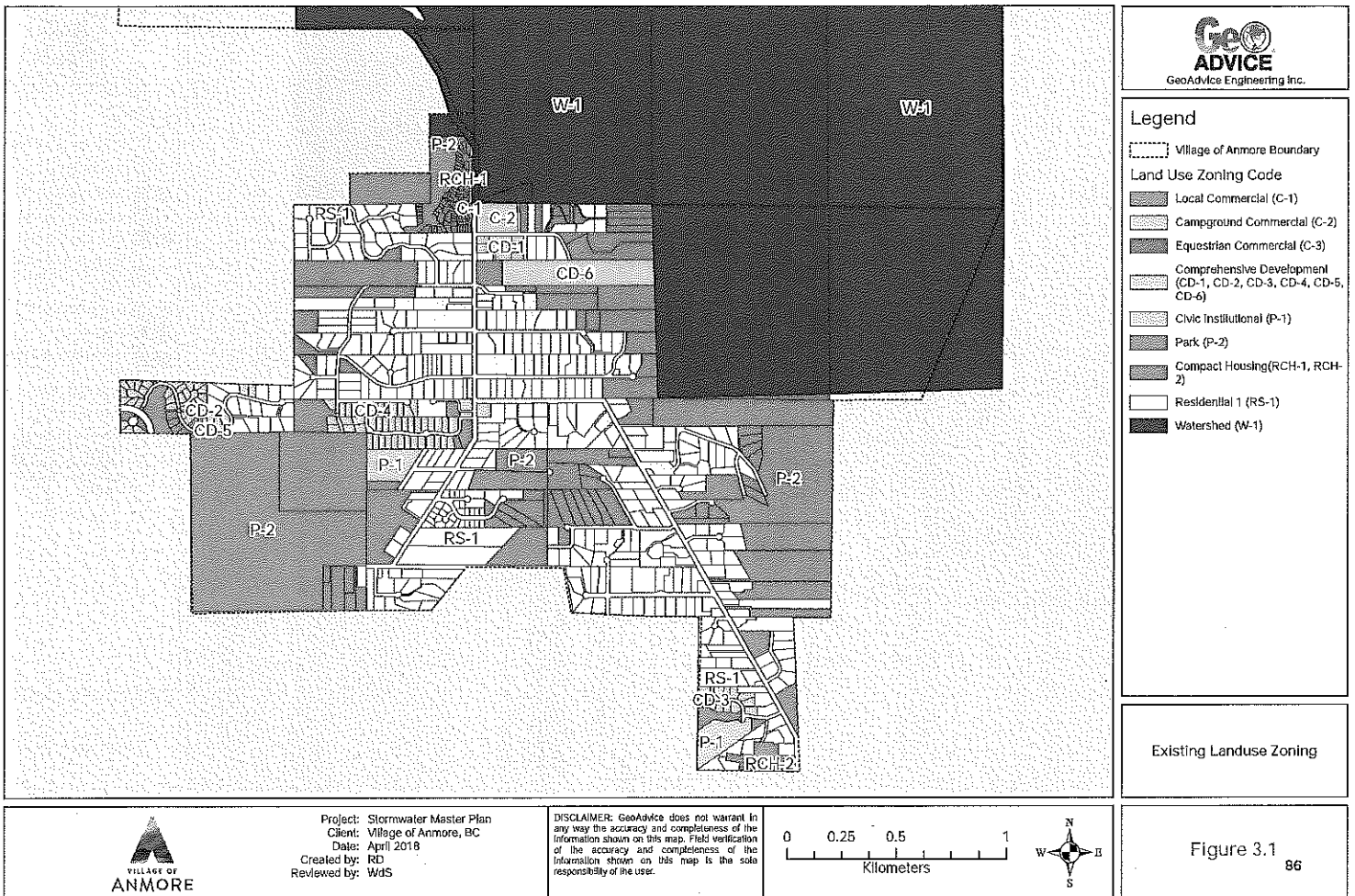
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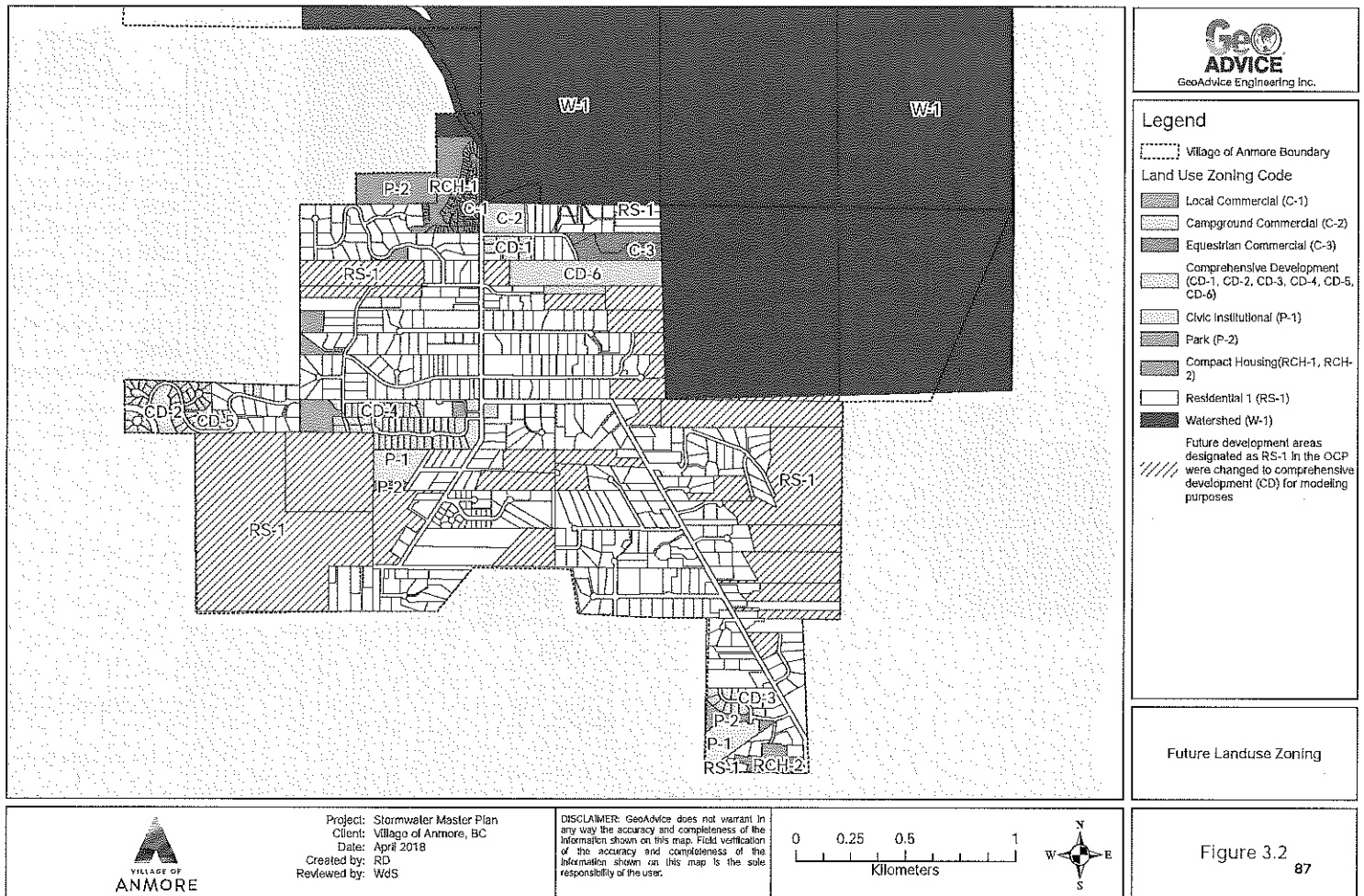
3. Land Use and Zoning

Existing and future land uses were based on the Village of Anmore Official Community Plan (OCP)¹. In consultation with the Village, a land use map showing the existing land use was created as shown in **Figure 3.1**.

The Village OCP identifies future development to predominantly occur on currently undeveloped lands, with some infill or redevelopment in existing residential areas. The OCP further stipulates that the average density for new subdivisions will remain at one lot per one acre, consistent with the existing RS-1 zoning. However, in consultation with the Village, some of the future development areas currently designated as RS-1 were changed to comprehensive development (CD) for modeling purposes. This modification reflects more densified future developments (i.e. reflects a more conservative analysis of stormwater runoff) and is consistent with current development trends in the Village. The future land use plan assumed for this project is shown in **Figure 3.2**.

¹ Village of Anmore Official Community Plan Bylaw No. 532, 2014





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4. Drainage Design Criteria

4.1. Minor and Major Systems

The Village stormwater system consists of “minor” and “major” drainage systems. The following are excerpts from the Village of Anmore Design Criteria and provide a general description of each system.

Minor System

The “minor system” consists of underground conduits, open channels and watercourses to convey a 5-year return flow.

Major System

The “major system” consists of surface flood paths, roadways and watercourses to convey the 100-year return flow. In special conditions where surface flood paths cannot be established, pipes and culverts of the minor system may be enlarged to accommodate the major system flow.

The Village design criteria also state the following:

- Culverts crossing all roads shall be designed to accommodate the “major flows” with either by inlet or outlet control.
- Driveway culverts shall be designed to accommodate the “minor flows” unless otherwise indicated.

In summary, the conveyance features that form the Village stormwater system were classified, in consultation with the Village, as minor or major systems as shown in **Figure 4.1**.



Legend

- Village of Anmore Boundary
- Parcels
- Outfall
- Major System
- Minor System

Minor and Major Systems



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Client: Village of Anmore, BC
Date: April 2018
Created by: RD
Reviewed by: WdS

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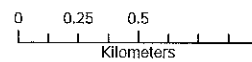


Figure 4.1

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4.2. Design Criteria

Table 4.1 summarizes the stormwater criteria consolidated from the Village design criteria and past Village reports.

Table 4.1: Village's Stormwater Criteria

Stormwater System	Stormwater Criteria
Culvert	Driveway culverts: safe conveyance of 5-year peak flows. Road crossing culverts: safe conveyance of 100-year peak flows. Driveway culverts shall be minimum 450 mm in diameter.
Storm sewer	Safe conveyance of 5-year peak flows in minor systems. Safe conveyance of 100-year peak flows in major systems. The minimum storm sewer pipe diameter shall be 200 mm in diameter, except where ditches discharge directly into a storm main where the minimum shall be 300 mm.
Ditch	Maximum velocity in an unlined ditch shall be 1 m/s.
Detention Requirement	5-year peak flows detained to 5-year pre-development peak flows.

Source: Anmore Works and Services Bylaw No. 242-1998

4.3. Design Storms

The Intensity-Duration-Frequency (IDF) curve data used to create the design storms are tabulated in Table 4.2. The IDF curve data were extracted from Metro Vancouver rain gauge QT57 – Westwood Plateau, and are based on recorded rain gauge data for the period of 1997-2014 (17 years).

Table 4.2: Intensity-Duration-Frequency Rainfall Intensity Values (QT57)

Return Period Duration	Rainfall Intensity (mm/hr)					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
5-min	43.0	61.3	73.4	88.6	100.0	111.2
15-min	26.3	37.6	45.1	54.6	61.7	68.7
30-min	19.8	25.7	29.6	34.6	38.3	41.9
1-hour	13.6	17.7	20.4	23.8	26.4	28.9
2-hour	10.5	13.8	16.0	18.8	20.8	22.8
6-hour	7.7	10.6	12.5	14.9	16.7	18.4
12-hour	5.6	8.0	9.6	11.7	13.2	14.7
24-hour	4.0	5.8	7.0	8.5	9.6	10.7
48-hour	2.7	4.2	5.1	6.3	7.2	8.1
72-hour	2.1	3.2	3.9	4.8	5.5	6.1

Source: Metro Vancouver Rain Gauge QT57 - Westwood Plateau (1997-2014)

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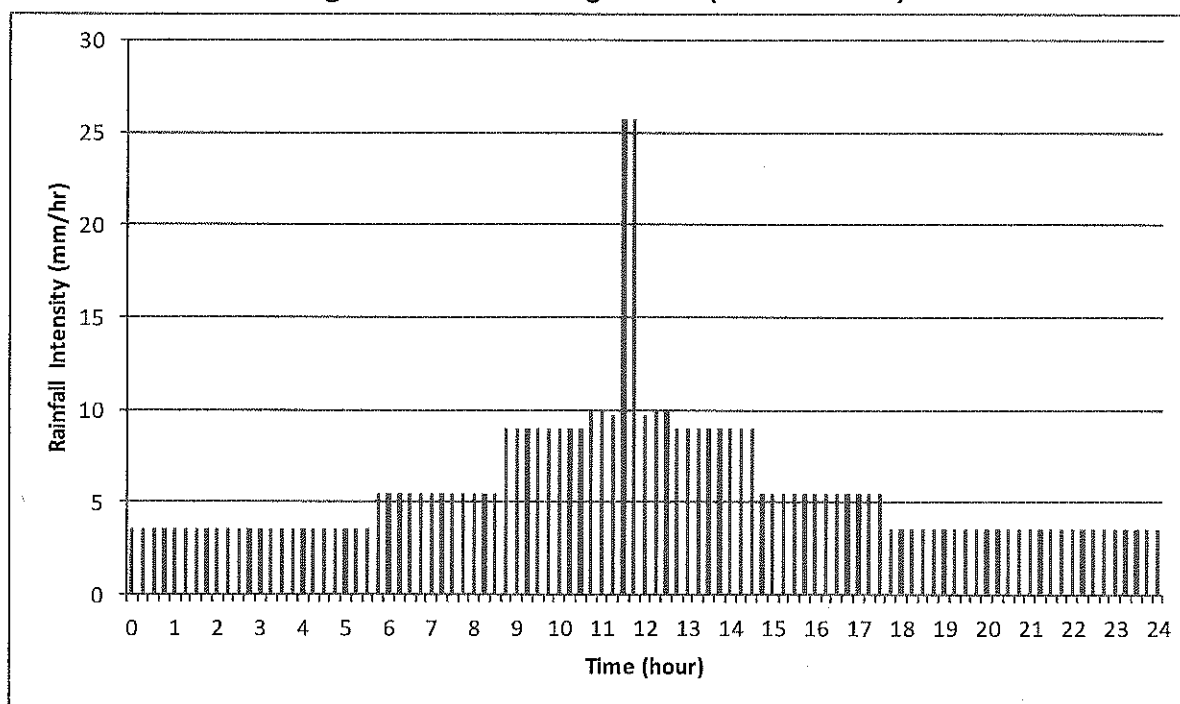
The synthetic “all duration” method was used to develop the design storm events. **Table 4.3** below presents total rainfall depths of the design events used to assess the drainage system.

Table 4.3: Design Storm Total Rainfall Depths

Storm Duration	1:5-year Total Depth (mm)	1:100-year Total Depth (mm)	Design Storm Shape
24 Hour	139.5	257.8	All Duration

Figures 4.2 and 4.3 show the design storm hyetographs used in the model.

Figure 4.2: 5-Year Design Storm (“All Duration”)

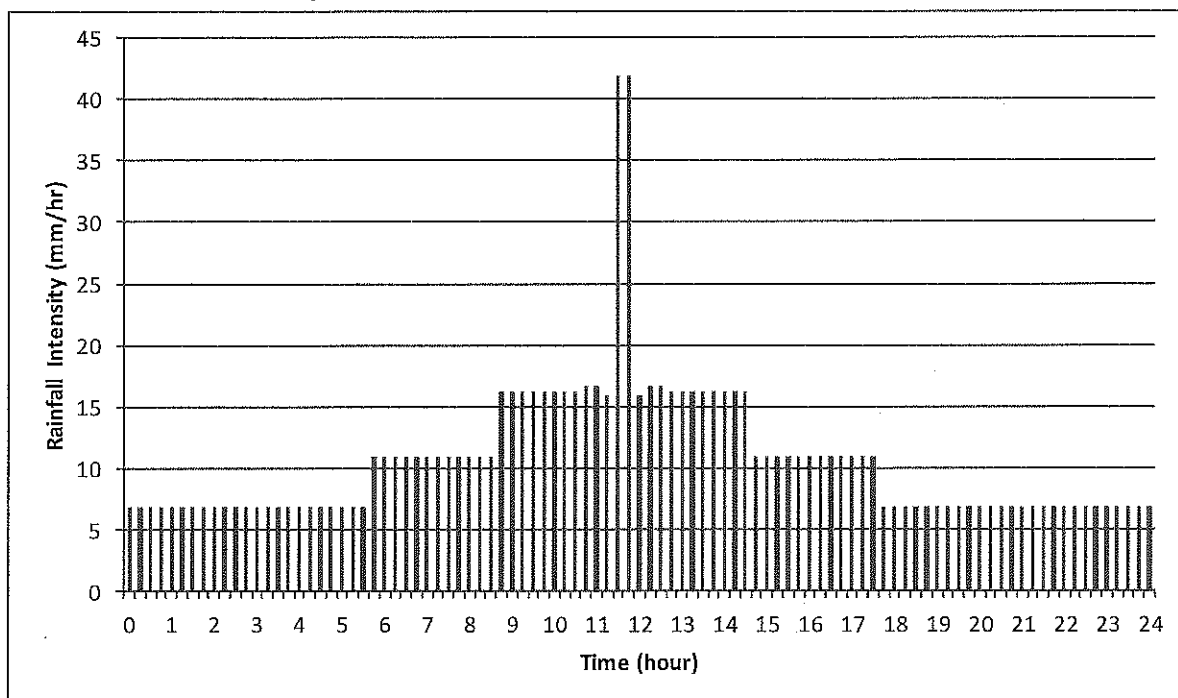


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Figure 4.3: 100-Year Design Storm ("All Duration")



4.3.1. Climate Change

Design storm hyetographs representing the impacts of climate change on rainfall volume were developed by increasing the intensity of existing design storms by an additional 15% in accordance with the Master Municipal Construction Documents (MMCD) guidelines. The climate change scenario was only considered to size recommended improvements.

5. Existing Stormwater System

The existing GIS dataset previously collected for the Village's Asset Management Plan was used as the basis of existing information to define the scope of the field data collection. This GIS dataset was compiled from CAD and record drawings, and staff knowledge. It was understood that this dataset was not complete and lacked key information for the development of the hydraulic model. As such, field surveys and condition assessments were conducted as part of this study.

5.1. Field Data Collection

With the Village GIS dataset at hand, USL completed culvert surveys and condition assessments. The field data was collected digitally and was provided to the Village in an ArcGIS geodatabase file. Additional culverts were identified while the field crew was on site. 27 additional culverts were identified, surveyed, and assessed for physical and operational condition.

5.1.1. Culvert Survey

USL completed the survey of over 265 culverts with diameters greater than 300 mm, collecting the precise location and invert elevations using a high accuracy grade system (TS15, GS24, CS15 system). The expected accuracy from this system is about 1 cm.

The location and invert elevations of the remaining smaller diameter culverts were collected using a backpack SX Blue II + GNSS system. The expected accuracy of this system ranges from 20 cm to 100 cm, depending on location of the culvert.

USL provided a technical memorandum that outlines the information used when starting the data compilation and collection and highlighting the existing data gaps at the outset of the field collection and condition assessment. Refer to **Appendix A** for the USL *GIS-Based Stormwater Data Review Documentation and Field Data Collection Methodology* tech memo.

5.1.2. Culvert Condition Assessment

The data collection and culvert condition assessment were performed throughout a 3-week period from January 15th – February 2nd, 2018. USL were tasked to assess all culverts in the Village. The inventory of the culverts included capturing the diameter, material, length, condition, notable deficiencies, maintenance needs and photos of assets and found deficiencies such as blockages, damaged ends, visible scour, degraded conduits, etc. **Table 5.1** summarizes the culvert condition rating categories.

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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Table 5.1: Culvert Condition Ratings

Condition Rating	Description	Estimated Remaining Life*
1 - Very Good	Only normal maintenance required	75% – 100%
2 - Good	Minor maintenance required	50% – 75%
3 - Fair	Maintenance required to return to accepted level of service	25% – 50%
4 - Poor	Requires renewal (significant renewal/upgrade required)	0% – 25%
5 - Critical	Asset unserviceable	0%

*Based on typical service life of approximately 60 years.

Table 5.2 summarizes the condition rating statistics of the Village of Anmore culverts.

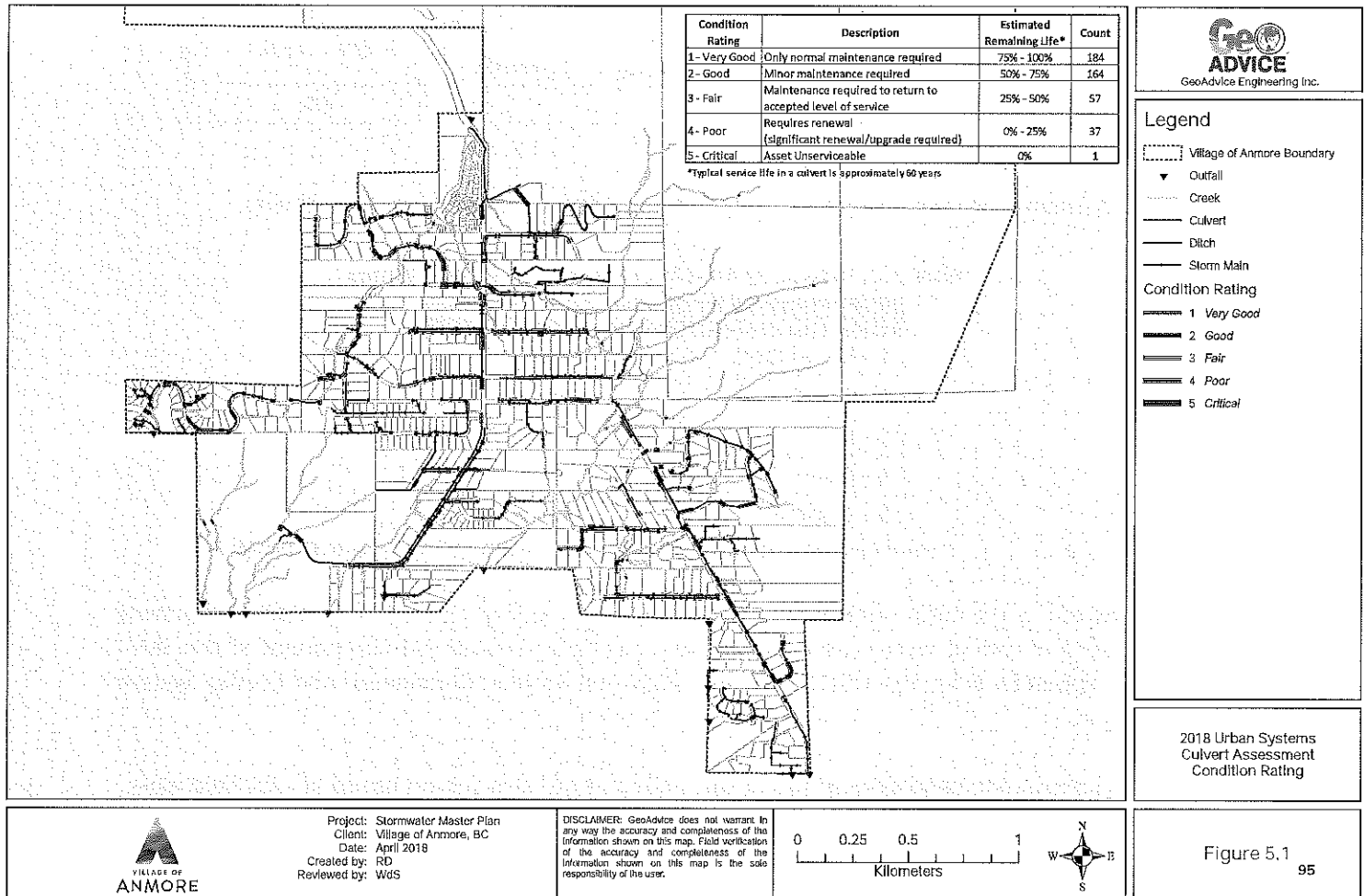
Table 5.2: Village of Anmore Culvert Condition Ratings

Condition Rating	Number of Culverts*
1 - Very Good	184
2 - Good	164
3 - Fair	57
4 - Poor	37
5 - Critical	1

*Several culverts could not be assessed for their condition (Refer to **Appendix A**).

USL provided a technical memorandum that documents the culvert condition assessment framework and coding system used for the field condition assessment component of the SMP. Refer to **Appendix B** for the *USL Culvert Condition Assessment Framework and Coding System* tech memo.

Figure 5.1 shows the condition ratings of the Village of Anmore culvert based on USL field work.



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project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

5.2. Flow Monitoring Program

GeoAdvice retained Bot Corp to conduct a stormwater flow monitoring program to measure, record and collect rainfall and flow monitoring data that were used to calibrate the model. The flow monitoring program consisted of four (4) flow monitoring sites and one (1) rain gauge, for a period of record of about two months from January 2, 2018 to March 7, 2018. The purpose of the flow monitoring program was to obtain field data for model calibration.

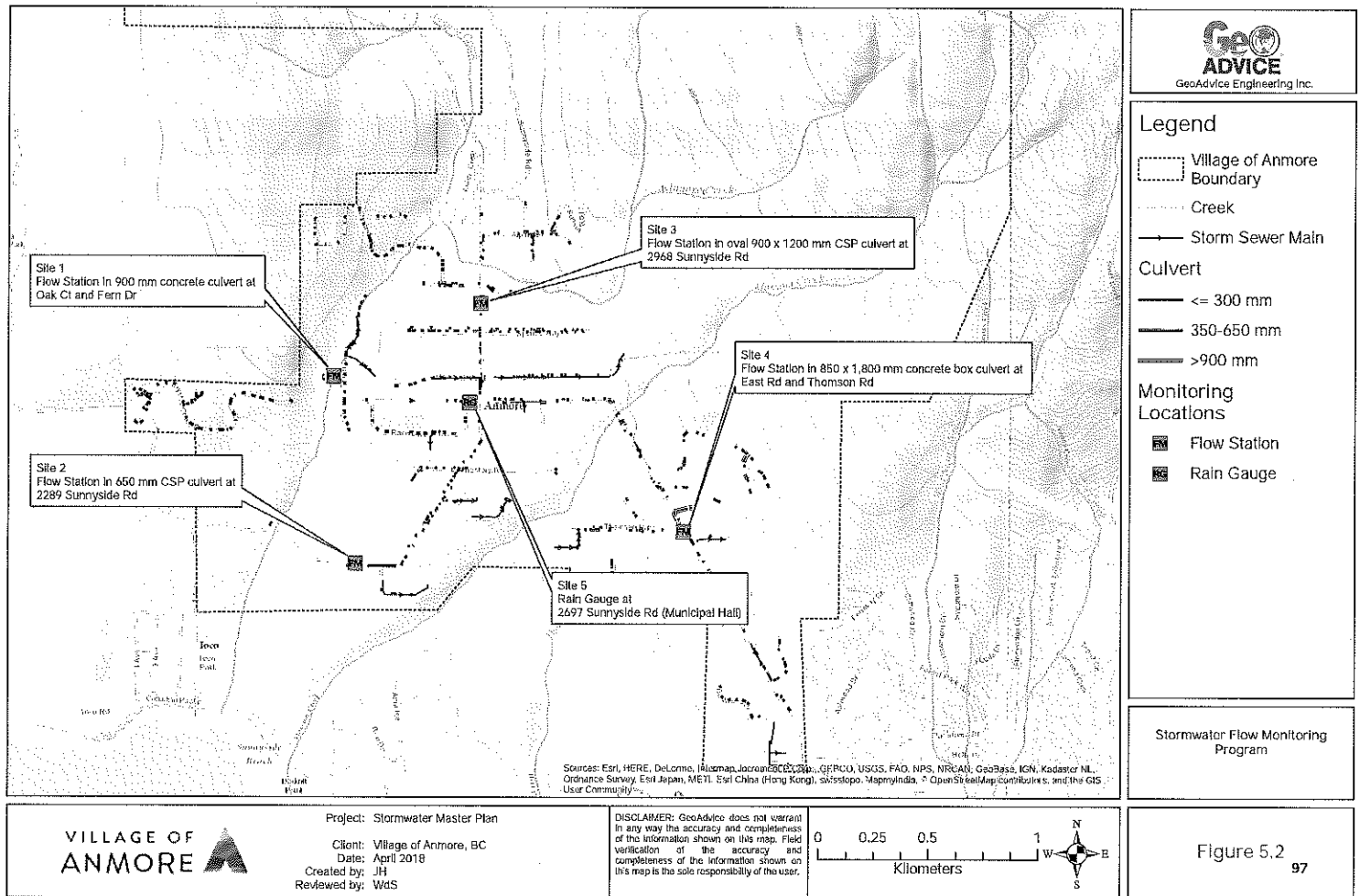
Table 5.3 describes the location of the four (4) flow monitoring stations installed by Bot Corp.

Table 5.3: Flow Monitoring Stations

Site No.	Site Location	Culvert ID	Approx. Civic Address
1	Oak Ct Culvert	D0167	147 Oak Ct
2	Discharge to Anmore Creek from Pond	D0279	2195-2289 Sunnyside Rd
3	Sunnyside Rd Culvert	D0159	2915-2967 Sunnyside Rd
4	East Rd Culvert	D0430_2	1001 Thomson Rd

One rain gauge was installed at 2697 Sunnyside Rd on January 4, 2018. Unfortunately, the rainfall data of this rain gauge was not usable due to a malfunction of the device. Therefore, rainfall data from Metro Vancouver rain gauge station QT57 – Westwood Plateau was used instead.

Figure 5.2 show the location of the rain gauge and flow monitoring stations.



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project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

5.2.1. Summary of Installation

The four (4) flow monitoring stations and one (1) rain gauge and the corresponding catchment size and installation notes are summarized in **Table 5.4** below.

Table 5.4: Flow Monitoring Catchment and Installation Notes

Site No.	Catchment Size (ha)	Bot Corp Installation Notes
1	23	Installed flow meter in the 900 mm culvert and performed verification.
2	16	Installed the flow meter in the 650 mm culvert and performed verification.
3	52	Installed flow meter in the oval culvert (900 x 1,200 mm) and performed verification.
4	94	Installed flow meter in the box culvert (850 x 1,800 mm) and performed verification. As there was a significant amount of sediment on the bottom on the culvert, a rectangle weir was installed. Flow was then measured based on the depth of flow over the weir crest.
5 (Rain Gauge)	N/A	Installed the rain gauge on the top of the Atco trailer at Anmore Municipal Hall.

Bot Corp field pictures and sketches of each monitoring device are provided in the following pages.

