

REGIONAL DISTRICT OF NANAIMO
SUSTAINABILITY SELECT COMMITTEE
THURSDAY, JULY 16, 2015
2:00 PM

(RDN Committee Room)

A G E N D A

PAGES

CALL TO ORDER

MINUTES

- 2- 4 Minutes of the Sustainability Select Committee meeting held on Tuesday March 17, 2015.
- 5 - 8 Minutes of the Drinking Water and Watershed Protection Technical Advisory Committee held on Tuesday April 14, 2015.

BUSINESS ARISING FROM THE MINUTES

COMMUNICATIONS/CORRESPONDENCE

UNFINISHED BUSINESS

REPORTS

- 9 - 33 Declarations Respecting Rights to a Healthy Environment.
- 34 - 36 Natural Gas Fireplace Rebate.
- 2015 Green Building Series (Presentation).
- Regional Growth and Long Range Planning Program Overview (Presentation).
- 37 - 83 Regional Hydrometric and Climate Monitoring Scoping Study.

ADDENDUM

BUSINESS ARISING FROM DELEGATIONS OR COMMUNICATIONS

NEW BUSINESS

ADJOURNMENT

IN CAMERA

Distribution: J. Stanhope (Chair), A. McPherson, H. Houle, M. Young, B. Veenhof, C. Haime, J. Kipp, W. Pratt, M. Lefebvre, T. Westbroek, P. Thorkelsson, G. Garbutt, R. Alexander, C. Midgley, T. Pan, M. Donnelly, P. Thompson, J. Pisani, N. Hewitt

J. Fell

For information only: B. Rogers, B. McKay, B. Bestwick, J. Hong, I. Thorpe, B. Yoachim, D. Sailland, T. Graff, F. Manson, T. Swabey, J. Hill, C. Golding, M. O'Halloran

REGIONAL DISTRICT OF NANAIMO

**MINUTES OF THE SUSTAINABILITY SELECT COMMITTEE
MEETING HELD ON TUESDAY, MARCH 17, 2015 AT 1:30 PM
IN THE RDN COMMITTEE ROOM / BOARD CHAMBERS**

Present:

Director J. Stanhope	Chairperson
Director A. McPherson	Electoral Area A
Director H. Houle	Electoral Area B
Director M. Young	Electoral Area C
Director B. Veenhof	Electoral Area H
Director M. Lefebvre	City of Parksville
Director T. Westbroek	Town of Qualicum Beach
Director C. Haime	District of Lantzville
Director W. Pratt	City of Nanaimo

Also in Attendance:

Director B. Rogers	Electoral Area E
Director J. Fell	Electoral Area F
P. Thorkelsson	Chief Administrative Officer
G. Garbutt	General Manager, Strategic & Community Development
R. Alexander	General Manager, Regional & Community Utilities
C. Midgley	Manager, Energy & Sustainability
M. Donnelly	Manager, Water & Utility Services
P. Thompson	Manager, Long Range Planning
T. Pan	Sustainability Coordinator
J. Pisani	Drinking Water & Watershed Protection Coordinator
N. Hewitt	Recording Secretary

Regrets:

Director J. Kipp	City of Nanaimo
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CALL TO ORDER

The Chairperson called the meeting to order at 1:30 pm.

MINUTES

MOVED Director Young, SECONDED Director Lefebvre, that the minutes of the Sustainability Select Committee meeting held on Tuesday September 16, 2014, be adopted.

CARRIED

Drinking Water and Watershed Protection Technical Advisory Committee.

After review of the minutes, the following correction was made to the DWWP TAC November 27th Minutes - section Business Arising From The Minutes - item 3, it stated:

There was a great discussion with First Nations the last meeting that has help us move forward.

The previous language was stricken and the following was inserted in lieu thereof:

There was a great discussion regarding First Nations partnership building at the last meeting that has helped us move in the right direction.

MOVED Director Pratt, SECONDED Director Young, that the minutes of the Drinking Water and Watershed Protection Technical Advisory Committee held on Thursday November 27, 2014, be received as amended.

CARRIED

REPORTS

Energy and Sustainability Program Overview (Presentation).

MOVED Director Lefebvre, SECONDED Director Haime, that the verbal report on Energy and Sustainability Program Overview be received.

CARRIED

Quarterly Energy Update (Presentation).

MOVED Director Haime, SECONDED Director Lefebvre, that the presentation on the Quarterly Energy Update be received.

CARRIED

Green Building Action Plan 2015.

MOVED Director Lefebvre, SECONDED Director Veenhof, that the updated Green Building Action Plan 2015 be approved as proposed.

CARRIED

Green Building Incentive Program 2015.

MOVED Director Westbroek, SECONDED Director Lefebvre, that the proposed 2015 Green Building Incentive Program be approved.

CARRIED

MOVED Director Westbroek, SECONDED Director Veenhof, that staff investigate the feasibility and financial implications of incorporating a Fortis BC rebate program for natural gas inserts into the RDN Green Building Incentive Program.

CARRIED

Strategic Energy Management Terms of Reference.

MOVED Director Veenhof, SECONDED Director Westbroek, that the Strategic Energy Management Terms of Reference be approved as presented.

CARRIED

Drinking Water/ Watershed Protection Program Overview (Presentation).

MOVED Director Pratt, SECONDED Director Lefebvre, that the verbal report on Drinking Water Watershed Protection Program Overview be received.

CARRIED

Regional Growth and Long Range Planning Program Overview (Presentation).

This item was withdrawn from the agenda due to time constraints. The Regional Growth and Long Range Planning Overview will be provided at a later date.

ADJOURNMENT

MOVED Director Veenhof, SECONDED Director Lefebvre, that this meeting be adjourned.

CARRIED

Time 4:17 pm

CHAIRPERSON



**MINUTES OF THE REGULAR MEETING OF THE
DRINKING WATER AND WATERSHED PROTECTION
TECHNICAL ADVISORY COMMITTEE
HELD ON TUESDAY, APRIL 14, 2015 AT 12:30 PM**

Present:

Mike Donnelly, CHAIR	Manager, Water & Utility Services, RDN
Pat Lapcevic.....	Ministry of Forests, Lands and Natural Resource Operations
Faye Smith.....	Environment Community Representative
Molly Hudson	Forest Industry Representative, Island Timberlands (for Chris Cole)
Kate Miller	Manager, Environmental Initiatives, CVRD
Barbara Silenieks.....	City of Parksville (for Mike Squire)
Bill Sims	Manager, Water Resources, City of Nanaimo
Morgan Kennah.....	Forest Industry Representative (for Ken Epps)
Alan Gilchrist	Academic Community Representative (VIU)
Courtney Simpson	Islands Trust Representative
Gilles Wendling	General Public Representative (South)
Mike Squire	City of Parksville / Program Manager, Arrowsmith Water Service

Regrets:

Peter Law	General Public Representative (North)
Chris Cole	Forest Industry Representative, TimberWest
Leon Cake.....	Water Purveyors' Representative
Bob Weir.....	Director of Engineering, Town of Qualicum Beach
Fred Spears	Director of Public Works, District of Lantzville
Kirsten Fagervik	Ministry of Transportation and Infrastructure
David Vincent	Hydrologist Representative (Northwest Hydraulic Consultants)
Deb Epps	Registered Professional Biologist Representative
Oliver Brandes.....	Academic Community Representative
Lynne Magee.....	Island Health

Also In attendance:

Julie Pisani	Drinking Water and Watershed Protection Coordinator, RDN
Alex King.....	Special Projects Assistant, RDN
Deanna McGillivray	Special Projects Assistant, RDN
Randy Alexander	General Manager, Regional & Community Utilities, RDN
Linda Brooymans.....	VIU Mt. Arrowsmith Biosphere Reserve Research Institute

CALL TO ORDER

M. Donnelly called the meeting to order at 12:05 pm.

MINUTES

MOVED Morgan Kennah, SECONDED Alan Gilchrist, that the minutes from the regular meeting of the Drinking Water and Watershed Protection Advisory Committee held November 27, 2014 be adopted.

CARRIED

BUSINESS ARISING FROM MINUTES

COMMUNICATIONS/CORRESPONDENCE

UNFINISHED BUSINESS

MUNICIPAL UPDATES

Updates were given from City of Nanaimo, City of Parksville and Regional District of Nanaimo on water supply, potential conservations measures, and updates on current projects.

PRESENTATIONS/DISCUSSION

L. Brooymans gave a presentation on **VIU Mt. Arrowsmith Biosphere Reserve Research Institute**.

It is a UNESCO designation that requires that biosphere reserves serve their region and the world as sites of excellence that demonstrate improved ways to resolve human/environment conflicts through local community efforts and sound science. VIU and the City of Parksville currently co-manage the biosphere reserve designation.

Discussion: The RDN and VIU / MABRRI are discussing possible academic partnerships that align with the DWWP action plan. Initial ideas included: wetland mapping, ecosystem services valuation study, lake monitoring.

Action: TAC members will come to the next meeting with more formalized and detailed ideas for potential student research projects. Those ideas will be workshopped with the group to determine the best fit with the DWWP program and its partners.

J. Pisani introduced the **development of a new DWWP web interface** that is map-based and structured by water region.

Discussion: TAC feedback was positive, agreeing that place-based information is sought after, aesthetically pleasing and user friendly. Caution was given that keeping it updated is crucial and takes staff time.

Action: J. Pisani will distribute the link when the test site (Water Region 1 only) is functional, allowing the committee to give more detailed feedback when they see the site in operation.

P. Lapcevic gave a brief presentation on the new **BC Water Sustainability Act**, reporting that the BC Water Sustainability Act regulations are coming into effect in January 2016. The Phase 1 implementation of the Act includes water pricing and groundwater regulation / licensing.

Key points:

- Licensing groundwater will only apply to non-domestic users
- Licensing existing users will take place over a three year period to apply and have historical use recognized; application fee exemption in year one of the 3-year period
- Date of first use will remain in place, but there is potential to review this under a Water Sustainability Plan that evaluates beneficial use and purpose
- It will be possible to require drilling authorizations under the new Act and Water Sustainability Plans

Action: The Province will keep stakeholders (including those on the TAC) informed on the developments of the WSA implementation and regulations.

J. Pisani presented an update on **Area E (Nanosee) Water Monitoring**. This includes the recently initiated water monitoring in the Parker Road Area of Nanosee. This will be the first phase of what will be an Area E wide water monitoring program to gather higher resolution data to refine water budget calculations. This will improve our understanding of the water supply, demand and stress in the area. The monitoring that recently started (April 1st) is collecting water level data from 15 volunteer wells, 3 water level stations on Maelstrom Creek, and one proposed community well.

REPORTS

Final Report - Regional Hydrometric & Climate Monitoring Scoping Study

J. Pisani summarized the study goals and objectives, which had been guided by a sub-committee of the TAC (plus other stakeholders) with specific interest and expertise in streamflow and climate data and monitoring. Priority sites for further monitoring across the region to meet data needs and benefit potential partners were identified in the report.

Action: The committee moved that this report be brought forward to the Sustainability Select Committee.

Action: Partners will need to be identified and committed to the priority sites prior to implementation. Urban streams (within municipalities) will be discussed in a supplementary scoping report.

UPDATES

- NRCAN/GSC – Nanaimo Lowlands Aquifer Characterization Study
 - Draft of Atlas illustrating the characterization study will be circulated by NRCAN for comment in May. Going to press this summer.
 - Aquifer model results publication is anticipated in June.
- State of Our Streams publication
 - Goal: to reach the general public with the trends and information gathered from the CWMN and raise the profile of local stewardship groups
 - Target: Publication in July.

Suggestion: Consider publishing as an insert in local newspapers, rather a mail-out.

ADDENDUM

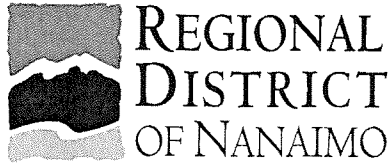
NEW BUSINESS

BUSINESS ARISING FROM COMMUNICATIONS

ADJOURNMENT

The meeting was adjourned at 3:02 pm.

Mike Donnelly, Chair



RDN REPORT	
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BOARD	

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STAFF REPORT

TO: Geoff Garbutt
General Manager, Strategic and
Community Development

DATE: July 8, 2015

FROM: Chris Midgley
Manager, Energy and Sustainability

MEETING: SSC – July 16, 2015

FILE: 5280 01 RHE

SUBJECT: Declaration of the Right to a Healthy Environment

RECOMMENDATION

That the Regional District of Nanaimo Board of Directors consider supporting a declaration of the right to a healthy environment at the 2015 Union of British Columbia Municipalities Convention.

PURPOSE

To report on existing Regional District of Nanaimo (RDN) accomplishments relating to promoting a healthy environment in the region, and to outline the implications to future planning, sustainability and the economy for making a formal Declaration of the right to a healthy environment.

BACKGROUND

At the Regular Board Meeting held April 28, 2015, Mr. Paul Manly and Captain Trevor Greene appeared as a delegation to express the importance of people’s right to live in a healthy environment, and to urge the Board to make a formal Declaration respecting people’s right to live in a healthy environment. As a result, the following motion was carried:

That the Blue Dot Declaration be referred to the SSC to review and report on the existing accomplishments and impacts of the Declaration on future planning, sustainability and economy.

A draft Declaration respecting people’s right to a healthy environment is provided as Appendix A, however there are five key features of the declaration worth summarizing here:

1. All people have the right to live in a healthy environment, including the right to know about pollutants and contaminants released into the local environment;
2. The Regional District of Nanaimo has the responsibility to respect, protect, fulfill and promote these rights;

3. The Regional District of Nanaimo shall apply the precautionary principle;
4. The Regional District of Nanaimo shall apply full cost accounting; and
5. By December 31st, 2015 the Regional District of Nanaimo shall specify objectives, targets, and timelines and actions the RDN will take to fulfill residents' right to a healthy environment.

The appended Declaration is based on the Suzuki Foundation's Blue Dot Initiative, which has as its ultimate goal to amend the Canadian Charter of Rights and Freedoms to include the right to a healthy environment for all Canadians. To achieve this objective, the Suzuki Foundation is encouraging individuals to call upon their local communities to pass municipal declarations respecting people's right to live in a healthy environment. Local governments are then urged to make a call for action at the Provincial level; and when seven out of ten provinces, representing more than half the population of Canada support the initiative, an amendment to the Canadian Charter of Rights and Freedoms can be considered at the Federal level.

Over the past year, the Suzuki Foundation has conducted an outreach campaign to encourage citizens to become 'blue dot supporters' and to highlight communities that have made the Declaration. At the time of writing, there are 837 individual Blue Dot Supporters in the Regional District of Nanaimo as follows:

- Bowser: 17 supporters
- Qualicum Beach: 101 supporters
- Coombs/ Errington: 23 supporters
- Parksville: 87 supporters
- Nanoose Bay: 30 supporters
- Lantzville: 18 supporters
- Nanaimo: 472 supporters
- Gabriola Island: 89 supporters

None of the member municipalities in the region have made a formal Declaration respecting people's right to a healthy environment. The City of Nanaimo has brought forward a modified version of the Declaration to its Advisory Committee on the Environment and Sustainability, and pending committee support, will consider endorsing the Declaration at a future date. The Town of Qualicum Beach has received correspondence from Mr. Paul Manly and Captain Trevor Greene requesting support for a regional level declaration, and the District of Lantzville has received correspondence from the City of Port Moody requesting support for a declaration respecting the right to a healthy environment at the Union of BC Municipalities Convention to be held in September, 2015.

It is also worth noting that in April of this year, a resolution was presented to the Association of Vancouver Island Coastal Communities (AVICC) by the Districts of Saanich and Central Saanich endorsing the Declaration respecting people's right to a healthy environment. That resolution was supported at the 66th Annual AVICC Meeting, and will be placed on the Agenda for consideration at the 2015 Union of British Columbia Municipalities (UBCM) Conference.

ALTERNATIVES

1. That the Board of Directors endorse the Declaration of the right to a healthy environment at the Union of BC Municipalities Convention to be held in September, 2015.
2. That that Board of Directors endorse a Regional District of Nanaimo Declaration of the right to a healthy environment as presented or amended.
3. That the Board of Directors do not endorse the right to a healthy environment.
4. That alternate direction be given to staff.

FINANCIAL IMPLICATIONS

For alternative 1, there are no immediate financial implications for the Regional District of Nanaimo. If a UBCM resolution is supported and results in Provincial action, then any financial implications for the RDN will also be incurred by other BC jurisdictions.

For alternative 2, if the Board endorses the Declaration as drafted or amended, there are unknown but potentially significant financial implications. If amendments are requested, then staff will be required to spend the time necessary to develop a draft declaration that the Board of Directors can support. This work is not currently on any departmental work plan, but could be achieved by the end of 2015 at the expense of other tasks if deemed a sufficiently high priority by the Board.

If the Board endorses the declaration without amendments, then there will be potential financial implications relating to the right to know about pollutants and contaminants released into the local environment; as well as the provision that by December 31st 2015, the Regional District of Nanaimo shall specify objectives, targets, and timelines and actions the Regional District of Nanaimo will take, within its jurisdiction, to fulfill residents' right to a healthy environment; review the objectives, targets, timelines and actions every five (5) years, and evaluate progress toward fulfilling this declaration; and consult with residents as a part of this process.