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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Flow Site 1:

Site Picture



Inlet Picture

Not available

Upstream Conduit Picture

Not available

Downstream Conduit Picture

Not available

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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Flow Site 2:

Site Picture



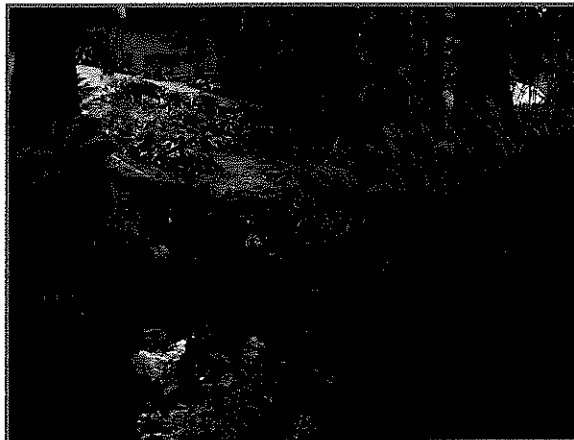
Inlet Picture



Upstream Conduit Picture



Downstream Conduit Picture



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project ID: 2017-051-ANM

Flow Site 3:

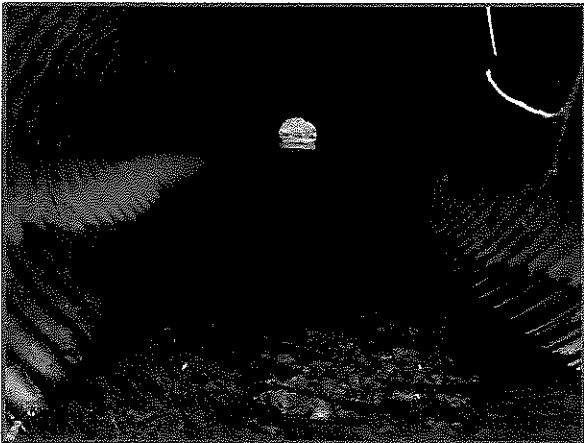
Site Picture



Inlet Picture



Upstream Conduit Picture



Downstream Conduit Picture



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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Flow Site 4:

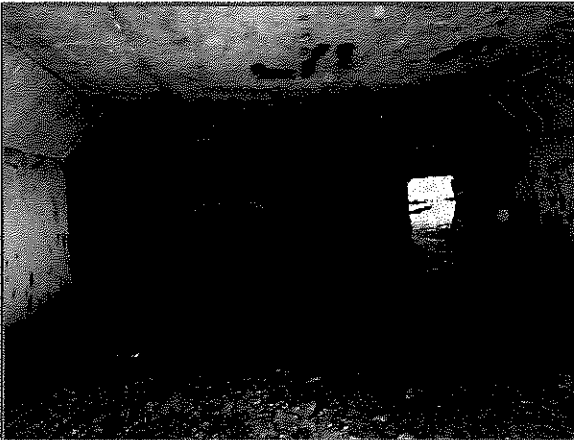
Site Picture



Inlet Picture (Weir Not Installed Yet)



Upstream Conduit Picture



Downstream Conduit Picture



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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Rain Gauge Site 5:

Site Picture



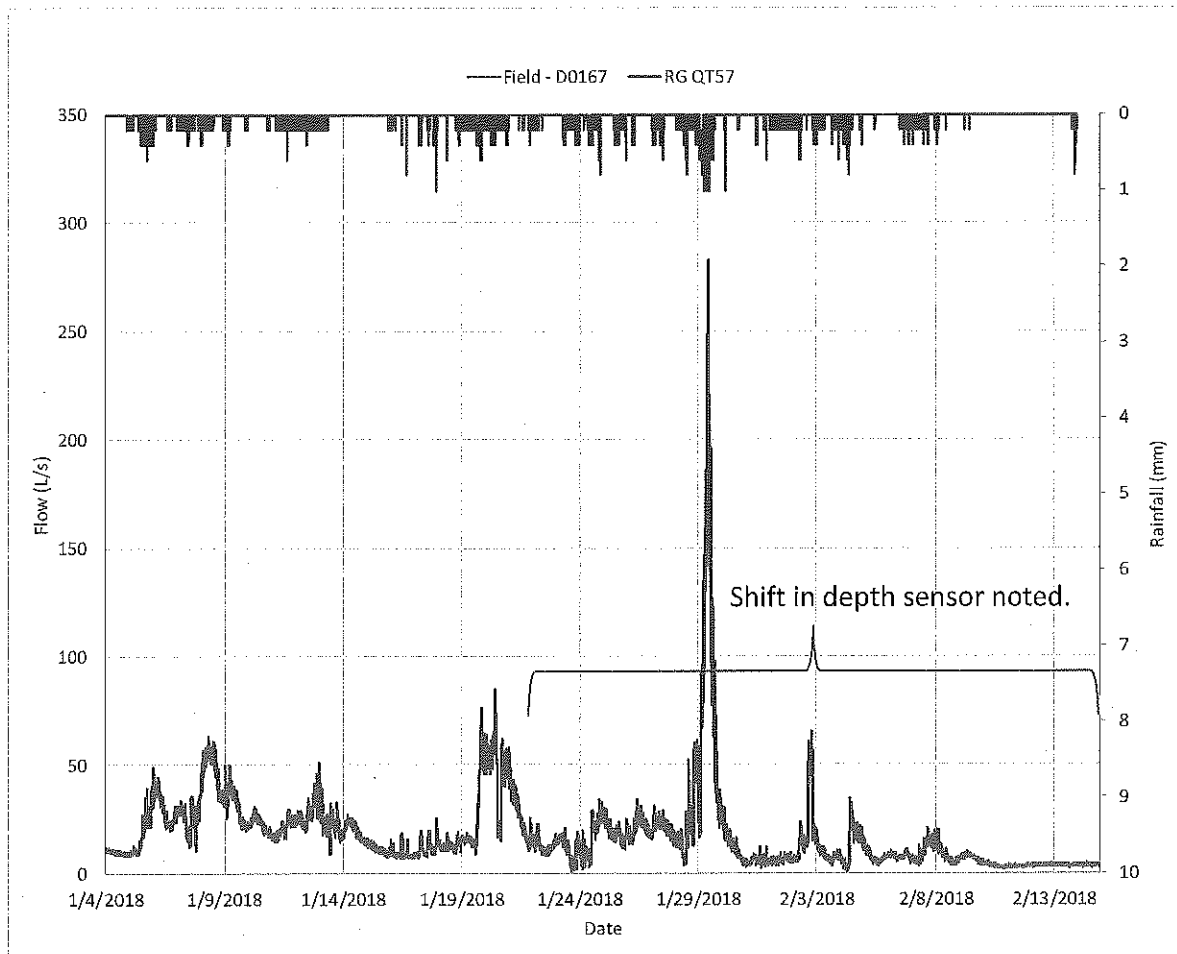
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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

5.2.2. Flow Monitoring Hydrographs

Figure 5.3 to Figure 5.6 show the flow monitoring hydrographs for each of the four sites.

Figure 5.3: Flow Monitoring Hydrograph – Site 1

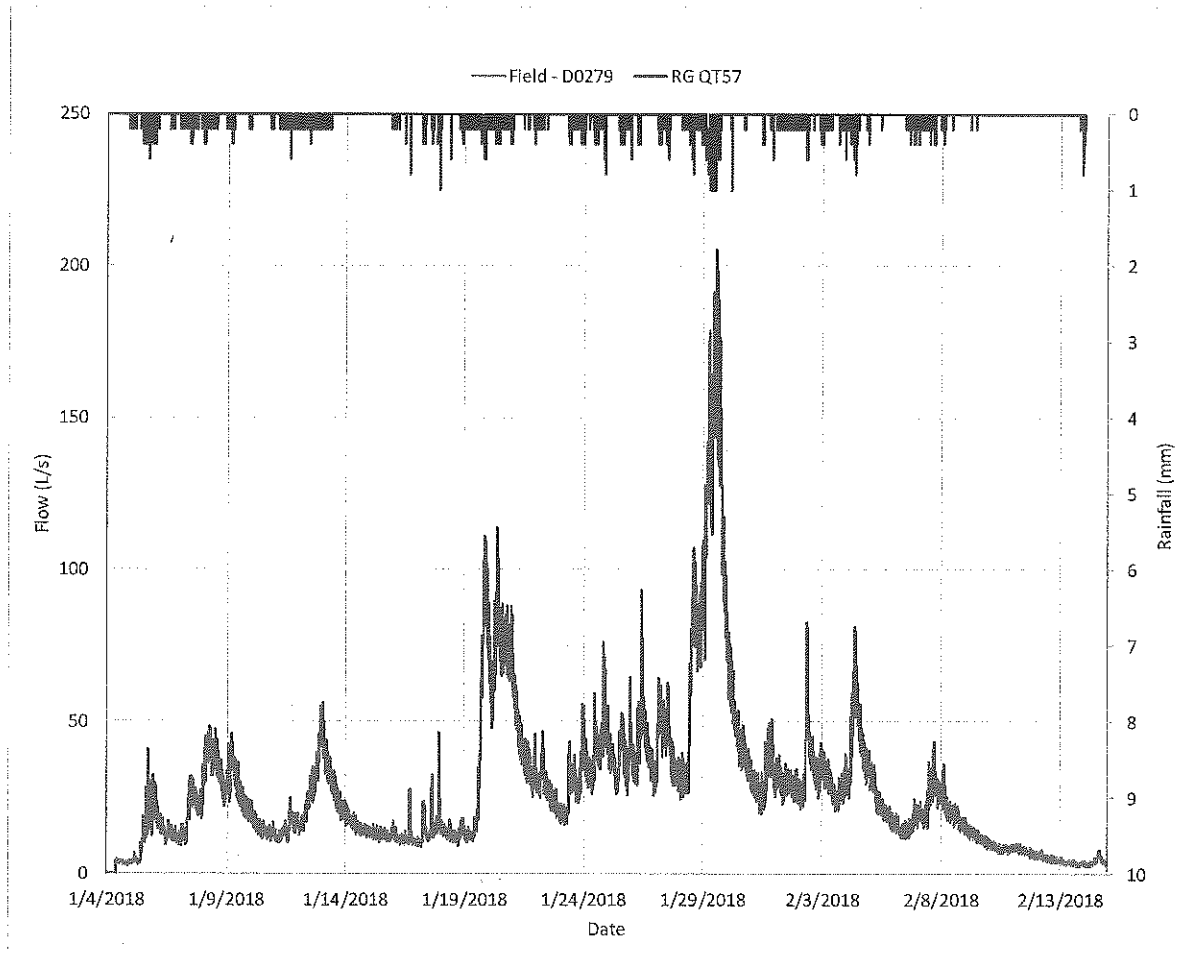


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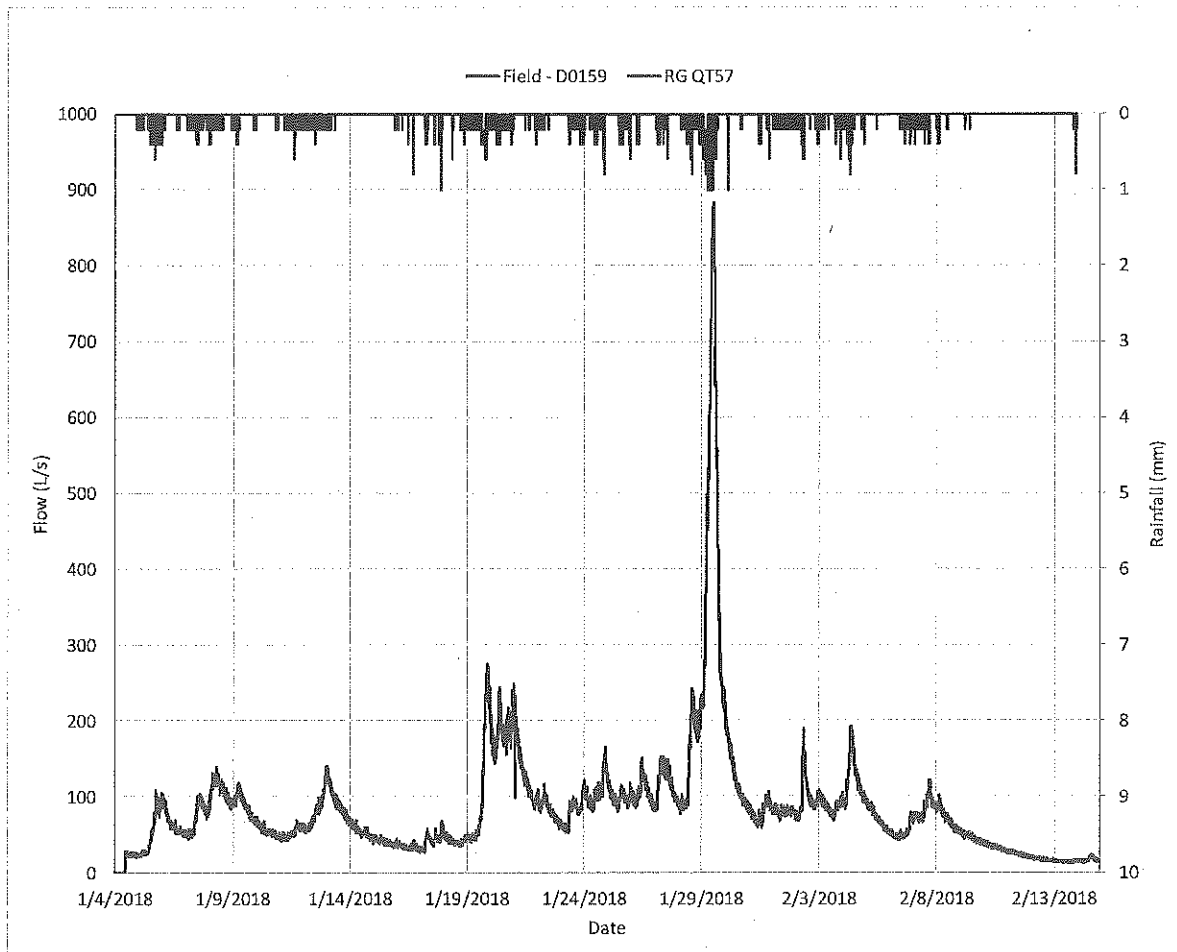
Figure 5.4: Flow Monitoring Hydrograph – Site 2



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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Figure 5.5: Flow Monitoring Hydrograph – Site 3

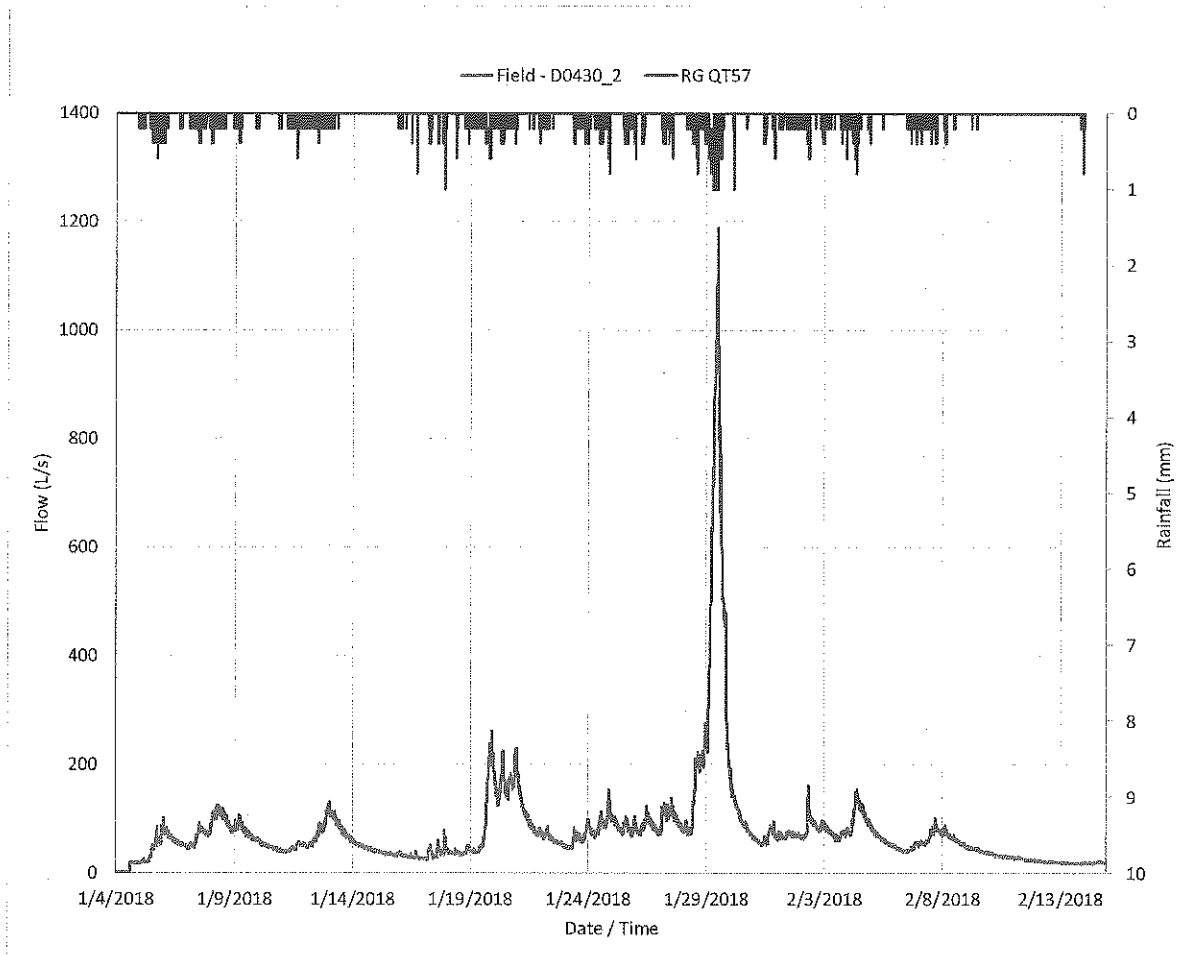


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project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

Figure 5.6: Flow Monitoring Hydrograph – Site 4



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project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

5.2.3. Storm Event Summary

By analyzing the rainfall data in conjunction with the flow monitoring data, individual storm events were identified. The storm event data from the QT57 rain gauge are summarized in **Table 5.5**.

Table 5.5: Storm Event Summary (Rain Gauge QT57)

Event	Start Date / Time	Duration (hr)	Maximum Rainfall Intensity (mm/hr)	Total Rainfall (mm)	Return Period*
1	1/5/2018 8:00	19	3.8	27.4	< 2yr
2	1/7/2018 1:00	37	2.0	31.0	< 2yr
3	1/11/2018 4:00	54	1.8	36.4	< 2yr
4	1/18/2018 18:00	55	4.2	61.6	< 2yr
5	1/28/2018 2:00	40	8.0	106.8	< 2yr
6	1/31/2018 8:00	52	4.6	29.4	< 2yr
7	2/2/2018 19:00	44	3.6	35.6	< 2yr
8	2/6/2018 10:00	51	2.4	33.0	< 2yr

**Estimated return period based on the Metro Vancouver QT57 – Westwood Plateau IDF curves.*

It is important to note that the statistics presented in **Table 5.5** are based on the QT57 rain gauge located in Westwood Plateau. Although rain gauge QT57 is thought to be a good representation of the rainfall in Anmore, the actual rainfall that occurred over the Village of Anmore may vary.

5.3. Stormwater Model

5.3.1. Hydraulic Model Development

Figure 5.7 shows the modeled drainage system elements including storm sewers, culverts, creeks, detention ponds and subcatchments. As agreed with the Village, the drainage model consisted of all pipes, plus the open-channel ditch and creek systems. In addition, some of the larger detention facilities were included. To be conservative, the on-lot detention facilities were excluded from the Village model as these facilities typically fail due to a lack of maintenance. Finally, catch basins and swales were also not included in the model.



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Legend

- Control Manhole
- ▼ Detention Pond
- ▼ Outfall
- Culvert
- Storm Main
- Creek
- Ditch
- Connectivity
- Detention
- Subcatchments
- Village of Anmore Boundary

Model Study Area



Project: Stormwater Master Plan
 Client: Village of Anmore, BC
 Date: April 2018
 Created by: RD
 Reviewed by: WdS

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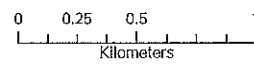


Figure 5.7
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project: Village of Anmore Stormwater Master Plan
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Storm Mains and Culverts

A review of the asbuilt record drawings was completed to develop an inventory of the underground storm mains. Information such as location, diameter, and invert elevations were extracted and used to develop the hydraulic model. The following set of asbuilt record drawings were reviewed:

- Alder Way
- Alpine Dr Sunset Ridge
- Anmore Creek Way
- Birch Wynde
- Blackberry Dr
- Burrard Thermal-Gas
- Canterwood Court
- Charlotte Crescent
- Chestnut Drive
- Countryside
- Crystal Creek
- Dogwood Dr
- Eaglecrest Dr
- East Rd
- Elementary Rd
- Fern Dr
- Hemlock Dr (West)
- Hummingbird
- Kinsey Dr (Pinnacle Ridge)
- Lancaster
- Magnolia Way
- Mountain Ayre
- Ravenswood Dr
- Seymour View
- Sparks Way
- Spence Way
- Strong Rd
- Sugar Mountain
- Summerwood
- Sunnyside
- Thompson Rd
- Uplands
- Wollny Court
- Wyndam Crescent

Culverts were defined in the model based on data collected during the culvert survey conducted by USL. In addition to the culverts surveyed by USL, additional culverts were identified during model development. The geometry of these additional culverts was field-verified by GeoAdvice, while the invert elevations were assumed based on an assumed depth below ground.

Manning's "n" roughness coefficients were assigned to the storm mains and culverts based on material according to **Table 5.6**.

Table 5.6: Storm Main and Culvert Roughness Coefficient

Material Type	Manning's Roughness Coefficient*
Concrete	0.013
PVC	0.013
CMP	0.024
Unknown	0.013

**Roughness coefficients based on information from the Village of Anmore Works and Services Bylaw Consolidated No. 242 1998.*

Modeled storm mains and culverts with an inlet or outlet were assigned an entrance loss coefficient of 0.5 and an exit loss coefficient of 1.0, respectively.

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Ditches and Creeks

Ditches connecting driveway culverts were manually created in the model with assumed maximum side slopes of 1.5:1 (Horizontal:Vertical) and a minimum bottom width of 0.3 m, as defined in the Village design criteria. Note that some roadside ditches are known to be either larger or smaller than these assumed dimensions; however, field survey to establish the actual size of all roadside ditches was beyond the scope of this project.

The major creeks including the Anmore, Mossom, and Schoolhouse Creeks were defined based on LiDAR digital elevation data. Creek locations, transects and invert elevations were extracted from this digital data.

Manning's "n" roughness coefficients were assigned to open channels based on industry standards and as shown in **Table 5.7**.

Table 5.7: Open Channel Roughness Coefficient

Feature Type	Manning's Roughness Coefficient
Excavated Ditch	0.03
Natural Channels	0.05

Junctions and Control Structures

Junctions were added in the model to provide pipe-to-pipe and open channel-to-channel connectivity. Additionally, some of the junctions were used in the model to represent where runoff is loaded into the system or to allow stormwater to exit the system. Junctions also provide connectivity where transitions between different physical attributes such as size and slope occur.

The following GIS point layers were provided by the Village and used to define the junction features in the model:

- Manholes
- Control manholes
- Inlets
- Outlets

Rim elevations for junctions with missing ground elevation data were extracted from LiDAR data. For the junctions with missing invert elevations, an assumed depth below ground value was assigned to establish inverts.

Control manholes are utilized to provide hydraulic control in the storm main system. **Table 5.8** summarizes the modeled control manholes and the corresponding asbuilt drawings provided by the Village.

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Table 5.8: Modeled Control Manholes

Control Manhole ID	Location	Asbuilt Drawing No.
J0214	2160 Summerwood Ln	02.104-10
J0285	1130-1150 Mountain Ayre Lane	96.47(PH.2)-3
J0352	Uplands Drive & Anmore Creek Way	07.79-5
J0767	768 Sunset Ridge	N/A
J1162	206 Kinsey Drive	4569-DP-02
J1166	1770 Lancaster Court	96.47(PH.3)-10
J1182	98-2 Leggett Drive	09.57-23
J1193	2665 Fern Drive	02.65(PH.2)-18
J1199	2664 Fern Drive	Assumed
J1209	39 Birch Wynde	03.28-6 (Storm MH 3)
J1212	1 Alder Way	03.28-6 (Storm MH 1)
J1251	1078-1080 Uplands Drive	2111-02136-0 no. 29/36
J1255	1040 Heron Way	2111-02136-0 no. 30/30
J1261	1780 East Road	06.40-14
J1294	1462 Crystal Creek Drive	133758 no. 07
J1299	149 Dogwood Drive	01.20-16
J1332	Eaglecrest Road New Development	2015-08 p.11

Detention Facilities

Drainage within the study area is managed in part by detention facilities. These facilities serve a key role in creek flow and flood management.

The storage geometry and volume for each of the modeled detention facilities were either extracted from asbuilt drawings or estimated using the LiDAR data. Inlet and outlet controls of each detention facility were defined using weirs and/or orifices based on information from asbuilt drawings. **Table 5.9** summarizes the detention facilities included in the model.

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Table 5.9: Modeled Detention Facilities

Storage ID	Type	Location	Asbuilt Drawing No.
SU01	Detention Pond	206 Kinsey Drive Detention Pond 1	4569-PP-08 4569-DP-01 4569-DP-02
SU02	Detention Pond	206 Kinsey Drive Detention Pond 2	4569-PP-08 4569-DP-01 4569-DP-02
SU03	Detention Pond	110 Dogwood Drive Detention Pond	01.20-16
SU04	Detention Pond	Eaglecrest Dr & Chestnut Ct Detention Pond 1	2015-08 p.10-11
SU05	Detention Pond	Eaglecrest Dr & Chestnut Ct Detention Pond 2	2015-08 p.10-11
D0207	Storage Pipe	2664 Fern Drive	Assumed
D0208	Storage Pipe	2676 Fern Drive	02.65(PH.2)-13
D0523	Storage Pipe	1770 Lancaster Court	96.47(PH.3)-7
D0532	Storage Pipe	10 Leggett Drive	09.57-13
D0533			
D0534			
D0536			
D0556	Storage Pipe	39 Birch Wynde	03.28-4
D0559	Storage Pipe	8 Alder Way	03.28-3
D0565	Storage Pipe	768 Sunset Ridge	2011-01712-1 p.1
D0576	Storage Pipe	Mountain Ayre Lane	96.47(PH.2)-3
D0578	Storage Pipe	2160 Summerwood Lane	02.104-10
D0587	Storage Pipe	Heron Way & Uplands Drive	2111-02136-0 p.29
D0588			2111-02136-0 p.29
D0592	Storage Pipe	1046 Heron Way	2111-02136-0 p.30
D0619	Storage Pipe	Between Bedwell Bay Road & Crystal Creek Drive	133758 no. 07

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project: Village of Anmore Stormwater Master Plan
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Storage ID	Type	Location	Asbuilt Drawing No.
D0691	Storage Pipe	Uplands Drive & Anmore Creek Way	07.79-5
D0646	Storage Pipe	Eaglecrest Road New Development	2015-08 p.11
D0702			2015-08 p.11
D0707	Storage Pipe	Wollny Court & East Road	06.40-9
D0708			
D0709			
D0710			

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project ID: 2017-051-ANM

5.3.2. Hydrologic Model Development

Subcatchment Delineation

Subcatchments are hydrologic units of land whose topography and drainage system elements combine to direct surface runoff and groundwater interflow into the network system. Model subcatchments were delineated based on surface topography and location of conveyance features. The result is over 1,100 subcatchments, each consisting of smaller subcatchments in developed areas and larger subcatchments located in the natural undeveloped areas. The calibrated subcatchment parameters are summarized below.

Subcatchment Width and Length

Width and length subcatchment properties characterize the overland flow path and the time of concentration for sheet flow runoff to the loading point.

Subcatchment widths for small subcatchments (less than or equal to 0.2 ha) were estimated based on the assumption that the flow length is 50 m, representing the typical distance between the furthest point of the parcel to the fronting storm sewer. The subcatchment width formula is:

$$width = \frac{Area}{length} = \frac{Area}{50\ m}$$

Subcatchment widths for larger subcatchments (greater than 0.2 ha) were estimated based on the presumption that both catchment shape and local flow barriers increase the overland flow length. The subcatchment width formula is:

$$width = \frac{Area}{length};\ length = 1.7 \times \sqrt{Area}$$

A factor of 1.7 was used to define the subcatchment width as shown in the above formula. This factor was used based on engineering judgement from similar models.

Subcatchment Slope

Subcatchment slopes were estimated based on calculating the average slope over the catchment using LiDAR data and then dividing by 2. The division by 2 provides for a longer simulated time of concentration due to meandering channels and piped networks that are not parallel with the direction of the average slope.

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Subcatchment Hydrologic Parameters

Table 5.10 summarizes the hydrologic parameters that were uniformly applied to all the subcatchments. These values were selected based on industry publications and engineering judgement.

Table 5.10: Subcatchment Hydrologic Modeling Parameters

Hydrologic Parameter	Value
Depression Storage	
Pervious Area (mm)	5.0
Impervious Area (mm)	0.5
Manning's "n" Roughness Coefficient	
Pervious Area "n"	0.40 (undeveloped) 0.20 (developed)
Impervious Area "n"	0.05

Source: Parameter values based on consideration of ASCE (1992)² and McCuen, R. et al. (1996)³.

Subcatchment Impervious Percentage

The impervious percentage and the portion assumed to be routed to pervious area for each subcatchment, as defined in **Table 5.11**, were estimated based on existing land use coverage as defined in **Section 3**.

Table 5.11: Village of Anmore Subcatchment Imperviousness per Landuse

Zone	Description	Total Imperviousness (%)	Runoff Routed to Pervious Area (%)
RS-1	Residential 1	50	25
RCH-1	Compact Housing 1	70	25
RCH-2	Compact Housing 2	70	25
CD	Comprehensive Development	70	25
C-1	Local Commercial	80	25
C-2	Campground Commercial	60	25
C-3	Equestrian Commercial	60	25
P-1	Civic Institutional	50	25
P-2	Park	20	100
W-1	Watershed	10	100
I-1	Industrial	80	25
Road	Road	70	25

² ASCE (1992). *Design & Construction of Urban Stormwater Management Systems*, New York, NY

³ McCuen, R. et al. (1996). *Hydrology*, FHWA-SA-96-067, Federal Highway Administration, Washington, DC

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It was assumed that 25% of runoff from developed areas is routed to pervious surfaces, and 100% of runoff from natural areas (P-2 and W-1) is routed to pervious surfaces.

Base Flow

The 2018 flow monitoring data showed that Sites 2 and 3 experienced the greatest base flows. Indeed, Sites 2 and 3 captured upstream catchments that consist of primarily flatter terrain (less than 20% slope) which has a greater potential for groundwater discharge into the drainage system. Based on recorded flow data and using Site 2 as a proxy for the other areas, a baseflow of 1 L/s/ha was applied to catchments with flatter terrain. No base flow was applied for catchments with slopes greater than 20%.

Soil and Catchment Infiltration

Soil information was extracted from the Detailed Soil Survey (DSS) Compilation GIS layer available through Agriculture and Agri-Food Canada. The infiltration rates assumed for each soil type were extracted from the EPA-SWMM Manual 5.1 (Rawls W. J. et al., (1983). J. Hyd. Engr.). The modified Horton infiltration process was used to characterize soil infiltration characteristics in the model. The Horton infiltration parameters are summarized in **Table 5.12**.