Regarding people's right to know about pollutants and contaminants released into the local environment, the RDN is already required to operate within federally and provincially mandated limits for discharges into the environment and to report on compliance, particularly for solid and liquid waste facilities. However this reporting is not detailed in nature, and the declaration as written could justify inquiries into the range and quantity of specific materials legally discharged to the environment. Responding to such inquiries would require staff and potentially professional resources and could call attention to substances discharged while performing permitted activities. This may not be a negative outcome, but it may be costly, and would be more equitable if enhanced reporting was required across the Province as a whole rather than on a piecemeal basis according to who has or has not made this Declaration.

The final provision relating to targets, objectives, timelines, and actions encompasses a considerable amount of work to undertake by the end of the year, work that is not in any departmental work plan. Adding a new process to establish targets, objectives, timelines and actions, and consulting the public on this process is not achievable without reallocating staff resources from current projects.

STRATEGIC PLAN IMPLICATIONS

The content of the Declaration respecting the right to a healthy environment is closely aligned to the Mission, Vision and Values, as well as Strategic Priorities and departmental Strategic Goals and Actions expressed in the RDN Board Strategic Plan. Not surprisingly, a great deal of the activities undertaken by the RDN already aim to ensure clean air and water for residents; access to nature; support for a strong, local agricultural community, and participation in decision making.

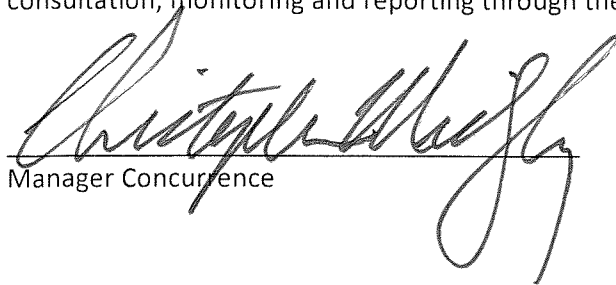
Evidence for this is most effectively provided in the annual report on departmental activities, and accomplishments circulated to the Board each year. Appendix 'B' provides the 2014 report on departmental activities and accomplishments and demonstrates how the RDN promotes and protects a healthy environment in the region.

The formality of making a declaration supporting the right to a healthy environment would therefore seem like an easy step to take, however the potential for additional work relating to target setting, monitoring and reporting and related activities will take staff time away from delivering on Board priorities without in fact contributing to actual on-the-ground benefits to residents of the region.

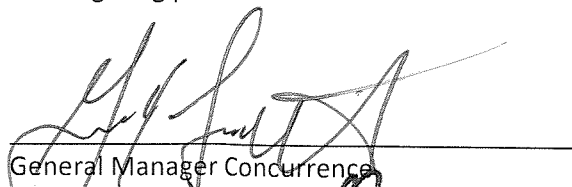
SUMMARY/CONCLUSIONS

The objective of the Blue Dot initiative, led by the Suzuki Foundation, is to amend the Canadian Charter of Rights and Freedoms to include the right to a healthy environment. To achieve this objective, the Suzuki Foundation has urged individuals to encourage their local communities to make a Declaration respecting the right to a healthy environment, and for local communities to encourage action at the provincial level. When seven of ten provinces representing more than half of Canada's population support an amendment to the Charter, it is possible to move forward with an amendment.

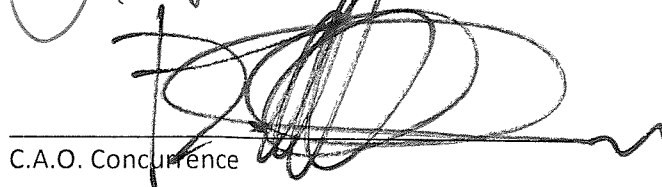
The Association of Vancouver Island Coastal Communities has already endorsed the Declaration, ensuring it will be the subject of a resolution at the UBCM convention to be held in September, 2015. Therefore the opportunity for the Province of BC to also endorse the declaration will be available later this year. If the UBCM resolution is successful, this successfully advances the goal of Blue Dot initiative to amend the Canadian Charter of Rights and Freedoms. If the resolution fails at the UBCM, then it will be more relevant for the Regional District of Nanaimo to consider making a declaration respecting the right to a healthy environment. In that case, the work plans of the departments affected can incorporate the additional tasks relating to establishing targets, objectives, timelines and actions; as well as consultation, monitoring and reporting through the annual budgeting process for 2016.



Manager Concurrence



General Manager Concurrence



C.A.O. Concurrence

Regional District of Nanaimo Declaration The Right To A Healthy Environment

Whereas the **Regional District of Nanaimo** understands that people are part of the environment, and that a healthy environment is inextricably linked to the well-being of our community;

The **Regional District of Nanaimo** finds and declares that:

1. All people have the right to live in a healthy environment, including:

The right to breathe clean air

The right to drink clean water.

The right to consume safe food.

The right to access nature

The right to know about pollutants and contaminants released into the local environment.

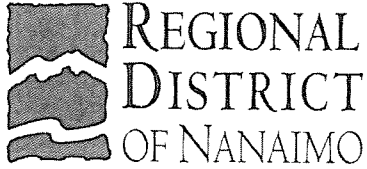
The right to participate in decision-making that will affect the environment

2. The **Regional District of Nanaimo** has the responsibility, within its jurisdiction, to respect, protect, fulfill and promote these rights.
3. The **Regional District of Nanaimo** shall apply the precautionary principle: where threats of serious or irreversible damage to human health or the environment exist, the **Regional District of Nanaimo** shall take cost effective measures to prevent the degradation of the environment and protect the health of its citizens. Lack of full scientific certainty shall not be viewed as sufficient reason for the **Regional District of Nanaimo** to postpone such measures
4. The **Regional District of Nanaimo** shall apply full cost accounting: when evaluating reasonably foreseeable costs of proposed actions and alternatives, the **Regional District of Nanaimo** will consider costs to human health and the environment.
5. By Dec 31st 2015, the **Regional District of Nanaimo** shall specify objectives, targets and timelines and actions the **Regional District of Nanaimo** will take, within its jurisdiction, to fulfill residents' right to a healthy environment, including priority actions to:
 - a. Ensure equitable distribution of environmental benefits and burdens within the municipality, preventing the development of pollution "hot spots";
 - b. Ensure infrastructure and development projects protect the environment, including air quality;

- c. Address climate change by reducing greenhouse gas emissions and implementing adaptation measures;
- d. Responsibly increase density;
- e. Prioritize walking, cycling and public transit as preferred modes of transportation;
- f. Ensure adequate infrastructure for the provision of safe and accessible drinking water;
- g. Promote the availability of safe foods;
- h. Reduce solid waste and promote recycling and composting;
- i. Establish and maintain accessible green spaces in all residential neighbourhoods.

The **Regional District of Nanaimo** shall review the objectives, targets, timelines and actions every five (5) years, and evaluate progress towards fulfilling this declaration.

The **Regional District of Nanaimo** shall consult with residents as part of this process.



RDN REPORT		
CAC APPROVAL		
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BOARD		

MEMORANDUM

TO: Paul Thorkelsson
Chief Administrative Officer

DATE: February 3, 2015

FROM: Linda Burgoyne
Administrative Coordinator

SUBJECT: 2014 Departmental Activities and Accomplishments

PURPOSE:

To provide the Board with a summary of departmental activities and accomplishments for 2014.

BACKGROUND:

Each year staff provide the Board of Directors with a compilation of departmental activities and accomplishments that occurred throughout the year.

STRATEGIC PLAN IMPLICATIONS:

Many of these activities include the continuation and implementation of the strategic priorities and action areas of the Board’s Strategic Plan.

The following information is a summary of departmental activities and accomplishments, including works in progress, for 2014.

In addition to the following departmental activities and accomplishments, Staff and Board members participated in the many phases of the organizational operational efficiency and service review during 2014. The implementation of the recommendations from this review will strengthen the link of service delivery to the strategic priorities of the RDN.

CORPORATE SERVICES

Administrative Services:

- Coordinated the Grants-In-Aid Committee meetings and distributed Grants-In-Aid funding to 13 local organizations for social programs and services.
- Conducted the 2014 Local Government Elections for the Regional District of Nanaimo and for the Gabriola Island Local Trust Area on behalf of the Islands Trust.
- Conducted voting for School District’s No. 68 and 69 elections in conjunction with RDN elections.

- Conducted a referendum in a portion of Electoral Area E (the Nanoose Bay Peninsula Water Service Area) to authorize borrowing funds for capital improvements and upgrades in the service area in conjunction with the 2014 Local Government Elections.
- Conducted a referendum in Electoral Area H to establish the Northern Community Marine Search and Rescue Contribution Service in conjunction with the 2014 Local Government Elections.
- Developed & implemented a mail ballot voting process for the 2014 Local Government Elections.
- Continued implementation of paperless agenda plan.
- Continued implementation of an enhanced Board follow-up process to provide greater assistance to staff in tracking Board direction.
- Continued to maintain a comprehensive bylaw index on SharePoint that provides the description, citation, bylaw type, current status and adoption date for all RDN bylaws.
- Completed program to improve signage at 6300 Hammond Bay Road site and within the Administration building.
- Coordinated building renovations and maintenance projects for the Administration building.
- Prepared an updated bylaw for the administration of the *Freedom of Information and Protection of Privacy Act* for the Board's consideration and adoption (April 22, 2014).
- Responded to 18 requests under the *Freedom of Information and Protection of Privacy Act*.
- Provided support to Regional and Community Utilities with petition processes requesting boundary expansions for water and sewer service.
- Coordinated the Remuneration Committee meetings and reported their recommendations to the Board.

Communications:

- Assisted with publicity and strategic communications planning for all major RDN projects and announcements, including the Regionally Significant Projects funding announcement, the RDN Citizens' Survey, the RDN Transit CNG Bus Launch, the Cedar Skate Park Grand Opening, and the 2014 Local Government Elections.
- Assisted with First Nations protocol and planning for major events and meetings, including the Grand Opening of the Cedar Skate Park the September, 2014 Watershed Tour and the Inaugural Board Meeting.
- Photographed all major RDN events and announcements, maintained a photo record and provided photos to local media upon request.
- Liaised with media and other levels of government as required, and continued to maintain and build relationships with local media outlets and with other levels of government.
- Produced a one-page Board Report after each RDN Board meeting containing meeting highlights. Distributed reports on the RDN website and on social media.
- Produced 36 media releases for RDN departments and assisted departments with promoting their initiatives through effective use of social media.
- Coordinated three *Regional Perspectives* publications - Budget 2014 (March distribution), Fall 2014 (September distribution), and Election 2014 (late October distribution).
- Produced the Spring *Electoral Area Update* newsletter publication (one each for six of the seven Electoral Areas).
- Assisted Water and Utility Services with production of four editions of *WaterNews* (May, June, August and November 2014).
- Provided one-on-one media relations training for staff in various departments (eg. Transit, Emergency Planning, Long Range Planning).
- Assisted the Chief Election Officer with Notice of Election and Election Reminder advertising.

- Played a key role providing public information and liaising with media during the December, 2014 Emergency Operations Centre activation.

Human Resources: (as at November 27, 2014)

- Completed 26 recruitment and selection panels. Posted 67 positions and interviewed 97 people.
- Received the Certification of Recognition (COR) Gap Analysis report and began taking steps to achieve certification.
- Coordinated monthly Joint Health and Safety Committee meetings.
- Coordinated approximately 24 Sick Leave Bank Committee meetings and prepared and issued letters to employees in response to their request for time from the sick leave bank.
- Coordinated monthly Joint Consultation (Labour Management) Committee meetings. Resolved 5 of 5 items.
- Followed-up on WorkSafeBC claims and employee health and safety concerns.
- Managed LTD claims including the application process, monitoring the status of each claim and facilitating return to work plans. Currently there are nine active LTD claims being managed.
- Coordinated four Arete training sessions on bullying and harassment in which 70 employees participated. A total of 150 employees have completed this training to date.
- As of November 2014 worked with the Union to resolve approximately 11 grievances.
- Coordinated and participated in Collective Bargaining with CUPE representatives and later with the assistance of a Labour Relations Board mediator in successfully reaching a tentative agreement. To be ratified by the parties in mid-January 2015.

Information Services:

- Server clustering and virtualization – As of 2014 have placed 25 servers in a virtual environment actively sharing a common Storage Area Network (SAN) for data storage.
- Disaster Recovery – by year-end will have a live data replication site active at Oceanside Place for data replication and server failover redundancy in the event of a loss to the RDN main data processing center at the head office.
- Merged the security camera systems at Head Office and the Transit facilities into a common centralized operating system.
- Completed the upgrade of the Solid Waste scale house software system which included implementation of new workstations and server hardware platforms.
- Provided 2014 Election equipment support.
- Provided effective ongoing support for wireless devices across all departments.

Geographic Information Systems (GIS):

- Attained a current ortho photo of the RDN to maintain our two-year image acquisition schedule.
- Re-designed GIS and addressing web page.
- Completed significant adjustments to improve spatial accuracy of parcel and related map layers using controls from new surveys and GPS capture of survey pins.
- Created new GIS map layer of building footprints (in process).
- GPS used to capture Park trails and features, survey pins, Transit bus stops, enforcement sites, illegal dumping sites, utility infrastructure.
- Conducted research on undeveloped lands, titles and rights of way, etc. before Land Title and Survey Authority of BC applied new fee structure.

- Provided support to RDN Departments:
 - 2014 Elections – Voters Lists / Maps;
 - water budget data management and mapping;
 - Park Management Plans;
 - Trail Plans;
 - Secondary Suite project – mapping and analysis;
 - Agricultural Lands Study – mapping and analysis;
 - Solid Waste ‘Recollect’ project – data compilation;
 - Solid Waste Curbside Collection calendar mail out project – data compilation;
 - Fairwinds rezoning and PDA;
 - Drinking Water and Watershed Protection – various projects;
 - Fire Department mapping;
 - Transit Bus stop and route GPS capture and mapping;
 - RDN Parks and Trails Guide maps;
 - Neighbourhood Emergency Preparedness mapping;
 - providing road and address information in support of 911 dispatch;
 - Sustainability – various project mapping and analysis;
 - Enforcement – various map needs.

FINANCE

Financial Reporting

- Completed the implementation of the FMW Capital Plan budget software tool.
- Met all statutory financial reporting deadlines with a clean audit opinion.
- Completed the consolidation of the 2015 provisional budget for the Board’s review.
- Regional Perspectives budget edition completed & budget brochure included with all utility bills.
- Began implementation of new contaminated sites accounting standard for inclusion in 2015 financial statements.
- Developed and implemented new monthly and year-end reporting process using FMW tool.
- Continued to provide project accounting, reporting and eligibility advice for grant funded projects for all departments (Community Works and other Gas Tax funded projects, Building Canada Infrastructure programs).
- Provided financial reports to assist Energy and Sustainability regarding the Carbon Action Revenue Incentive Program and Climate Action Charter.
- Completed debt servicing agreements/capital improvement billings for the San Pareil Water Service upgrades and Hawthorne Rise Sewer project.

Accounting Services

- Maintained accounts and completed annual utility billings as scheduled for 17,300 customers.
- Began work with software providers to develop an interface for Solid Waste scale transactions to the finance system.
- Reviewed available options for web based payroll entry in use in the Finance Department for applicability to other departments.
- Implemented electronic funds transfer for expense claims for Board and staff.
- Began implementation of new Vadim Explorer Tool for specialized end user reporting.
- Began implementation of new Vadim Open Tool for online customer account access.

Finance General

- Provided risk management, purchasing and financial analysis support to other departments.
- Participated in the asset management strategy planning process.
- Provided support to volunteer fire departments regarding building projects, vehicle purchases, insurance requirements and financial plans.
- Administered the Northern Community Justice Service grant funding applications/awards process.
- Participated in the administration committees for the Northern Community Justice Service, Central Island 911 Partnership and the North Island 911 Corporation.
- Carried out all Canada Revenue Agency requirements related to 2012-2014 GST/HST audit August 2014.