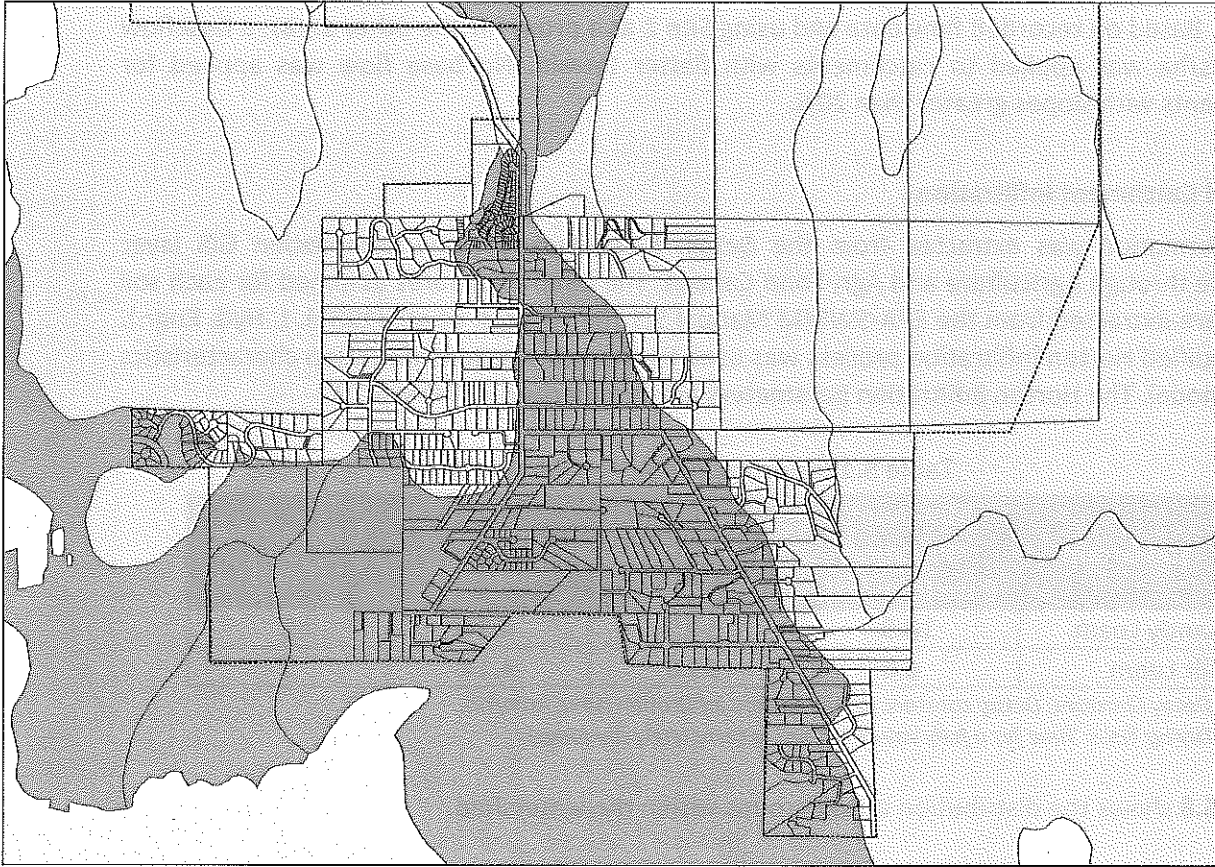
Table 5.12: Horton Infiltration Parameters

Soil Group	Minimum Infiltration Rate (mm/hr)	Maximum Infiltration Rate (mm/hr)	Decay Constant	Drying Time (days)
Sandy Loam	10.9	54.5	4.14	5
Silt Loam	6.6	33.0	4.14	5

Decay Constant: Decay constant for the Horton infiltration curve (mm/hr).

Drying Time: Time for a fully saturated soil to completely dry (days).

Figure 5.8 shows the distribution of soil groups within the watershed.



Legend

- Village of Anmore Boundary
- Soil Classification***
- Silt Loam
- Sandy Loam

*Source: Detailed Soil Survey (DSS) Completions, Agriculture and Agri-Food Canada

Soil Type Classification



Project: Stormwater Master Plan
Client: Village of Anmore, BC
Date: April 2018
Created by: RD
Reviewed by: WdS

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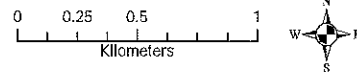


Figure 5.8
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project: Village of Anmore Stormwater Master Plan
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Groundwater

The 2018 flow monitoring data show that groundwater interflow is present in the system. The groundwater flow was modeled using the following equation:

$$\text{Groundwater flow} = A_1(D_1 - BC)^{B_1},$$

Where:

- A_1 is the groundwater flow coefficient
- B_1 is the groundwater flow exponent
- BC is the channel bottom elevation above bottom of surficial aquifer
- D_1 is the average water table elevation above bottom of surficial aquifer taken midway between channel and edge of sub-basin

The 2018 data also showed that groundwater flow from catchments with steeper terrain was different than catchments with flatter terrain. As such, calibration of groundwater parameters for subcatchments with slopes greater or equal to 20% differed from subcatchments with slopes less than 20%, as shown in **Table 5.13**.

Table 5.13: Groundwater Parameters Calibrated Values

Parameter	Flatter Terrain (Slope < 20%)	Steeper Terrain (Slope >= 20%)
A_1	0.2	0.05
B_1	2	2

The groundwater module in the SWMM engine requires that a surficial aquifer be defined. The aquifer parameters used in the Village model are presented in **Table 5.14**.

Table 5.14: Aquifer Parameters

Aquifer Parameter (Unit)	Calibrated Value
Porosity (Fraction)	0.5
Wilting Point (Fraction)	0.15
Field Capacity (Fraction)	0.28
Conductivity (mm/hr)	20
Conductivity Slope	10
Tension Slope	15
Upper Evaporation Fraction	0.35
Lower Evaporation Depth (m)	14
Lower GW Loss Rate (mm/hr)	0.002
Bottom Elevation (m)	0
Water Table Elevation (m)	10
Unsaturated Zone Moisture (Fraction)	0.28

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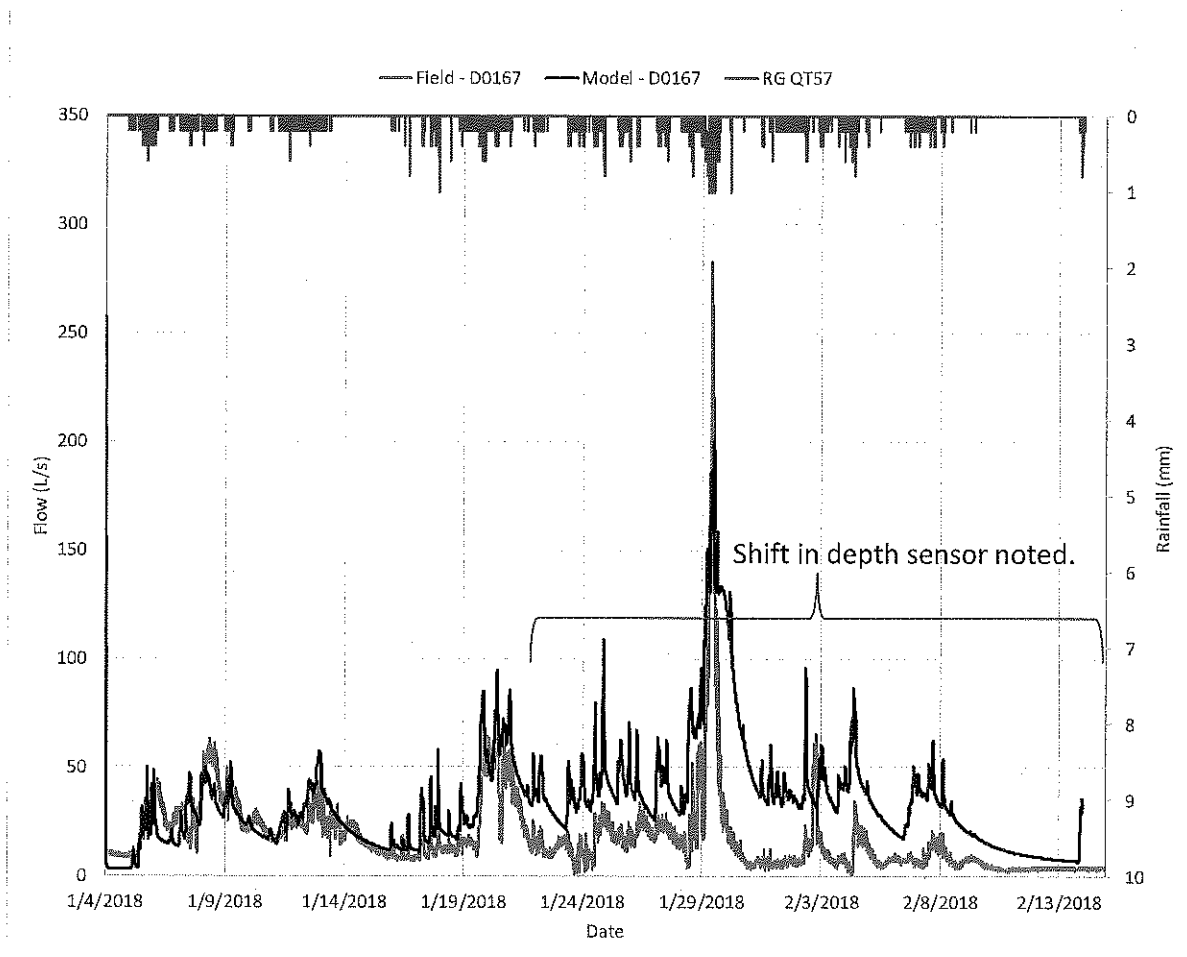
project: Village of Anmore Stormwater Master Plan
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5.3.3. Model Calibration

Rather than simulating individual storm events for model calibration, a continuous simulation from January 2 to March 7, 2018 was run. Continuous simulation allows the model to simulate the impacts of antecedent moisture conditions on catchment flows between back-to-back storm events. The model parameters were adjusted in an iterative manner until model results achieved an acceptable correlation with the measured flow data for the storm events identified. The calibrated model parameters were presented in **Section 5.3.2**.

Figure 5.9 to Figure 5.12 show the calibration flow hydrographs comparing the modeled and measured flows at each flow monitoring site.

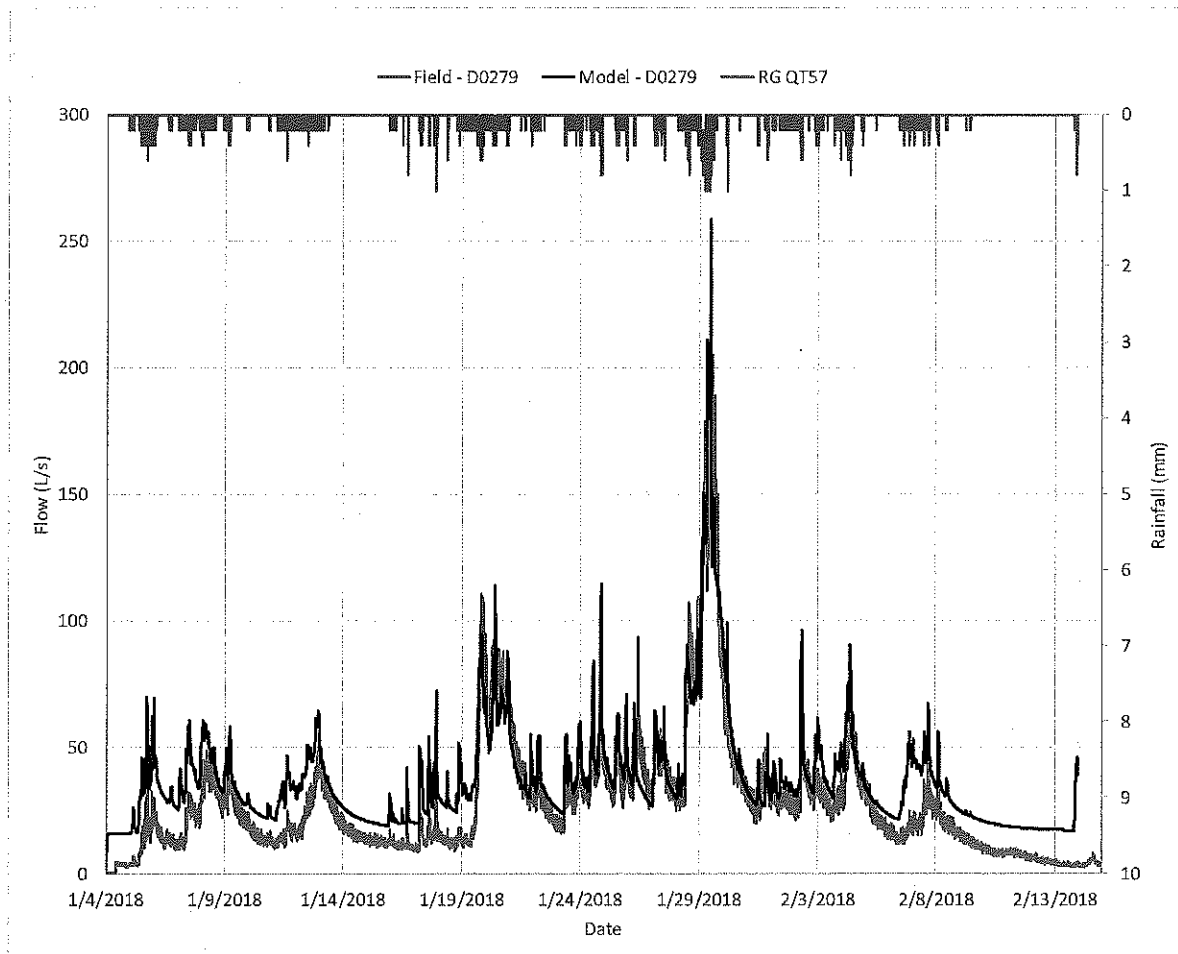
Figure 5.9: Anmore Calibration Hydrograph – Site 1



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Figure 5.10: Anmore Calibration Hydrograph – Site 2

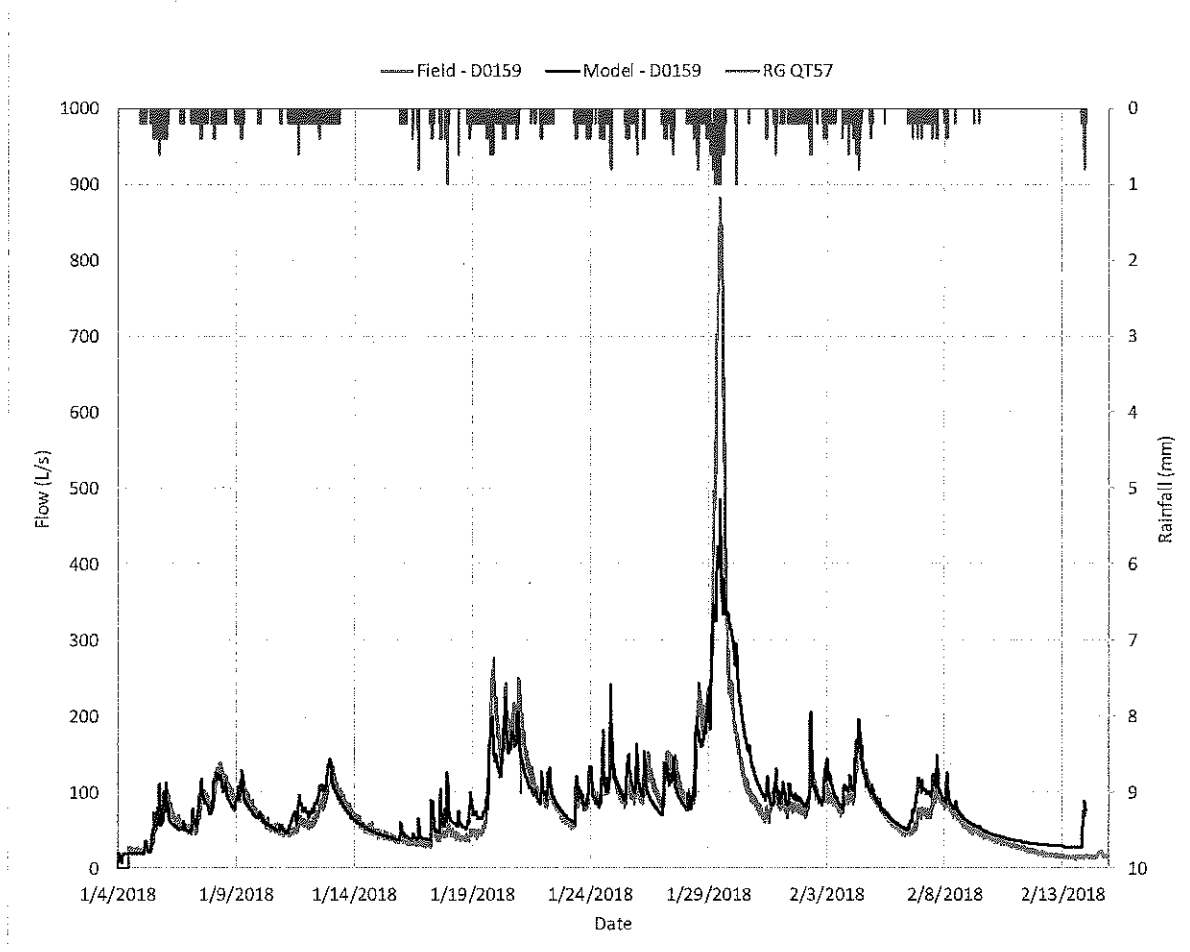


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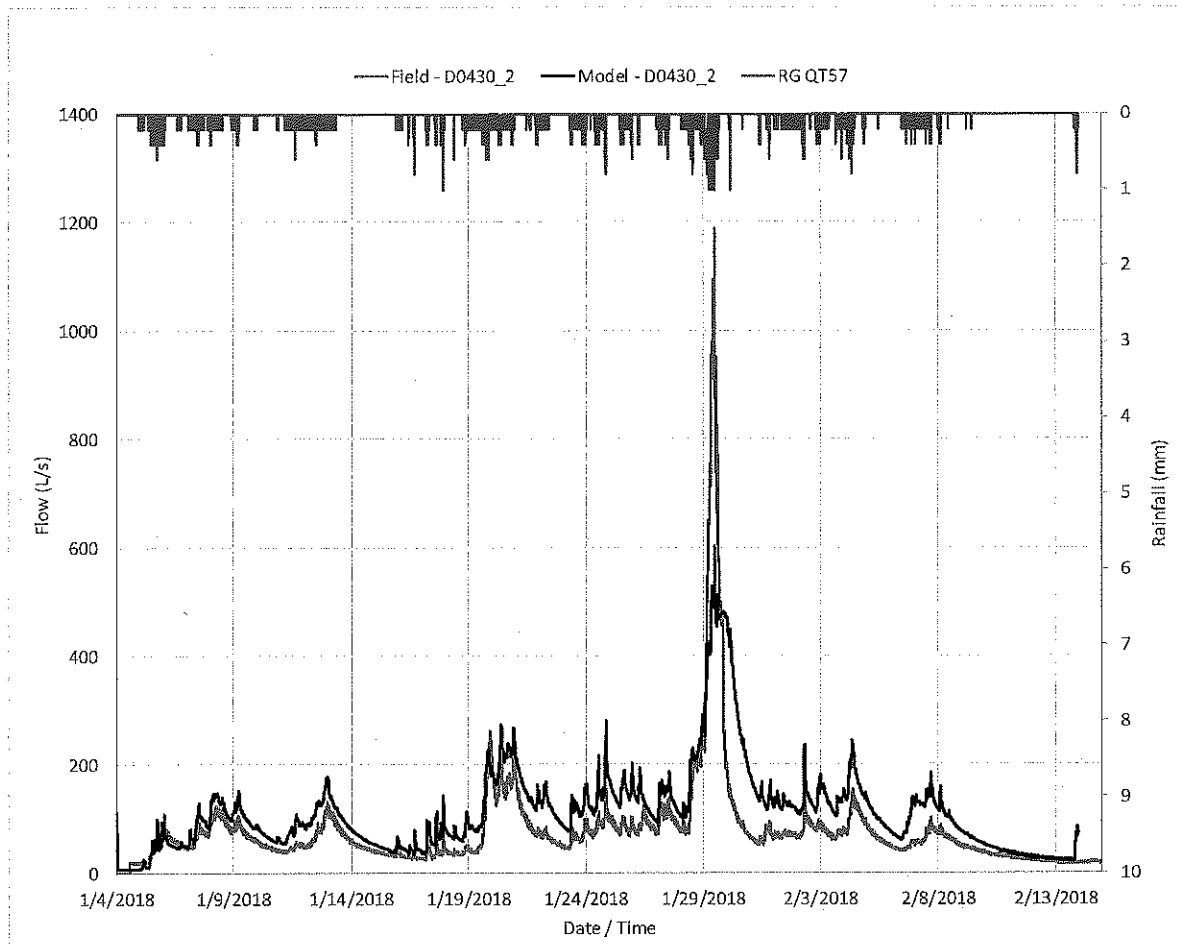
Figure 5.11: Anmore Calibration Hydrograph – Site 3



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Figure 5.12: Anmore Calibration Hydrograph – Site 4



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Overall, the model shows an acceptable agreement with the measured flows at the four flow stations. Event 5 (January 28, 2018), the largest event captured, show larger flow and volume discrepancies at Sites 1, 3 and 4, which may be caused by precipitation inaccuracies as described below:

- Rain gauge QT57 located in Westwood Plateau is approximately 3 km away from the Anmore Village Centre.
- There is a certain degree of uncertainty when rainfall data recorded at a fixed location are applied to large or distant areas. Microclimates often exist within large areas and often cause variations in localized precipitation volume and intensity that cannot be reflected in the model.
- Additionally, the storm events used for model calibration consisted of less than 2-year return periods. For best calibration results, it is recommended that the model be validated against larger storm events when data becomes available.

The parameters derived during calibration were applied to the remainder of the unmonitored study area. Final catchment characteristics and calibrated parameters are summarized in **Table 5.15**.

Table 5.15: Catchment Characteristics and Calibrated Parameters

Site Number	1	2	3	4
Area (ha)	23	16	52	94
Average Flow Length (m)	276	231	404	331
Average Width (m)	96	81	140	115
Average Slope (%)	11	7	12	13
Average TIMP (%)	34	44	29	27
Average Routed to Perv. (%)	73	65	79	86
Average Max Infil. (mm/hr)	55	33	47	51
Average Min Infil. (mm/hr)	11	7	9	10
Flatter Terrain Slopes (%)	13%	100%	37%	9%
Steeper Terrain Slopes (%)	87%	0%	63%	91%
Land Use Distribution				
Residential 1	49%	53%	35%	23%
Comprehensive Development 6	0%	0%	3%	0%
Park	19%	31%	8%	44%
Watershed	27%	0%	50%	28%
Road	5%	16%	4%	5%

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6. Assessment of Existing and Future Drainage Systems

6.1. Future Drainage System

To assess the impact on areas that are anticipated to undergo land use changes, the future OCP land use information as shown in **Figure 3.2** and the estimated hydrology parameters presented in **Section 5** were used to create the future modeling scenario. The primary difference between the existing and future scenario is the increased runoff resulting from the following:

- Increase in impervious areas;
- Increase in directly connected impervious areas; *and*
- Decrease in surface roughness of pervious areas.

When conducting the capacity analysis, future flow management controls were not considered as agreed with the Village. This approach is conservative and represents a worst-case scenario.

6.2. Capacity Assessment

Design storms were simulated to assess the hydraulic capacity of the existing conveyance system of culverts and storm mains under existing and future OCP land use conditions. The assessment was completed by simulating the design storms summarized in **Section 4.3** and applying the design criteria summarized in **Section 4.2**. Each asset was assessed using a capacity Likelihood of Failure (LoF) rating system as described below.

Capacity LoF was determined using the hydraulic capacity (q/Q) and hydraulic grade line (HGL) model results under peak conditions. **Table 6.1** and **Table 6.2** summarize the criteria used to define the capacity LoF rating for the culverts and storm mains.

Table 6.1: Hydraulic and HGL Scoring Criteria

Criteria	Result
Hydraulic Capacity (q/Q = peak flow / full pipe flow)	
$q/Q < 1$	A
$q/Q \geq 1$	B
Hydraulic Grade Line (HGL)	
HGL < Crown Elevation OR Surge Duration ≤ 15 min	A
Crown Elevation \leq HGL < Ground Elevation AND Surge Duration > 15 min	B
HGL \geq Ground Elevation	C

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Table 6.2: Capacity LoF Ratings

Capacity LoF	Hydraulic	HGL	Description
1	A	A	Conduit performing as designed
2	A	B or C	Adequate capacity, downstream condition causing backwater
3	B	A	Marginal capacity
4	B	B	Capacity exceeded and surcharging likely
5	B	C	Capacity exceeded and flooding likely

Table 6.3 and Table 6.4 summarize the capacity LoF rating results.

Table 6.3: Existing Land Use Capacity LoF Rating Results

Capacity LoF	Number of Storm Mains*	Number of Minor System Culverts	Number of Major System Culverts
1	221	398	44
2	27	1	1
3	5	13	1
4	6	0	0
5	4	11	7

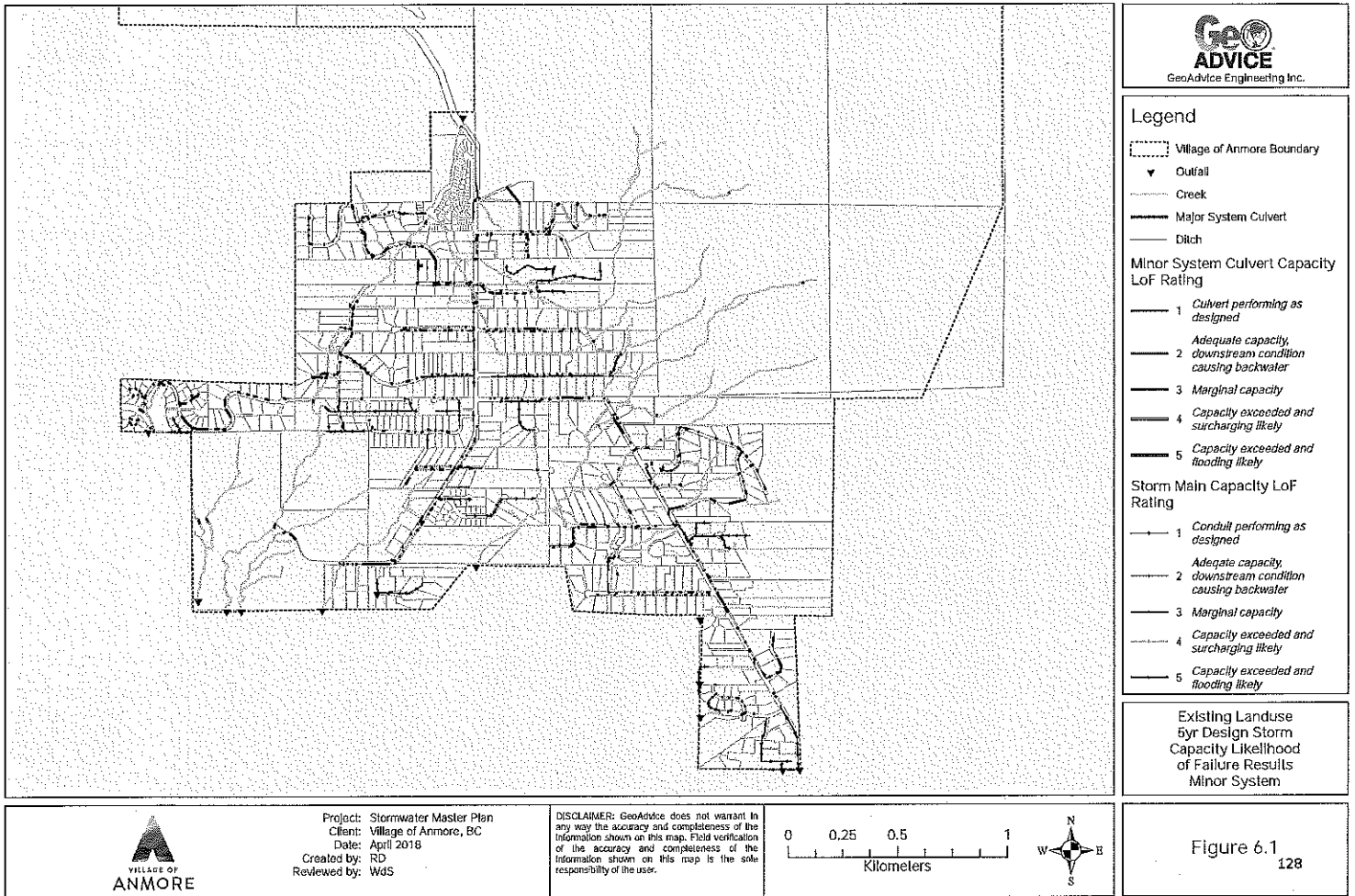
*Includes 23 detention pipes.

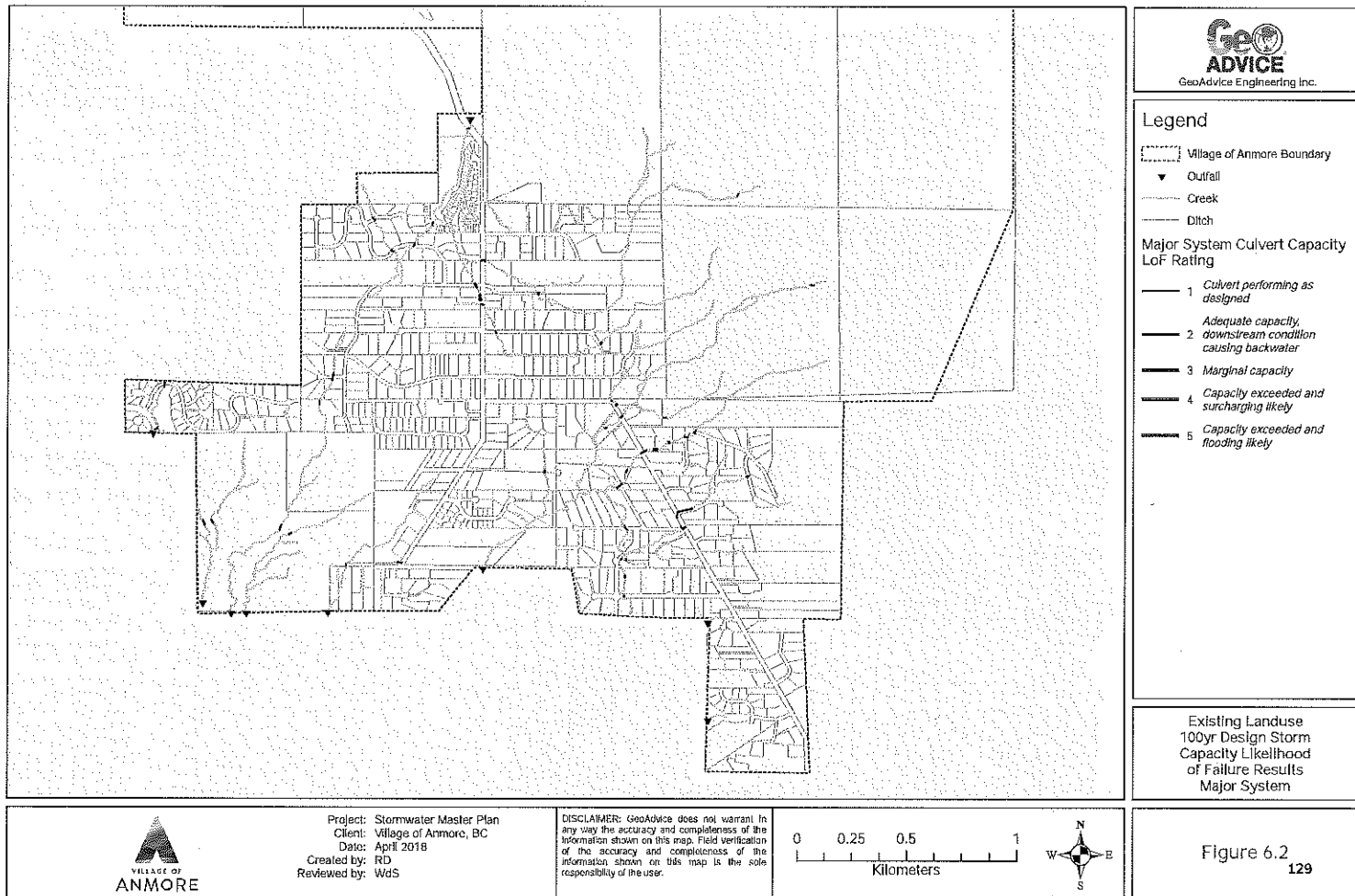
Table 6.4: Future Land Use Capacity LoF Rating Results

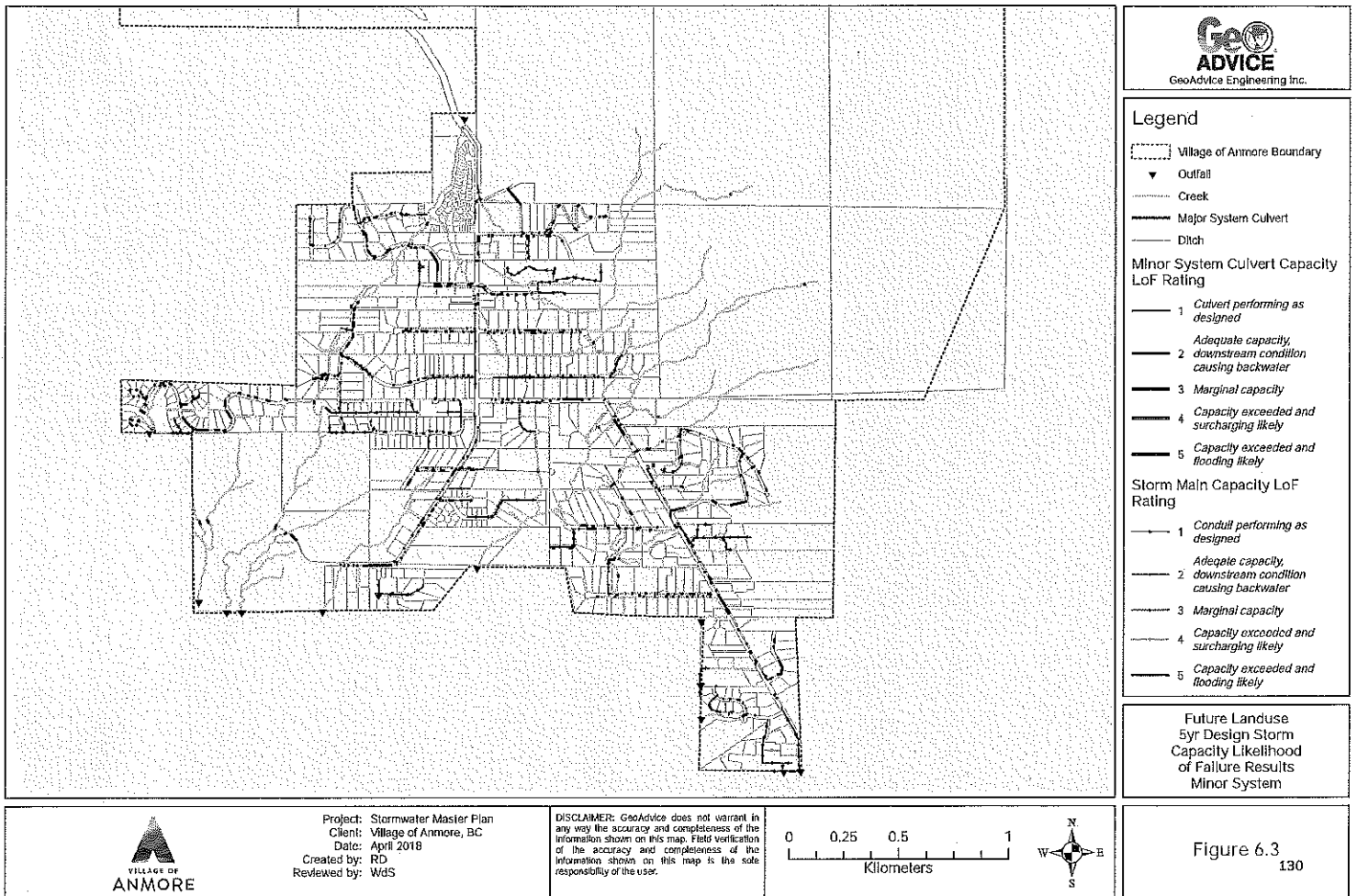
Capacity LoF	Number of Storm Mains*	Number of Minor System Culverts	Number of Major System Culverts
1	210	394	44
2	34	1	1
3	8	14	1
4	7	0	0
5	4	14	7

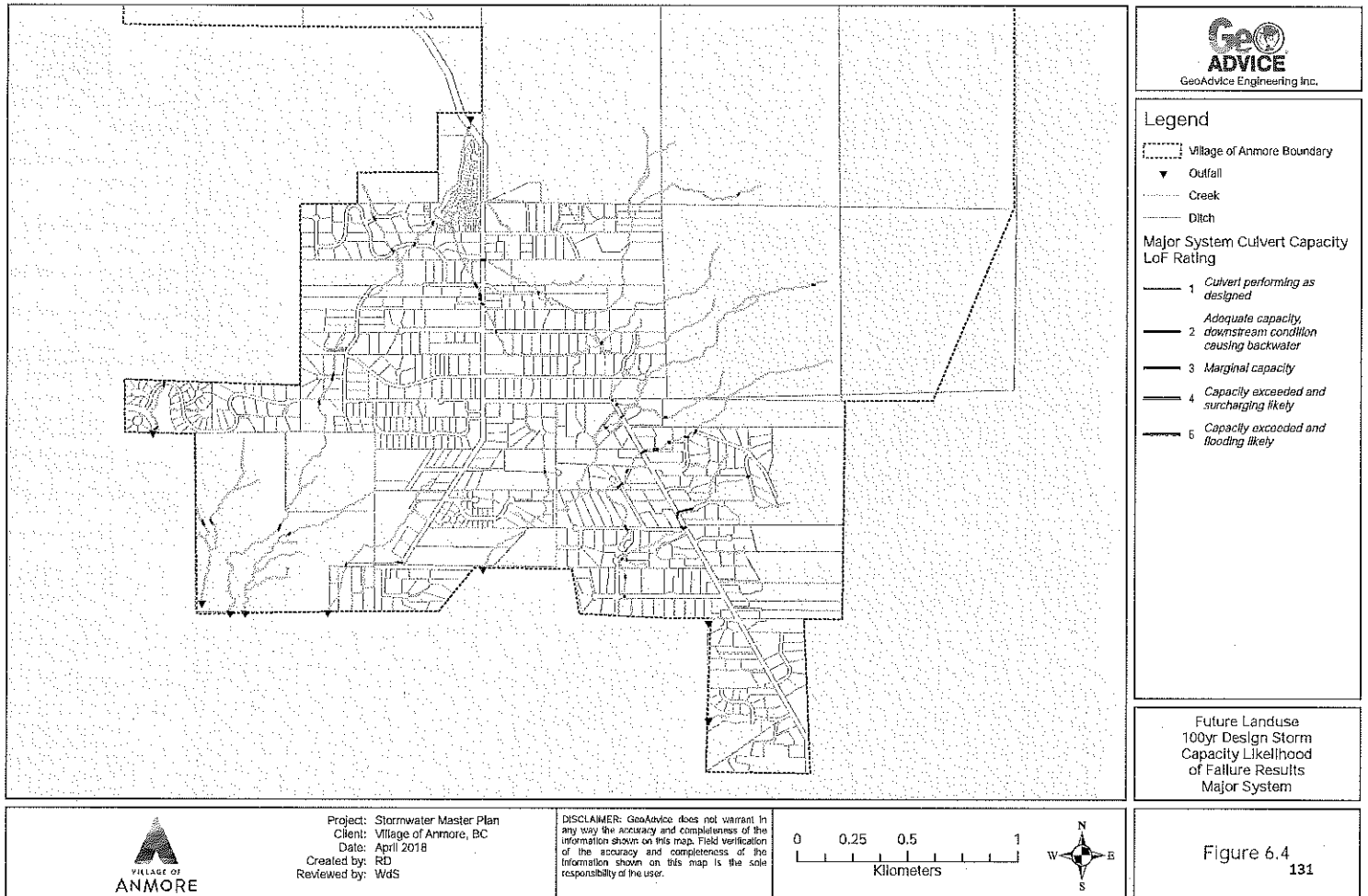
*Includes 23 detention pipes.

Figure 6.1 to Figure 6.4 show the capacity LoF rating results for the existing and future land use scenarios.









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6.3. Risk Assessment

To assess the risk associated with each culvert and storm main should the asset fail, condition and capacity LoF ratings were analyzed together with its corresponding consequence of failure to develop an overall risk score. The methodology to determine an asset's consequence of failure rating is described below.

Consequence of Failure

The consequence of failure was defined in this study as a function of the road classification as agreed with the Village. For example, the consequence of failure of a culvert or storm main located in a park will impact fewer people and cost less to repair damages than a culvert located under a heavily traveled roadway such as East Rd or Sunnyside Rd. **Table 6.5** defines the consequence of failure based on road classification.

Table 6.5: Village of Anmore Consequence of Failure Ratings

Consequence of Failure	Road Classification
1	No Road
2	Local Road
3	Arterial Road (i.e. East Rd/Sunnyside Rd)

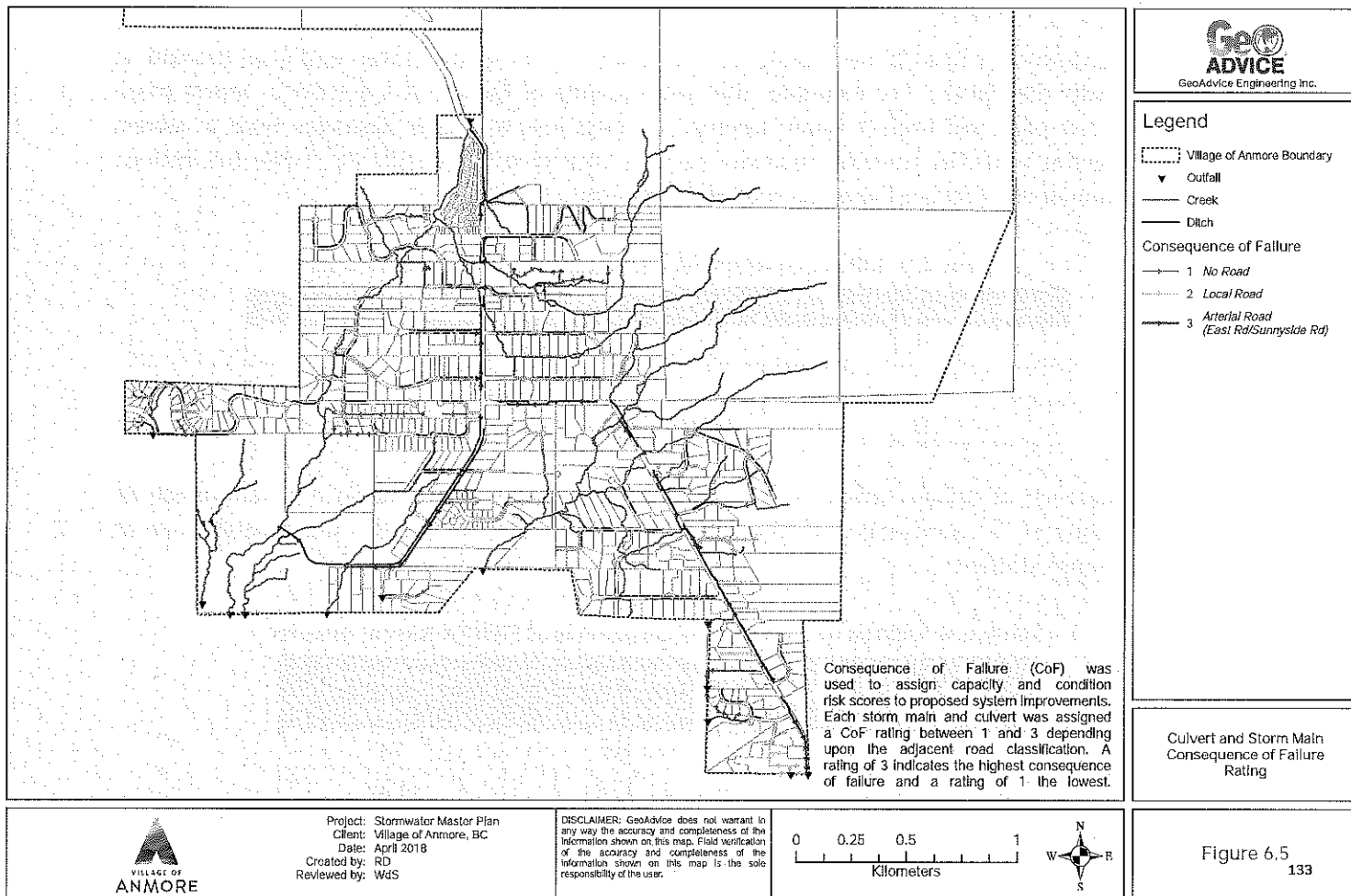
A consequence of failure rating of '1' represents the least impact, while a consequence of failure rating of '3' represents the greatest impact. **Table 6.6** summarizes the consequence of failure ratings statistics.

Table 6.6: Village of Anmore Consequence of Failure Rating Results

Consequence of Failure	Number of Storm Mains*	Number of Culverts
1	68	14
2	152	356
3	43	106

**Includes 23 detention pipes.*

Figure 6.5 shows the consequence of failure ratings for the storm mains and culverts.



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Risk Score

Matrices of the relationship between an asset's condition and capacity LoF ratings and its consequence of failure ratings are shown in **Figure 6.6**. The matrices were used to assign condition and capacity risk scores to each asset. A risk score of '1' represents the lowest risk while a risk score of '3' represents the highest risk.

Figure 6.6: Condition and Capacity Risk Score Matrices

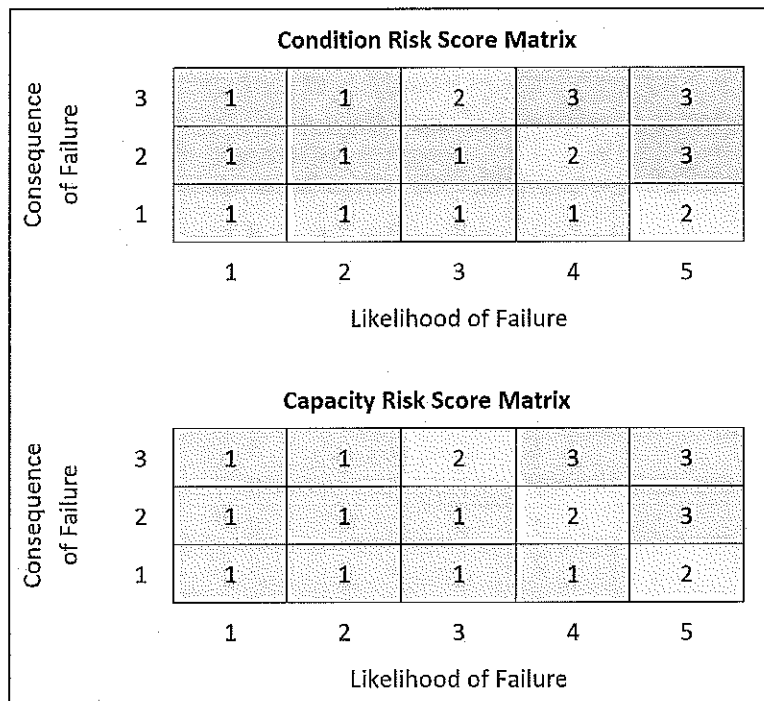


Table 6.7 below summarizes the condition and capacity risk score results.

Table 6.7: Condition and Capacity Risk Results

Risk Score	Condition***		Existing Land use - Capacity			Future Land use - Capacity		
	Storm Main*	Culvert*	Storm Main*	Minor System Culvert	Major System Culvert	Storm Main*	Minor System Culvert	Major System Culvert
1	42	389	253	410	45	251	407	45
2	220	75	9	2	1	11	2	1
3	1	12	1	11	7	1	14	7

*Includes 23 detention pipes.

**Includes minor and major systems culverts.

***Culverts and storm mains with unknown condition were assumed a condition risk score of 2 (Refer to **Appendix A**).

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Prioritization

A benefit of developing risk scores for the Village's drainage assets is that it provides a decision-making process for near-term and long-term capital planning. Priority ratings were assigned to each asset based on the asset's condition and capacity risk scores. The overall priority rating, as presented in **Table 6.8**, combines the condition, capacity and consequence failure risk assessments into a single 1 to 5 priority rating. A rating of '1' represents the highest priority and a rating of '5' represents the lowest priority.

Table 6.8: Overall Level of Priority Rating

Priority	Risk Score			Total Risk Score
	Condition	Existing Capacity	Future Capacity	
1 (highest priority)	3	3	3	Total risk score = 9
2	3	2	3	Total risk score = 8
	2	3	3	
3	3	2	2	Total risk score = 7
	3	1	3	
	2	2	3	
	1	3	3	
4	3	1	2	Total risk score = 6
	2	1	3	
	1	2	3	
5 (lowest priority)	3	1	1	Total risk score = 5
	1	1	3	

Assumptions:

- Only culverts or storm mains with at least one risk score equal to 3 were considered for upgrade.
- Culverts and storm mains with unknown condition LOF rating were assumed a condition risk score of 2.

Only culverts and storm mains with a condition or capacity risk score of '3' were considered critical and were considered for improvement. **Table 6.9** summarizes the priority rating results.

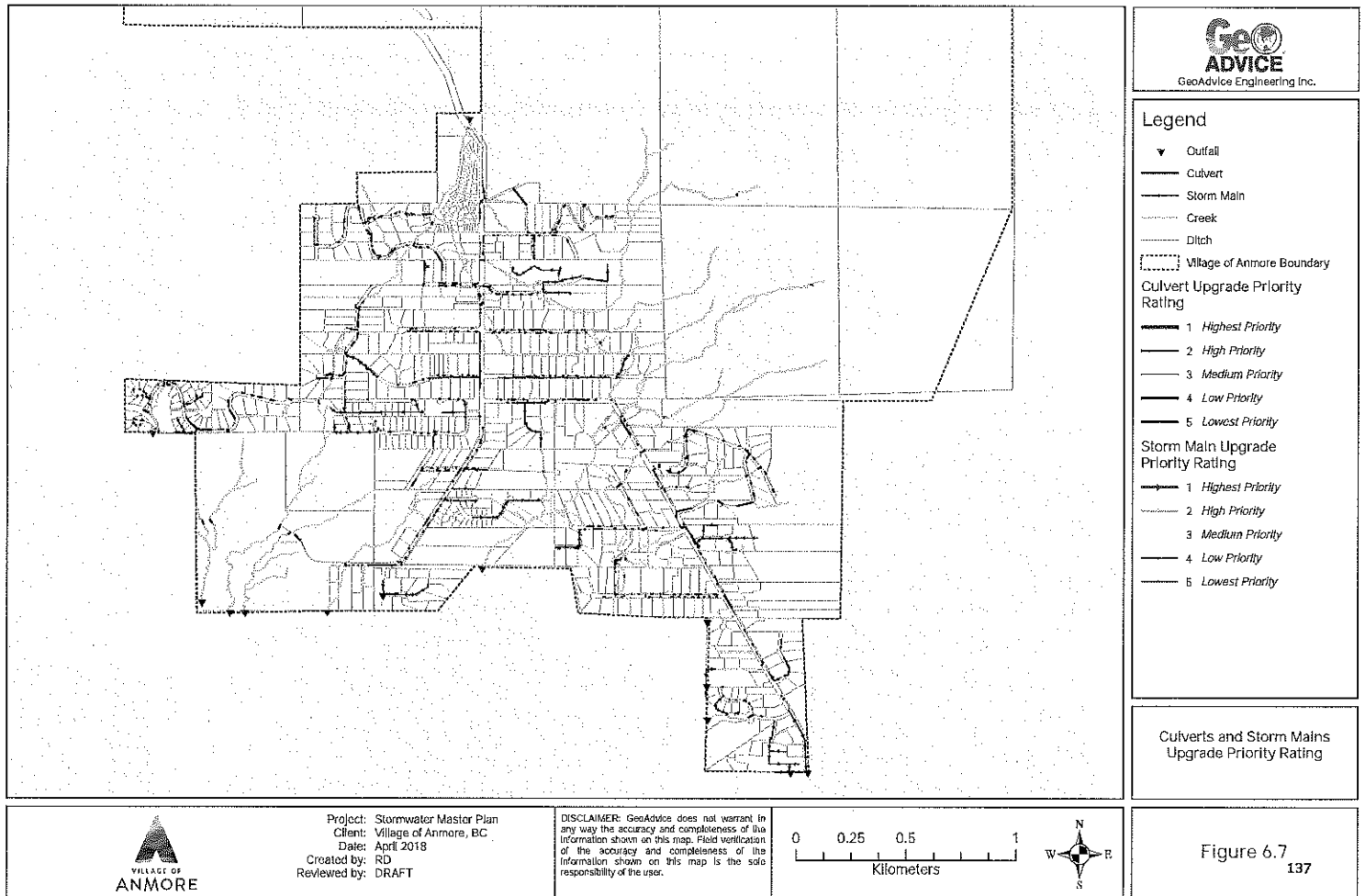
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Table 6.9: Culverts and Storm Mains Priority Rating Results

Priority	Number of Storm Mains	Number of Minor System Culverts	Number of Major System Culverts
1	0	0	2
2	0	2	3
3	1	9	2
4	0	0	0
5	1	12	1

Figure 6.7 shows the location of culverts or storm mains with priority ratings of 1 to 5.



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7. Recommended Improvements

7.1. Culvert and Storm Main Improvements

Recommended improvements were sized to convey the flows simulated under the future land use scenario with consideration of impacts from climate change. All culvert and storm main upgrades were assumed to be circular shape with the same existing slope and a Manning's 'n' roughness coefficient of 0.013. For condition-driven improvements where the required size was smaller than the existing size, the existing size or the minimum required size defined in the design criteria, whichever is greater, was recommended.

Table 7.1 lists the culvert and storm main improvements triggered by capacity and condition risks. The recommended improvements were grouped into projects based on physical location and flow path. The project ID indicates the priority for the projects. Finally, the cost estimates for each upgrade were provided by ISL and are not a guarantee of actual construction costs.

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Table 7.1: List of Culvert and Storm Main Improvements

Project ID	Model ID	Location	Length (m)	Existing Diameter (mm)	Upgrade Diameter (mm)	Design Peak Flow (L/s)****	Upgrade Trigger	Priority	System	Conduit Type	Cost Estimate (\$)
1***	D0227	Sugar Mountain/ Sunnyside	27.8 m	450 mm	450 mm	158 L/s	Condition	5	Minor	Storm Main	\$24,000
	D0158	Sunnyside Rd	18.1 m	450 mm	675 mm	592 L/s	Capacity	3	Minor	Storm Main	\$15,000
	D0153	Sunnyside Rd	6.8 m	800 mm	1,200 mm x 2,400 mm	2,480 L/s	Capacity	2	Major	Culvert	\$34,000
	D0154			800 mm							
	D0151	Sunnyside Rd	7.1 m	600 mm	1,200 mm x 2,400 mm	2,296 L/s	Cond & Cap	1	Major	Culvert	\$36,000
	D0152			800 mm							
2	D0491	East Rd/ North of Kinsey Dr	11.1 m	450 mm	1,200 mm	2,597 L/s	Capacity	2	Major	Culvert	\$27,000
	D0017	East Rd/ North of Kinsey Dr	22.8 m	450 mm	1,500 mm	2,662 L/s	Capacity	3	Major	Culvert	\$42,000
	D0375	East Rd	30.1 m	450 mm	1,500 mm	2,690 L/s	Capacity	5	Major	Culvert	\$109,000
	D0085	Seymour View Rd	14.2 m	450 mm	1,500 mm	2,772 L/s	Capacity	5	Major	Culvert	\$62,000
	D0002	Seymour View Rd	34.0 m	900 mm	1,500 mm	3,097 L/s	Capacity	5	Major	Culvert	\$120,000
3	D0307	Alpine Dr	9.1 m	450 mm	600 mm	364 L/s	Capacity	3	Minor	Culvert	\$11,000
	D0308	Alpine Dr	7.5 m	450 mm	600 mm	370 L/s	Capacity	3	Minor	Culvert	\$10,000
	D0146	Alpine Dr/ Sunnyside Rd	30.4 m	450 mm	675 mm	376 L/s	Capacity	2	Minor	Culvert	\$32,000
4	D0210	Sunnyside Rd	7.1 m	350 mm	450mm**	2 L/s	Condition	5	Minor	Culvert	\$4,000
	D0278	Sunnyside Rd	6.1 m	300 mm	450 mm	296 L/s	Capacity	2	Minor	Culvert	\$4,000
	D0279	Sunnyside Rd	14.4 m	650 mm	675mm*	1,056 L/s	Condition	5	Major	Culvert	\$14,000
5***	D0479	East Rd	12.3 m	250 mm	450 mm	233 L/s	Capacity	3	Minor	Culvert	\$6,000
	D0464	East Rd	30.7 m	300 mm	450 mm	479 L/s	Capacity	3	Minor	Culvert	\$12,000
	D0465	East Rd	6.4 m	450 mm	450 mm	207 L/s	Condition	5	Minor	Culvert	\$4,000
	D0466	East Rd	6.7 m	450 mm	450 mm	348 L/s	Condition	5	Minor	Culvert	\$4,000
	D0467	East Rd	12.6 m	450 mm	675 mm	949 L/s	Capacity	5	Minor	Culvert	\$13,000
	D0468	East Rd	14.7 m	450 mm	750 mm	1,054 L/s	Capacity	3	Minor	Culvert	\$21,000



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Project ID	Model ID	Location	Length (m)	Existing Diameter (mm)	Upgrade Diameter (mm)	Design Peak Flow (L/s)****	Upgrade Trigger	Priority	System	Conduit Type	Cost Estimate (\$)
	D0469	East Rd	9.3 m	450 mm	750 mm	1,057 L/s	Capacity	5	Minor	Culvert	\$17,000
	D0470	East Rd	4.9 m	450 mm	900 mm	1,139 L/s	Capacity	3	Minor	Culvert	\$15,000
	D0471	East Rd	5.1 m	450 mm	900 mm	1,155 L/s	Capacity	3	Minor	Culvert	\$15,000
	D0472	East Rd	9.6 m	450 mm	900 mm	1,153 L/s	Capacity	5	Minor	Culvert	\$19,000
	D0474	East Rd	26.2 m	450 mm	1,050 mm	1,426 L/s	Capacity	5	Minor	Culvert	\$41,000
	D0475	East Rd	5.5 m	900 mm	1,200 mm	1,608 L/s	Capacity	5	Minor	Culvert	\$18,000
	D0429	East Rd	5.5 m	900 mm	1,200 mm	1,599 L/s	Capacity	5	Minor	Culvert	\$18,000
	D0424	East Rd	14.3 m	650 mm	675mm*	401 L/s	Condition	5	Minor	Culvert	\$20,000
6	D0373	East Rd	7.4 m	450 mm	450 mm	53 L/s	Condition	5	Minor	Culvert	\$4,000
	D0372	East Rd	12.6 m	450 mm	450 mm	185 L/s	Condition	5	Minor	Culvert	\$6,000
	D0368	East Rd	9.4 m	900 mm	1,200 mm	1,660 L/s	Capacity	3	Major	Culvert	\$24,000
	D0107	East Rd	11.6 m	375 mm	450mm**	7 L/s	Condition	5	Minor	Culvert	\$6,000
	D0021	East Rd	17.7 m	300 mm	450mm**	50 L/s	Condition	5	Minor	Culvert	\$8,000
7	D0347	Spence Way	25.3 m	300 mm	450mm**	44 L/s	Condition	5	Minor	Culvert	\$10,000
8	D0212	Ravenswood Dr	17.2 m	300 mm	450 mm	194 L/s	Capacity	3	Minor	Culvert	\$8,000
	D0211	Ravenswood Dr	8.4 m	300 mm	450 mm	201 L/s	Capacity	5	Minor	Culvert	\$5,000
	D0198	Ravenswood Dr	6.0 m	300 mm	450 mm	223 L/s	Capacity	3	Minor	Culvert	\$4,000
	D0204	Ravenswood Dr	4.0 m	300 mm	450 mm	228 L/s	Capacity	5	Minor	Storm Main	\$5,000
	D0165	Ravenswood Dr	23.6 m	300 mm	600 mm	409 L/s	Capacity	5	Minor	Storm Main	\$18,000
	D0374	Ravenswood Dr	55.4 m	300 mm	600 mm	409 L/s	Capacity	5	Minor	Storm Main	\$42,000
9	D0033	Fern Dr	28.6 m	300 mm	450 mm	185 L/s	Capacity	5	Minor	Culvert	\$12,000
	D0179	Oak Ct/Fern Dr	25.4 m	300 mm	450mm**	55 L/s	Capacity	5	Minor	Culvert	\$11,000

*Assumed next available culvert size based on industry standards.

**Bylaw requires minimum diameter of 450 mm but smaller diameter could be hydraulically acceptable.

*** D0153 and D0154 are parallel culverts that will be upgraded to a single box culvert. D0151 and D0152 are parallel culverts that will be upgraded to a single box culvert. D0465 and D0466 are parallel culverts that could be replaced by a single culvert. D0474 has a parallel culvert that is not deficient.

****Represents the Future Land Use 5-Year Design Storm with Climate Change for the Minor System and Future Land Use 100-Year Design Storm with Climate Change for the Major System.