RECREATION AND PARKS SERVICES

Recreation Program Services:

- Provided registered programs to 4,692 participants including 2,074 preschool, children and youth in summer camps.
- Offered an expanded afterschool drop in sports program in Qualicum Beach that has been well attended.
- Offered extended (30 days) summer day camps for students during the provincial teachers' job action.
- Five Canada Summer Jobs students were placed with the department.
- Developed and launched the Grade Five Activity Pass and Grade Six Activity Card to help promote physical fitness in this age group.
- Developed and launched the Corporate and Volunteer Group Recreation Pass.
- Developed a Terms of Reference for the RDN Employee Wellness Committee.
- Continued active involvement and support of District 69 events including Qualicum Beach Day, Qualicum Beach Family Day, Kite Festival, Kidfest, Terry Fox Run, Youth Week, Hi Neighbour Day, Nanoose Family Day, Volunteer Week, and Storybook Village.
- Continued the Financial Assistance Program to enable low-income individuals & families to access facilities and programs. Over 153 households will receive subsidies by year-end totalling \$29,140 in access to department programs & facilities, the majority being for public swim admissions.
- Supported 35 recreation projects and initiatives through funding by the District 69 Recreation Commission's Community and Youth Grants, totaling \$47,720.
- Coordinated over 2,718 field bookings in District 69 with 138 field use contracts completed.
- Leaders In Training (LITs): 27 LITs were trained for summer leadership volunteer opportunities, LITs completed a total of 365 training hours, and completed 1,750 hours of volunteering in July and August.
 - LITs volunteered at five RDN summer programs - Storybook Village, Kite Fest, Kid Fest, Ocean Mile Swim and Terry Fox Run.
- Year four of the implementation of the Youth Recreation Strategic Plan with:
 - Fourth year of financial support of free and low cost events at arena and third year at the aquatic centre;
 - Fourth year of Youth Recreation Advisors (YRAs). Representation comes from middle and secondary schools with ages of YRAs ranging from 11-18 years;
 - Third year of grant funding available to secondary schools. Grant deadline extended to early 2015 to give schools time to put together applications with the late start of the 2014/2015 school year. Youth Recreation Advisors review and approve applications;

- Third year of grant funding available for rural organizations. Grant deadline extended to early 2015 to coincide with school grant applications. Youth Recreation Advisors review and approve applications;
- New drop-in, low cost and afterschool programming;
- Second year of RDN Youth website and Facebook page;
- First year Youth Programmer is chairing Youth Link and managing email information distribution for the Youth Link network.
- Final full year of agreement with Island Health – Integrated Health Network (IHN) to provide seated fitness programs to IHN (and public) clients. IH–IHN also sponsored their clients with two or more designated chronic illnesses with access to RDN recreation services.
- Coordination of the 2nd annual celebration of Active Aging Week (September 22-27, 2014) with 28 advertised events hosted for free by 10 community partners: Island Health, VIU Centre for Healthy Aging and VIU Elder College, PGOSA, Qualicum Beach Seniors Centre, The Career Centre, ACRA, Hot n Cool Yoga Club, Alzheimer Society, Nanoose Place, and Paradise Adventure Mini Golf.
- Founding member of Oceanside Health and Wellness (OHWN) Committee and began working with Island Division of Family Practice, Island Health and other OHWN partners on community health and wellness initiatives.
- Provided 1,100 hours of inclusion service to 26 participants.
- Completed the seventh year of recreation service delivery in EA ‘H’ working with the local elementary school, the Lighthouse Recreation Commission, and the Deep Bay Research Field Station. Supported local parent group offering sports programs. Hosted the first in a series of Park ‘n’ Play drop in community gatherings over the summer at the Henry Morgan Community Park.
- Active Living Guide - 15,000 delivered semi-annually by unaddressed ad mail; 18,500 produced twice per calendar year.
- Fifth year of the RDN Performance Recognition Awards program which recognizes District 69 residents for outstanding achievement in athletics or arts.
- Implementation of Fees and Charges Bylaw for District #69 recreation facilities and programs.
- Continued support as a founding member of the Vancouver Island Sport Tourism Council and Oceanside Sport Tourism initiatives.
- Implement and complete capital maintenance projects as required and work with Cedar School and Community Enhancement Society (CSCES) on management of Cedar Heritage Centre.
- Completed new three year funding and service agreement with Gabriola Recreation Society.
- Continue to monitor and work with other recreation service providers currently under contract (CSCES, ACRA and GRS).
- Completed five year rental agreement with SD#69 for dedicated RDN recreation program space at the former Qualicum Beach Elementary School site.
- Completed feasibility study for Ballenas Track, now working on shelf ready plan with SD# 69 and local Track and Field Club.
- Developed and delivered annual planning session for Electoral Area ‘A’ Parks, Recreation and Culture commission members.
- Organized and delivered a tour of Woodbank and North Cedar Intermediate schools for Electoral Area ‘A’ Parks, Recreation and Culture commission members.
- Coordinated the official opening of the Cedar Skate Park.

Ravensong Aquatic Centre (Aquatic Services):

- Continued operation of the Aquatic Centre and provided over 4,700 hours of use and 90,000 admissions for public sessions.
- Provided learn to swim programs for 2,140 children.

- Continued participation in the RDN Asset Management Planning Group.
- Provided higher level aquatic leadership instruction to 203 learners.
- Aquatic programs that were offered and supported away from Ravensong, within the community, included Qualicum Beach Mile Swim, School Salmon Observation, Polar Bear Swim at Parksville Beach, various School District 69 outings to the beach, Horne Lake Summer First Aid, and Little Qualicum River Hatchery.
- Completed 2014 annual maintenance items during shutdown; sound system replacement, re-grout leisure tank, upgrade domestic hot water system, re-condition chlorine system.
- Commenced an aquatic safety audit of the Ravensong Aquatic Centre with the Lifesaving Society of BC/Yukon.
- Continued with facility and equipment preventative maintenance schedules and programs.
- Continued to coordinate energy and sustainability to develop and implement a comprehensive energy management strategy for RDN recreation facilities.

Oceanside Place (Arena Services):

- Developed and implemented additional programs designed to enhance hockey and skating skills through camps and programs for female hockey players, drop in hockey for youth, birthday parties for youth, and public skate sessions for adults.
- Continuing arena operation provided over 7,800 hours of arena use and over 21,000 people in attendance for public skating sessions.
- Extended Winter Wonderland and developed a New Year's event for the Community.
- Participated in the development of the Vancouver Island Sport Tourism Committee's bid for the 2016 National Women's U18 Hockey Championship.
- Participated in the RDN Asset Management Planning Group.
- Continued with facility and equipment preventative maintenance schedules and programs.
- Upgraded the ice plant control system's hardware and software.
- Continued to coordinate energy and sustainability to develop and implement a comprehensive energy management strategy for RDN recreation facilities.
- Continued to host local and regional tournaments involving youth, adults and seniors.
- Continued with the development of year two of the vending agreement with Complete Vending, in accordance with the Healthy Food and Beverage Initiative.
- Implemented training sessions for use of PAD (AED) for public user groups.
- Completed advertising updates for facility advertising and Zamboni advertising agreements.
- Enhanced facility concession services by establishing a seating area and in accordance with the Healthy Food and Beverage Initiative.
- Completed a three phased review and update for facility signage.
- Completed capital projects for lighting replacement, boiler replacement and water treatment.
- Provided a report to the District 69 Recreation Commission and the RDN Board regarding the implications the changes to the City of Parksville's permissive tax bylaw will have on the Parksville Curling Club and District 69 Arena.
- Completed a building assessment on the D69 Arena and assisted the Parksville Curling Club in implementing recommendations.

Parks Services:

- Development of the Park and Trails Guidelines.
- Permit applications were processed and issued for community events, tours, and commercial filing for parks and trails system.

- Lease for new Parks Operations Building negotiated and signed.
- Completed maintenance, safety inspections, cleanup and repair of all Community and Regional Park sites.
- Continued working with partners, operators, contractors and caretakers to deliver parks services.
- Continued to respond to requests for information and support from Committees, RDN Board, other local governments and residents.
- Assisted in the completion of the RDN Asset Management report.
- Developed the preliminary 2015 Budget.
- Park Assessments:
 - Completed assessments, meetings, reports and negotiations for potential parklands in various Electoral Areas;
 - Negotiated a Licence of Use for Meadowood School Site;
 - Negotiated a Licence of Use for French Creek School Site.

Community Parks:

- Completion and opening of the Cedar Skate and Bike Park (EA A).
- Development of Community Parks and Trails Strategy for Board approval in 2014 (EA's E,F,G,H).
- Repairs completed to the edge of the Nelson Road Boat Launch (EA A).
- Whalebone Community Park clean and reclaim of entrances completed (EA B).
- Old wells at Whalebone Community Parks were decommissioned (EA B).
- Completed berm around Rollo Water Reservoir (EA B).
- Completed agreement and gate install at 707 Community Park (EA B).
- Worked with GALT to install a new trail in Cox Community Park (EA B).
- Preliminary design completed for the Village Trail (EA B).
- Completed a building assessment of the Extension School (EA C Extension).
- Worked with the community to install a covered bridge and trail in Extension Miners Community Park (EA C Extension).
- Completed a community consultation at Anders Dorrit Community Park (EA C EW/PV).
- Completed assessment of roadside trail options along Jingle Pot (EA C EW/PV).
- Completed drainage improvements and plantings at Errington CP (EA F).
- Completed the detailed design, tender and install of an adventure playground and sport court at Meadowood Way Community Park (EA F).
- Completed assessment of roadside trail options in French Creek (EA G).
- Completed swing install at Henry Morgan Community Park (EA H).
- Assisted volunteers to clear the Essary Road Trail (EA H).
- Assisted volunteers with GPS work on Area H Trails (EA H).
- Completed a funding agreement for Lighthouse Centre Capital Upgrades (EA H).
- Installed signs in Oakdown Community Park (EA H).
- Installed ramp to beach at Shoreline Drive Beach Access (EA H).
- Ongoing support to Community Park Advisory Committees (all EA's).
- Ongoing support for review of subdivisions, park land dedications and acquisitions (All EA's).

Regional Parks and Trails:

- The Regional Parks Brochure was updated, printed and distributed.
- Beachcomber:
 - kiosk designed and installed.
- Benson Creek Falls Regional Park:

- the Management Plan was completed for Board approval in January;
- Designed and installed parking upgrades at Jamison Road;
- Park lease renewal negotiated for 30 years.
- Coats Marsh Regional Park:
 - the flood mitigation berm was completed and a new pond leveler was installed.
- Descanso Bay Regional Park:
 - completed projects include road and campsite upgrades.
- E&N Trail:
 - preliminary assessments completed;
 - applications made to MOTI and ALR;
 - design completed to 50%.
- Fairwinds – Lakes District Regional Park:
 - concluded park dedication phasing and development agreements as part of rezoning of the Fairwinds Lakes District Lands;
 - commenced the development of the Parks Management Plan for the Regional Park per the Phased Development Agreement with Fairwinds;
- Horne Lake Regional Park:
 - new generator was purchased and installed;
 - completed projects include new road and campsite development, campsite upgrades, caretaker house repairs, trail signage;
 - highway signs and the Horne Lake Road directional signs were replaced.
- Lighthouse Country Regional Trail:
 - completion of staging area at Lighthouse Community Park Entrance;
 - interpretive signs developed and installed.
- Little Qualicum River Regional Park:
 - bridge assessment and legal advice obtained for transfer of easement back to the RDN;
 - ATV control and signage installed.
- Little Qualicum River Estuary Regional Conservation Area:
 - continued working with partners on invasive plant removal;
 - worked with partners to install three plant enclosures.
- Morden Colliery Regional Trail:
 - report and assessment on bridge options over the Nanaimo River was completed;
 - completed repairs and upgrades to the Thatcher Creek Bridges.
- Moorecroft Regional Park:
 - trails upgraded;
 - boat house roof replaced;
 - completed building assessment of Kennedy Hall;
 - renovated the bathroom in the caretakers house;
 - arranged for animal control to visit the park to help with dog off leash issues;
 - installed trail signage.
- Mount Benson Regional Park:
 - the Witchcraft Lake Trail Agreement yearly report was completed;
 - the emergency access road was upgraded;
 - trails in park were developed and upgraded.
- Nanaimo River Regional Park:
 - removed broom and planted 100 new trees.
- TransCanada Trail:
 - trail realigned after consultation with equestrian group and land owners;

- licence renewal completed.
- Park Assessments:
 - completed three assessment and Board reports for regional parkland.

REGIONAL AND COMMUNITY UTILITIES

Wastewater Services:

- Completed the design and construction of the replacement of the GNPCC primary effluent line and bypass chamber.
- Completed the design and construction of the GNPCC outfall replacement for the land section, including cost share with the City of Nanaimo for fish passage culvert and watermain replacement.
- Commenced detail design on the GNPCC outfall marine section.
- Commenced Environmental Impact Study for GNPCC Secondary Treatment Upgrade Project.
- Beneficially reused 100% of biosolids from the RDN treatment facilities and FCPC effluent at the Morningstar Golf Course.
- Completed manhole repairs and camera inspections on the northern and southern sewer interceptor lines.
- Completed cleaning of digester 2 at GNPCC and commenced structure and mechanical review and upgrade strategy.
- Commenced the engineering study and design on the protection of the Qualicum Beach interceptor pipeline.
- Submitted the Liquid Waste Management Plan Amendment to the Minister of Environment.
- Received Minister of Environment approval of the Liquid Waste Management Plan Amendment.
- Completed the 2014 SepticSmart program with 166 people attending workshops throughout the region.
- Partnered with the Onsite Wastewater Management Association of BC (WCOWMA-BC) which offered a \$28,500 grant used towards financial incentives for onsite system property owners performing system upgrades or having a maintenance plan professionally developed.
- Completed construction of the Chase River Pump Station bypass return line and flapper gate.
- Completed design and tender documents for the Departure Bay Pump Station #1 pump, motor and drive replacement.
- Completed assessment of dewatering requirements for GNPCC.
- Completed Co Gen project at GNPCC, including replacing blowers, new finishing vessels, seismic support and upgraded pipe work.
- Completed design and construction of the sludge line replacement at FCPC.
- Completed installation of influent flow metering at FCPC.
- Completed installation of influent and effluent flow meters at GNPCC.
- Completed Operational Building HVAC upgrades and MCC room cooling improvements.
- Completed design on the Bay Avenue Pump Station backup generator which provides electricity to the pump station during power failure.
- Successfully passed third party surveillance audit for Wastewater Services' ISO 14001 certified Environmental Management System.
- Commenced Rural Village Sewer Servicing Projects:
 - Area H sewer servicing detailed design;
 - Cedar Village servicing strategy.

Water Services:

Administration / Project Management:

- Completed annual reporting for eight RDN community water systems and three regional park systems for submission to Island Health.
- Completed Westurne Heights Water service area petition process.
- Completed Reid Road Sewer extension petition process and initiated design and construction.
- Completed the Hawthorne Rise sanitary sewer main extension project.
- Tendered and completed construction of the Hawthorne Rise sewer main extension.
- Completed boundary amendments to sanitary sewer bylaws for Pacific Shores, Cedar and French Creek.
- Authorized approximately 50 water bill rebates under the RDN Adjustment for Water Leak Policy.
- Tendered a smoke-testing and closed-circuit camera inspection project for RDN sanitary sewer mains.
- Updated the department's asset database to reflect system growth.
- Initiated a review of Whiskey Creek water treatment options.
- Initiated detailed engineering design of watermain upgrade on Garry Oak Drive.
- Initiated review of possible filtration exclusion for water treatment in San Pareil.
- Installed a back-up generator in the Englishman River water system pump station facility.
- Initiated a successful referendum to authorize borrowing \$2.6 Million for capital upgrades in the Nanoose Bay Peninsula Water Service Area.
- Initiated a process review to update water and sewer servicing standards to RDN Bylaw No. 500.
- Completed the uni-directional watermain flushing program.
- Completed air valve and fire hydrant maintenance.
- Completed a reservoir cleaning program.
- Completed safety reviews and staff safety training.
- Updated and expanded the Water Services website.
- Updated and expanded the Water Services Emergency Response Plan for all water systems.
- Expanded the streetlighting service in the French Creek/Morningstar area.
- Continued to monitor RDN-owned community water supply for compliance with Canadian Drinking Water Guidelines.
- Initiated a Development Cost Charge Bylaw for the NBPWSA.
- Initiated the development of a Storm Water service area for the Fairwinds Development.
- Continued involvement in the Englishman River Water Service process.

Operations:

- Completed construction and commissioning of the new San Pareil pump station and reservoir.
- Installed proper backflow protection at all RDN sewer lift stations.
- Initiated a confined space rescue agreement with the City of Parksville.
- Purchased excavator and trailer.
- Purchased and re-purposed two used trucks from Transit.
- Purchased, installed and commissioned new controls for the Madrona pump house.
- Installed a second reclaim tank at the Nanoose Water Treatment Plant.
- Well rehabilitation completed at Westbay #3 and Fairwinds #1.
- Proactive leak protection program completed in San Pareil and Whiskey Creek.
- Fire hydrant upgrades completed in the Nanoose Bay Peninsula Water Service Area.
- Installed remote sensing turbidity meters at Whiskey Creek and San Pareil.

- Upgraded controls in the Nanoose Peninsula including:
 - Activation of the Sherbrooke PRV;
 - Activation of the Dolphin altitude valve;
 - Conversion of the Eagle Heights reservoir to lead reservoir;
 - Installation of a manual transfer switch at Craig Bay pump-station.
- Installed aluminum walkway on berm at Whiskey Creek.
- Operate and maintain the Regional Parks water systems.
- Carried out staff training program.