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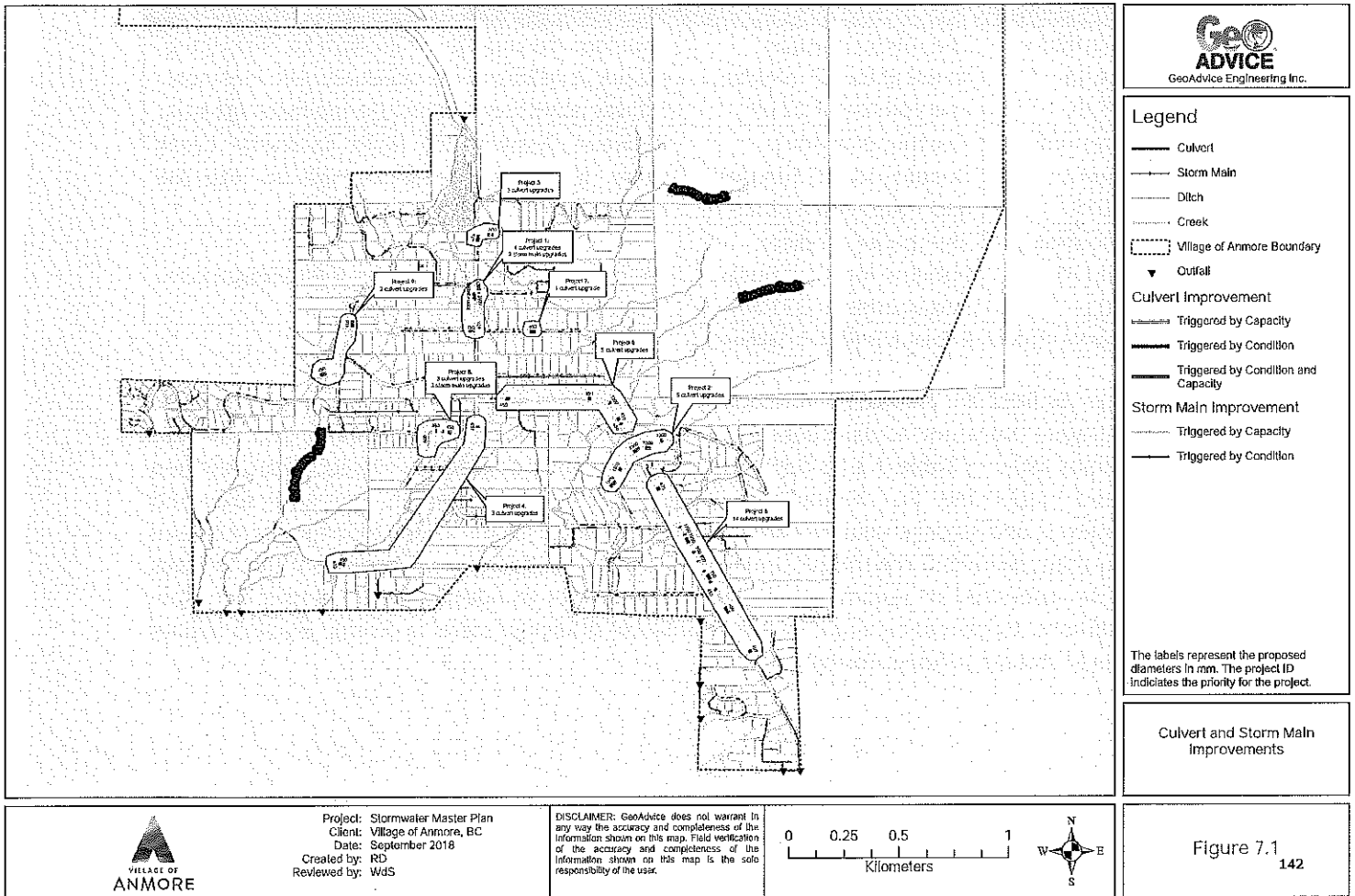
The Village of Anmore is planning to revitalize and develop the lands around the current Village Hall as a Community Gathering Place. Project ID 1 should be reviewed at that time as there may be an opportunity to divert the stormwater flows to Sunnyside Rd instead.

Table 7.2 summarizes the culvert and storm main improvements for the minor and major systems.

Table 7.2: Culvert and Storm Main Improvements Summary

Priority	Minor System Upgrade Length (m)	Major System Upgrade Length (m)
1	-	7
2	37	18
3	126	32
4	-	-
5	351	93
Total	514	150

Figure 7.1 shows the location of the culverts or storm mains improvements.



7.2. Stormwater Control and Storage Facility Review

Flow control facilities limit the peak flow rate that is allowed to discharge into receiving creeks to protect downstream channels and culverts from excessive erosion and overtopping. In analyzing the simulation results for the future land use scenario, it was determined that during the 5-year design storm flows, three (3) storage facilities exceed their storage capacity and cause flooding to occur as summarized in **Table 7.3**.

Table 7.3: Flow Control Facilities Exceeding Capacity

Model ID	Future Land Use 5-Year Design Storm Results*	Flooding Location
Detention Pipe ID D0576	The model predicts flooding for 17 minutes and volume of 27 m ³ .	Thomson Rd and Mountain Ayre Ln. If flooding occurs, it will be in the cul-de-sac on Thomson Rd with flow proceeding into the forested area.
Detention Pipe ID D0619	The model predicts flooding for 26 minutes and volume of 117 m ³ .	Between Bedwell Bay Road & Crystal Creek Drive. If flooding occurs, it will be into the forested area.
Detention Pond ID SU03	The model predicts flooding for 37 minutes and volume of 121 m ³ .	South of 110 Dogwood Drive. If flooding occurs, it will be into the forested area.

*Includes improvements as identified in **Section 7.1**.

These facilities are characterized in the model based on available information and may not accurately represent actual operation conditions. Therefore, it is recommended that the facilities listed in **Table 7.3** be further evaluated to ensure that they are accurately defined in the model and that operational characteristics such as orifice and weir sizes and elevations and storage volumes are accurately defined. In the event that the facilities are accurately defined in the model, a review should be conducted to determine if the facilities can be optimized or require structural improvements to operate better under high flow conditions. Optimization could include increasing discharge rates to creeks, slowing bypass rates to storage, adding storage, etc.

8. Conclusions and Recommendations

8.1. Summary of Study Findings

The primary objective of this project was to create a Stormwater Master Plan (SMP) that provides a roadmap to direct the orderly expansion and improvement of the Village of Anmore stormwater system. To meet this objective, a hydrologic and hydraulic model of the Village of Anmore stormwater system was created using PCSWMM.

The intent of this project was to provide the Village with:

- A hydrologic/hydraulic model of the Village's stormwater system;
- A culvert inventory suitable for incorporation into the Village's GIS and asset management systems; and
- A Stormwater Master Plan report that:
 - describes the hydraulic condition of the existing stormwater system;
 - describes the physical condition of the existing culvert infrastructure; and
 - provides improvement recommendations to accommodate existing and future development.

With the Village GIS dataset at hand, USL completed culvert surveys and condition assessments. The data collection and culvert condition assessment were performed throughout a 3-week period from January 15, 2018 to February 2, 2018. USL were tasked to assess all culverts in the Village. **Table 8.1** summarizes the condition rating results of the Village of Anmore culverts.

Table 8.1: Village of Anmore Culvert Condition Ratings

Condition Rating	Number of Culverts
1 - Very Good	184
2 - Good	164
3 - Fair	57
4 - Poor	37
5 - Critical	1

The flow monitoring program consisted of four (4) flow monitoring sites and one (1) rain gauge, for a period of record of about two months from January 2, 2018 to March 7, 2018. The purpose of the flow monitoring program was to obtain field data for model calibration.

Rather than simulating individual storm events for model calibration, a continuous simulation from January 2, 2018 to March 7, 2018 was run. Overall, the model shows an acceptable agreement with the measured flows at the four flow stations.

To assess the impact on areas that are anticipated to undergo land use changes, the future OCP land use information and the estimated hydrology parameters were used to create a future conditions modeling scenario. The primary difference between the existing and future scenario is the increased runoff resulting from the following:

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- Increase in impervious areas;
- Increase in directly connected impervious areas;
- Decrease in surface roughness of pervious areas; and
- Increased precipitation due to climate change.

Recommended improvements were sized to convey the flows simulated under the future land use scenario with consideration of impacts from climate change. **Table 8.2** lists the culvert and storm main improvements triggered by capacity and condition risks. The recommended improvements were grouped into projects based on physical location and flow path. The project ID indicates the priority for each project. The highest priority projects are included in Project ID 1. A full list of projects with prioritization is provided in **Section 7**.

Table 8.2: List of Culvert and Storm Main Improvements

Project ID	Location	Length (m)	Existing Diameter (mm)	Upgrade Diameter (mm)	Conduit Type	Cost Estimate (\$)
1	Sunnyside Rd	60	450 – 800	450 – 1,200 x 2,400	Culvert/Storm	\$109,000
2	East Rd/Creek	112	450 – 900	1,200 – 1,500	Culvert	\$360,000
3	Alpine Dr	47	450	600 – 675	Culvert	\$53,000
4	Sunnyside Rd	28	300 - 650	450 – 675	Culvert	\$22,000
5	East Rd	164	250 – 900	450 – 1,200	Culvert	\$223,000
6	East Rd	59	300 – 900	450 – 1,200	Culvert	\$48,000
7	Spence Way	25	300	450	Culvert	\$10,000
8	Ravenswood Dr	115	300	450 – 600	Culvert/Storm	\$82,000
9	Fern Dr	54	300	450	Culvert	\$23,000
Total		664			Total	\$930,000

8.2. Recommendations Following the Study

Based upon the findings from this analysis, GeoAdvice recommends that the Village of Anmore plan to undertake the projects in the Stormwater Master Plan to relieve system deficiencies and prepare for future development. In addition, GeoAdvice recommends the following:

1. Verification of Unit Costing

The Village should verify the unit costs used in the costing analysis.

2. Field Verification of Stormwater Collection System Information

The Village should undertake verification of the existing diameter and invert information for the proposed culvert and main upgrades summarized in **Section 7**.

3. Additional Flow Monitoring

The Village should undertake additional flow monitoring to confirm flow assumptions made for the unmonitored areas and enhance model accuracy.

4. Extended Modeling Support Services

We will assist the Village in maintaining and operating the model for a period of one (1) year from the date of completion of this assignment and update the Village of its operational status on a quarterly basis via a written status report. It is understood that during this period, we will respond to specific queries to model scenarios from the Village for capital planning and operational needs.

5. Maintenance of Stormwater System Model

Ongoing development, zoning and infrastructure changes dictate that updates should be completed every year. Asset capacities should be updated where future investigations indicate discrepancies from assumptions used in the model development.

6. Development Application Review

Development application reviews require detailed modeling to validate the system capacity and assess the hydraulic impact of proposed developments. We will assist the Village to complete the analyses required to assess a proposed development's impact on their stormwater system.

DRAFT REPORT

project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

Submission

Prepared by:

Chuck Linders
Stormwater Modeling Expert / Senior
Review

Reviewed and Approved by:

Werner de Schaetzen, Ph.D., P.Eng.
Project Manager / Senior Review

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DRAFT REPORT

project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

Appendix A USL
Tech Memo #1 – Culvert Survey

MEMORANDUM

Date: April 2, 2018
To: Werner de Schaetzen, P.Eng.
cc: Jonathan Hung, P.Eng.
From: Wade Turner, GISP
File: 3275.0009.01
Subject: Village of Anmore – Stormwater Master Plan
GIS-Based Stormwater Data Review Documentation and Field Data Collection Methodology
Technical Memo #1

The purpose of this memo is to outline the information used when starting the data compilation and collection and highlighting the existing data gaps at the outset of the field collection and condition assessment. The GIS-based stormwater data was provided by the Village of Anmore at the start of the Stormwater Master Plan project. This memo also outlines the methodology, equipment and expected accuracy of the field collected information from the field survey capture.

We understand that the GIS-based stormwater data provided by the Village was prepared through effort by ISL Engineering and Land Services Inc. and others. The data was provided by the Village to Urban System Ltd. and was reviewed for completeness and spatial accuracy. Inaccuracies and missing information were anticipated and had been verbally discussed with the Village.

The GIS-based stormwater data review enabled our project team to identify issues with the existing stormwater GIS data and develop a plan to address the issues and fill data gaps through field investigation and data collection. It was important to identify these deficiencies since the information will be used by GeoAdvice Engineering Ltd. to build the Village's stormwater model and conduct analysis of Anmore's stormwater systems.

Below are some of the notable deficiencies that were found in the data:

- Minimal attribution (missing diameter, material, inverts);
- Spatial inaccuracies (many culverts drawn off their actual location and not aligned with the roads visible from orthophoto);
- Attribute inaccuracies in the diameter and material of the culverts (some diameter and material incorrect based on field confirmation); and
- No available condition information for culverts.

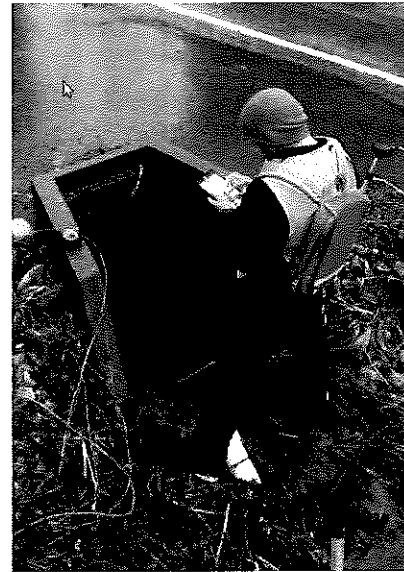
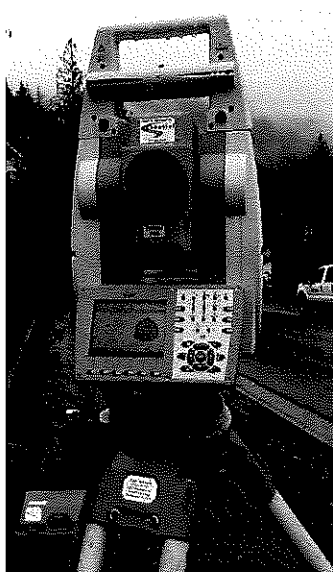
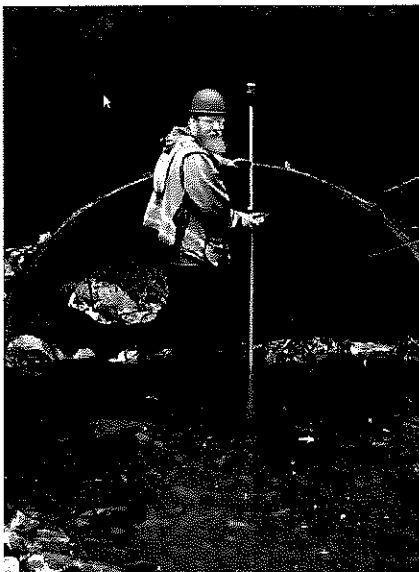
Prior to commencing the field condition assessment and culvert survey, a meeting was held with GeoAdvice Engineering, Urban Systems and the Village of Anmore where priority culverts were determined to focus the field collection. It was determined that all culverts were to be assessed for condition including both large and small diameter culverts. From the field assessment, the final culvert count was 487. Data from the condition assessment and field survey was compiled into an updated GIS-based culverts dataset. This dataset included the condition assessment, invert elevation data and the pictures that were taken in the field. All data was provided to GeoAdvice Engineering and will be made available to Village staff at the end of the project.

MEMORANDUM

Date: April 2, 2018
File: 3275.0009.01
Subject: Village of Anmore – Stormwater Master Plan
GIS-Based Stormwater Data Review Documentation and Field Data
Collection Methodology
Page: 2 of 2

URBAN
systems

The 265 culverts over 300mm diameter were surveyed by an Urban Systems land surveyor to collect the precise location and invert elevations of each of these culverts. The larger diameter culverts were surveyed using a high accuracy survey grade system (TS15, GS24, CS15 system). The expected accuracy from this system is 1 cm. The location of the remaining 222 smaller diameter culverts was collected by field staff using a backpack SX Blue II + GNSS system. The location accuracy of the backpack GPS ranged from 20 cm – 100 cm, depending on location of the culvert. Below are sample photos taken during the field investigation:



Please let us know if there are any questions or confirmation needed on the above.

Sincerely,

URBAN SYSTEMS LTD.

A handwritten signature in black ink, appearing to be "Wade Turner".

Wade Turner, GISP
Condition Assessment and Field Survey Coordinator

/wt

cc: Jonathan Hung, P.Eng. - GeoAdvice Engineering Ltd.

U:\Projects_KAMA3275\0009\01\Correspondence\C1-Client\2018-04-02 - Technical Memo #1.docx

DRAFT REPORT

project: Village of Anmore Stormwater Master Plan
 project ID: 2017-051-ANM

Table A.1: Culvert Condition

Culvert Model ID	Condition
D0506	Unknown
D0504	Unknown
D0503	Unknown
D0501	Unknown
D0499	Unknown
D0497	Unknown
D0496	Unknown
D0495	Unknown
D0493	Unknown
D0492	Unknown
D0491	Unknown
D0355	Unknown
D0281	Unknown
D0230	Unknown
D0180	Unknown
D0085	Unknown
D0002	Unknown
D0650	Unknown
D0649	Unknown
D0627	Unknown
D0612	Unknown
D0572	Unknown
D0571	Unknown
D0570	Unknown
D0569	Unknown
D0568	Unknown
D0567	Unknown
D0473	Unknown
D0331	Unknown
D0330	Unknown
D0313	Unknown
D0285_4	Unknown
D0285_3	Unknown
D0500	1
D0487	1
D0484	1
D0481	1
D0480	1

Table A.2: Storm Main Condition

Storm Main Model ID	Condition
D0722	Unknown
D0721	Unknown
D0720	Unknown
D0719	Unknown
D0718	Unknown
D0717	Unknown
D0716	Unknown
D0706	Unknown
D0705	Unknown
D0704	Unknown
D0703	Unknown
D0701	Unknown
D0700	Unknown
D0699	Unknown
D0698	Unknown
D0697_2	Unknown
D0697_1	Unknown
D0697	Unknown
D0696	Unknown
D0695	Unknown
D0694	Unknown
D0693	Unknown
D0692	Unknown
D0690	Unknown
D0689	Unknown
D0688	Unknown
D0687	Unknown
D0686	Unknown
D0685	Unknown
D0684	Unknown
D0683	Unknown
D0682	Unknown
D0681	Unknown
D0680	Unknown
D0679	Unknown
D0678	Unknown
D0677	Unknown
D0676	Unknown

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project: Village of Anmore Stormwater Master Plan
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D0479	1
D0472	1
D0468	1
D0464	1
D0462	1
D0460	1
D0458	1
D0450	1
D0448	1
D0446	1
D0442	1
D0434	1
D0433	1
D0431	1
D0426	1
D0425	1
D0420	1
D0419	1
D0418	1
D0417	1
D0416	1
D0412	1
D0411	1
D0400	1
D0399	1
D0398	1
D0396	1
D0395	1
D0394	1
D0393	1
D0391	1
D0390	1
D0389	1
D0388	1
D0387	1
D0383	1
D0382	1
D0381	1
D0380	1
D0376	1

D0675	Unknown
D0674	Unknown
D0673	Unknown
D0672	Unknown
D0671	Unknown
D0670	Unknown
D0669_2	Unknown
D0669_1	Unknown
D0668	Unknown
D0667	Unknown
D0666	Unknown
D0665	Unknown
D0664	Unknown
D0663	Unknown
D0662	Unknown
D0661	Unknown
D0660	Unknown
D0659	Unknown
D0658	Unknown
D0657	Unknown
D0656	Unknown
D0655	Unknown
D0654	Unknown
D0653	Unknown
D0652	Unknown
D0648	Unknown
D0647	Unknown
D0645	Unknown
D0644	Unknown
D0643	Unknown
D0642	Unknown
D0641	Unknown
D0640	Unknown
D0639	Unknown
D0638	Unknown
D0637	Unknown
D0636	Unknown
D0635	Unknown
D0634	Unknown
D0633	Unknown

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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

D0375	1
D0371	1
D0369	1
D0367	1
D0366	1
D0360	1
D0359	1
D0328	1
D0325_4	1
D0325_3	1
D0325_1	1
D0324	1
D0306	1
D0305	1
D0304	1
D0303	1
D0302	1
D0301	1
D0300	1
D0299	1
D0298	1
D0297	1
D0296	1
D0295	1
D0294	1
D0293_2	1
D0293_1	1
D0290	1
D0289	1
D0288	1
D0287	1
D0286	1
D0285_2	1
D0285_1	1
D0284	1
D0283	1
D0282	1
D0281_2	1
D0281_1	1
D0277	1

D0632	Unknown
D0631	Unknown
D0630	Unknown
D0629	Unknown
D0628	Unknown
D0626	Unknown
D0625	Unknown
D0624	Unknown
D0623	Unknown
D0622	Unknown
D0621	Unknown
D0620	Unknown
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D0616	Unknown
D0615	Unknown
D0614	Unknown
D0613	Unknown
D0611	Unknown
D0610	Unknown
D0609	Unknown
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D0607	Unknown
D0606	Unknown
D0605	Unknown
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D0603	Unknown
D0602	Unknown
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D0600	Unknown
D0599	Unknown
D0598	Unknown
D0597	Unknown
D0595	Unknown
D0594	Unknown
D0593	Unknown
D0591	Unknown
D0590	Unknown
D0589	Unknown
D0586	Unknown

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project: Village of Anmore Stormwater Master Plan

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D0275	1
D0272	1
D0270	1
D0267	1
D0264	1
D0263	1
D0262	1
D0252	1
D0250	1
D0245	1
D0243	1
D0241	1
D0240	1
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D0181	1
D0141	1
D0134	1
D0133	1
D0132	1
D0131	1
D0130	1
D0128	1

D0585	Unknown
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D0583	Unknown
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D0548	Unknown
D0547	Unknown
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D0545	Unknown
D0544	Unknown
D0543	Unknown
D0542	Unknown
D0541	Unknown
D0540	Unknown
D0539	Unknown

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project: Village of Anmore Stormwater Master Plan
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D0126	1
D0125	1
D0124	1
D0123	1
D0122	1
D0121	1
D0120	1
D0119	1
D0118	1
D0117	1
D0116	1
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D0104	1
D0102_2	1
D0102_1	1
D0100	1
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D0285	Unknown
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D0165	Unknown
D0102	Unknown
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D0075	Unknown
D0016_4	Unknown
D0016_3	Unknown
D0016	Unknown
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D0432	1
D0385	1

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D0057	1
D0055	1
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D0049	1
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D0486	2
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D0454	2

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D0405_1	2
D0404	2
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D0202	2
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D0018	2
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D0016_1	2
D0015	2
D0320	3
D0228	3
D0180_2	3
D0180_1	3
D0031	3

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project: Village of Anmore Stormwater Master Plan
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D0452	2
D0444	2
D0443	2
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D0430_1	2
D0429	2
D0428	2
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D0334	2
D0326	2
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D0319	2
D0318	2
D0316	2

D0019	3
D0227	4

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D0314	2
D0313_2	2
D0313_1	2
D0312	2
D0311	2
D0310	2
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D0182	2
D0179	2

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project: Village of Anmore Stormwater Master Plan
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D0174	2
D0173	2
D0172	2
D0167	2
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D0054	2

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project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

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D0044	2
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D0042	2
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D0035	2
D0034	2
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D0408	3
D0370	3
D0365	3
D0354	3
D0346	3
D0343	3
D0342	3
D0341	3
D0339	3
D0337	3
D0336	3

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project: Village of Anmore Stormwater Master Plan
project ID: 2017-051-ANM

D0335	3
D0333	3
D0327	3
D0322	3
D0317	3
D0307	3
D0278	3
D0274	3
D0266	3
D0256	3
D0254	3
D0244	3
D0238	3
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D0217	3
D0206	3
D0203	3
D0196	3
D0192	3
D0175	3
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D0146	3
D0140	3
D0109	3
D0108	3
D0099	3
D0090	3
D0089	3
D0088	3
D0068	3
D0051	3
D0022	3

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project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

D0466	4
D0465	4
D0445	4
D0441	4
D0440	4
D0439	4
D0438	4
D0437	4
D0424	4
D0421	4
D0415	4
D0414	4
D0413	4
D0373	4
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D0332	4
D0329	4
D0323	4
D0315	4
D0279	4
D0226	4
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D0168	4
D0152	4
D0151	4
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D0039	4
D0038	4
D0037	4
D0023	4
D0021	4
D0347	5

DRAFT REPORT

project: Village of Anmore Stormwater Master Plan

project ID: 2017-051-ANM

Appendix B USL Tech Memo #2 – Culvert Condition Assessment



Unit 203, 2502 St Johns Street
Port Moody, British Columbia
V3H 2B4 Canada
Tel (604) 931-0550

MEMORANDUM

Date: March 28, 2018
To: Werner de Schaetzen, P.Eng.
cc: Jonathan Hung, P.Eng.
From: Wade Turner, GISP
File: 3275.0009.01
Subject: Village of Anmore – Stormwater Master Plan
Culvert Condition Assessment Framework and Coding System – Technical Memo #2

The purpose of this memo is to document the culvert condition assessment framework and coding system used for the field condition assessment component of the Stormwater Master Plan Project for the Village of Anmore.

The framework was used to inform the type of data that was to be collected during the field inspections. The framework was developed with the following principles in mind:

Simple: The goal of this condition framework was to ensure it is simple so that operators can continue to use the framework after the project is completed. This will ensure the condition inspection program can be continuous rather than being completed just for this project.

Informative: The framework focuses on using the observed condition and collect information that can be used to adjust the theoretical service life assumed in the asset management plan by estimating the remaining life and identifying deficiencies (both capital and maintenance). This information will help refine the asset management investment plan, assist with capital planning and maintenance activities on a moving forward basis.

Develop Condition Assessment Framework and Coding System

The following activities were undertaken during the development of the framework and coding system:

- Review industry best practice condition inspection documents and detail desired by Anmore;
- Develop condition framework (in alignment with best practices; IPWEA, NAMS, etc.);
- Develop this technical memo documenting the condition framework.

Note: The below framework and coding system was prepared to help guide discussion with Village staff, the project team and field personnel to identify existing condition of each culvert noting deficiencies such as blockages, damaged ends, visible scour, degraded conduits, etc.

MEMORANDUM

Date: March 28, 2018
 File: 3275.0009.01
 Subject: Village of Anmore – Stormwater Master Plan
 Culvert Condition Assessment Framework and Coding System – Technical Memo #2
 Page: 2 of 3



CULVERT ASSESSMENT FRAMEWORK



Notes By: _____ Time and Date: _____

Culvert Information:

Location: (collected by field survey)

Weather: _____

Number of Culverts: _____

Approximate Cover/Free board:

Upstream (m): _____ Downstream (m): _____

Barrel Shape (circle one): ☐ Circular ☐ Box ☐ Elliptical ☐ Other: _____

Diameter (mm): _____ / Width (mm): _____ # Height (mm): _____

Pipe Material (circle one): ☐ GSE / ☐ Concrete / ☐ Corrugated Plastic / ☐ Smooth Plastic / ☐ Masonry / ☐ Timber / ☐ Other: _____

Flowing or Standing Water? ☐ Flowing ☐ Standing Depth (mm): _____

Direction of Flow: _____

Complete Blockage (circle one / yes) Upstream / Downstream / Both

Appurtenances (circle one):

Upstream: ☐ Projecting / ☐ Altered / ☐ Headwall / ☐ Headwall & Wingwalls / ☐ Flared End / ☐ Other: _____

Downstream: ☐ Projecting / ☐ Altered / ☐ Headwall / ☐ Headwall & Wingwalls / ☐ Flared End / ☐ Other: _____

Culvert Condition and Performance (check all those that apply):

Notable Problems	Middle	Inlet	Outlet
Obstructing Blockage (> 1/3 of total)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sediment Blockage (1/3 to 2/3 of total)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deformation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Local Box	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Heave or Sunken	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aggressive Abrasion / Corrosion / Chemical	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More detailed condition inspection required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Notes:

*Note: Typical service life in a culvert is approximately 50 years

Coding System:

Condition Rating	Description 1	Description 2	Estimated Remaining Life*
1	Very Good	Only normal maintenance required	75% - 100%
2	Good	Minor maintenance required	50% - 75%
3	Fair	Maintenance required to return to accepted level of service	25% - 50%
4	Poor	Repairs repairs (significant repairs/upgrade required)	0% - 25%
5	Critical	Asset Unserviceable	0%

Insert Photo's Here

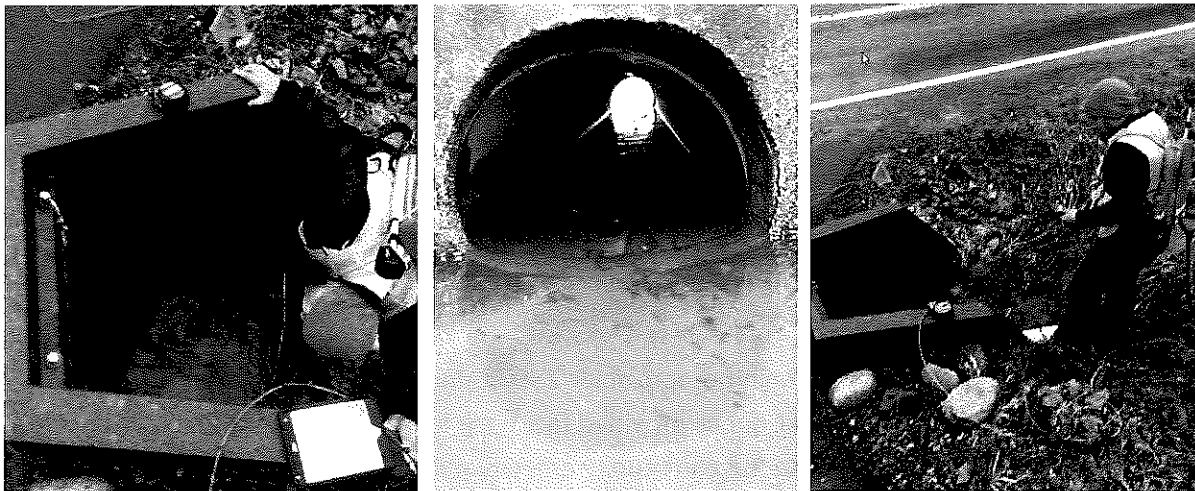
MEMORANDUM

Date: March 28, 2018
File: 3275.0009.01
Subject: Village of Anmore – Stormwater Master Plan
Culvert Condition Assessment Framework and Coding System – Technical Memo #2
Page: 3 of 3



For the field data collection, the condition framework was integrated with a GIS-based mobile form application (ArcGIS Collector). Collector was deployed to collect the current condition of each culvert along with the necessary attribution and associated photos required to support the development of the PC-SWMM model and support the analysis. This method of digital data capture ensured that the culvert condition and associated photos were collected efficiently, and that information could be provided to GeoAdvice and the Village in GIS format.

The data collection and culvert condition assessment were performed throughout a 3-week period from January 15th - February 2nd, 2018. during the hours of 8 am – 5 pm. Urban Systems field staff were tasked to assess all culverts in the Village. The final culvert count was 487. The inventory of the culverts included capturing the diameter, material, length, condition, notable deficiencies, maintenance needs and photos of assets and found deficiencies such as such as blockages, damaged ends, visible scour, degraded conduits, etc. Below are sample photos taken during the field condition assessment:



Please let us know if there are any questions or confirmation needed on the above.

Sincerely,

URBAN SYSTEMS LTD.

A handwritten signature in black ink, appearing to be "Wade Turner".

Wade Turner, GISP
Condition Assessment and Field Survey Coordinator

/wt

cc: Jonathan Hung, P.Eng. - GeoAdvice Engineering Ltd.

U:\Projects_KAM\3275\0009\01\Correspondence\01-Clients\2018-04-02 - Technical Memo #2.docx



VILLAGE OF ANMORE

REPORT TO COUNCIL

Date: September 12, 2018

Submitted by: Jason Smith, Manager of Development Services

Subject: Rezoning Application for 2307 Sunnyside Road - Cordovado

Purpose / Introduction

The purpose of this report is to provide Council with the latest development proposal for 2307 Sunnyside Road, which includes a revised site plan and an update Community Amenity Contribution package.

Recommended Options

That Council refer the rezoning proposal for 2307 Sunnyside Road to the Advisory Planning Commission and the Parks and Recreation Committee for comment.

Background

The Village is in receipt of a rezoning proposal for 2307 Sunnyside Road. This proposal came before Council late in 2017 and Council provided feedback to the applicant and directed staff to hire a land economist to evaluate the community amenity package being offered by the proponent.

Discussion

Proposed Development

The proposal is for 19 lot single family dwelling development that would be accommodated through the creation of a Comprehensive Development (CD) zone. The site is 13.41 acres in size and currently zoned Residential 1 (RS-1) and the proposed density is 1.42 units/acre. The proposal would include the possibility of secondary suites but coach houses would not be permitted.

The original proposal that was presented to Council contained duplexes and a strata road. Based on Council's comments the proponent has altered to the plan to include a public road with a 20 metre right of way and removed duplexes from the property. The full details of the proposal can be seen in the attached site plan.

Report/Recommendation to Council

Rezoning Application for 2307 Sunnyside Road - Cordovado

September 12, 2018

Community Amenities

Park and Green Space

The proposal would see 34% percent of the site dedicated to the Village as park and green space. Within the park the applicant is proposing to dedicate and construct a network of trails. These trails would provide important linkages from the corner of Sunnyside Road and Ludlow Lane to the Anmore Elementary School as well as providing connection into the loco lands.

Increased Sunnyside Road Right of Way

Sunnyside Road currently encroaches onto the 2307 Sunnyside Road property and this proposal would rectify this situation. Staff have investigated the history of Sunnyside Road and there appears to have been an error made decades ago whereby a road dedication affecting this property had been drawn up but never registered at Land Titles. Sunnyside Road is one of two primary access roads for the Village and it is critical that this road be located entirely within road right of way to ensure legal access for maintenance and any possible future expansion.

Village Hall/Community Space Contribution

The applicant is offering to make a contribution of \$493,500 to Village for use towards the future construction of a new Village Hall/Community Space. This is an increase from \$450,000 that was originally proposed. The increase was made in response to the GP Rollo report that the Village commissioned, at the proponent's expense, to review to the development proposal and advise the Village as to what 50% of the value of the lift being realized through the rezoning would be (attachment 2).

Official Community Plan Analysis

Staff have reviewed the development proposal for consistency with the Official Community Plan (OCP) and offer the following analysis:

The current development proposal would have a density of 1.42 units/acre and is seeking to be rezoned under the CD zoning policy in the OCP, which is policy RLU-8. This policy lays out three circumstances where a CD zone could be considered. This proposal is seeking to be considered under the following:

Proposed development delivers a demonstrable and overall benefit to the community, socially, environmentally or economically.

Report/Recommendation to Council

Rezoning Application for 2307 Sunnyside Road - Cordovado

September 12, 2018

The policy then goes on to identify three criteria that a CD zone must comply with. Firstly, that it upholds the intentions and strategies described in OCP policy RLU-3. Second that the density not exceed 1.8 units/acre. Third, that the development anticipates and employs strategies to minimize the financial implications to the Village in terms of ongoing infrastructure maintenance and replacement requirements.

Policy RLU-3 encourage development proposals to be mindful of the impact of development on environmental features and systems. This proposal concentrates development on a smaller footprint than would otherwise be realized through an RS-1 subdivision. The view impacts will be minimal as nearly all of the new development will be separated from any existing development by green space.

Community amenities are contemplated in OCP Policy RLU-10 and RLU-11. The proposed amenity package offered by the proponent would satisfy these policies.

Proposed Next Steps

Staff recommend that this rezoning proposal be referred to the Advisory Planning Commission and the Parks and Recreation Committee for comment. Should Council support this recommendation, staff would then return to Council with the comments from both groups and a draft bylaw for consideration.

Other Options

The following options are provided for Council's consideration:

1. That Council refer the rezoning proposal for 2307 Sunnyside Road to the Advisory Planning Commission and the Parks and Recreation Committee for comment.
[Recommended]; or
2. That Council advise staff and the proponent that they do not wish to proceed any further with this rezoning application; or
3. That Council advise staff and the proponent of further changes to the rezoning proposal that would have to be made prior to proceeding with a referral.

Report/Recommendation to Council

Rezoning Application for 2307 Sunnyside Road - Cordovado

September 12, 2018

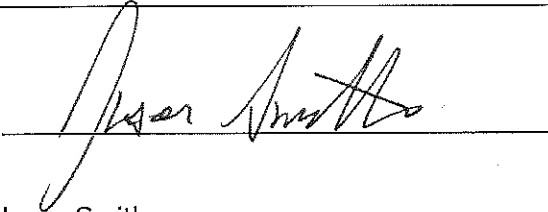
Financial Implications

There are no financial implications for any of the options presented.

Attachments:

1. Site Plan for 2307 Sunnyside Road
2. GP Rollo CAC Analysis Report

Prepared by:

A handwritten signature in black ink, appearing to read "Jason Smith", is written over a horizontal line.

Jason Smith

Manager of Development Services

Bradbury Architecture

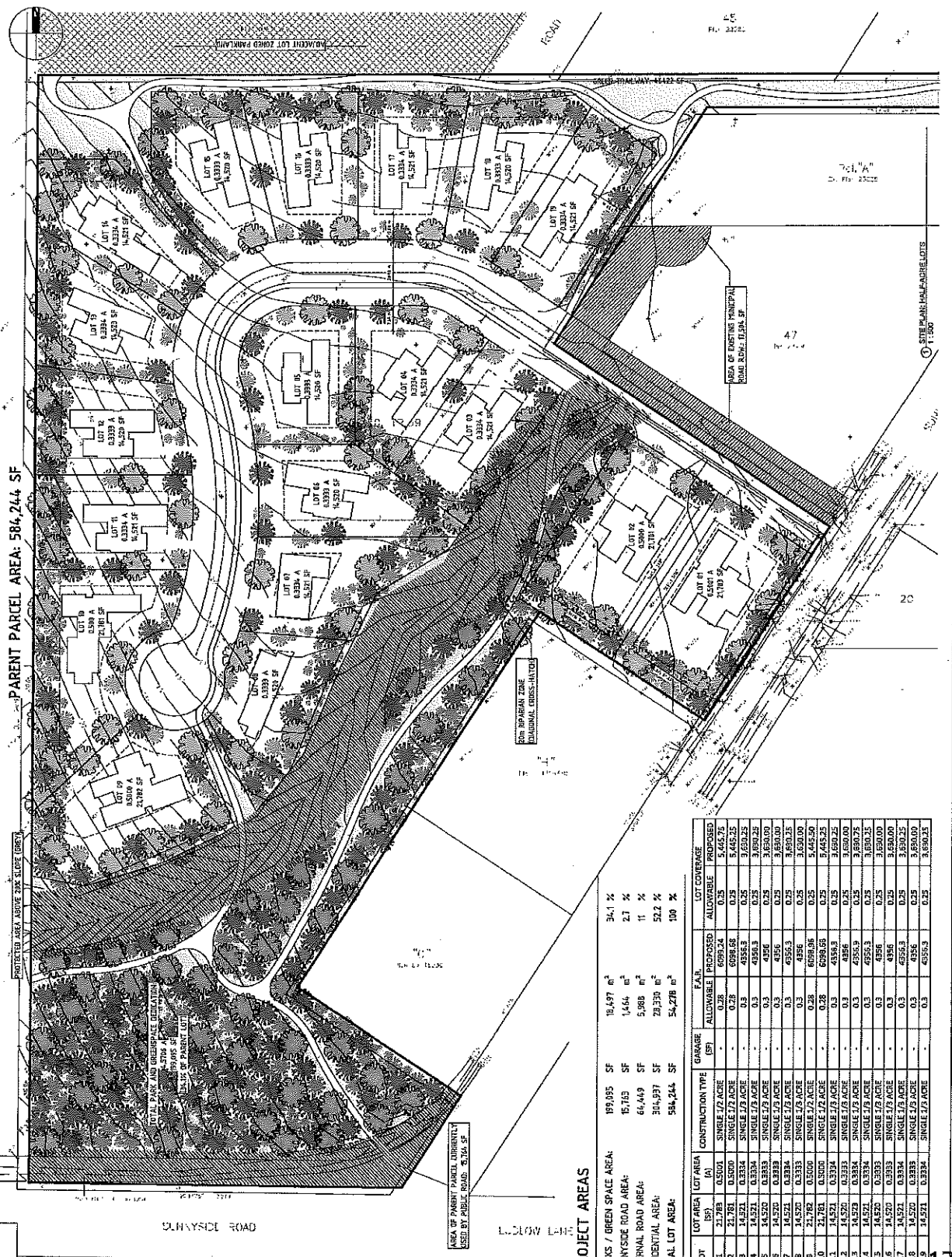
Address: 10000 N. 10th Ave, Suite 100, Phoenix, AZ 85021
 Phone: (602) 998-1111
 Email: info@bradburyarchitecture.com

Project: 10000 N. 10th Ave, Suite 100, Phoenix, AZ 85021
 Date: 10/1/2014
 Scale: 1" = 100'

Attachment 1

SITE PLAN
 2007 SUBMITTAL
 984 LOTS 1/2 - 1/2

A1.00



PROJECT AREAS

PARKS / GREEN SPACE AREA:	18,497 m²	36.1 %
SUNNYSIDE ROAD AREA:	1,464 m²	2.7 %
INTERNAL ROAD AREA:	5,288 m²	11 %
RESIDENTIAL AREA:	304,937 SF	52.2 %
TOTAL LOT AREA:	584,244 SF	100 %

LOT	LOT AREA (SQ FT)	CONSTRUCTION TYPE	GAZONAGE (SQ FT)	F.A.R. ALLOWABLE	F.A.R. PROPOSED	LOT COVERAGE ALLOWABLE	LOT COVERAGE PROPOSED
1	21,783	0.5500	0.00	0.28	0.00	0.25	5,445.75
2	21,783	0.5500	0.00	0.28	0.00	0.25	5,445.75
3	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
4	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
5	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
6	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
7	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
8	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
9	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
10	21,783	0.5500	0.00	0.28	0.00	0.25	5,445.75
11	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
12	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
13	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
14	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
15	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
16	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
17	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
18	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
19	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25
20	14,521	0.3334	0.00	0.28	0.00	0.25	3,630.25



August 16, 2018

Jason Smith
Village of Anmore
2697 Sunnyside Road
Anmore, BC V3H 5G9

Re: 2307 Sunnyside Road Land Lift Analysis

G.P. Rollo & Associates (GPRA) has been retained by the Village of Anmore to complete a land lift and amenity contribution analysis for the rezoning of 2307 Sunnyside Road (hereafter referred to as 'the Site') from the current RS-1 Residential Zone to the proposed CD Zone by the property owner. The purpose of the analysis is to estimate the land lift and amenity contribution on the 13.41 acre site from a change in Zoning from current planning that would permit 11 single family lots (identified as the 'base density') to a new Zone that would permit up to 19 single family lots on the Site. The land lift is identified as the difference in supported land value between the two Zonings.

The analysis consisted of preparation of residual land value analyses which determines the maximum value that a developer could afford to pay for the Site if developed under both the proposed CD Zone and the base density. GPRA used standard developer proformas to model the economics of typical development as proposed/allowed under the new zoning. The 'Lift' is then calculated as the difference in residual land values under the current Zone and that which has been proposed in the new CD Zone.

METHODOLOGY & ASSUMPTIONS

The Site is approximately 13.41 acres and can be developed under current zoning with 11 single family residential lots of roughly an acre in size each. The proposed rezoning would subdivide the parcel into 19 lots comprised of four 1/2 acre lots and fifteen 1/3 acre lots for development as single family residential.

The analyses are created using a standard developer proforma wherein estimates of revenues and costs are inputs and the remaining variable is the desired output. In typical proformas this output is usually profit, following a revenues minus costs equals profit formula.

For a residual land valuation, however, an assumption on developer's return needs to be included in order to leave the land value as the variable to solve for. The residual values are the maximum supported land value a developer could pay for the site (under the density and conditions tested) while achieving an acceptable return for their project. It is possible for a typical static proforma analysis to misrepresent the viability of a project by not properly accounting for the time that it will take to develop and market. In these cases the preferable methodology to employ is the use of a discounted cash flow analysis, wherein one forecasts out estimates of revenues and costs over a

number of years, with viability being determined through a calculation of an Internal Rate of Return (IRR). For this project, GPRA has derived the residual land value based on the development achieving an IRR of 15%.

The residual land values determined from this analysis of the Site as proposed for 19 lots is then compared to the value of the Site under it's the base density. This change in value, or "lift," is the total potential monies that are available for public amenities or other public works not considered as part of the analysis. GPRA have made allowances for improvements that would typically be incurred through development such as proposed. Any additional improvements that would be specifically required by the Village only from the proposed rezoning and not from development under current zoning would impact the lift and would need to be identified, priced, and included in a revised analysis.

Typically there is some sharing of the lift value between the Jurisdiction and the developer, but the percentage shared varies by community and by project. It is GPRA's understanding that in compliance with current policy, the Village has determined that they will seek 50% of the lift for amenities.

GPRA determined sales revenues used in the analyses from a review of recent sales and offerings for sale of land and built single family homes within roughly 20 km of the Site, with a focus on projects that were deemed comparable to that which has been proposed for the Site. Project costs were derived from sources deemed reliable, including information readily available from quantity surveyors on average hard construction costs in the area. Development or soft costs have been drawn from industry standards, and from the Village's sources. All other assumptions have been derived from a review of the market and from other sources deemed reliable by GPRA.

CONCLUSIONS & RECOMMENDATIONS

GPRA identifies the lift (the lift being defined as the difference in supported land value for the property developed for 19 lots comprised of four 1/2 acre lots and fifteen 1/3 acre lots and the base value for 11 one acre lots on the Site from rezoning as being roughly \$987,000. As such, the Village share at 50% of the lift would be \$493,500 that could be sought as an amenity contribution.

I trust that our work will be of use in the Village's decision on the rezoning of 2307 Sunnyside Road. I am available to discuss this further at your convenience.



Gerry Mulholland | Vice President
G.P. Rollo & Associates Ltd., Land Economists
T 604 275 4848 | M 778 772 8872 |
E gerry@rolloassociates.com | W www.rolloassociates.com

From: Rich Knowles [mailto: [REDACTED]]
Sent: August-31-18 1:56 PM
To: Christine Baird <Christine.Baird@anmore.com>; juli.haliwell@anmore.com
Subject: Fw: Environmental assessment of Buntzen Lake wrt Species At Risk (SAR) by Proposal for Race Rowing Club on Buntzen Lake for Council and public submission

[REDACTED]

Edited from a prior submission under the Privacy of Information Act. This email is approved for Public Record viewing and Council use. Only minor current updates are done.

Subject: Environmental assessment of Buntzen Lake wrt Species At Risk (SAR) by Proposal for Race Rowing Club on Buntzen Lake

Dear Julie Halliwell and Village of Anmore Councillors,

I am a former working biologist and research scientist (UBC and Univ of Guelph) and resident of Anmore, BC. Besides my other work and Directorships, I am also involved in various ecological projects of concern in British Columbia.

For Submission to Council:

I have spent time this last month investigating and gaining valuable information for Anmore Village Council and BC Hydro among other stakeholders which Council stated (July 2018 Public Meeting) was required in advance to consider the proposal from lobbyists of RCA to allow a rowing club with land development on Buntzen Lake. I have also been in contact with the various stakeholders governing the use and protection of Buntzen Lake including but not limited to BC Hydro and the B.C. Ministry of Forests, Lands and Resource and they have made their own comments and are looking into the topic of such a proposal separately if it is ever submitted officially by the proponents and local lobbyists for the plan.

Pertaining to Council's requirement for environmental assessments (re: Councillor Froese's request in Council Public Meeting July/18 for a requirement for Environmental Reviews to be submitted by the lobbyist proponents prior to the next stage of review) for Council's assessment, I include:

1) The environmental assessment study, "Species At Risk, Conservation and Stewardship in the Coquitlam Watershed" (2014)

A definitive environmental study of habitat restoration and protection with identified species at risk (SAR) at, and within the boundaries of, Buntzen Lake (which is part of the Coquitlam Watershed) :

- Created specifically for use to assist related government and municipalities to set environmental policy surrounding decisions. It is government sanctioned for use from a Village Council level to BC Hydro and to any level of government such as the many various Ministries of the BC Provincial Government governing watershed use and species at risk (SAR).
- Officially commissioned by BC Hydro, The Ministry of Forest, Lands and Resources and the BC Conservation Foundation as recently as 2014.
- BC Government sanctioned and vetted comprehensive report of specific named Species At Risk (SAR) in Buntzen Lake Park and Reservoir and the Coquitlam Watershed.
- Sanctioned for use by the Government of British Columbia (and located on its website).
- Clarification below in "Executive Summary Notes" see page 14 Chart).

2) A diagram of types of sculling boats to gain perspective of size of a proposed boathouse for storage.

- Please note, the lobbyist proponents for the RCA have stated for the record in the Village resident's meeting that a building to house up to 60 of these boats are needed. Please also see the comments in the Tri-City News on the number of boats stated by the proponents in a submitted letter by Linda Reimer former Liberal MLA and recipient of the order of BC which was put into print.

3) Two legal cases from May 2018 (British Columbia) and July 2018 (Ontario), Globe and Mail.

- 2 legal liability court cases siding against human habitat destruction of species at risk.
- Federal and Provincial Courts have set precedence.
- In the Ontario case, a private land owner is found guilty. In the British Columbia case, Government officials were held guilty due to lack of due diligence to better protect habitat and species at risk (SAR).

a) BC May 2018 Court ruling announcement:

<https://www.theglobeandmail.com/news/national/tiny-minnow-wins-big-victory-for-species-at-risk/article4285176/>

b) Ontario July 2018 Court ruling announcement:

<https://www.theglobeandmail.com/politics/article-court-approves-protection-of-frog-species-on-private-land-saying/>



Court rules Ottawa can halt private development to protect

...

www.theglobeandmail.com

The federal government will now be able to restrict development projects across Canada in cases where species face extinction

Fire Risk of a Critical Watershed:

Finally, it is important to remind all concerned that we in BC have yet again passed through one of the most tragic fire seasons in British Columbia history. In fact it has broken a number of records this year. Based on these summer tragedies increasing in number over the past 5 years, we heard John Horgan (BC Premier) announcing his opinion we can likely expect this as our future "new normal" (in his TV comment quote two weeks ago on Global News). His comment is relying on the most up-to-date science studies under the BC Ministries involved in fire study and statistics and environment made regarding fires made in the province.

That human encroachment in wild areas is proven beyond doubt as a major culprit of fires is seen in many articles and pronouncements from government this being only one:

<https://toronto.citynews.ca/video/2018/08/27/humans-likely-caused-more-than-400-wildfires-in-b-c-so-far-this-year/>

Approving a land and support building development that destroys SAR habitat is one thing to consider. Another is the approval for use and in so doing increasing the human encroachment factor during off hours of operation for human use of what is otherwise currently a carefully monitored and safeguarded park as Buntzen Lake Park area is. The proposal has stated they desire special privileged access before and after hours of operation of the park.

The proposal made by the proponents to date requires they have use of private park monitored areas during important periods where no monitoring is available. Where no proper working authority of oversight, such as the Park Warden and his staff who maintain and ensure fire hazard safety and the overall safety of the park and rules, will be available and thus free reign by the club members and their friends and families will be approved at the very critical times when formal park monitors and Warden and staff are not on site and

working. To approve such use not only is a recipe for complete disaster for fire hazard increase but it could be considered a reckless act and a dereliction of duty of office under the new normal of fire risk and safety.

Please be advised,

- a) I have been in contact with the head Species At Risk Coordinator at The Ministry of Forests, Lands and Resource and also with BC Hydro regarding this possible Buntzen Lake proposal of use and for land development in and on the lake and use as a sports facility in reference as its direct threat to Species At Risk (SAR) at Buntzen Lake. I further brought the attached Study back to the forefront of their attention in any request for permits and use of Buntzen Lake beyond its current use agreement. Further contact to the federal and provincial government Ministries of the Environment will be followed through on an as needed basis and discussions have begun as well already at this level.
- b) I have brought to their attention above of the legal settlements of SAR as well (as cited above) so that a fully informed decision be made. Regardless, I do request Village Council and Staff make it their duty of office to ensure the appropriate decision makers at BC Hydro with whom the Village may confer from time to time on Buntzen Lake, are forwarded this report in your review of this proposal to assure the stakeholders involved are apprised accordingly. I will of course follow up with them separately on this issue. Thank you in advance.
- c) Powerful environmental groups who have a vested interest in the outcome of protecting SAR (Species At Risk) in B.C., two of whom are cited in the May 2018 British Columbia court case (i.e. The David Suzuki Foundation and The Georgia Strait Alliance) who took the BC government to court winning their case, are becoming increasingly aware and involved in this discussion. The fact is, this story of Buntzen Lake proposal for use is now making the news locally in print and online and in social media. While the discussion has yet to open to Species At Risk, I remind all stakeholders and the Council itself of the serious ramifications of the recent legal settlements in the above cases cited in addition to the recent review of the Trans Mountain Pipeline federal court case just settled this week. This latter judgement enforced the federal government to go back to their environmental assessment review process as it was completely flawed in a number of respects - in particular the court noted that increased human encroachment (tanker traffic) will seriously put Species At Risk (the resident pods of orca whales) at jeopardy and that their initial environmental review by the National Energy Board was deeply flawed and did not assess this properly (in fact it is stated sufficient proof exists that it was "rigged" from the beginning). In turn, the federal government is on a long and costly road in face of these legal impediments which was borne directly of their own dereliction of duty and lack of stewardship with specific regard to defense of natural habitat and the Species At Risk in them. There is much more to come from their dereliction of duty in acts which many, including the federal court of Canada, consider deceitful.

As the process was flawed, the outcome has become costly and clearly and without doubt, is a testament to the importance of the requirement of all the stakeholders of

Buntzen Lake to seriously address ALL areas of habitat restoration are insured the protection they require under federal law and that federal law takes it VERY seriously when those responsible do not do their proper due diligence.

d) The necessity for government to maintain that environmental protection and habitat protection issues and protecting species at risk is clearly paramount in Canada, That said, I am not prejudicial against any sports per se. My daughter was a race sculler in high school using Deep Cove as their rowing area which was a popular location for high end racing scull boats year round. It is of some interest that she is also against using Buntzen Lake for scull racing boats under this proposal for land development and use. I too am an avid healthy individual maintaining excellence in health, a cycling and exercise regimen as a former serious athlete and I openly support a healthy lifestyle and exercise and sports. However, I cannot justify and condone activities that are clearly to me and to many in authority to the detriment of more important issues and governance of Species At Risk and habitats in nature which have no other voice but those that understand their importance for us and future generations beyond their obvious stunning beauty and for the soul. The complexity of humanity with the natural environment is a complex web but every piece is required for the betterment of all - humans and nature combined.

e) Without prejudice, I am available to act on a volunteer basis to the Village as a science advisor on such matters on a case by case basis if called upon in advance.

It is with great respect and assurance that Council has now been apprised of this information with its added Executive Summary Notes (below).

The purpose of this submission to Village Council and staff, who I know and respect and who support the laws of Canada, is to allow them to be fully informed of the facts so that they may be able to act wisely understanding the ramifications of approving any land development, sports complex or similar developments - now or in the future - in a protected habitat watershed for species at risk (SAR) which Buntzen Lake is.

I do promise the Village of Anmore, Village Council and staff and our citizens that I will use all my power to ensure the natural habitat of Buntzen Lake and the greater park watershed surrounding it, is protected for species at risk (SAR) under the federal and provincial laws of Canada. I hope that promise is met with resounding support by each member of the Village Council and staff and equally by all the citizens of our fair Village nestled in the stunning and beautiful valley by the lake of the mountains of Anmore.

Yours very faithfully, and in trust,

J. Richard P. Knowles, B.Sc. (Biol.)
3116 Sunnyside Road, Anmore BC
Canada

Executive Summary Notes (4 notes):

Note 1) Clarification to Council of the specific distances noted in Chart on Page 14:

There are various distances mentioned along the east lakeside area. They refer to specifically discovered sub-habitat locations within the East side of Buntzen Lake, however, the whole of the Eastern Region of Buntzen Lake affects each of these identified sub-habitats. Habitats are not isolated islands of concern, they are interwoven and span larger encompassing and surrounding areas. For example, the need for a species may require to have corridors of travel - as noted in the report as informative- for distances between their mating habitat in the spring (a Buntzen stream is one area isolated in this chart but access to Buntzen Lake itself when the dry season reduces the sub-habitat's stream levels is still to be safeguarded). The report in the chart does not expand to include these details because it is written assuming facts regarding relationships like this are already known and assumed to be the case by those trained eyes that commissioned and would commonly use the report at BC Hydro, the Ministry of Forest, Lands and Natural Resource, the federal Ministry of Environment and Climate Change etc.. So, I respectfully ask Council to keep such issues of refining parameters of the study to not be made into "spitting hairs" arguments of debate prior to getting unbiased science advisor's technical advice. I further may advise Council to be guarded in allowing others to apply and twist meanings which are not correct in an attempt to confuse or twist their actual scientific meanings for their own personal agendas which has been seen attempted before in other cases. The federal courts are clear on this issue. I am available, as is the author of the report, to help guide any unbiased discussions as a science advisor to Council upon request.

Note 2) Other Species At Risk not cited in the Chart of the Report:

Reading the report you will discover other species at risk discovered during the report study period for future and immediate study in the region (ref: top of Page 2 of the report which is the top of Page 6 of the pdf. document). Buntzen Lake is currently managed as a Preserved Natural Habitat in its current unhurried state as a well managed Park, watershed, dam and nature preserve. Without protection of habitat reserves as Buntzen Lake is, science studies prove now as fact, that current species at medium risk quickly drop off at logarithmic rates to red listing and extinction events very quickly if converting a preservation site (like Buntzen Lake) to human encroachment and land development. For example, turning a pristine natural lake into a sports lake for high traffic human use in sensitive habitat areas where the destruction of important habitat to be changed into permanent buildings and parking lot land developments, septic field(s) which spread concentrated feces and urine into groundwater and into the surrounding environment with increased human encroachment use year round would fall under such a risk as perceived by any common average person perspective in law. May I suggest it is time for all of us to get past the simpleton naiveté argument that land development in a natural protected ecosystem such as Buntzen Lake is okay simply because "hey, it all grows back". Any average educated person today knows full well that some things never grow back; it is called complete extinction. And if the argument is "hey we've got plenty of it to go around elsewhere", you better check the fire storms we've had in this province recently. What we do know for sure though is the good news being finally people and governments in Canada are being held legally and severely accountable if they break the law by not preventing such damage when they knowingly could and should have.

Note 3) Other identified British Columbia listed species at risk in Buntzen Lake:

Species At Risk fall under multiple measuring categories, some provincial , some federal and some global. All must be considered when adjudicating a Species At Risk and no single one can be used in judgment in court cases. Being aware of this is needed education for any stakeholders involved.

The Great Blue Heron, is already of grave concern. The lake south end has noted Blue Heron feeding and sightings in Buntzen Lake and a number of nesting activities have been logged at the Ministries involved that point to Buntzen Lake nesting locations around the lake itself which is very exciting news to anyone knowledgeable in this area and that respects the sanctity and importance of life. Herons feed within 15 Km of nests. While nesting sites are cited as critical to find by the report, feeding habitat preservation for Blue Heron to feed - for frogs to small fish and turtles - is paramount to ensure food is available to the Heron for nesting and successful rearing of young. Imagine being told you can have a great place to live but your only food grocery store you could access is 2 hours away and you have to leave your baby alone while you go shopping. As Herons do not have refrigerators and storage cupboards, consider you needing to do that trip 3 or 4 times a day. Food source habitats are directly related to where their nesting colonies exist. Destruction or threat of feeding habitats will not be tolerated under SARA (the Species At Risk Act). Feeding and nesting sites are under severe threat in the Coquitlam Watershed which includes Buntzen Lake as an integral part to protect for the Blue Heron - a species at severe risk. The famous Colony in the Coquitlam Watershed (cited in the Study attached) is one of the most important colonies discovered and monitored and is struggling in the last few years in what is termed "colony collapse". Blue Herons are an integral part of a complete food web and complex ecosystem which include frogs, fish, reptiles, important pollinating insects, bats, tadpoles, marshland, plant species that feed local bears and other mammals, and bird species like osprey, kingfisher, red-winged blackbird and eagle that require marshes to survive for them to live, mate and nest in these ecosystems. Blue Herons and their simple act of feeding in a marsh actually hold all these together and require these to be held together for the heron to survive.

For this to continue successfully, the most important effort required at this very moment is for intelligent leadership of stakeholders to prevent human abuse and overuse and to protect these areas sensibly from other types of human land development schemes that would destroy and collapse Buntzen Lake's already sensitive ecological and natural ecosystems.

So, it is not just an isolated area but a broader perspective that must be seen for the whole Coquitlam Watershed of which Buntzen Lake is an integral part, to protect as pristine in nature as humanly possible. To do so can be done as simply applying a broad Policy Statement as official policy for the Village and the Province (BC Hydro and the Ministry of Forests et al) to openly discuss, accept and enter into the OCP or to stand as a Standard Operating Procedure (SOP) for the long term future as formal policy and for the record.

Note 4) The area on east side of Buntzen Lake includes the important gated Forestry Service Road access to the north end.

The realized expected increase in traffic as a result of the proposal's land development of a new clubhouse building and septic field and parking lot of the north end of the lake will push this otherwise carefully used and monitored use road to a create a damaging environment for the Species At Risk (Pacific or Coast Tailed Frog) found specifically

identified here. It is also specifically the area (East Side) where in the proposed submission by the lobbyists for RCA stated they wished to use to further develop and install a boathouse and boat launch near the South Beach area and a parking lot and building at the north end which would increase the use of this FSR well beyond its initial use plan. regardless to the proposal (as facts may change to plans of development and buildings) , considering the size of such a boathouse (see attachment - lengths of boats) this is no small feat and would create massive lakeshore and lakeside habitat destruction to accommodate such a building, parking lot and club house and would also increase the use of this road well beyond what I have been led to understand what an unbiased habitat and Species At Risk expert (such as a Species At Risk Co-ordinator working for the B.C. Ministry of Forests, Lands or the federal Ministry of the Environment) would consider safe. I thus recommend Council not proceed until these stakeholders have completed a proper necessary thorough review.

On a much lessor unrelated (to SAR) point to review:

With respect to the conflicting statements of record made by the lobbyists for RCA to Council regarding parking and questions of increased traffic in the July /18 Public Council Meeting:

I must point out what appears to be at least one conflicting statement made by the lobbyist proponents for the RCA proposal in the Pubic Meeting of July 2018 that requires some clarification. In a statement offered to Council regarding an email complaint from residents they received (from their call for comments to the residents of Anmore) that there could be an increase in unwanted traffic along Sunnyside Rd. outside of normal hours and during winter months when the lake natural habitat restores (and indeed Anmore residents as well!) during a respite from human encroachment during its habitat restorative period. One of these proponents stated to Council :

(paraphrased but nearly exact) ".. and there will be no extra traffic because the rowers will ride their bicycles up so the residents don't need to worry about that."

If that is in fact true and not simply a glibly dismissive comment, may I ask Council to investigate why the proponents need their own parking lot?

Thank you

Species at Risk Conservation and Stewardship in the Coquitlam Watershed

Final Report 2013-2014

Western Toad metamorph



April 2014

FWCP Report No. 13.W.COQ.02

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Executive Summary

In 2013, funding was approved for the Fish and Wildlife Compensation Program project titled “Species at Risk Conservation and Stewardship in the Coquitlam Watershed.” In cooperation with multiple Species at Risk (SAR) Recovery Teams and stakeholders, the project is working towards conservation and restoration using a multi-species approach that can also be applied to other watersheds. For this project, these initiatives will work towards outlining and completing actions that will compensate for some negative ecological impacts in the Coquitlam Watershed that resulted from the development of the Coquitlam-Buntzen Hydro Project. In order to comprehensively develop specific management and restoration recommendations several steps are being followed in this project as it relates to species at risk and their habitat.