Drinking Water and Watershed Protection

- Continued the fourth year of the Community Watershed Monitoring Program, in partnership with the Ministry of Environment. Coordinated ten community groups to carry out water quality testing at 55 different sites on 27 rivers and streams in our Region.
- Continued the Volunteer Observation Well Program, monitoring groundwater levels at 12 private wells to complement the Ministry of Environment Observation Well program.
- Team WaterSmart outreach program attended fourteen community events and hosted nine WaterSmart outdoor landscaping workshops and six WellSmart workshops.
- The Education Program facilitated 11 day-long field trips for school kids to their drinking watershed, in collaboration with forest industry and municipal water utilities staff, and developed watershed education programs for summer camps, home-school groups, and preschools.
- Completed 33 irrigation system audits with a focus on strata communities.
- Managed rainwater harvest and well upgrade incentive programs, issuing a total of 33 rainwater harvest and 14 well upgrade rebates.
- Met with the Drinking Water/Watershed Protection (DWWP) Technical Advisory Committee.
- Facilitated the Small Water Systems working group annual meeting, with attendance by Island Health representatives.
- Facilitated discussion with provincial and regional partners on the development of a Regional Hydrometric and Climate Monitoring program.
- Launched Water Use and Reporting Centre program in partnership with municipalities.
- Completed literature review as part of phase one of the Watershed Protection initiative.
- Updated DWWP web site information access.
- Provided support for the Simon Fraser University Recharge Study/Groundwater Model on Gabriola Island.

STRATEGIC AND COMMUNITY DEVELOPMENT

Current Planning:

- Reviewed and processed 122 new applications including 8 bylaw amendment files, 75 development permits and development variance permits, and 25 new subdivisions along with the on-going review of in-stream applications.
- Supported the review and adoption of zoning amendment and phased development agreement applications for the Lakes District and Schooner Cove.
- Supported Long Range Planning with major projects including the preparation and implementation of Secondary Suites regulations.
- Prepared a revised ALR application review process with options for EA Director and Agricultural Advisory Committee comment.

- Collaborated with Energy and Sustainability and Long Range Planning in preparing regulatory amendments to reduce barriers to green building technologies for the Board's consideration.
- Prepared and supported the Board's consideration of land use regulations to address the Marihuana for Medical Purposes Regulations.
- Supported the Board's review and comment to the Ministry of Agriculture's on the Ministry's draft bylaw standard for medical marihuana production facilities on ALR land.
- Provided support for the Agricultural Advisory Committee in implementation of Agricultural Area Plan and in providing comment on ALR applications.
- Provided administrative support for the Board of Variance.
- Assisted various RDN Departments with land use information and advice related to corporate projects.
- Supported Bylaw Services in response to general complaints and complex legal enforcement action related to land use.

Community Planning

- Nanaimo Airport Planning Process:
 - A number of meetings were held with the Nanaimo Airport Commission related to Phases 2 and 3 of the Nanaimo Airport Planning Process. Phase 2 is the development of a MOU that outlines a process and principles for developing a Land Use Plan for the airport;
 - A preliminary draft of the MOU was prepared;
 - A terms of reference for an Advisory Committee was adopted. The committee will provide advice to the RDN during Phases 2 and 3 of the process.
- A new **Regional Growth Strategy** was adopted in November 2011 and subsequently numerous actions related to implementation of the RGS have occurred. Activities in 2014 included:
 - Continued process to develop indicators and targets to achieve key RGS policies. Activities in 2014 included:
 - completion of a report on the use of indicators by the RDN and identified a set of possible indicators;
 - attended a workshop with knowledgeable professionals to refine the set of possible indicators and prepared a report on results of the workshop which included a set of recommended indicators and targets;
 - worked with RDN Board to develop a draft set of indicators and targets;
 - conducted public consultation and completed a report documenting the results of the consultation. Made recommendations for a final set of indicators, targets and other data for the RDN to monitor.
 - Initiated a process to develop a monitoring and reporting system on regional economic, population, social and environmental trends and progress towards achieving RGS goals.
 - Prepared an annual report regarding implementation of the RGS;
 - Long Range Planning staff made presentations and/or provided information to interested groups and high schools;
 - Meetings were held with municipal staff to update them on activities related to RGS implementation;
 - Regular updates made to the RGS web site.
- Staff processed one Regional Context Statement received from a member municipality which was accepted by the RDN Board.
- Staff processed a request for a minor amendment to the Regional Growth Strategy received from the Town of Qualicum Beach.

- The **Agriculture Area Plan Implementation** was approved by the RDN Board in 2013. Activities in 2014 included:
 - a review of RDN regulations and policies to identify barriers to agriculture;
 - development of a discussion paper on barriers to agriculture and possible options to address those barriers;
 - a workshop with stakeholders to identify priorities for the barriers that the RDN should be addressing;
 - meetings with agricultural organizations and other stakeholders;
 - public consultation on the barriers to agriculture including an online survey;
 - Research was conducted and correspondence sent to the province regarding farm tax assessment;
 - to assist with communication on RDN activities related to agriculture a web site containing numerous topics related to agriculture was developed;
 - provided support for and attended meetings of the Agricultural Advisory Committee.
- The **Affordable Housing Action Plan** was approved in 2011 and identified actions for the RDN and its partners to undertake over the next few years. Activities in 2014 included:
 - staff processed six requests for funding from the Capacity Building to End Homelessness Reserve Fund. The Board approved grants to the John Howard Society, Society of Organized Services, People for a Healthy Community, Manna Homeless Society and the First Unitarian Fellowship of Nanaimo;
 - updated the web based resource guide on affordable housing for renters, homeowners and housing providers. The guide includes a comprehensive list of contacts for a wide range of housing topics from market rental to emergency homeless shelters to homeowner grants. This is the only resource of this type in the region;
 - took part in homelessness initiatives organized by member municipalities;
 - initiated research and met with service providers regarding the establishment of a new service to provide funding to address social issues in School District 69.
- The **Secondary Suites Project** was initiated in 2013. Activities in 2014 included the following:
 - staff made revisions to draft bylaws to amend the two zoning bylaws to allow secondary suites in all residential zones which was subsequently adopted by the Board;
 - community consultation on the bylaw amendments including information sessions and public hearings;
 - the Board adopted a policy to provide for a consistent and clear approach on how existing and new secondary suites will be treated with respect to enforcement of the zoning bylaw, obtaining confirmation from the RDN that basic life safety aspects of the BCBC have been met, and the building inspection process;
 - initiated research into removing barriers and providing incentives to encourage the construction of secondary suites.

First Nations

- Provided information and guidance related to First Nations consultation for several RDN departments including, Current Planning, Recreation and Parks Services, Transportation and Solid Waste Services, Regional and Community Utilities (this includes reviewing documents upon request).
- Coordinated attendance of First Nations, RDN Elected Officials and RDN staff at various special events hosted by the RDN or First Nations. These include Cedar Skate Park Opening, Snuneymuxw

First Nation National Aboriginal Day Celebration and Community Building Ground Breaking, RDN Watershed Tour, Qualicum First Nation Open House, RDN Inaugural Board Meeting.

- Helped facilitate successful outcome to the concerns of Snaw-Naw-As (Nanoose First Nation) related to the Fairwinds re-zoning and phased development agreement.
- Liaised and coordinated with First Nations and Vancouver Island University regarding bringing the Witness Blanket art installation to the region.
- Worked with two First Nations to draft protocols for the RDN to follow to acknowledge First Nations Traditional Territory.
- Provided support to RDN departments and assisted in giving timely information and responses to First Nations concerns related to treated effluent leak from storm damaged sewer outfall pipe at Morningside Park in Nanaimo.
- Provided support and communication between RDN EOC and Snuneymuxw First Nation related to Nanaimo River flood risk in Electoral Area A (Cedar) and collaboration for a joint response.
- Provided support and introductions between First Nations and RDN elected officials, RDN staff and staff of member municipalities.
- Responded to various requests for information from First Nations regarding RDN operations.
- Initiated and followed up on opportunities for collaboration.
- Ongoing maintenance of respectful relationships with First Nations elected officials and staff.
- Maintained an up-to date consultation spreadsheet.

Other Items/Projects

- Staff spent considerable time on the issue of seaweed harvesting in Electoral Area 'H'. Activities included:
 - researching and identifying options for local government action to influence seaweed harvesting;
 - meeting with provincial government staff to discuss the issue;
 - responding to enquiries and complaints from the community.
- Provided support to RDN Current Planning on items related to zoning and the Phased Development Agreement for the Fairwinds Lakes District and Schooner Cove.
- Provided support to RDN Energy and Sustainability on the development of zoning amendments to support small scale renewable energy.
- Provided support to RDN Energy and Sustainability on the development of a guidebook on sustainable site planning.
- Represented the RDN at various meetings and on committees related to land use planning, transportation, affordable housing, economic development, and water supply.
- Staff met with several land owners/developers to discuss potential developments and RDN support and requirements.

Building Inspection

- Electoral Areas 'B' and 'H' Building Inspection community offices continue to operate as a convenience for local residents on building permit matters and communicating with RDN staff.
- Issued approximately 730 building permits with an estimated construction value of \$90 million.
- Field Inspectors conducted approximately 3,500 inspections on new construction overall.
- Permit turn-around time reduced to an average of three weeks (95% of time) on major projects and two weeks or less on smaller projects.
- Public use of department web pages for general information, updates and permitting statistics continued to rise.

- Approximately 95% of identified building bylaw infractions resolved prior to enforcement action being required.
- Mobile file management implementation is underway.

Bylaw Enforcement

- Two Bylaw Enforcement Officers investigated approximately 300 bylaw complaints of varying complexity.
- Legal action on several complex enforcement files continued in 2014. Eighteen staff reports went to the Board on various issues (unsafe buildings, unsightly premises, noise control, zoning, animal control).
- Public use of website for complaints and general information continues to rise.
- 95% of files resolved by voluntary compliance.
- Mobile file management implementation is underway.

Emergency Planning

- Two Emergency Management Select Committee Meetings were held with five reports and two program updates presented.
- Training included: EOC table top exercise (multi jurisdiction, senior level management); regional EOC training (Operations, Planning, Finance/Admin); EOC Notification Drill; Emergency Coordinator attended NER training at CFB Esquimalt; four new EOC staff completed 'Basic Training'; EMBC/JIBC webinars for EOC Sections: Building Situational Awareness in the EOC, the Incident Command Post, and the EOC Interface; Flood Response and Recovery; EOC Activation; Social Media and Emergency Management; Liaison Officer – Putting Theory into Practice.
- The Great BC ShakeOut Earthquake Drill participation included community and staff involvement (drill, 'Lunch and Learn', display, etc.). ESS and Emergency Communications teams participated in both D68 and D69 as well as numerous NEP teams.
- Emergency Preparedness Week events were held around the region including displays by ESS and Emergency Communications (Gabriola Island, Oceanside), radio interview, newspaper coverage – (message amplification).
- Two radio sets were purchased for use in the Oceanside service area. Reception Center and radio equipment inventories were conducted. Lists were created for 2015 purchases for identified gaps.
- A regional survey on "Disaster Resilience – How Ready Are We?" was conducted.
- Disaster simulation at Tamagawa University – hands on scenario for 40 NEP/ESS volunteers to practice skills in a realistic setting complete with 'victims' with mock injuries.
- Second annual NEP event was held at Nanoose Place. Rapid Damage Assessment overview, VIU 'Disaster Gourmet' contest, regional stakeholder participation, 120 participants.
- New volunteers joined the Oceanside ESS (7), Gabriola Island ESS (13), and Lantzville ESS (25). There were four ESS Level 1 call outs. Oceanside ESS participated in three evacuations.
- A volunteer appreciation BBQ was held in the Qualicum Beach area for ESS/emergency communications volunteers. Participation in National Volunteer Appreciation Week.
- Sixteen NEP workshops, resulting in eight new NEP groups. One NEP group conducted emergency communications fan out exercises and neighborhood evacuation/muster drills. Seven community events were attended.
- Participation in SFN's Health Accreditation Process, review of SFN's Emergency Operating Plan, Emergency Preparedness Community Plan, and flood response protocols. Participation in SFN's Aboriginal Day celebration, and the Qualicum First Nation open house. Ongoing liaison and sharing of emergency program resources.

- Draft Recovery Plan in process with a focus on creating operational guidelines with the Canadian Red Cross as per Recovery Services Agreement.
- Operational readiness/building interoperability presentation and reviews conducted at the start of the fall/winter season (including EOC staff and external regional stakeholders).
- Winter Storm Emergency Events – Level 3 response: two floods and one landslide – three evacuations, one evacuation alert, ESS and SAR utilized. Thirty RDN EOC staff and nine external stakeholder agencies were involved.

Energy and Sustainability:

- Completed energy use and emission reporting to Province for RDN and the City of Parksville, and publicly reported on progress toward carbon neutral operations resulting in a \$112,558 grant to the RDN.
- Successful delivery of 2015 Green Building Series with the largest audience since the program start in 2010 (over 300 attendees).
- Received first and second readings to the proposed amendments for Bylaw No. 500 and Bylaw No. 1285 which aim to remove regulatory barriers to green building features and systems.
- Coordinated the Real Estate Energy Efficiency Project, in partnership with the City of Nanaimo and the Vancouver Island Real Estate Foundation, with \$75,000 in funding from BC Hydro and the BC Real Estate Foundation.
- Initiated the third Green Building Guidebook: *Sustainable Site Planning and Subdivision*.
- Received a Provincial grant of \$19,950 to support the Regional Woodstove Exchange Program, in partnership with the City of Nanaimo.
- Completed the Green Building Outreach Strategy and Implementation Plan.
- Committed a total of \$26,410 in Green Building Incentives to residents who improve the environmental performance of their homes.
- Collaborated with the Gabriola Commons to develop a 10kw demonstration solar system (ongoing).
- Developed a Terms of Reference and instituted interdepartmental staff meetings to promote organizational collaboration and efficiency.
- Introduced a new high efficiency, hybrid electric vehicle into the corporate vehicle pool fleet.
- Developed an RFP for an organization-wide Strategic Asset Management Framework and Implementation Plan, and played a leading role coordinating the consultant team (ongoing).
- Supported completion of 2013 Annual Financial Report.
- Coordinated the release of over \$100,000 from the regional *Corporate Climate Action Fund* to enable investments in higher efficiency infrastructure, vehicles and equipment, including \$40,500 for condensing boilers at Ravensong Pool, \$30,000 for variable frequency drive pump controllers at the Departure Bay Pump Station, and \$10,000 for an independent assessment of the District 69 Arena.
- Coordinated the Northern Community Economic Development Program, which disbursed or committed almost \$40,000 in local economic development grants into the District 69 communities.

TRANSPORTATION & SOLID WASTE SERVICES 2014

Transportation Services:

- Completed the 2014 Transit Business Plan titled *RDN Transit Future Plan*.
- Implemented new Conventional Transit scheduling software in partnership with BC Transit.
- Completed compressed natural gas (CNG) Transit facilities upgrades.
- Completed the compressed natural gas compressor station installation.
- Commissioned into service 25 new CNG buses.
- Installed new bus stop shelters in the Town of Qualicum Beach.
- Implemented a 'Z-card' bike/transit route map in conjunction with the City of Nanaimo.
- Worked with BC Transit to implement a new BC Transit website.
- Participated on the Nanaimo South Downtown Waterfront Initiative.
- Performed frame repairs on 1998 New Flyer buses.
- Implemented a new uniform online ordering system.
- Updated the Transit Operations Manual.
- Completed accessible bus pads in the City of Nanaimo.
- Supported the Emergency Operations Centre (EOC) during flooding and landslides.
- Trialed Ground Positioning System (GPS) for the Transit fleet.

Solid Waste Services:

Zero Waste Programs

- Commenced Stage 2 (ie identification and selection of preferred options) of the *Regional Solid Waste Management Plan* review. Re-established the Public and Technical Advisory Committee and established a Board Solid Waste Select Committee.
- Compiled data from licensed waste management facilities to determine the 2013 region-wide diversion rate of 68% and the second lowest provincial annual per capita disposal rate of 347 kg.
- Conducted inspections of 12 private recycling facilities under the Waste Stream Management License (WSML) Bylaw No. 1386 to ensure operations in compliance with approved site operating plans.
- Investigated and resolved 113 illegal dumping complaints, supported 15 community cleanups, and recovered 33 tonnes of material. Realigned responsibilities with the Bylaw Enforcement department to better utilize their investigative expertise with respect to illegal dumping.
- Launched *Recycling2014.ca* website hosted in conjunction with the City of Nanaimo. (Obtained rights for *Recycling2014.ca* through to *Recycling2020.ca*).
- Key participant with the Solid Waste Association of North America and the BC Product Stewardship Council. Sponsor for the Coast Waste Management Association and presenters at the CWMA Annual Conference.
- Participated in the National Solid Waste Benchmarking Initiative.

Curbside Collection Program

- Revised and extended for 5 years the curbside collection contract with BFI Canada Inc.
- Implemented recyclable material changes as a result of the new provincial packaging and printed paper stewardship program. Hired a temporary Project Assistant to meet the RDN's administrative obligations stemming from the contract with Multi-Material British Columbia for the collection of recyclables.
- Launched the *RDN Curbside Widget and App*, which provides on-line lookup information as well as e-mail, phone and mobile device reminders for curbside collection.

- Undertook residential curbside outreach and visited 3,400 homes on collection day prior to pick up time.
- Issued two Curbside Program Newsletters.