The first year of this 5-year proposed project, was focused on ‘identifying’ species at risk and their habitat. Current occurrence information was compiled and tracking of undocumented occurrences was conducted. Mapping of these occurrences as well as species habitats were also undertaken for several priority species; Western Painted Turtles (*Chrysemys picta bellii*), Great Blue Herons (*Ardea Herodias fannini*) and several amphibian SAR (Red-legged Frogs (*Rana aurora*), Pacific Tailed Frogs (*Ascaphus truei*) and Western Toad (*Anaxyrus boreas*)) due to their high conservation framework and BC Hydro Species of Interest rankings. Habitat, including potential threats and opportunities for restoration, were assessed at several sites in Coquitlam Watershed.

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Species at Risk Conservation and Stewardship in the Coquitlam Watershed

1. Introduction

The Coquitlam-Buntzen generating complex includes two dams, a diversion tunnel, two outlet tunnels, and two power houses. Coquitlam Dam is at the south end of Coquitlam Lake Reservoir. The Coquitlam watershed area is 253 km² (193 km² above the dam and 60 km² below), with elevations ranging from 153 m to over 2000 m. The Buntzen Lake watershed has an area of 21 km², with elevations of 127 m to 1257 m (BC Hydro, 2011a-c) (**Figure 1**). Although some information is available on dam construction impacts and its affect on both species distributions and available habitat in the Coquitlam Watershed, this information is limited. Therefore, further research to identify methods to compensate for any negative impacts has been identified as a top priority in this watershed (BC Hydro, 2011b).

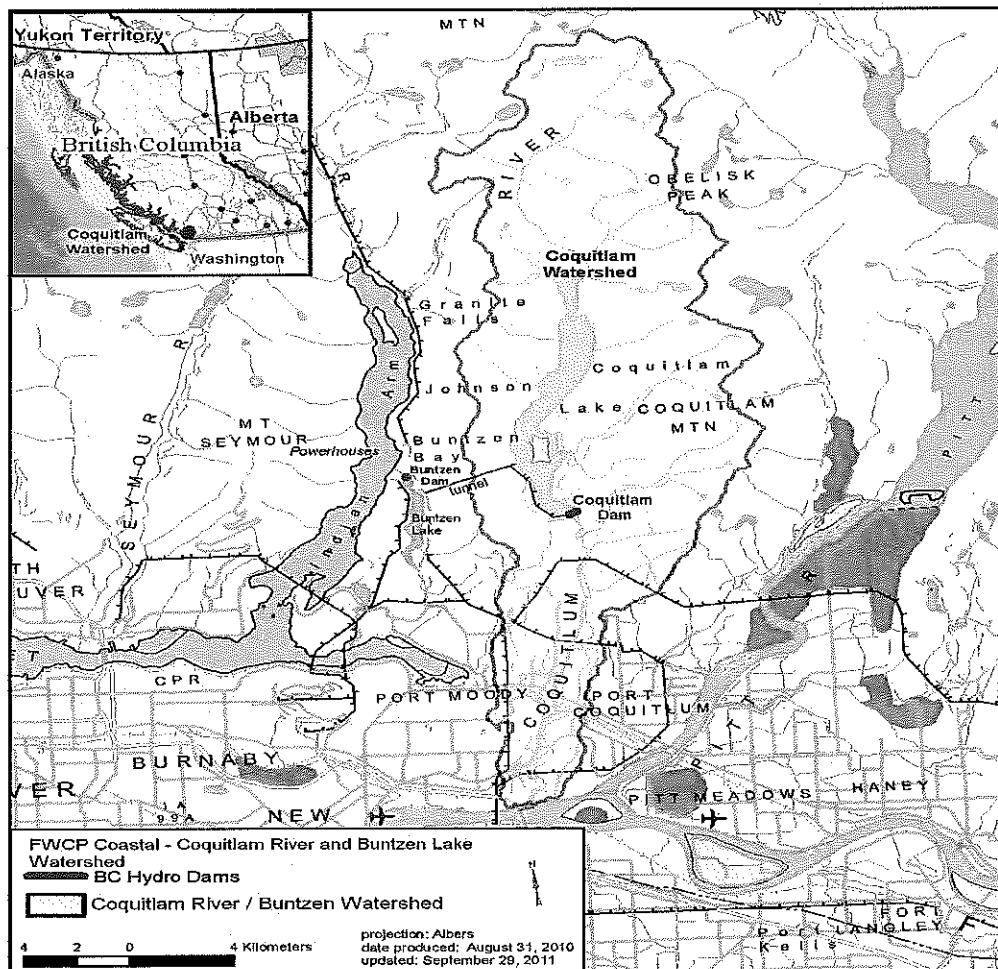


Figure 1. The Coquitlam River and Buntzen Watershed Hydropower project in the Lower Mainland, BC (BC Hydro, 2011a).

Construction of the dams has resulted in footprint issues and impacts on wildlife and habitats, including loss of instream, upland and riparian habitats. Flooding of 17 hectares of river and lowland forest, the 30 kilometre perimeter of Coquitlam Lake, and 177 kilometres of upland forest has caused the loss of riverine and coniferous valley side habitats and associated wildlife losses (BC Hydro, 2011a).

Other impacts include migration barriers, particularly to fish and large mammals, altered flow regimes and diversions. There has also been reduction in the recruitment of large woody debris (LWD) downstream of the Dam and in the Coquitlam River (BC Hydro, 2011c).

Impacts to species at risk are also significant and many species likely to be found within the watershed were assessed for priority to the Fish and Wildlife Compensation Program. Thirteen mammal species were identified, with Pacific Water Shrew being one of four species assigned a high priority. There were 20 birds and 8 reptile/amphibian species identified, with Great Blue Herons, Western Painted Turtles and Red-legged Frogs, respectively, also assigned high priority (BC Hydro, 2011b)

2. Goals and Objectives

The goal of the project is to identify, conserve and restore priority species at risk and their habitat within the Coquitlam River watershed. This is following the goal of the Alouette Watershed Species at Risk Project for which intentions were to use the same model from that project, that began in 2011, and apply it to other watersheds (Mitchell, 2012). The first step for the project was to compile existing occurrences of all species of risk using Conservation Data Centre requests, reviewing reports available from various stakeholders and local residents. Updated occurrences were also tracked for all species. Western Painted Turtles (*Chrysemys picta bellii*), Red-legged Frogs (*Rana aurora*), Pacific Tailed Frogs (*Ascaphus truei*), Western Toad (*Anaxyrus boreas*) and Great Blue Herons (*Ardea Herodias fannini*) were selected as a priority species in this first year, due to their high Conservation Framework and BC Hydro Species of Interest Action Plan rankings.

Specifically these goals will be achieved through these objectives:

1. Mapping all species at risk occurrences, including historical and recent, to provide a spatial representation of overlapping occurrences and priorities for future conservation, restoration and stewardship efforts.
2. Mapping priority species habitat to guide future conservation, restoration and stewardship efforts.
3. Identifying specific threats to the priority species and their habitats, protecting occupied sites, and restoring degraded habitat
4. Preventing further population declines, habitat loss and degradation through increased accessibility to data, as well as public outreach and education designed to enhance awareness and stewardship of the species and its habitat.

3. Study Area

The Coquitlam River and Buntzen Lake watersheds lie in the southernmost extension of the Pacific Ranges of the Coast Mountains of British Columbia about 30 km northeast of Vancouver (BC Hydro, 2011a) (**Figure 2**). Our Area of Interest (AOI) for the project has been defined as the provincial Assessed Watershed boundary as well as additional areas where known species occurrences extend (i.e., Western Painted Turtle occurrences are connected and considered within the Federal and Provincial survival habitat designation) (WPTRT, 2014).



Figure 2. The Coquitlam-Buntzen Watershed boundary (AOI for 2013-14 Coquitlam Species at Risk) Project.

4. Methods

a. Area of Interest Delineation and Mapping

The area of interest was delineated using an 'Assessed Watershed' Geographic Information Systems (GIS) layer from the provincial government site providing public access to GIS information, the GEOBC Gateway (source: <http://geobc.gov.bc.ca/>) and from description and map provided in the *BC Hydro Coquitlam/Buntzen Watershed Plan* (BC Hydro, 2011). Historic observations were obtained through the Conservation Data Centre (CDC) (source: <http://www.env.gov.bc.ca/cdc/>), whose data layers are also available through the GEOBC Gateway.

b. Surveying

Surveying in the first year of the project has been largely conducted via visual observations at sites visited as part of site assessments (see below). However, visits were also conducted at known and historical/existing occurrences for Western Painted Turtle, Red-legged Frog and Great Blue Heron. In addition, surveys for Western Toads were done in conjunction with Western Painted Turtle surveying as well as using similar techniques as with Red-legged Frogs, as there is some habitat overlap between species but timing for surveys differed. Pacific Tailed Frogs inhabit steep stream habitat not generally suitable for breeding for the other focal amphibian species, although incidental adult observations were also sought.

Surveying for Western Painted Turtle occurred during peak basking time (10 am – 3 pm) and were conducted using binoculars from shore or by boat. For areas where it is difficult to see basking locations from shore and difficult to access by boat, a spotting scope was used. When surveying by boat, care was taken to paddle away from shore (> 50 m away or in the middle of the water body) and look from a distance to determine turtle presence prior to potentially causing turtles to flee. Areas with woody debris appropriate for basking (e.g., not too far out of the water for turtles to climb and large enough for a turtle to rest its body) that are south facing have a higher likelihood of attracting turtles. Most times in spring and summer and even into fall, weather dependant, can be suitable to detect basking turtles (Kilburn and Mitchell, 2011).

In order to detect Red-legged frog presence, the primary method employed was egg mass surveys. These were conducted in spring (March for this project) and the number of egg masses per site was considered to be equivalent to the number of breeding females in the population (i.e., one egg mass per female) (Hallock and McAllister, 2009; Scott and Woodward, 1994). Egg mass surveying involved paddling edges of water bodies and visually observing egg masses with the aid of polarized glasses below the water surface (generally attached to vegetation or wood and at an average depth of 15 cm) (Hallock and McAllister, 2009, Matsuda et al., 2006). However, some water bodies were small and shallow enough that wading and/or observing with binoculars from edges were also used as methods to search for egg masses. Similar methods were employed for Western Toads at many overlapping sites; only egg strings, larvae (tadpoles) and/or toad metamorphs ('toadlets') were surveyed for May through to August rather than March.

Surveys for Pacific Tailed Frogs involve a Time-Constrained technique (TCS), which involves searching suitable stream habitat (cobble, pool/riffle, step pool) for 30-minutes (15 minutes for 2 people searching) (MELP, 2009). During this time larvae are sought and placed temporarily in a holding container. Following the survey, the larvae are counted and aged. Pacific Tailed Frogs remain in a larvae stage until approximately 4 years of age and based on size and limb growth can be classed into, hatchling, 1st year, 2nd year and 3rd year. The 4th year of life generally involves the 'meta' stage in which all limbs are formed but they remain aquatic and retain their tail.

Great Blue Heron historic colonies were visited in order to detect any recent activity. However, no suitable formal survey technique was available to this project that detects new colonies (aerial surveys are one of the few techniques that may be possible to detect new colonies but are very disruptive and expensive). New colony observations are almost exclusively incidental; provided through forestry, construction or other works as well as through public reporting. For this project, a stewardship approach was employed for seeking new colonies. Talks, newspaper articles, posters and brochures were all provided or produced to illicit novel colony observations (See **Appendix IV: Summary of SAR Stewardship**). Incidental observations of Great Blue Herons were also recorded while surveying of other SAR but primarily these are foraging observations which are not very useful for detecting nesting sites (herons can and often do forage up to 15 km from their nest or colony).

c. Site Assessments

Sites assessments in this first year of the project were very preliminary and were only made via observations during SAR surveys and Stewardship activities. Communication was initiated/maintained throughout the project year with the City of Coquitlam, Department of Fisheries and Oceans, Metro Vancouver Parks, Burke Mountain Naturalists, Colony Farm Park Association, Friends of Deboville, Watershed Watch Salmon Society, local residents/naturalists and any group currently conducting activities (or potentially in the future) in the watershed. A preliminary list was begun with the intention of formal assessment work, further SAR surveys and individual Restoration Action Plans to be developed in future years of the project (funding dependant) as had been done in the launch SAR project in the Alouette (Mitchell, 2013).



Figure 3. Potential restoration sites: Upper Coquitlam River Park (upper) and Kwikwetlam wetlands (lower). Photos by Aimee Mitchell

5. Results

a. Historic and Current Species at Risk Occurrences

Records, both sensitive and non-sensitive, were obtained from the Conservation Data Centre (CDC). In addition, meetings were held with the Burke Mountain Naturalists, Friends of Deboville, local naturalists and other stakeholders to obtain any records they may possess as well as to discuss any priority species or indications of declines observed by them (Figure 4).

Currently, 18 occupied sites are known for Western Painted Turtles in the Lower Mainland/Fraser Valley, with nearly all of the populations in the region at risk of extirpation, with less than 20 individuals present (WPTRT, 2014; Mitchell et al., 2013). Of these 18 sites, seven exist in the Coquitlam Watershed.

However only half of these were previously known up to the dates available with the CDC and since the inception of the Coastal Painted Turtle Project work beginning in 2009. Some Red-legged Frog and Pacific Tailed Frog observations appear to have been known but likely unreported in several areas. No CDC records were available noting the Western Toad observations that were gathered just prior and during this project. Great Blue Heron declines have been observed in the Coquitlam Watershed. Of the 6 colonies in and around the boundary of the Coquitlam Watershed only one remains active, the Mary Hill Colony. However, the size of the Mary Hill Colony has also been declining, particularly over the last 2 years.

Since the initiation of the project 25 new species at risk occurrences have been documented in the Coquitlam Watershed (Figure 5).

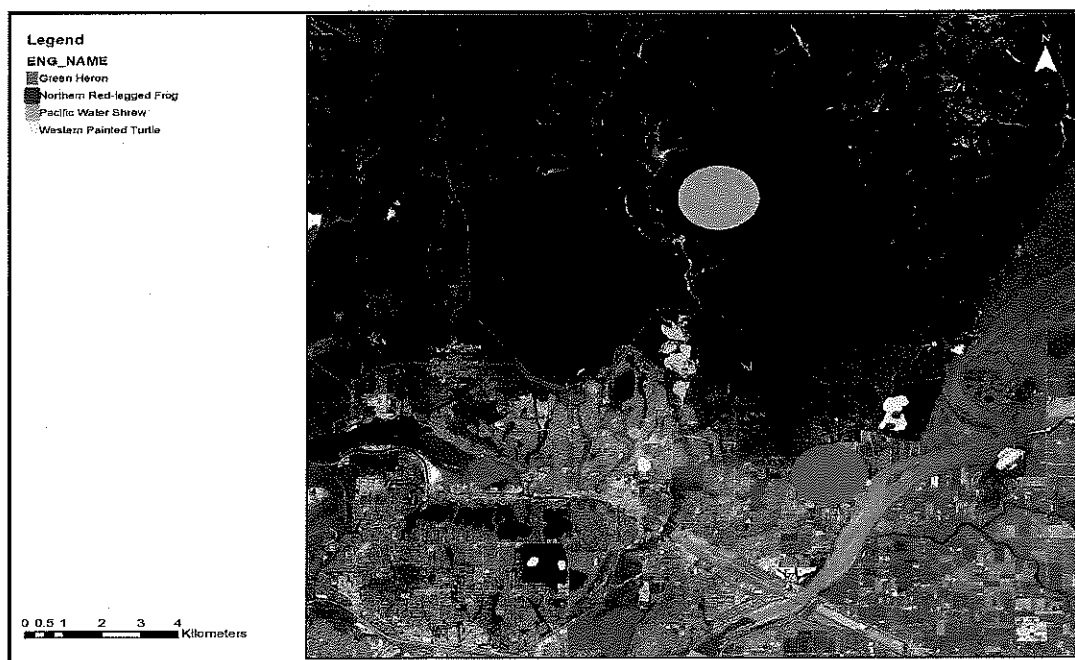


Figure 4. Existing Species at Risk Occurrences in the Coquitlam Watershed (prior to project inception)

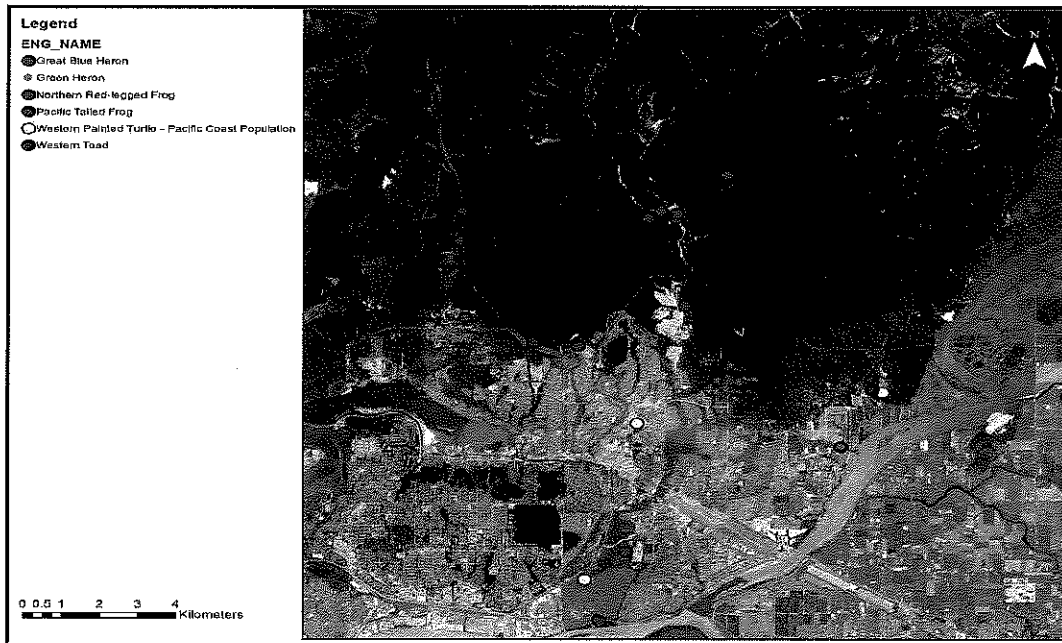


Figure 5. Current Species at Risk Occurrences in the Coquitlam Watershed (since project inception)

b. Species at Risk Surveys

Seventeen surveys for Western Painted Turtles were conducted at 13 sites for 73 person hours. Western Painted Turtles were confirmed at three sites in 2013; Colony Farm Regional Park, Minnekhada Regional Park and Lafarge Lake (Fig. 6 and Table 1). Thirty-seven surveys were conducted for Red-legged Frogs with detections at 10 sites; 3 in the lower watershed and 7 in the upper watershed, for 54 person hours (Fig. 6 and Table 1).

Western Toads were detected at 2 sites; Minnekhada Regional Park and Deboville Slough. Both an adult toad and >100 metamorphs (toadlets) were observed at Minnekhada, while a single adult toad was observed at Deboville Slough (Figure 7 and Table 1.). Thirteen sites for a total of 76.5 person hours were visited at ideal times for detecting breeding, while another 25 (which were not accessible until late winter/early spring 2014) did not have toads detected but have potential to be breeding sites.

Surveys for Pacific Tailed Frogs were attempted to be conducted at 16 sites, however five sites were either seasonal or unable to be surveyed for some reason. Of the 11 sites with surveys conducted for 7.5 person hours, Pacific Tailed Frogs were detected at four (Fig. 8 and Table 1).



Figure 6. Western Painted Turtle basking on shore at Colony Farm Regional Park, July 2013 (upper) and close up shot of Red-legged Frog egg mass in Coquitlam MV Watershed, March 2014 (lower). Photos by Aimee Mitchell and Chris Currie.



Figure 7. Western Toad metamorph at Minnekhada upper marsh, August 2013 (upper) and Adult Western Toad at Minnekhada lower marsh, August 2013 (lower). Photos by Aimee Mitchell.

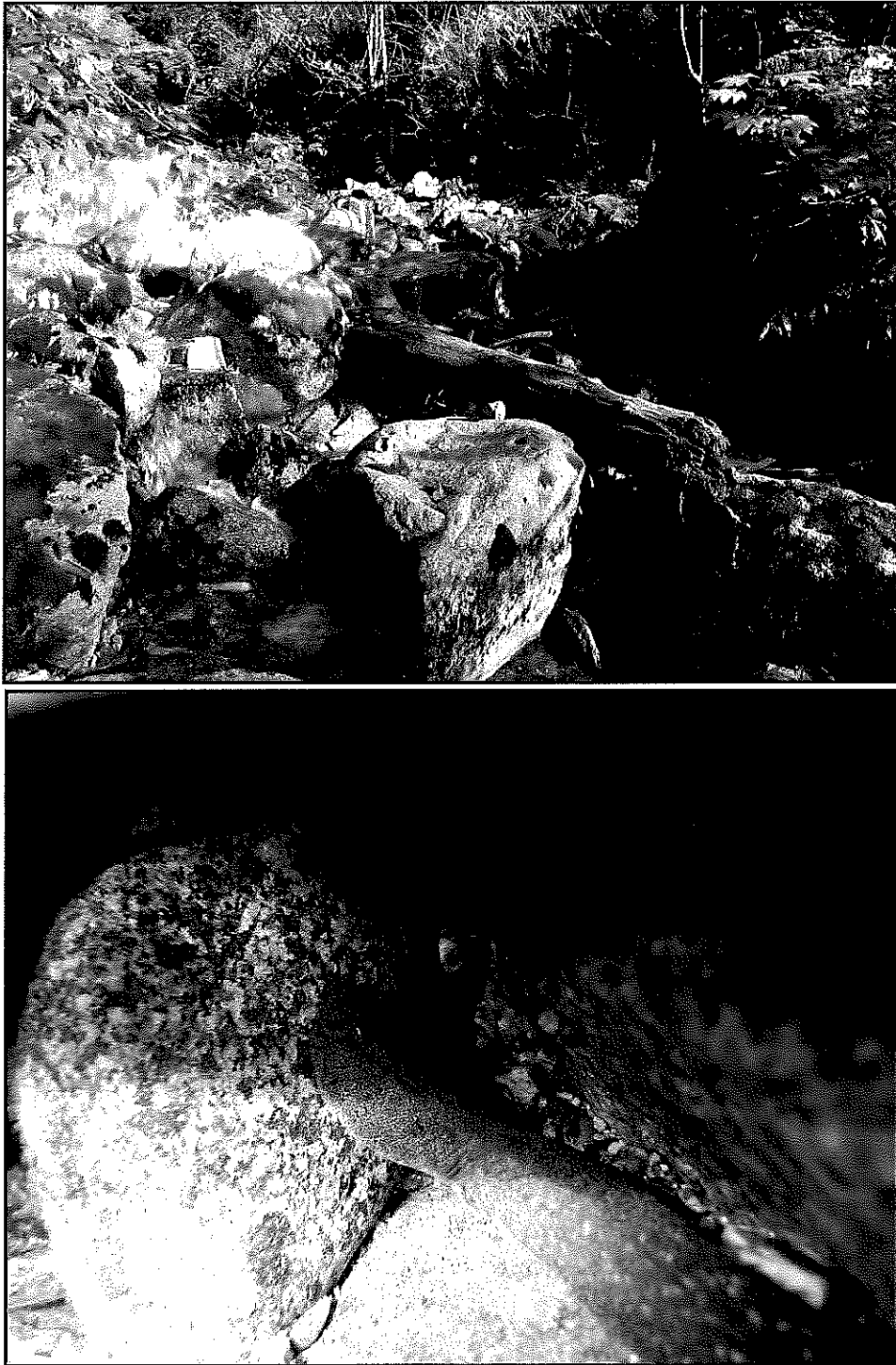


Figure 8. Pacific Tailed Frog habitat on east side of Buntzen Lake, October 2013 (upper) and Pacific Tailed Frog larvae in Monsom Creek, October 2013 (lower). Photos by Aimee Mitchell.

In collaboration with the Heron Working Group, nesting monitoring was conducted in spring 2013 at the only known active Great Blue Heron nesting colony in the Coquitlam Watershed, the Mary Hill Colony, just south of Colony Farm Regional Park. Monitoring was conducted through this group by Dan Shervill (provided in-kind) of the Canadian Wildlife Service as part of yearly monitoring conducted at all active heron nesting colony in the Lower Mainland and Sunshine Coast and by contractors hired to monitor highway construction affects. In 2013, monitoring detected low fledging success of the 102 nests present. This is largely assumed to be related to the construction of the Port Mann Bridge and some birds from this colony are believed to have established a new colony at Deer Lake in Burnaby. No new colonies were detected in this project year, however, over 10 observations of herons were provided to members of the project through stewardship initiatives. In addition, herons were incidentally observed at six survey sites (Fig. 9 and Table 1).



Figure 9. Great Blue Heron Foraging at Lower Coquitlam River Park – Oxbow Restoration. Photo by Aimee Mitchell.

Overall, surveys were conducted at 51 locations throughout the watershed over the project year (April 2013-March 2014). This survey effort covered the expanse of the watershed with the exception of the far north portion past Coquitlam Lake due to snow cover that restricted access to this area at the time permission was granted to access this portion of the watershed (Fig. 10 and Table 1).

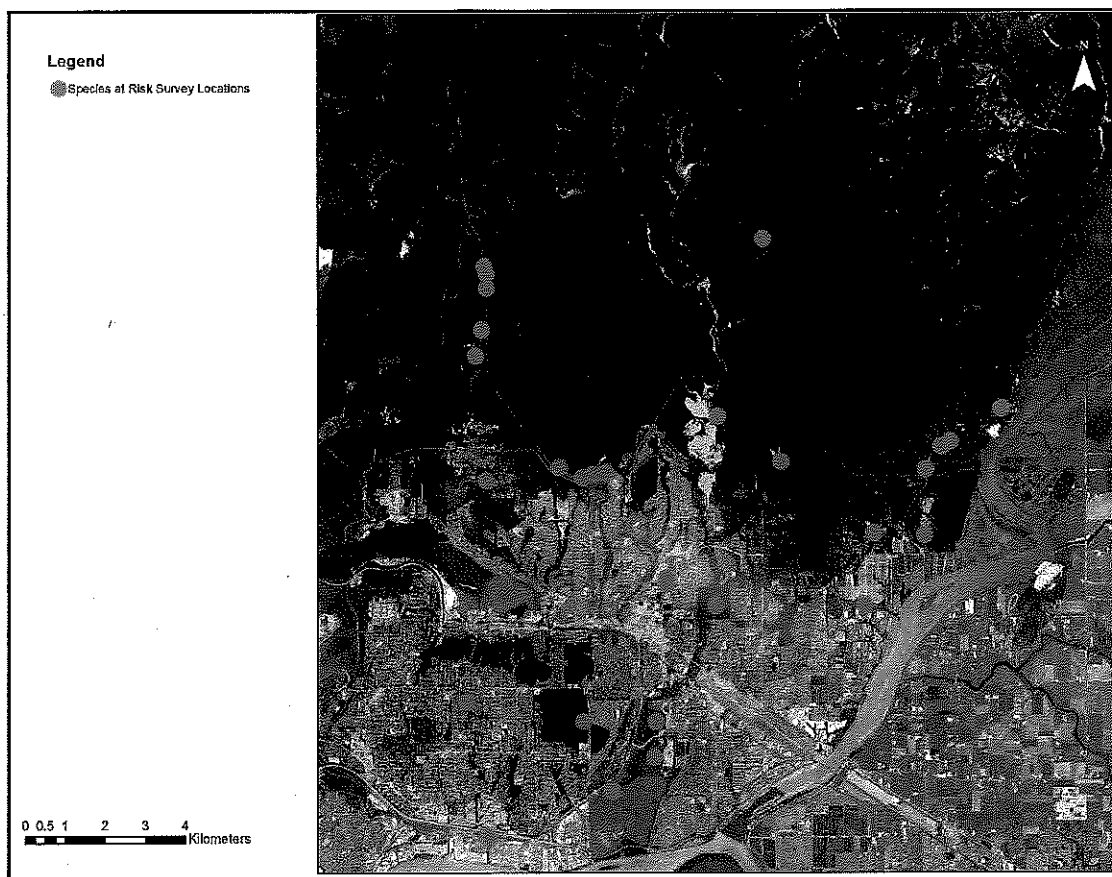


Figure 10. Sites surveyed for Western Painted Turtle and Amphibian SAR in the Coquitlam Watershed in 2013-14

c. Sites for potential restoration

Sites for potential restoration noted in year 1 included, Upper Coquitlam River Park (observation of Red-legged Frog breeding), Lower Coquitlam River Park (Great Blue Heron observed, possible Red-legged Frog Breeding habitat), Eagle Mountain Park (Red-legged Frog breeding confirmed, Western Toad breeding likely), Kwikwetlam Wetlands (Red-legged Frog confirmed breeding site and prior Western Painted Turtle observation) and Colony Farm Regional Park (Great Blue Heron foraging site, Western Painted Turtle occupied site). Restoration activities planned would vary from site to site depending on habitat and species observations and also could range from a cooperative effort with other projects (i.e., ensuring Red-legged Frog breeding habitat is maintained when conducting works at Upper Coquitlam River Park) or undertaking novel restoration (conducting turtle habitat enhancement at Kwikwetlam wetlands; removal of invasive species and installation of nesting habitat).

Table 1. Survey summary for Species at Risk in the Coquitlam Watershed in 2013-14

Site/Location Name	Easting	Northing	CHPI confirmed	TRSC-E confirmed	RAAU confirmed	ANBO confirmed	ASTR Confirmed	GBHE Confirmed
Minnekhada Regional Park	521830	5460540	Y	Y	Y*	Y	-	Y
Lower Coquitlam River Park - Oxbow restoration	516598	5458784	X	X	Y?	X	-	Y
Deboville Slough-Mclean Creek-ditch to WMA	520311	5458796	Y*	Y	X	Y	-	Y
Como Lake	510332	5456385	Y*	Y	X	X	-	X
Mundy Lake	513246	5455907	Y*	Y	Y*	X	-	X
Lost Lake	515330	5459339	Y*	Y	X	X	-	X
Lafarge Lake	515358	5459492	Y	Y	X	X	-	X
Como Creek - 3 locations	510875	5453051	Y*	X	X	X	-	-
Kwikwetlam Wetlands	515041	5455023	Y*	X	Y	X	-	Y
Colony Farm - Kwikwetlam Band Office to Sheep Paddocks	513983	5454174	Y	X	Y*	X	-	Y
PoCo Trail Tremblay ponds - Coquitlam River pools	515085	5455911	X	X	X	X	-	X
Quarry Road	521855	5462181	-	-	-	X	-	-
East of Buntzen Rec Area - Buntzen Creek	510547	5465015	-	-	-	-	X	-
At end of Eagle Mtn Road and hike along hydro road	513517	5462066	-	-	-	-	X	-
Noons Creek	513244	5461986	-	-	-	-	X	-
West Noons Creek	512636	5462230	-	-	-	-	Y	-
Partington Creek	520557	5460590	-	-	-	-	X	-
McIntyre Creek	522248	5462754	-	-	-	-	S	-
Diener Creek	522477	5462878	-	-	-	-	S	-
Munro Creek	523749	5463704	-	-	-	-	X	-
Burke Mtn - Near Provincial Park Gate	518223	5462372	-	-	-	-	X	-
East side of Buntzen Lake - km 0.5	510681	5465664	-	-	-	-	Y	-
East side of Buntzen Lake - km 1.5	510813	5466699	-	-	-	-	Y	-
East side of Buntzen Lake - km 2.2	510809	5467056	-	-	-	-	S	-
East side of Buntzen Lake - km 2.9	510754	5467242	-	-	-	-	X	-
Monsom Creek	510808	5461921	-	-	-	-	Y	-
Eagle Mountain Park	513808	5462115	X	X	Y	X	X	X
Upper Coquitlam River Park	516613	5463509	X	X	Y	X	-	X
Coquitlam MV Watershed - 23 locations	517747	5467927	-	-	Y	X	-	Y

CHPI = Western Painted Turtle, TRSC-E = Red-eared Slider (non-native), RAAU = Red-legged Frog, ANBO = Western Toad, ASTR = Pacific Tailed Frog, GBHE = Great Blue Heron
 Y* - previously confirmed but not during project, Y - confirmed during project, X - surveyed but not detected, S - Seasonal creek and "N" Not suitable to survey for species/not surveyed.
 Indicates important documented sightings:

d. Partnership building and Species at Risk Stewardship

Since the inception of the project multiple partnerships have been formed. In attempts to partner and coordinate on any works that have occurred or will potentially occur in the Watershed, connections have been made with: the Kwikwetlam First Nations, the Burke Mountain Naturalists, The Friends of Deboville, City of Coquitlam, Department of Fisheries and Oceans, Metro Vancouver Parks, South Coast Conservation Program, BCIT Fish and Wildlife Program, local naturalists, private landowners and others (See Appendix IV and Figs. 11 and 12).



Figure 11. Species at Risk Partnership building and Stewardship; Kwikwetlam First Nations members assisting with surveying in Kwikwetlam wetlands, July 2013.

Photo by Aimee Mitchell



Figure 12. Species at Risk Partnership building and Stewardship; training with BCIT Students at Lower Coquitlam River Park (upper) and attendance at City of Coquitlam Canada Day Event at Lafarge Lake (lower). Photos by Aimee Mitchell

6. Discussion

An increase in Species at Risk (SAR) occurrences in the Coquitlam Watershed has already been observed in the first year of the project. With SAR occurrences identified, partners and others working in the watershed can now become more aware of species presence and consider them and their habitat into the works, whether it is restoration or development. Success has already been displayed in the project with the various partnerships that have been formed, communications opened and commitments made to working towards common multi-species approach to conservation.

7. Recommendations

The Western Painted Turtle Recovery Team is currently proposing augmentation (via head-started hatchlings) for turtle populations with high risk of extirpation. All sites in the Coquitlam Watershed fall under this category. Future works and management at these occupied sites should consider turtles and promote habitat improvements to provide for a potentially augmented and recovering population of Western Painted Turtles suitable and safe habitat to thrive. This involves construction, enhancement and/or maintenance (such as at existing sites of Colony Farm Sheep Paddocks and Minnekhada Regional Park) of nesting and basking habitat. Interpretive signage at any recovery site is also highly recommended.

Species at Risk Amphibians have varying specific recommendations depending on habitat, but overall protection and monitoring of identified breeding habitat is critical. Although there are several observations for Red-legged Frog breeding sites, they are easily impacted by development (draining or filling of ponds) and road maintenance. It is recommended that ditch cleaning avoid breeding times for Red-legged Frogs. This recommendation was already considered and employed at the Coquitlam MV Watershed sites. Minnekhada is the only known breeding site for Western Toads in the watershed and should be monitored closely. Pacific Tailed Frogs, particularly adults which have limited data collected on them, should be considered in logging activities and maintenance of hydro roads. While breeding streams are often identified and provided some consideration, the surrounding terrestrial habitat where adult inhabit is often not included when making land use/management decisions. Adult spend the majority of the life terrestrially and are known to travel close to 200 m from their breeding streams.

Current management recommendations for Great Blue Herons in the Coquitlam River Watershed are focused on the Mary Hill Colony, the only currently active site in the watershed. However, because disturbance was a factor versus habitat change, the only real recommendation is to continue monitoring this site post-disturbance. If other factors come to light following monitoring, then those should be addressed in the best way possible. Further reporting of Heron nesting (and other SAR) observations are encouraged through the SCCP (<http://www.sccp.ca/>)

Sites with potential for restoration should be shared with partners and stewards to ensure the observations made during this study are being considered in continuing or future work and management decisions.

8. Acknowledgements

Partners/Supporters:

The project was made possible by funding of BC Hydro's Fish and Wildlife Compensation Program. In addition to inspiring the model the proposal for this project was built on, Kym Welstead, the Species at Risk Biologist at the Ministry of Forest, Lands and Natural Resource Operations (MFLNRO) for the South Coast Region, provided in-kind project advisement. Kym Welstead has also provided direction, contacts, field support and information on the species at risk occurrences in the Watershed. The British Columbia Conservation Foundation (Joanne Neilson and Kerry Baird) provided administrative support for this project, including co-coordinating various members of the project in terms work contracts and reporting.

The Kwikwetlam First Nations, including Craig Orr, has provided support and coordination. Two Kwikwetlam Band Members, Carl and Marvin, enthusiastically surveyed Colony Farm and their local wetland (Kwikwetlam wetlands) which they had never ventured in by boat. Through this project these members were able to use their traditional territory in culturally-significant way, canoeing.

The South Coast Conservation Program (SCCP) provided a variety of information of species at risk such as presented in Factsheets. Tasmin Baker, who was hired as the Stewardship Coordinator for this project also worked cooperatively with the SCCP through another project sponsored by Habitat Stewardship Program.

The Burke Mountain Naturalist, Colony Farm Park Association and Friends of Deboville (primary contact Elaine Goulds) provided any species records they possessed and provided valuable information on any priority species or indications of declines observed by them. These groups also provided important contacts in terms of projects they had previously worked cooperatively on or intended to work on in the watershed, helping direct the development of the Sites for potential restoration list.

Alison Evelyn of Metro Vancouver Parks has been extremely helpful in providing access and expressing interest in cooperative efforts for restoration at their sites in the Watershed. City of Coquitlam (Caresse Selk) has provided support in terms of providing contacts, sighting information, working cooperatively on SAR sign installation and expression of interest in coordinating restoration at assessed sites in Municipal Parks.

Ken Juvik and Mike Mayers of the MV Coquitlam Watershed along with many other staff members were extremely helpful in providing reports and mapping information as well as assistance with surveys.

Research:

Christopher Currie of the Coastal Painted Turtle Project (CPTP) contributed to survey efforts for turtles and SAR amphibians. In addition, Christopher Currie, Aimee Mitchell, Andrea Gielens, Deanna MacTavish, Justin Suraci and Vanessa Kilburn of the CPTP, primarily sponsored through *Habitat*

Stewardship Program (HSP) funding, contributed background survey information and links to outreach and restoration initiatives at the currently Western Painted Turtle occupied sites in the watershed.

Dan Shervill of the Canadian Wildlife Service Canada (CWS) and in cooperation with the Great Blue Heron Working Group, provided background survey and population baseline data for the currently known and active heron colony (Mary Hill). Ross Vennesland, of Parks Canada, and Kym Welstead, of the BC Ministry of Forests, Lands and Natural Resource Operations, provided historical and recent monitoring data on the Mary Hill Colony and advice on behalf of the Great Blue Heron Working Group. Chris Lee, of Aquaterra, also contracted to conduct some heron monitoring and part of the GBHWG provided updated colony monitoring data and also provided other SAR occurrence observations in the watershed.

9. References

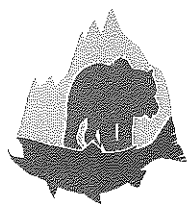
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Appendix I: Financial Statement

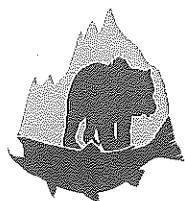


FISH AND WILDLIFE COMPENSATION PROGRAM

Financial Statement Form

Project # 13.W.COQ.02

	BUDGET		ACTUAL	
	FWCP	Other	FWCP	Other
INCOME				
<i>Total Income by Source</i>	\$46,150.00	\$91,000.00	\$46,150.00	\$91,657.03
Grand Total Income (FWCP + other)	\$137,150.00		\$137,807.03	
	BUDGET		ACTUAL	
	FWCP	Other	FWCP	Other
EXPENSES				
Consultant Fees	\$33,200.00	\$37,600.00	\$37,842.44	\$38,094.03
(List others as required)				
Kwikwetlam First Nations	\$5,000.00	\$0.00	\$500.00	\$0.00
Species/Habitat experts/volunteers	\$0.00	\$41,000.00	\$0.00	\$41,000.00
MFLNRO Project Advisement	\$0.00	\$10,000.00	\$0.00	\$10,000.00
BCCF Project Coordination	\$900.00	\$0.00	\$900.00	\$0.00
MATERIALS & EQUIPMENT				
Equipment Rental				
Materials Purchased	\$950.00	\$0.00	\$452.63	\$0.00
Travel Expenses	\$0.00	\$2,400.00	\$0.00	\$2,563.00
Permits				
(List others as required)				
Stewardship materials	\$600.00	\$0.00	\$1,634.05	\$0.00
signs	\$1,000.00	\$0.00	\$320.90	\$0.00



FISH AND WILDLIFE COMPENSATION PROGRAM

Financial Statement Form – Continued

ADMINISTRATION				
Office Supplies				
Photocopies & printing				
Postage				
(List others as required)				
BCCF Administration	\$4,500.00	\$0.00	\$4,499.98	\$0.00
Total Expenses	\$46,150.00	\$91,000.00	\$46,150.00	\$91,657.03
Grand Total Expenses (FWCP + other)	\$137,150.00		\$137,807.03	
BALANCE (Grand Total Income – Grand Total Expenses)	\$0.00		\$0.00	
	The budget balance should equal \$0		The actual balance might not equal \$0	

* Any unspent FWCP financial contributions are to be returned to:

Fish and Wildlife Compensation Program
c/o BC Hydro
11th floor
6911 Southpoint Drive
Burnaby, BC
V3N 4X8
Attention: Lorraine Ens

For more information visit fwcp.ca.

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Appendix II: Performance Measures-Actual Outcomes

Performance Measures

Using the performance measures applicable to your project, please indicate the amount of habitat anticipated to be restored/enhanced for each of the specified areas (e.g. riparian, tributary, mainstem). The same table will be used in the final report to summarize project results.

Performance Measures-- Target Outcomes													
Project Type	Primary habitat benefit targeted of project (sq.m.)	Primary Target Species	Estuarine	In-stream Habitat - Mainstream	In-stream Habitat - Tributary	Riparian	Reservoir Shoreline Complexes	Riverine	Lowland Deciduous	Lowland Coniferous	Upland	Wetland	Other
Impact Mitigation													
Fish passage technologies	Area of habitat made available to target species		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drawdown zone revegetation/ stabilization	Area turned into productive habitat		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Wildlife migration improvement	Area of habitat made available to target species		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Prevention of drowning of nests, nestlings	Area of wetland habitat created outside expected flood level (1:10 year)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Habitat Conservation													
Habitat conserved - general	Functional habitat conserved/replaced through acquisition and management	Red-legged Frog	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Northwestern Salamander
Habitat conserved - general	Functional habitat conserved by other measures (e.g. riprapping)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Designated rare/special habitat (subset)	Rare/special habitat protected	Western Painted Turtle	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Western Toad, Red-legged Frog, Great Blue Heron

Performance Measures – Target Outcomes - Continued													
Project Type	Primary habitat benefit targeted of project (sq.m.)	Primary Target Species	Estuarine	In-stream Habitat – Mainstream	In-stream Habitat – Tributary	Riparian	Reservoir Shoreline Complexes	Riverine	Lowland Deciduous	Lowland Coniferous	Upland	Wetland	Other
Maintain or Restore Habitat forming process													
Artificial gravel recruitment	Area of stream habitat improved by gravel placement		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Artificial wood debris recruitment	Area of stream habitat improved by LWD placement		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Small-scale complexing in existing habitats	Area increase in functional habitat through complexing		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Prescribed burns or other upland habitat enhancement for wildlife	Functional area of habitat improved		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Habitat Development													
New habitat created	Functional area created		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Other													
Identification, monitoring	Habitat area of occupation known	Western Painted Turtle, GB Heron	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
		Red-legged Frog, Tailed Frog	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
		Western Toad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

2

Appendix III: Confirmation of FWCP Recognition
(See Appendix IV for signage, brochure and media coverage)

Appendix IV. Species at Risk in the Coquitlam Watershed Stewardship Summary – Tamsin Baker

Summary of the Coquitlam River/Buntzen Lake Watersheds Species At Risk Project: Stewardship Activities 2013-14



Report Prepared by

Tamsin Baker, MSc
Tetrad Ecological Consulting,
South Coast Conservation Program Stewardship Coordinator

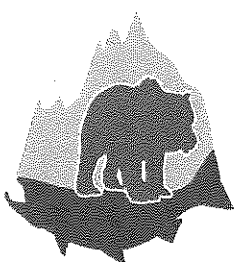
March 2014

Report Prepared for:
BC Conservation Foundation and BC Hydro's Fish and Wildlife Compensation Program

Acknowledgments

A number of people and organizations helped in the implementation of this stewardship initiative. Thanks to Aimee Mitchell for providing support and guidance. More thanks go to the various stewardship organizations and engaged individuals for providing their time and information. The South Coast Conservation Program helped in also providing information and website support.

Thanks also to the BC Conservation Foundation for providing contract administration support.



FISH AND WILDLIFE COMPENSATION PROGRAM

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BRITISH
COLUMBIA

Canada
 Fisheries and Oceans
Canada

Pêches et Océans
Canada

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Executive Summary

The stewardship component of the Coquitlam River/Buntzen Lake Species at Risk (SAR) project raised awareness about local endangered species in the following ways. Local stewardship organizations were contacted, public SAR signage in City of Coquitlam parks was created, local media were contacted, and a SAR brochure for the Tri-Cities Area was designed and printed. Additionally, information was compiled about local environmental projects and SAR sightings. Contact with local environmental groups and the public encouraged additional sightings of SAR, with a focus on the nesting Great Blue Herons.

Stewardship Initiative

Purpose

As part of the Coquitlam River/Buntzen Lake Species at Risk project, this stewardship initiative was to prevent inadvertent losses of population and habitat for species at risk (SAR) through increased awareness and improved accessibility to data. Targeted species included the Western Painted Turtle, Red-legged Frog, Western Toad, Coastal Tailed Frog, Western Screech Owl, Pacific Water Shrew and Great Blue Heron.

Results

Contacted Local Stewardship Organizations and Individuals:

The main messages were:

- Introduction to the local SAR that may be present.
- Inquiry if they have any recent recordings of SAR (not already reported).
- To be on the lookout for SAR and to encourage the recording and reporting of any possible sightings
- If they are undertaking any projects that may impact local SAR populations, and if there are any projects where activities can occur to support the recovery of SAR.

A spreadsheet was created to list the local stewardship initiatives.

Groups contacted:

- Friends of DeBoville Slough – PowerPoint presentation given at February meeting and arranged for heron poster to be put up in kiosk.
- Hoy/Scott Creek Streamkeepers – PowerPoint Presentation given at January meeting and delivered heron poster to be put up at hatchery location.
- Burke Mountain Naturalists – Outreached in person to various members, and included a detailed article in their February 2014 newsletter
- Maple Creek Streamkeepers – Contacted through email. Possible Red-Legged Frog habitat.
- Riverview Horticultural Society – Tour of site and transfer of information
- Colony Farm Park Association (Wildlife Committee) – Contacted to discuss heron count.
- Coquitlam River Watershed Roundtable – Participated in June 2013 meeting.

- Watershed Watch Salmon Society (Craig Orr) – Made inquiry regarding past and existing projects.
- Hyde Creek Watershed Society – Outreached in person at community event and delivered heron poster at hatchery.
- Coquitlam River Watch – Outreached via email to explore sharing of SAR sighting information.

Other individuals contacted:

- Maurice Coulter-Boisvert: DFO, Salmonid Enhancement Community Advisor
- Dave Nanson, DFO
- Mike Pearson, Biologist
- Chris Lee, Biologist
- Niall Williams, local naturalist, affiliated with multiple initiatives
- Kiyoshi Takahashi, local naturalist, affiliated with multiple initiatives

Community Events Participation:

- Canada Day in Coquitlam (Lafarge Lake)
- Salmon Come Home in Coquitlam (Hoy creek) – October 2013

South Coast Conservation Program (SCCP) partnership

The SCCP works to facilitate the conservation and restoration of species and ecosystems at risk on BC's South Coast. Partnering with the SCCP increased the ability to outreach to various groups and individuals in the Tri-Cities. The SCCP's website and general contact email was used to encourage individuals to find out more information about this project and to report SAR sightings. The SCCP is currently undertaking a Landowner Contact Program in the Lower Mainland/Fraser Valley, which encourages landowners to protect and enhance wildlife habitat in their backyard. One site visit on private land resulted in the follow-up monitoring of possible Red-legged Frog habitat for this project.

Local Government

Contact was also made with various local government staff. I worked with the City of Coquitlam staff to raise awareness and on creating and installing signs in several parks. Metro Vancouver Regional Parks staff at Colony Farm was contacted primarily to discuss the Great Blue Herons nesting. Information was also passed along to the Environment committee for the Village of Anmore. The resulting SAR brochure was distributed to all five City Halls and respective staff.

Signage

The City of Coquitlam agreed to put signs regarding SAR in several of their parks. The text and photos were provided, and the City's designers created the signs. Printing was paid for by the FWCP. The resulting signs are to be put up at four locations: Mundy Lake, Lost Lake, DeBoville Slough and Coquitlam River Park. See Figures 1 and 2.

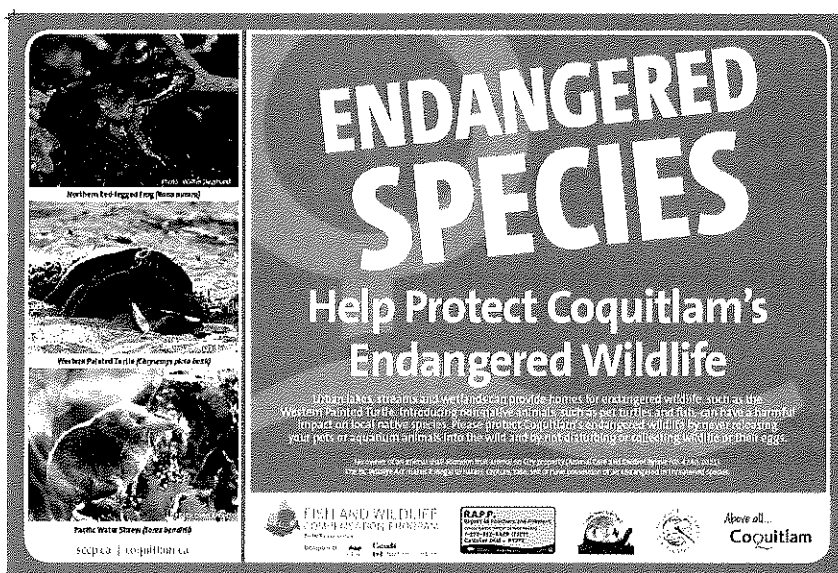


Figure 1: Horizontal sign designed for City of Coquitlam parks.

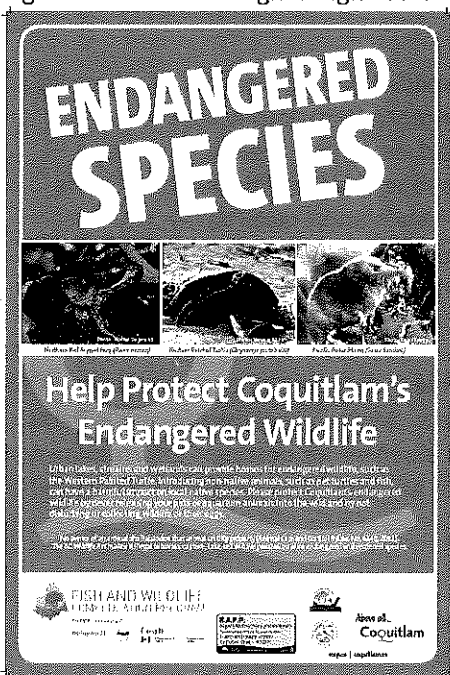


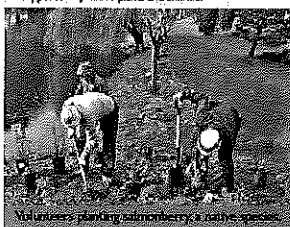
Figure 2: Vertical sign designed for City of Coquitlam parks.

Brochure

With edits from the SCCP and the Canadian Wildlife Service, the resulting brochure was created (see Figure 3). 2600 were printed. Distribution occurred to various local stewardship groups and local government.

Biodiversity in Your Backyard

The Tri-Cities are wonderful communities in which to live and play. Part of what makes this area so special is the diverse natural environment. This includes forested mountains, rivers, creeks, wetlands and open fields which support many native plants and animals.



Volunteers planting a native tree.

Species Under Threat

Local natural areas needed to support native species are vanishing due to various human-related threats such as habitat loss, invasive species and pollution. The Lower Mainland and Fraser Valley are hotspots of biodiversity with over 250 species at risk, 150 of which may be found in the Tri-Cities.



The Coquitlam River and the area around it provides important habitat for many species.

What defines a "Species at Risk"?

In BC, species and ecological communities are analyzed and then listed by the BC Conservation Data Centre. On a Canada-wide basis, species are listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and then can be added to Schedule 1 of the Species at Risk Act (SARA).

Species at Risk Listing Definitions in BC and Canada	
Red-listed	Any BC species being considered for designation as Endangered or Threatened under the BC Wildlife Act
Blue-listed	Any BC species not immediately threatened, but of Special Concern due to their sensitivity to human activities or natural events
Extinct	A species that no longer exists
Extirpated	A species that no longer exists in its native BC or Canadian habitat, but may occur elsewhere
Endangered	A species facing imminent extinction or extirpation
Threatened	A species that is likely to become endangered if limiting factors such as diminishing population sizes, isolated geographic distribution, and habitat threats are not reversed
Special Concern	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events

Help Protect Endangered Species!

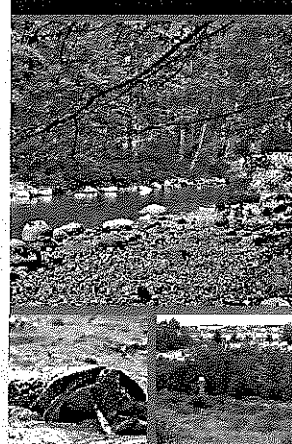
Positive Activities:

- Control the spread of invasive plant species
- Add native plants and nest boxes for birds to your backyard
- Never release your pets or aquarium animals into the wild
- Do not disturb or collect wildlife, or their eggs
- Get involved with your local stewardship or field naturalist group
- Obey dogs on leash signs to avoid disturbing wildlife habitat

Watch for endangered species! Help is needed to collect additional location data. If you spot a rare species, record and report your sighting. Information to document includes the location, date/time, the species and number seen. If feasible, take a photo.



Endangered Species of the Tri-Cities Area



Anmore • Belcarra • Coquitlam
Port Coquitlam • Port Moody, BC

Local Species at Risk:

Reptiles:

Western Painted Turtle (*Chrysemys picta*)
Federal Status: Special Concern, BC Status: Red

The only native turtle left in BC. They are identified by their body shape where there is a sleekness between the head and neck resulting in little distinction between those body parts.

Take care not to confuse them with the non-native Red-eared Sliders (*Trachemys scripta*). The best way to tell the difference is that the Western Painted Turtles have the red under-shell, whereas Red-eared Sliders have a yellow under-shell and side. Many Sliders have distinct red marks behind their eyes, but the simple absence of the mark does not mean it is a Western Painted Turtle.



Western Painted Turtle

Molluscs:

Oregon Forestsnail (*Allogona townsendiana*)
Federal Status: Endangered, BC Status: Red

This snail is one of the largest land snails in BC. It can be found mostly in deciduous forests dominated by big-leaf maple and red alder with stinging nettle and sword fern. Adults can be identified by the thick white aperture lip when viewing the snail from below.

Photos courtesy: Tamara Bailey, Green City, Green Coquitlam, Vanessa Wilkins, David Leung, Walter Segments, Ripon's Fish and Wildlife, and Parks Canada.

Amphibians:

Northern Red-legged Frog (*Rana aurora*)
Federal Status: Special Concern, BC Status: Blue

Found across the Lower Mainland, these frogs prefer a range of aquatic and upland environments. When mating, Red-legged Frogs prefer shallow ponds and slow-moving streams. Once mature, adults will spend much of their time on land. However, every year they return to breed in the same freshwater location that they were born.



Northern Red-legged Frog

Other rare amphibians to be on the lookout for are the Western Toad (*Anaxyrus boreas*) and Pacific Tailed Frog (*Ascaphus truei*). Both are listed as Special Concern/Blue. But be aware to not confuse these frogs with non-native frogs such as the American Bullfrog (*Lithobates catesbeianus*) and the Green Frog (*Lithobates clamitans*). Search online for the BC Frogwatch Program to learn how to identify frogs.



Oregon Forestsnail

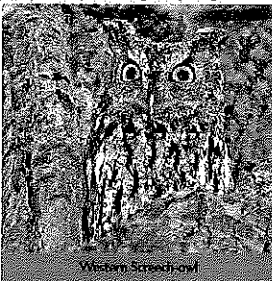
Birds:

Great Blue Heron (*Ardea herodias fannini*)
Federal Status: Special Concern, BC Status: Blue

Populations of this majestic bird are likely on the decline even though it is a common sight as it hunts for food in areas ranging from fresh and saltwater marshes, streams and open grassy fields. Herons generally find quiet forests to build their nests in, colonies to court, nest and raise their young between February and April. Main threats include habitat loss, disturbances to their nests and predation by Bald Eagles.

Owls

Three owls are Blue-listed in the Tri-Cities. These are the Western Screech-owl (*Meotis bennettii bennettii*), Barn Owl (*Tyto alba*) and Short-eared Owl (*Nio flammeus*). While the Barn Owl and Short-eared Owl are more likely to be found in open fields, the Western Screech-owl can be found in forests. The Western Screech-owl is under threat partially due to being in competition with the more common Barred Owl (*Strix varia*) whose range is expanding.



Western Screech-owl



Great Blue Heron

Mammals:

Pacific Water Shrew (*Sorex bendirii*)
Federal Status: Endangered, BC Status: Red

This elusive mammal is the largest shrew in BC, and in Canada, is only found in the riparian areas of the South Coast. It feeds on invertebrates both in and out of the water and has a fringe of stiff hairs on its back feet that help it swim and even run on the top of water for short periods of time.



Pacific Water Shrew


Figure 3: Endangered Species of the Tri-Cities Area brochure

Species at Risk sightings

The Great Blue Heron used to have several colonies in the Tri-Cities. Most recently, it appears as though the last known nesting area (near Colony Farm) has also been abandoned. To discover unknown nesting sites and to encourage the participation of the local stewardship groups and the public, an effort was made to encourage new sightings of heron nests (as well as other endangered species). A poster was created and distributed, a press release was sent out, and the initiative was mentioned in the article

published by the Burke Mountain Naturalists. See Figure 4. The SCCP website was the main source for additional information. 16 SAR sightings were made, with the majority of them being Great Blue Herons. Unfortunately none of the sightings resulted in new nests being found in the Tri-Cities area. However, the high level of community interest and support was one positive outcome.

GREAT BLUE HERON (*Ardea Herodias fannini*) - SPECIES AT RISK:



Seen any Great Blue Herons recently? Tell us about it!

The Great Blue Heron Needs Your Help to Ensure its Conservation in the Coquitlam River Watershed

HOW YOU CAN HELP:

SEND US YOUR OBSERVATIONS OF NESTING OR NESTING BEHAVIOUR!
CARRYING OF STICKS OR ROOSTING IN TREES.

THE IMPORTANT TIMING FOR THESE OBSERVATIONS ARE BETWEEN:
FEBRUARY AND APRIL

TIGHT AND STICKS OBSERVATIONS OF HERONS TRAVELLING TO AND FROM THE NESTING SITES BETWEEN FEBRUARY AND AUGUST ARE ALSO USEFUL.

For more information:
lamsn@sccp.ca
604 202 2381

www.sccp.ca

The Great Blue Heron that lives on BC's coast is a relatively common sight. When standing, this blue-grey wading bird can be over 1 m in height and when in flight can be identified by its large wingspan and neck folded in an s-shape. They can be found hunting for food in areas ranging from along fresh and saltwater marshes, streams and open grassy fields to ornamental backyard ponds. **They find quiet forests to build their nests in colonies to court, nest and raise their young.**

The main threats to herons include those that impact their ability to nest in these colonies. **Colonies vary in size from a few nests to over 20.** Issues include human disturbance, lost of habitat due to development and eagle predation.

It is likely that the heron population is declining on the South Coast. To help stop this decline, more information is needed about where these birds are creating colonies and breeding in this region.

Information collected will be used towards Great Blue Heron conservation in the Coquitlam River watershed and on BC's South Coast.

South Coast Conservation Program

FISH AND WILDLIFE COMPENSATION PROGRAM

The FWCP is a partnership of:

BC Hydro **BC Wildlife Compensation Program** **Canada** **Coquitlam River Watershed Society** **Coquitlam River Watershed Society**

Figure 4: Poster distributed to encourage sightings of nesting Great Blue Herons

Media Stories

The following are links to the stories that were published about this project.

Tri-City News: <http://www.tricitynews.com/community/252330921.html>

Anmore Times (March 2014 Print edition, p.13): <https://docs.google.com/file/d/0B-MZnkyJ2P-OUTNEN0dFZ3VnblU/edit?pli=1>

In addition, I did a 5 minute interview on the CBC Radio 1 Vancouver program *The Early Edition* on March 27, 2014 regarding the issue of the missing herons in Coquitlam.

<http://www.cbc.ca/player/Radio/Local+Shows/British+Columbia/ID/2445017613/>

Rowing Boat Classes

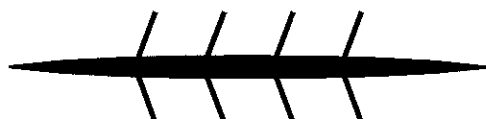
Skull boats



- 1x Single scull**
1 rower
Average length: 8.2 m (27 ft)
Minimum weight: 14 kg (30.8 lbs)

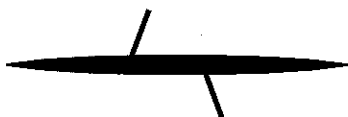


- 2x Double scull**
2 rowers
Average length: 10.4 m (34 ft)
Minimum weight: 27 kg (59 lbs)



- 4x Quadruple scull**
4 rowers
Average length: 13.4 m (44 ft)
Minimum weight: 52 kg (114 lbs)

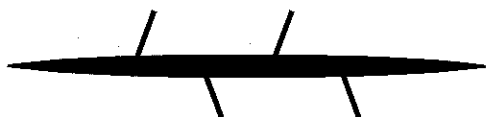
Sweep boats



- 2- Pair**
2 rowers
Average length: 10.4 m (34 ft)
Minimum weight: 27 kg (59 lbs)



- 2+ Coxed pair**
2 rowers with cox
Average length: 10.4 m (34 ft)
Minimum weight: 32 kg (70 lbs)



- 4- Four**
4 rowers
Average length: 13.4 m (44 ft)
Minimum weight: 50 kg (112 lbs)



- 4+ Coxed four**
4 rowers with cox
Average length: 13.7 m (45 ft)
Minimum weight: 51 kg (110 lbs)



- 8+ Eight**
8 rowers with cox
Average length: 19.9 m (62 ft)
Minimum weight: 96 kg (211 lbs)