Solid Waste Facilities

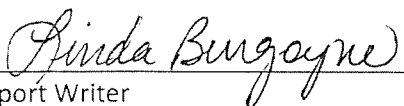
- Served approximately 170,000 customers.
- Published and presented a *Solid Waste Operations Manual* to all program staff.
- Developed an *Operator Trainer* position to promote equipment operator proficiency and improve operating safety.

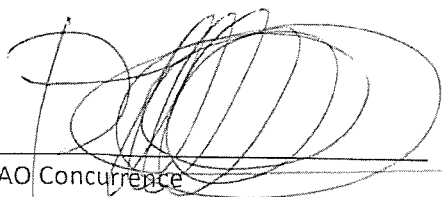
Cedar Landfill:

- Replaced waste cover system by acquiring *Iron Grizzly Panels*, which reduces costs, improves operational efficiency, operator safety, and aids with bird control.
- Awarded a 3-year contract for environment monitoring to the consulting engineering firm SNC-Lavalin at approximately 10% lower cost than the previous contract.
- Installed five vertical and one horizontal landfill gas collection wells and commissioned three of the vertical wells.
- Achieved greater than 60% landfill gas recovery and maintained the gas collection system fully operational at greater than 95%.
- Acquired a Portable Landfill Operations Team Shelter (PLOT) to facilitate better communication and operations quality control.
- Undertook video monitoring and flushing of the leachate system.
- Completed the Cedar Road sanitary line relocation which allows for construction of the landfill North Berm.
- Implemented a soil acceptance program for utility corridor soils generated by member municipalities.

RECOMMENDATION:

That the Board receive the summary of activities and departmental accomplishments for the Regional District of Nanaimo for 2014.


Report Writer


CAO Concurrence



RDN REPORT	
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BOARD	

STAFF REPORT

TO: Chris Midgley
 Manager, Energy and Sustainability

DATE: June 26, 2015

FROM: Ting Pan
 Sustainability Coordinator

MEETING: SSC July 16, 2015

SUBJECT: Natural Gas Fireplace Rebate Feasibility

FILE: 6430-05-GBIP

RECOMMENDATION

That the Regional District of Nanaimo (RDN) not create a new Green Building Incentive Program rebate for natural gas inserts.

PURPOSE

To investigate the feasibility and financial implications of introducing a rebate for natural gas inserts into the RDN Green Building Incentive Program.

BACKGROUND

At the Sustainable Select Committee meeting held on March 17, 2015, the following motion was carried:

“That staff investigate the feasibility and financial implications of incorporating a Fortis BC rebate program for natural gas inserts into the RDN Green Building Incentive Program.”

Currently, Fortis BC has an EnerChoice Fireplace Program that offers a \$300 rebate for an eligible fireplace. The EnerChoice label indicates the product is the most efficient of gas hearth products available. While the woodstove exchange program does offer \$250 for residents to upgrade their woodstove to a gas stove or insert if it is a primary heating appliance in the house, the RDN does not offer a rebate for the purchase of a natural gas fireplace on its own.

Creating an additional rebate as part of the RDN Green Building Incentive Program for natural gas inserts could easily be accomplished, however the rebate would not be widely available in the region, and it would not be an effective tool to reduce energy consumption or emissions.

Firstly, a new natural gas rebate will not be applicable to most residents in the Electoral Areas. *Appendix A: Gas Distribution Map* shows the distribution of natural gas service in the region. As shown, the service is only available in a portion of residential areas in French Creek (Electoral Area ‘G’), Nanoose Bay (Electoral Area ‘E’) and Cedar (Electoral Area ‘A’).

Secondly, natural gas fireplaces do not provide significant energy savings or Greenhouse Gas emissions reduction. A 2011 study titled *The Impact of Gas Fireplace Operation on Winter Energy Consumption and House Temperatures* conducted by the Canadian Centre for Housing Technology found that fireplace operation had a significant impact on increasing total house heating energy consumption compared to

new gas furnaces and electric heating systems. This is due to the lower efficiency of gas fireplaces. EnerChoice fireplace inserts have efficiencies ranging from 61% to 90% whereas the fuel efficiency of new gas furnaces and electric heating systems is above 90%.

Since the RDN Green Building Incentive Program is intended to encourage impactful actions that are widely applicable to residents across the region, a new rebate for natural gas inserts is not recommended. Instead, the RDN will continue to provide residents with information about rebate programs offered by major utilities, as is the case with the Fortis BC EnerChoice Fireplace Program, but to provide additional resources only when the benefits are significant and shared widely across the region.

ALTERNATIVES

1. That the RDN does not create a new rebate for natural gas inserts.
2. That alternate direction be given to staff.

FINANCIAL IMPLICATIONS

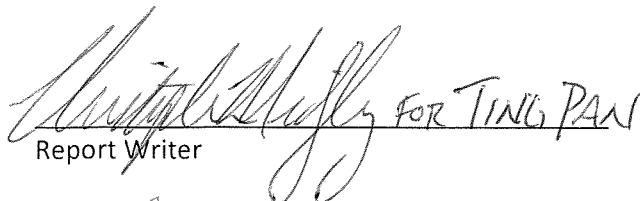
If a new rebate for natural gas inserts is introduced as a part of the RDN Green Building Incentive Program, the cost will be covered by \$20,000 allocated to the program. Although a new rebate will not change the total amount of program funding, it will potentially reduce the funds available for existing rebates or future high-impact programs, such as an oil furnace replacement program.

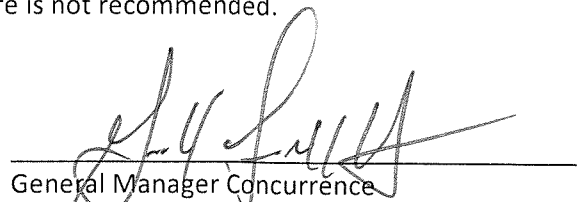
STRATEGIC PLAN IMPLICATIONS

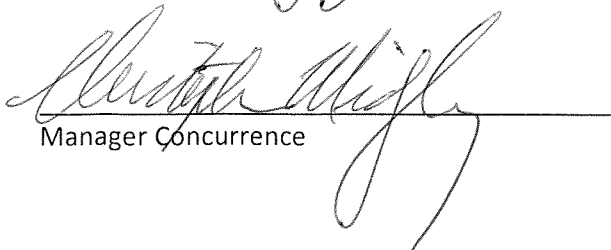
The Green Building Incentive Program is intended to support residents' investment in energy and resource efficiency. The limited applicability and potential consequence of increasing total heating energy consumption make a natural gas insert rebate unlikely to improve energy efficiency across the region.

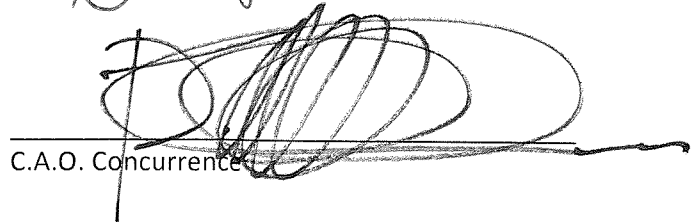
SUMMARY/CONCLUSIONS

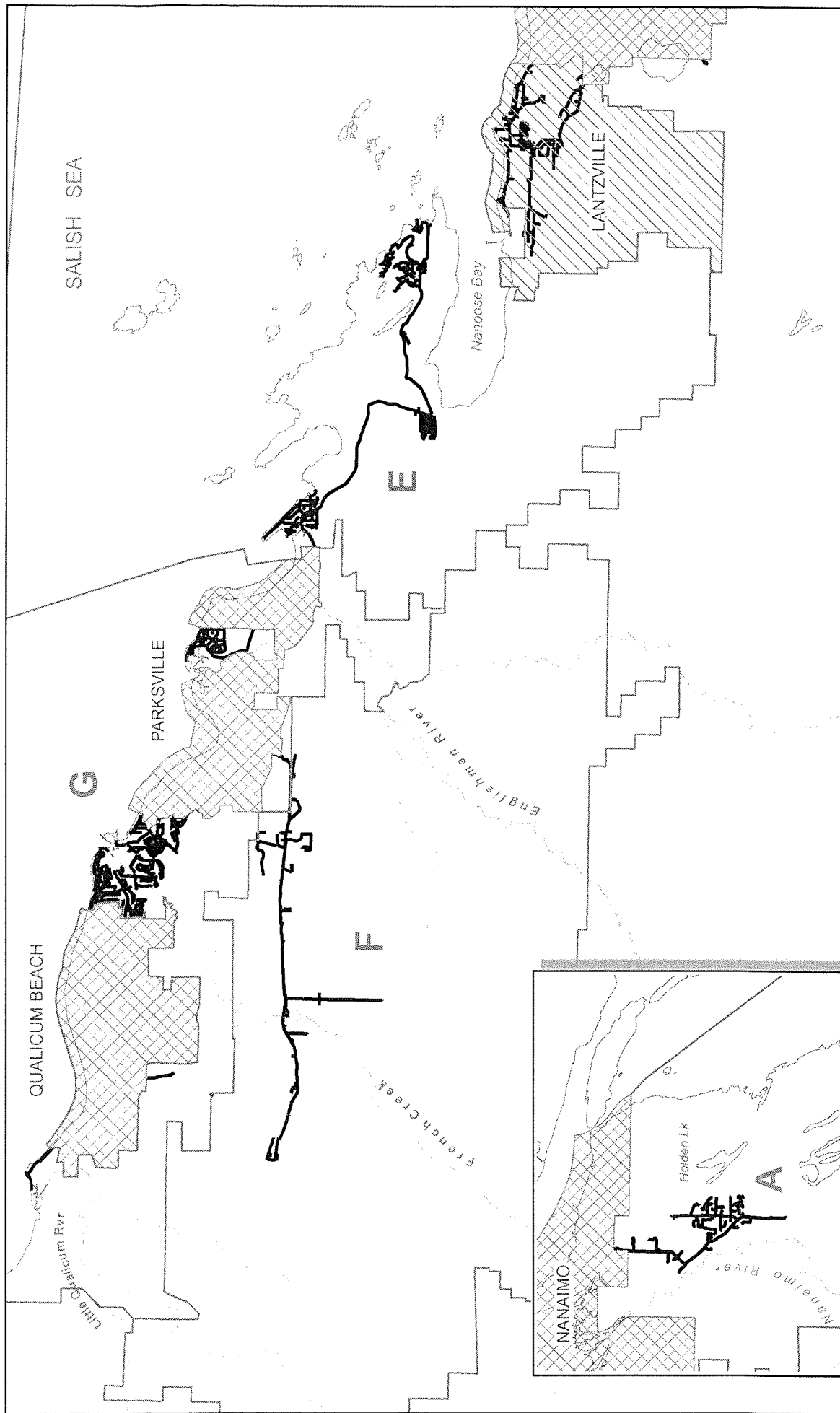
Staff has investigated the feasibility and financial implications of incorporating a rebate program for natural gas inserts into the RDN Green Building Incentive Program. It is found that natural gas service is very limited in Electoral Areas, restricting the application of such a rebate. Furthermore, gas fireplaces are likely to increase total heating energy consumption and do not provide significant energy efficiency benefits to the community. A new rebate for natural gas inserts is not compatible with the intention of the RDN Green Building Incentive Program and therefore is not recommended.


Report Writer


General Manager Concurrence






Manager Concurrence


C.A.O. Concurrence



June 29, 2015

APPENDIX 'A': GAS DISTRIBUTION IN ELECTORAL AREAS AND LANTZVILLE

-  Gas Distribution Line (Fortis)
-  District of Lantzville
-  Electoral Area
-  Other Municipality



TO: Mike Donnelly
Manager, Water Services

DATE: July 10, 2015

FROM: Julie Pisani
DWWP Coordinator, Water Services

MEETING: SSC, July 16, 2015

FILE: 0360-20-DWPAC

SUBJECT: Regional Climate and Hydrometric Monitoring Study

RECOMMENDATION

That the Sustainability Select Committee receive this report for information.

PURPOSE

To inform the Board about the outcomes of a recent scoping study that identified data gaps in climate and streamflow (hydrometric) monitoring within the Regional District of Nanaimo.

BACKGROUND

Under the Board adopted Drinking Water & Watershed Protection (DWWP) Action Plan, *Program 2: Data Inventory and Monitoring*, specifically points to the need to fill gaps in regional data on streamflow and climate.

A better understanding of streamflow and climate in our region will assist with water resource management – planning for floods, droughts and water supply for our communities. The 2013 Phase1 RDN Water Budget Study also pointed to the need for improved hydrometric (streamflow) and climate data, to further refine water budget (supply and demand) calculations to ultimately assist with land use planning decisions.

In July 2014, at the regular DWWP Technical Advisory Committee meeting, the committee members supported the investigation of hydrometric and climate monitoring data gaps within the region. A sub-committee was formed to provide direct guidance on this work. Kerr Wood Leidal was retained to perform a regional scoping exercise to identify i) where the most important gaps in hydrometric and climate data are, ii) which gaps are the highest priority to fill, and iii) which potential partners could benefit and work together.

The final report was presented to the DWWP TAC meeting on April 14, 2015 with a suite of recommendations for hydrometric and climate monitoring locations in the region.

The following were identified as the top priorities – the most important data gaps to fill – in the region:

Climate Monitoring (i.e. precipitation etc.)

- Nanoose
- Mt Arrowsmith
- Gabriola Island

Hydrometric (streamflow and level)

- Nanoose Creek
- Haslam Creek
- French Creek

Secondary priorities are also outlined in the study (see attached) for other key areas where monitoring is recommended.

ALTERNATIVES

1. Receive the report for information.
2. Provide alternate direction to staff.

FINANCIAL IMPLICATIONS

The priority monitoring sites should be pursued in partnership with other agencies, based on shared interest/mandate, and mutual benefit with regards to the data. Partnerships can cover a range of project elements such as capital costs, installation labour, data management, equipment maintenance, operational costs, land access and advisory assistance.

Partners that have been identified so far include:

- VIU Mt Arrowsmith Biosphere Reserve Research Institute grant funds (\$20,000) for capital costs for Mt. Arrowsmith Climate Station
- Island Timberlands and TimberWest for potential land access
- MOE / MFLNRO for advisory assistance, data management and station installation
- Water Survey of Canada for advisory assistance, data management and station installation
- Arrowsmith Water Service
- RDN Parks for potential station siting
- Others to be determined

There are no financial implications to the RDN at this time. Any related future budgetary items will be brought forward in the 2016 budget deliberations and will be based on partnerships.

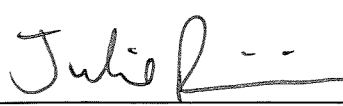
STRATEGIC PLAN IMPLICATIONS


This study is directly linked to strategic goals and actions as noted in the Board Strategic Plan, to develop clarity on the region’s water resource. This study identifies a course of action by which to gather important information that will enable the development of progressive and efficient water management across the region.

Climate and hydrometric data are important elements of an information base about water supplies in the region that will assist in making sound decisions about development and growth.

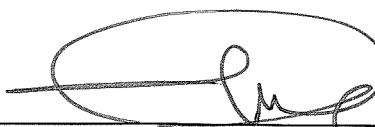
SUMMARY/CONCLUSIONS

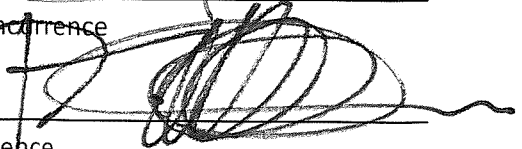
This summarizes the Regional Climate and Hydrometric Monitoring Scoping Study that was completed for the RDN in April 2015. Priorities for future expanded monitoring are outlined. Improved local monitoring of climate and streamflow (hydrometrics) in our region is valuable local data that supports water supply forecasting, flood and drought warning, local watershed scale hydrological evaluations, among other important purposes. These priorities are not to be pursued by the RDN alone; rather they are best addressed through partnerships with Provincial, academic and other stakeholders.



Report Writer


General Manager Concurrence



Manager Concurrence


CAO Concurrence



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Regional Climate and Hydrometric Monitoring Network Scoping Study

FINAL
April 2015
0536.010

Prepared for:
Regional District of Nanaimo



Prepared by:
Craig Sutherland, P.Eng.





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- Appendix B: Field Reconnaissance Reports



Executive Summary

One of the goals identified in the Regional District of Nanaimo's (RDN) Drinking Water and Watershed Action Plan (Action Plan) is to:

Improve information about the Region's water resources in terms of both quality and quantity, in support of better land use decisions and public understanding.

To meet this goal, the Action Plan recommends implementation of a Water Resource Inventory and Monitoring Program. In addition, the RDN Regional Water Budget Phase 1 project completed in 2013 recommended collection of additional climate and hydrometric data at key location to fill identified data gaps to better understand available surface and ground water resources. The purpose of this study is to move beyond the general recommendation of these plans and to identify, prioritize locations and identify potential partnerships to support additional climate and hydrometric (streamflow) stations within the region to improve the existing climate and hydrometric monitoring networks.

Some of the key purposes for collection of climate and hydrometric data include:

- Assessment of available surface water and ground water supplies for land development and community planning
- local watershed scale hydrological evaluations for habitat conservation measures, design of water supply or other development;
- interpreting water quality data to provide estimates of total loading rather than only concentrations of pollutants;
- design flood estimates and rainfall intensities for drainage, stream crossings or flood protection design;
- operational hydrology for seasonal water supply forecasting,
- flood forecasting and warning,
- watershed health tracking,
- fire weather monitoring (for forestry operations and forest fire safety),
- baseline monitoring for climate change impact assessment; and
- other currently unknown future uses.

Currently, the climate and hydrometric monitoring stations in the region are operated by a variety of agencies and stakeholders, ranging from Federal and Provincial Government to local Stewardship groups. The currently active stations in the RDN include:

- Twelve hydrometric stations
(most of which are on regulated streams and are used for monitoring of water supplies)
- Seventeen climate stations
(most of which are located along the coastal lowlands at elevations below 200 m)
- Two active snow monitoring sites
(one automated snow pillow and one manual snow course)



Through review of the currently available hydrometric and climate data key gaps have been identified in the network, most notably:

- a lack of hydrometric data for smaller coastal watersheds, smaller mountain headwater streams and larger natural or unregulated watersheds;
- a gap in the coastal climate monitoring network in the Nanoose region and on Gabriola Island as well as limited climate data available in the mountain headwater region (above elevation 200 m); and
- a lack of continuous snow data in the central and northern portion of the region.

Although the RDN has a reasonably good network of existing monitoring stations which provide sufficient data to assess region wide water availability, the lack of data at the key locations identified limits the ability to predict available water supplies at local scales. The following tables outline the recommended sites:

Recommended Hydrometric Stations

Watershed	Priority ₁	Potential Partner ₂	Comments
Primary Permanent Baseline Stations (on-going long term operation)			
French Creek	First (Continuous)	WSC/Friends of French Creek/BCCF/DFO (Seasonal since 2014)	Establish year-round continuous station. High surface and groundwater stress French Creek watersheds
Nanoose Creek	First	WSC	Baseline Station for Nanoose Area/High Surface Water Stress and Mod-Hi Ground Water Stress region
Haslam Creek	First	WSC	Baseline Station for southern RDN watersheds/moderate-high stress aquifers. Historical WSC gauge station. Nanaimo Airport Precipitation.
Goodhue Creek	Second	WSC or local Stakeholder Group	Baseline Station for Gabriola Island surface water balance.
Thames Creek	Third	NCES or other Stakeholder Group	Baseline station for lowlands watersheds in northern RDN.
Cameron River	Third	WSC	Upper Elevation Mountain watershed for assessment of high elevation runoff in region
Secondary Short Term or Seasonal Stations (operate for two or three years)			
Morningstar Creek	First	BCCF or other	Review surface water availability for High Groundwater Stress region
Hokkanen Creek	First	BCCF or other local stewardship group	Review surface water availability for High Groundwater Stress region
Kinkade Creek	Second	BCCF, NCES or other	As part of groundwater/surface water study for Spider/Illusion Lakes
Annie Creek	Second	BCCF, NCES or other	As part of groundwater/surface water study for Spider/Illusion Lakes.
Whiskey Creek	Second	BCCF or other	Review surface water availability for Mod-High Groundwater stress
Morrison Creek	Second	BCCF or MVIHES	Review surface water availability for Mod-High Groundwater stress



In addition to the longterm and secondary short-term hydrometric stations outlined above, several smaller streams within municipalities have been identified for streamflow measurement to track watershed health.

Recommended Climate Stations

Location	Priority ₁	Potential Partner ₂	Comment
Nanoose Climate Station	First	RDN	Provide climate data for Nanoose/Fairwinds areas
Gabriola Island Climate Station	First	RDN/Gabriola Volunteer Fire Department	Provide Climate Data for Gabriola/Mudge DeCourcy Island Water Region
Mt Cokeley/Mt Arrowsmith Automated Snow Pillow	First	Parksville/AWS/DFO/MF LNRO/MABRRI	Snow Pillow to collect snow data for Cameron River and Englishman River watersheds
Upper Little Qualicum/Cameron River Watershed	Second	MoTI (Climate Station on Highway 4)/ Island Timberlands	Additional Data for western portion of region with high annual rainfall
Horne Lake or Cameron Lake Climate Station	Second	DFO	Additional Collect data in highland/plateau region and to assist with forecasting for Storage at Horne Lake and Cameron lake
Upper Qualicum Watershed	Third	Unknown	Additional Data for northwestern portion of region with high annual rainfall
Upper Nanaimo River Watershed/ Fourth Lake Dam/Labour Day Lake	Third	Harmac/Timberwest/Island Timberlands	Additional Data for western portion of region with high annual rainfall

Note: 1 - **First Priority** implement within 1 to 2 years, **Second Priority** implement within 5 years, **Third Priority** implement after 5 years.
 2- Potential partner (capital funding, operation, in-kind, etc) identified for initial discussion with regard to station installation (AWS- Arrowsmith Water Service, BCCF – BC Conservation Foundation, DFO – Department of Fisheries and Oceans, MABRRI – Mt Arrowsmith Biosphere Reserve Research Institute, MoTI – Ministry of Transportation and Infrastructure, MFLNRO – Ministry of Forest, Lands and Natural Resource Operations, MVIHES – Mid Vancouver Island Enhancement Society, NCES – Nile Creek Enhancement Society, RDN – Regional District of Nanaimo, WSC- Water Survey of Canada

The capital cost for installation of hydrometric and climate station range based on specific site conditions (site access, power supply, site preparation, etc). However, typical costs are:

- Hydrometric stations \$15,000 to \$25,000
- Climate Stations \$13,500 to \$35,000
- Automated Snow Pillow \$40,000 to \$60,000

On-going maintenance cost for stations also varies but is typically between \$10,000 to \$20,000 depending on site access and complexity of the station.



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Section 1

Introduction



1. Introduction

1.1 Introduction

Kerr Wood Leidal Associates Ltd. (KWL) was retained by the Regional District of Nanaimo (RDN) to complete the following scoping study for a hydrometric and climate monitoring in the region. The goal of the scoping study is to provide a framework for a regional hydrometric and climate monitoring network expansion as part of implementation of the RDN Drinking Water and Watershed Protection (DWWP) Action Plan (Action Plan). Collecting, cataloguing and distributing information on water quantity and water quality is one of the seven key programs to be implemented as part of the Action Plan. The goal of Water Resource Inventory and Monitoring (Program 2 of the Action Plan) is to:

Improve information about the Region's water resources in terms of both quality and quantity, in support of better land use decisions and public understanding.

The monitoring network is also key in supporting other programs outlined in the Action Plan including public education and awareness (Program 1), watershed management planning (Program 3), water quality management (Program 6) and climate change adaptation (Program 7)

In addition to the programs outlined in the Action Plan, the Regional District of Nanaimo Water Budget Study – Vancouver Island (Water Budget) prepared in June 2013 recommended implementation of a regional surface water quantity monitoring program. The Water Budget study identified collection of additional baseline data as one of the data gaps that would need to be filled to support future detailed surface water and ground water modelling for higher risk watersheds and aquifers.

The purpose of this study is to move beyond the recommendations in the RDN Water Budget Project. This involves a review of potential for the Regional Network to collect both baseline data for future phases of the Water Budget Project as well as a wider regional hydrometric and climate data program to fulfill the needs of the broader community and stakeholders. In addition, a systematic framework has been developed to assist with prioritizing the stations and to consider capital and on-going costs.

1.2 Project Scope

The purpose of this Regional Hydrometric and Climate Network Scoping Study is to:

- Develop overall goals and objectives for a regional hydrometric and climate monitoring network in the context of the Action Plan, the Water Budget Study and other regional strategic plans;
- Develop a framework to assess potential monitoring sites in relation to these goals and objectives;
- Recommend hydrometric and climate data standards to be used in the network;
- Prepare a ranked list of monitoring sites (including both existing and proposed sites) using the framework;
- Develop an implementation plan for the network focused on the highest ranked locations including budget estimates for installation, on-going maintenance and training requirements; and
- Identification of potential stakeholder involvement and partnerships to support on-going monitoring program.



1.3 Project Team

The members of the project team for this study are:

Regional District of Nanaimo

Mike Donnelly, Manager of Water Services

Julie Pisani, Drinking Water and Watershed Protection Program Co-ordinator

Kerr Wood Leidal Associates Ltd.

Craig Sutherland, P.Eng. - Project Manager/Project Engineer

David Sellars, P.Eng – Senior Technical Review

1.4 Acknowledgements

The project team would like to thank the members of the Regional Hydrometric and Climate Monitoring Working Group technical advisory committee for their input and guidance, including:

Rosie Barlak, Ministry of Environment

Linda Brooymans, Mt Arrowsmith Biosphere Reserve Research Institute

David Campbell, River Forecast Centre

Tony Cheong, Ministry of Environment

Chris Cole, Timberwest

Brian Epps, Ministry of Forest Lands and Natural Resource Operations

Ken Epps, Island Timberlands

Kristen Fagervik, Ministry of Transportation and Infrastructure

Bill Floyd, Ministry of Forest Lands and Natural Resource Operations

Alan Gilchrist, Vancouver Island University

Neil Goeller, Ministry of Forest, Lands and Natural Resource Operations

Russ Greogory, Water Survey of Canada

Heather Johnstone, Ministry of Environment

Peter Law

Rob Mathewson, Water Survey of Canada

Bill Sims, City of Nanaimo

Mike Squire, City of Parkville/Englishman River Water Service

Fred Spears, District of Lantzville

Shawn Stenhouse, BC Conservation Foundation

Gilles Wendling, GW Solutions



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Section 2

Hydrometric and Climate Network



2. Hydrometric and Climate Monitoring Network

2.1 Need for Hydrometric and Climate Monitoring

As outlined in the Action Plan, the primary focus of the proposed regional hydrometric and climate monitoring network is to support the goals and objectives of the Action Plan with regard to the actions related to the Regional Water Inventory and Monitoring goals. In addition, the network should provide baseline data for future phases of the Regional Water Budget Project. The baseline data will be used in the future for surface water and groundwater modelling to better understand surface water/ground water interaction in higher risk watersheds in the region.

Most importantly from the RDN perspective is having good quality surface water data through which information regarding water availability can be assessed for land use planning and land development approvals.

In addition to RDNs specific identified goals for quantifying impacts to water resources with respect to land use planning, the regional hydrometric and climate monitoring network could also provide information to support a variety of other purposes which could include:

1. local watershed scale hydrological evaluations for habitat conservation measures, design of water supply or other development;
2. interpreting water quality data to provide estimates of total loading rather than only concentrations of pollutants;
3. design flood estimates and rainfall intensities for drainage, stream crossings or flood protection design;
4. operational hydrology for seasonal water supply forecasting,
5. flood forecasting and warning,
6. watershed health tracking,
7. fire weather monitoring (for forestry operations and forest fire safety),
8. baseline monitoring for climate change impact assessment; and
9. other currently unknown future uses.

Hydrometric and climate monitoring networks are often designed to support a specific purpose. However, the RDN network is intended to serve as a baseline network which could support the wide variety of purposes listed above in the future. Therefore, the network design will have to reflect the variation in climatic and hydrologic conditions across the region but at the same time provide sufficient good quality data at key locations to assist the RDN with their primary goal of assessing water impacts from land use planning.

The purpose of this study is to provide a framework to select appropriate locations for hydrometric and climate monitoring stations which can support the goals of the Action Plan and the recommendations from the Regional Water Budget Study Phase 1. At the same time, the network design must consider both the capital cost limitations of installing stations, the logistical constraints of sites (such as access for maintenance) to limit on-going operation and maintenance costs and potential partnerships with other agencies or stakeholders to support on-going costs and operation.



2.2 Existing Hydrometric and Climate Monitoring Networks

Currently, there are several sources of hydrometric and climate data across the RDN. These come from Federal, Provincial and Local Government as well as from industry. The available data sources across the region are listed below.

Hydrometric Data

- Water Survey of Canada
- Department of Fisheries and Oceans
- City of Parksville/Englishman River Water Service
- City of Nanaimo
- BC Conservation Foundation
- Harmac

Climate Stations

- Environment Canada
- BC Ministry of Environment
- BC Ministry of Forest Lands and Natural Resource Operations
- BC Ministry of Transportation and Infrastructure
- City of Parksville
- City of Nanaimo
- Timberwest
- Island Timberlands (still to be confirmed)
- School Climate Monitoring Network (developed by University of Victoria and supported by Vancouver Island School Districts)

Maps showing the locations of the existing active and discontinued stations are shown in Figure 1-1 and Figure 1-2, respectively. Although there is a good network of existing data, there are still key gaps in the existing data set which will require installation of new climate stations or hydrometric stations.

Hydrometric Monitoring

Hydrometric monitoring in BC has traditionally been undertaken by the Water Survey of Canada (WSC) through the BC/Canada Agreement. The WSC operates an "integrated" program that includes a network of about 450 stations across the province. Most of the WSC operated stations serve the needs of a large number of organizations sharing the use of common data. The number of stations in BC has dropped from around 800 in the 1980s and a good portion of the ongoing historical data record has been lost. International standards would estimate the required size of the hydrometric network in BC to be in the order of 1200-1500 stations. Much of the Provincial attention on flow monitoring is related to



flooding on large river systems where significant infrastructure (such as highways and hydro facilities) and public safety are at risk.

Within the RDN, the WSC continues to operate seven hydrometric stations of which three are located in the Nanaimo River watershed. These are located predominantly on larger watercourses and often in relation to operation and monitoring of water resource management systems. For instance, two WSC gauges within the Nanaimo River watershed are used to monitor conservation flows downstream of the Jump Creek Reservoir, used by the City of Nanaimo for municipal water supply and the Nanaimo Lakes reservoirs used by Harmac for industrial process water.

Many of the WSC stations are operated in partnership with other organizations. For instance, the Arrowsmith Water Service supports on-going operation of the Englishman River near Parksville Gauge (08HB002) while the City of Nanaimo supports on-going operation of the Millstone River at Nanaimo (08HB032).

Water survey of Canada data can be accessed via the following link:

<http://www.ec.gc.ca/rhc-wsc/>

Climate Monitoring

In British Columbia, climate monitoring is undertaken by a wide range of government agencies and industry. The data is used for many purposes ranging from long term monitoring of climate trends for climate change assessment to providing information on initial watershed conditions for operation forecasting such as flood forecasting, water supply forecasting or fire weather forecasting.

One of the key sources of climate data is the Climate Data Portal developed by the Pacific Climate Impacts Consortium (PCIC). This program provides a single portal to access data from a range of agencies including Environment Canada, Ministry of Forest, Lands and Natural Resource Operations, Ministry of Transportation and Infrastructure, Ministry of Agriculture, Ministry of Agriculture, Rio Tinto Alcan and BC Hydro. Much of the data relating to current climate stations within the RDN has come from this source. It can be accessed via the following link:

<http://www.pacificclimate.org/data/bc-station-data>

Snow Monitoring

Snow and snow pack monitoring stations within the region are operated by the Provincial Snow and Groundwater Survey and the data is reported by the River Forecast Center. The data can be found here:

<http://bcrcfc.env.gov.bc.ca/data/index.htm>

Water Quality Monitoring

Although the focus of this scoping study is surface water quantity, one of the goals of the Regional Water Resource Inventory and Monitoring Network is to collect, catalogue and distribute regional water quality data. The RDN are currently implementing a regional water quality monitoring program, the Community Watershed Monitoring Network which engages and trains local stewardship groups to collect water samples at key locations on streams throughout the region. This data will become part of the Regional Water Resource Inventory and Monitoring program.



Ground Water Monitoring

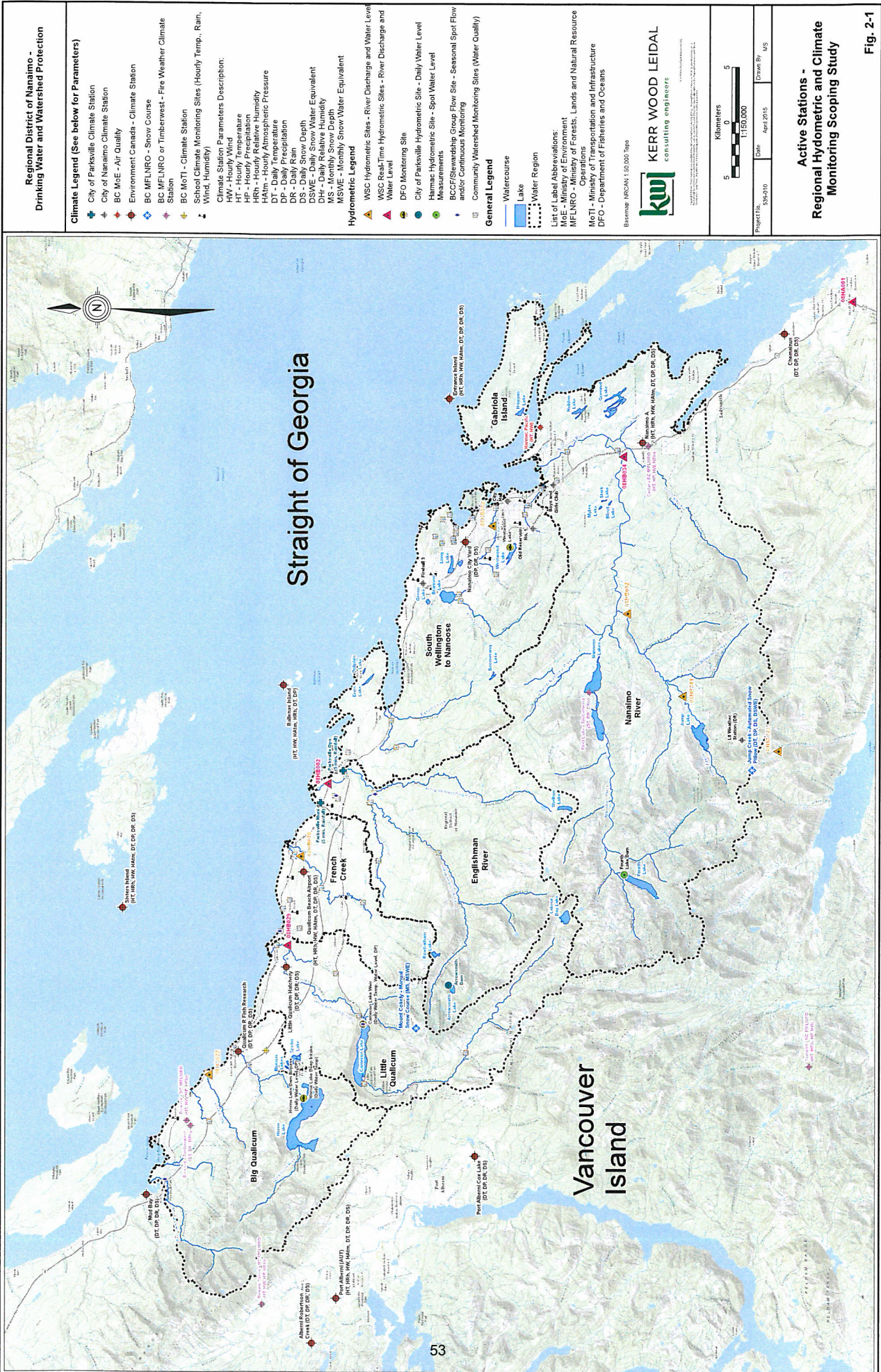
The scope of this study is to review surface water monitoring and climate network. However, groundwater monitoring is also a key component in understanding of the regional water resources. The key source of groundwater data is the Provincial Groundwater Observation Well network. This data can be accessed via the following link:

http://www.env.gov.bc.ca/wsd/data_searches/obswell/map/

Sixteen BC Observation Wells within the RDN have been added to the network since 2011 through a partnership between the DWWP program and the MFLNRO, enabled by grant funding. There are also volunteer observation wells (private residential wells) that are being monitored in the RDN. For more information see www.dwwp.ca



Figure 2-1: Locations of Existing Active Climate and Hydrometric Stations



Regional District of Nanaimo - Drinking Water and Watershed Protection

Climate Legend (See below for Parameters)

- City of Parksville Climate Station
- City of Nanaimo Climate Station
- BC MCE - Air Quality
- Environment Canada - Climate Station
- BC MELNRO - Snow Course
- BC MELNRO - Fire Weather Climate Station
- BC WOTI - Climate Station
- School Climate Monitoring Sites (Hourly Temp., Rain, Wind, Humidity)

Climate Station Parameters Description:

- HW - Hourly Wind
- HR - Hourly Relative Humidity
- HP - Hourly Precipitation
- HRh - Hourly Relative Humidity
- HAtm - Hourly Atmospheric Pressure
- DT - Daily Temperature
- DP - Daily Precipitation
- DS - Daily Snow Depth
- DSWE - Daily Snow Water Equivalent
- DHR - Daily Relative Humidity
- MS - Monthly Snow Depth
- MSWE - Monthly Snow Water Equivalent

Hydrometric Legend

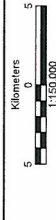
- WSC Hydrometric Sites - River Discharge and Water Level
- WSC Real-Time Hydrometric Sites - River Discharge and Water Level
- DFO Monitoring Site
- City of Parksville Hydrometric Site - Daily Water Level
- Harmac Hydrometric Site - Spot Water Level Measurements
- BCCF/Stewardship Group Flow Site - Seasonal Spot Flow and/or Continuous Monitoring
- Community Watershed Monitoring Sites (Water Quality)

General Legend

- Watercourse
- Lake
- Water Region

- List of Label Abbreviations:
 MoE - Ministry of Environment
 MELNRO - Ministry of Forests, Lands and Natural Resource
 MoTI - Ministry of Transportation and Infrastructure
 DFO - Department of Fisheries and Oceans

Scale: 1:50,000 Topo



Project No. 534010 Date: April 2015 Drawn By: MS

Active Stations - Regional Hydrometric and Climate Monitoring Scoping Study

Fig. 2-1



KERR WOOD LEIDAL
consulting engineers

Section 3

Hydrometric and Climate Network Review



3. Hydrometric and Climate Monitoring Network Review

3.1 Review Framework

In order to prioritize potential locations for additional hydrometric and climate monitoring sites, a framework has been developed to compare potential sites against a set of criteria. These criteria reflect both the specific Regional Water Inventory and Monitoring goals as well as the potential for data to be used by other stakeholders as data sources. The following sections outline the framework developed for both hydrometric and climate stations and presents a list of recommended sites.

Hydrometric

As previously outlined, the regional hydrometric and climate network should function to both provide specific data to support RDN land use planning, as baseline data for the Water Budget Project as well as to support other uses for hydrometric and climate data throughout the region.

A list of watershed parameters has been developed to provide a selection of criteria to first identify and then prioritize potential hydrometric site locations. The priorities for the recommended sites are based on the surface water and ground water stress levels, followed by availability of previous data sets, relationship to existing community water quality monitoring point, watershed size and dominant physiographic region.

The watershed parameters used in the framework for selection of hydrometric stations, in no particular order are:

1. Watershed Area which provides scale of the watershed, the network should cover a range of watershed scales.
2. Dominant physiographic region (ie: Coastal Lowlands (less elevation than 200 m), highlands/plateaux (200 m to 1000 m), interior mountains with elevations greater than 1000 m, The network should provide representative climate and hydrometric data within each of these dominant regions.
3. Large Lake – Is there a relatively large lake in the watershed which would dampen/store runoff? In order to estimate discharges in ungauged watersheds, it is important that the baseline station not have influence of large lakes or other storage which can increase baseflow above what would be seen in watersheds without large storage.
4. Regulated – Is flow in the watershed regulated by means of a storage reservoir or significant flow diversion?
5. Is there a currently a hydrometric station installed within the watershed?
6. Was there a discontinued hydrometric station installed within the watershed? How long did it operate?
7. Is there an active climate station near the watershed that would be representative of watershed precipitation and temperature?
8. Is there a Community Watershed Water Quality monitoring point in the watershed?
9. What was the surface water stress level calculated for the watershed in the Regional Water Budget Study?



10. What groundwater aquifers are associated with the watershed?
11. What was the water stress level calculated for the aquifers in the watershed?

A summary of all watersheds within the region is provided in Appendix A.

Climate

The primary objective of the climate station network is to provide sufficient coverage of the region to characterize the variation in climatic conditions. The total annual rainfall in the region varies dramatically from less than 1,000 mm in some regions along the coast to more than 4,000 mm in the mountainous area in the region. In addition, temperatures also vary depending on elevation with typically a 5°C to 10°C reduction in temperature for every 1,000 m elevation gain depending on relative humidity. However, at times of inversion, temperatures at higher elevations can sometimes be higher than those at lower elevation. Therefore, to best represent climate conditions in the region, there should be a representative distribution of climate station locations distributed throughout the region at varying elevations.

Currently, the majority of climate stations are located within the coastal lowlands area at elevations typically less than 200 m. There is good coverage of climate stations within the coastal lowland areas except for the Nanoose region. This area is located within the rain shadow of Mount Arrowsmith, the highest peak in the southern Vancouver Island ranges, and is therefore drier than other coastal areas in the region.

The only climate station data available in this region is the School Weather Network station located at Nanoose Bay Elementary. Although the school network stations provide a reasonable representation of climate conditions, they are not highly accurate climate stations. Therefore, an additional climate station in the Nanoose Area is recommended. There are several potential locations for this climate station in Nanoose including providing more accurate climate monitoring equipment for the Nanoose High School, at the Fairwinds Golf Course or at the RDN Nanoose Wastewater Treatment Plant.

There are a small number of climate stations located in the highlands/plateau physiographic region (between 200 m to 1000 m elevation). These are primarily fire weather stations operated by MFLNRO and the larger timber companies in the region including Timberwest. The fire weather stations record precipitation, temperature and relative humidity as input to fire condition models for forest operations.

Finally, there are currently only two stations in the region which provide data for conditions in the upper mountain elevations of the region, the Jump Creek Automatic Snow Pillow (ASP) site operated by MFLNRO and the L8 Weather Station operated by the City of Nanaimo. These are both located in extreme southern portion of the region (Jump Creek station is located in the Cowichan Valley Regional District).

Snow depth and snow water equivalent (estimate of the volume of water available in the snow pack) are recorded at the Jump Creek ASP as well as at a manual snow course site on Mt Cokely (above Cameron Lake).

Unlike screening of hydrometric stations, which has been based on physiographic and hydrologic conditions in the watersheds, selection of potential climate station locations have been based more on logistics including ease of access, conjunction with other stations and potential operational partners.



3.2 List of Recommended Sites

Hydrometric Sites

The list of recommended hydrometric station sites, their intended purpose (long term baseline reference station, short term station used to characterize and relate to baseline stations, or seasonal spot flow measurements) and relative priority are included in Table 3-1. The locations of the recommended hydrometric sites are shown in Figure 3-1.

The relative priority of stations (First, Second, Third) provides relative priority for implementation. The priority has been based on parameters outlined in the framework with a focus on first priority for the watersheds and aquifers with the highest relative water stress levels as well as those stations where a potential partner is identified.

In addition to the primary baseline stations and short term/seasonal stations, collection of spot flow measurements in smaller watersheds during summer baseflow period. This can provide better understanding of relative differences between summer stream baseflows which are dependent on groundwater conditions which can vary significantly from one watershed to the next. The locations of summer streamflow monitoring should be based on:

1. Recommendations in integrated rainwater/stormwater management plans prepared for municipalities for the purposes of watershed health monitoring; and
2. the outcome of the Community Watershed Monitoring Network water quality monitoring program.

A detailed scoping of small urban watersheds stream monitoring is outside the scope of this study. A follow-up detailed assessment should be completed as a follow-up and supplement to the more regional overview of this document

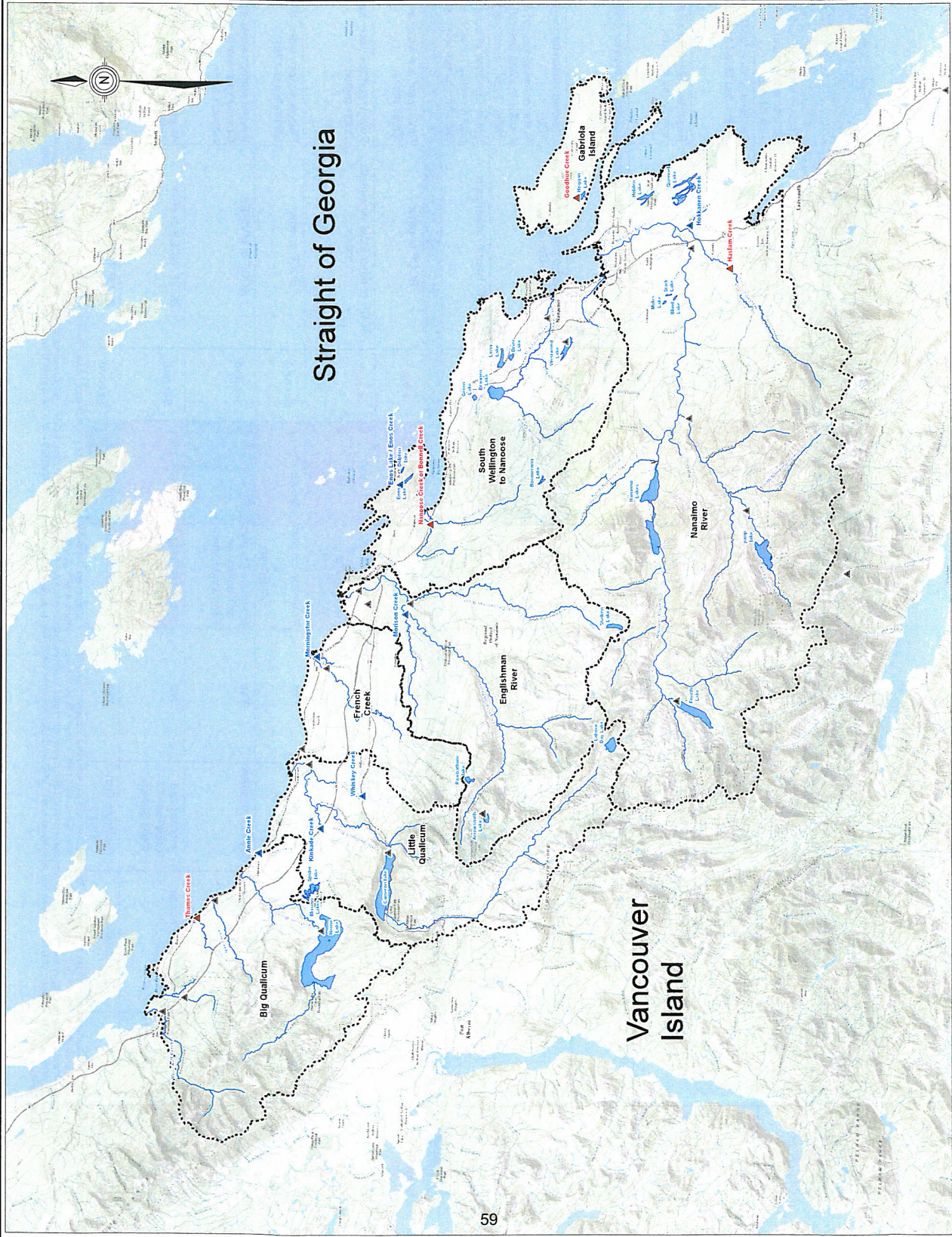
Climate Stations

Climate station locations are recommended based on review of the available climate station data and to compliment proposed hydrometric network. The list of recommended climate station sites and their priorities based on implementation timing are included in Table 3-2. The locations of the recommended hydrometric sites are shown in Figure 3-2.

Table 3-1: Preliminary Recommended Hydrometric Station List

Watershed Area (km ²)	Dominant Physiographic Region	Neighbouring Climate Station	Community Water Monitoring Program Site	Surface Water Stress ₁	Ground Water Stress ₁	Priority ₂	Potential Partners ₃	Comments
Primary Permanent Baseline Stations								
French Creek	Highlands/Plateau	Qualicum Beach Airport	Yes	High	High	First	WSC/Friends of French Creek/BCCF/DFO (seasonal in 2014)	Convert seasonal station to continuous station. High surface and groundwater stress French Creek watersheds
Nanoose Creek	Highlands/Plateau	Currently None (Recommended Nanoose Climate Station)	Yes	High	Moderate/High	First	WSC	Baseline Station for Nanoose Area/High Surface Water Stress and Mod-Hi Ground Water Stress region
Haslam Creek	Highlands/Plateau	Nanaimo Airport	No	Moderate/High (as part of Nanaimo River Watershed)	Moderate/High	First	WSC	Baseline Station for southern RDN watersheds/moderate-high stress aquifers.
Goodhue Creek	Lowlands	Currently None (Recommended Gabriola Climate Station)	No	Not Calculated	Moderate*	Second	WSC or local Stakeholder Group	Baseline Station for Gabriola Island surface water balance.
Thames Creek	Lowlands	Bowser/Mud Bay	Yes	Not Calculated	Low	Third	WSC, NCES or other Stakeholder Group	Baseline station for lowlands watersheds in northern RDN.
Cameron River	Mountains	Currently None	No	Not Calculated	Not Calculated	Third	WSC, Island Timberlands	Summer baseflows in Nile Creek not representative of smaller lowland watersheds. Linkage with Community Water Quality monitoring station on Thames. Upper Elevation Mountain watershed for assessment of high elevation runoff in region and inflow to Cameron Lake for storage forecasting
Secondary Short Term or Seasonal Stations (operate for two or three years)								
Morningstar Creek	Lowlands	Qualicum Beach Airport	No	Not Calculated	High	First	BCCF or other	Review surface water availability for High Groundwater Stress region
Hokkanen Creek	Lowlands	Nanaimo Airport	No	Moderate/High (as part of Nanaimo River Watershed)	High	First	BCCF or other local stewardship group	Review surface water availability for High Groundwater Stress region
Whiskey Creek	Highlands/Plateau	Little Qualicum Hatchery	Yes	Moderate (as part of Little Qualicum)	Moderate/High	Second	BCCF or other	Review surface water availability for Mod-High Groundwater stress
Morrison Creek	Highlands/Plateau	City of Parksville	Yes	Moderate (as part of Englishman River Watershed)	Moderate/Low	Second	BCCF or MVIHES	Review surface water availability for Mod-High Groundwater stress and Water Quality Monitoring Network
Kinkade Creek	Highlands/Plateau	Horne Lake Road/Hwy 19 - MoTI Station	No	Moderate/High (as part of Little Qualicum Watershed)	Moderate/High	Second	BCCF, NCES or other	As part of groundwater/surface water study for Spider/Illusion Lakes
Annie Creek	Lowlands	Qualicum Fish Research	Yes	Not Calculated	Moderate/Low	Second	BCCF, NCES or other	As part of groundwater/surface water study for Spider/Illusion Lakes.

Note: 1 - Groundwater and Surface Water Stress as reported in Regional District of Nanaimo Water Budget Study Phase 1 (Vancouver Island/Waterline, 2013) or Water Budget Study Phase 1 (Gabriola, Mudge and DeCourcy Islands)(SRK, 2013)
 2 - First Priority implement within 1 to 2 years, Second Priority implement WITHIN 5 years, Third Priority implement AFTER 5 years
 3 - Potential partner (capital funding, operation, in-kind, etc) identified for initial discussion with regard to station installation (AWS-Arrowsmith Water Service, BCCF - BC Conservation Foundation, DFO - Department of Fisheries and Oceans, MABRRI - Mt Arrowsmith Biosphere Reserve Research Institute, MoTI - Ministry of Transportation and Infrastructure, MFLNRO - Ministry of Forest, Lands and Natural Resource Operations, MVIHES - Mid Vancouver Island Enhancement Society, NCES - Nile Creek Enhancement Society, RDN - Regional District of Nanaimo, WSC- Water Survey of Canada



Regional District of Nanaimo -
Drinking Water and Watershed Protection

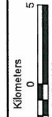
Legend

- ▲ Existing Active Hydrometric Station
- ▲ Preliminary Recommended Hydrometric Station
- ▲ Primary Baseline Station
- ▲ Secondary Seasonal/Short Term Station
- Lake
- Watercourse
- ⋯ Water Region

Basemap: NSR/CAN 1:50,000 Topo



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Project No: 394210 Date: February 2015 Drawn By: JMS

**Proposed Hydrometric Stations -
Regional Hydrometric and Climate
Monitoring Scoping Study**

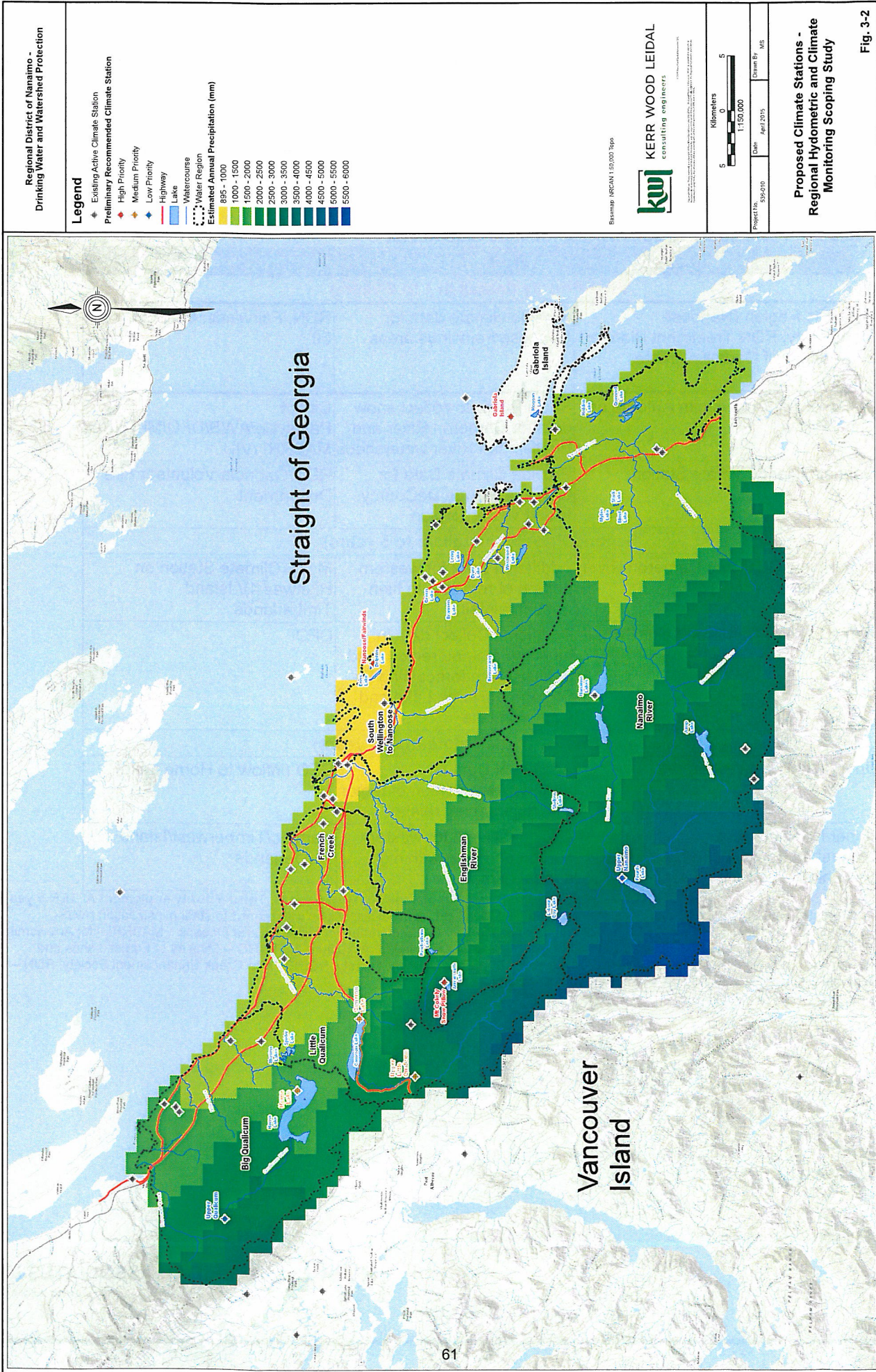
Fig. 3-1



Table 3-2: Preliminary Recommended Climate Station List

Location	Purpose	Potential Partner ₂
First Priority (install in 1 to 2 years)		
Nanoose Region (Nanoose Elementary, RDN Treatment Plant or Fairwinds Golf Course Climate Station)	Provide climate data for Nanoose/Fairwinds areas	RDN, Fairwinds, School District 69
Mt Cokely/Mt Arrowsmith Automated Snow Pillow	Snow Pillow to collect snow data for Cameron River and Englishman River watersheds	City of Parksville/AWS/DFO/MFLNRO/MABRRI /MIU
Gabriola Island Climate Station	Provide Climate Data for Gabriola/Mudge DeCourcy Island Water Region	RDN/Gabriola Volunteer Fire Department
Second Priority (install up to 5 years)		
Upper Little Qualicum/Cameron River Watershed	Additional Data for western portion of region with high annual rainfall	MoTI (Climate Station on Highway 4)/ Island Timberlands
Horne Lake or Cameron Lake Climate Station	Additional Collect data in highland/plateau region and to assist with forecasting for Storage at Horne Lake and Cameron lake	DFO
Third Priority (install more than 5 years)		
Upper Qualicum Watershed	Additional Data for northwestern portion of region with high annual rainfall	DFO (inflow to Horne Lake)
Upper Nanaimo River Watershed/Fourth Lake Dam/Labour Day Lake	Additional Data for western portion of region with high annual rainfall	Harmac/Timberwest/Island Timberlands

1 - **First Priority implement within 1 to 2 years, Second Priority implement WITHIN 5 years, Third Priority implement AFTER 5 years**
 2 – Potential partner (capital funding, operation, in-kind, etc) identified for initial discussion with regard to station installation (AWS- Arrowsmith Water Service, BCCF – BC Conservation Foundation, DFO – Department of Fisheries and Oceans, , MABRRI – Mt Arrowsmith Biosphere Reserve Research Institute, MoTI – Ministry of Transportation and Infrastructure, MFLNRO – Ministry of Forest, Lands and Natural Resource Operations, MVIHES – Mid Vancouver Island Enhancement Society, NCES – Nile Creek Enhancement Society, RDN – Regional District of Nanaimo, WSC- Water Survey of Canada



Section 4

Hydrometric and Climate Station Summary



4. Hydrometric and Climate Station Summary

4.1 Hydrometric and Climate Station Descriptions

Hydrometric Station

The components of a hydrometric station include:

1. Data logger (including batteries for power and possibly solar panel)
2. Water Level sensor (pressure transducer, radar, etc.)
3. Manual water level gauge (staff gauge)
4. Benchmarks

The water level sensor and data logger are used to collect a continuous record of water level at the site. Water levels are converted to flow using a water level flow relationship known as a rating curve. Rating curves can either be based on known hydraulics (such as a weir, culvert or other structure) or based on a series of manual water level and discharge measurements recorded in the field. Once a rating curve is established, it requires to be monitored to confirm that conditions in the channel have not changed resulting in a change in the water level-discharge relationship at the site.

The flow in a river can be calculated by the average flow velocity multiplied by the cross sectional area of the flow. Manual discharge measurements are most often recorded using the velocity-area method. It is relatively easy to measure the cross sectional area. However, the flow velocity varies across the channel (ie: slower velocity at the channel edge versus high velocity in the middle). A method known as the Manual discharge measurements are most often recorded using the velocity-area method. This method can be used to calculate discharge by estimating the average velocity using a series of flow velocity measurements across the channel.

In this method, a channel cross section perpendicular to the flow is established. This section is then divided into smaller sub-sections or panels, often 10 or more panels across the width of the channel. The velocity is measured in each panel using a flow velocity meter. The discharge in each panel is calculated by multiplying the recorded velocity by the area of the panel. The total discharge in the stream is then calculated as the sum of the discharges in each panel.

Often the velocity area method is difficult to implement in smaller streams or at low flows. This is because traditional flow velocity meters (essentially propellers) have difficulty measuring velocity in relatively shallow flow depth and the slow velocities. Alternative methods can be used in these instances such as diverting the flow into a small structure with a known water depth vs flow relationship (Parshall Flume), collecting flow downstream of a drop (small waterfall) or a culvert outlet in a bucket of known volume and timing how long it takes to fill or using new Doppler technology which uses radar (Doppler effect) to measure the velocity of the surface of the flow.

Climate Station

The components of a Climate Station include:

1. Air Temperature/Relative Humidity Sensor
2. Wind Speed and Wind Direction Sensor
3. Rainfall Gauge (Total volume or Tipping Bucket)
4. Solar Radiation (Optional)
5. Data logger and Telecommunication for Real-time stations



6. Power Source (120V mains power or 12 V battery/Solar Panel)

Often recording rainfall or precipitation can be challenging at certain climate stations. For lower elevation stations where temperatures do not fall below freezing regularly or there is significant snowfall, a tipping bucket rain gauge can be used to monitor precipitation on hourly basis. However, tipping buckets do not function well in freezing conditions due to freezing of the tipping mechanism and bridging/capping of snow over the collection cone. Therefore, at higher elevations other tools are used to record precipitation such as standpipe/total volume gauges or weighted rainfall gauges. These gauges measure the total precipitation (either rain or snow). The gauges are filled with an anti-freeze water mixture which melts falling snow such that either the depth of precipitation or the weight of precipitation can be measured.

Automatic Snow Pillow

The component of Automatic Snow Pillow Station include:

1. Air Temperature/Relative Humidity Sensor
2. Snow Depth Sensor
3. Rainfall Gauge (Standpipe/Total volume)
4. Snow Pillow and Manometer or Snow Scale
5. Data logger and Satellite Telecommunication
6. Power Source (12 V battery/Solar Panel)

Snow pillows are used to measure the snow water equivalent or the amount of water available in the snow pack. They are essentially a scale used to measure the weight of the snow. They consist of a flexible bladder placed on the ground filled with an antifreeze solution. A standpipe manometer is plumbed into the bladder. As snow falls on the bladder, the level of the fluid in the standpipe rises and falls depending on the weight of the snow lying on the bladder. The water level is either measured using a float system (shaft encoder) or a pressure transducer.

Snow depth is also measured at the sites using an ultrasonic sensor which measures the vertical distance from the sensor mounted above the ground on a tower to the surface of the snow below. Total precipitation is also measured using a standpipe total precipitation gauge as described in the climate station section above.

Manual Snow Course

Snow water equivalent can also be measured at a manual snow course site. This methodology involves a manual measurement of the snow depth and the water volume in the snow pack. Snow depth is measured using a graduated aluminum tube, known as a Standard Federal Snow Sampler, which is driven through the snow to ground. The sampler is then carefully withdrawn, extracting a core of snow. The tubes and the core of snow are then weighed using a scale calibrated to centimeters of water. The difference between the weight of the full tubes and the weight of the empty tubes is then calculated as the water equivalent of the snow. Several measurements are taken across a specific area known as a snow course and the average of the samples is reported as the SWE for the station. These measurements are often recorded once or twice a month and require staff to travel to the sites for measurements.



4.2 Preliminary Site Reconnaissance

Mr. Rob Mathewson of WSC, Ms. Julie Pisani of RDN and Mr. Craig Sutherland of KWL completed a preliminary site reconnaissance in the afternoon of February 12, 2015. The reconnaissance included visiting the site of two discontinued WSC stations, one located on Nanoose Creek and one located on Haslam Creek. The purpose of the visit was to review current site conditions to assess viability of re-establishing hydrometric stations at these locations. A summary of the findings are below:

Nanoose Creek (08HB039) – located downstream of Highway 19 bridge crossing

The Nanoose Creek channel downstream of the Highway 19 bridge is approximately 10 m wide. There is evidence of gravel deposition at the bridge crossing indicating that the channel maybe unstable at higher flow events. Approximately 60 m downstream of the bridge the channel becomes straight with potential for a relatively stable gauging section. It is likely that streamflow measurement at all stages would have to be carried out either by wadding or tethered boat. Streamflow measurement from the bridge would not likely be possible due to unstable channel conditions at the bridge crossing.

Property ownership and access will need to be confirmed.

Overall it is considered that this location would be suitable for installation of a gauging station; however, it may require higher level of effort to maintain and confirm water level-discharge relationship due to unstable nature of the channel.



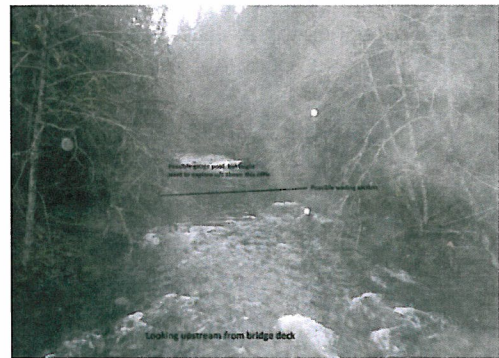
Nanoose Creek looking downstream at potential hydrometric gauging location.
Photo Credit: Rob Mathewson, WSC

Haslam Creek (08HB003) – located near western end Timberlands Road

The original location of the Haslam Creek Water Survey of Canada gauge was not located during the reconnaissance. However, a location with very good potential was found at the forest road bridge crossing located on private forest road off the end of Timberlands Road.

The Haslam Creek channel in this location is approximately 15 m wide. Downstream of the bridge the channel is straight and appears to be stable. It would provide a good location for measuring flow by either wadding or tethered boat. A pool with a stable outlet is located upstream of the bridge with a bedrock outcrop which could be used to attach the pressure transducer logger.

Overall this site is considered to be a very good candidate to install hydrometric station.



Haslam Creek looking upstream at potential hydrometric gauging location.
Photo Credit: Rob Mathewson, WSC

Copies of the field reconnaissance reports prepared by Mr. Mathewson are included in Appendix A.



4.3 Hydrometric and Climate Station Costs

Costs for climate and hydrometric stations include equipment, installation and on-going maintenance. In addition, hydrometric stations require at least five and preferably ten manual streamflow measurements to be collected throughout the first one or two years of station operation to develop a rating curve. Once the rating curve is developed, on-going streamflow measurements (two or three a years) are required to check and update the rating curve as necessary. Typical costs for climate station and hydrometric stations are shown in Table 3.

Table 3: Budgetary (Class C) Cost Estimates for Climate and Hydrometric Stations

Item	Budget Cost
Hydrometric Station (Local, small stream – Mobile Network Communication)	
Equipment (Data Logger, Pressure Transducer, Misc. station equipment)	\$5,000
Co-ordination and Installation (recon, co-ordination and installation)	\$10,000
<i>Total Installation Costs</i>	<i>\$15,000</i>
Rating Curve Development (including manual discharge measurements)	\$15,000 (in first year)
On-going maintenance (Maintenance Visits, Telemetry, Monthly Data Quality Review, etc.)	\$10,000/year to \$15,000/year on going
Hydrometric Station (Remote, or large stream – Satellite Communication)	
Equipment (Data Logger, Pressure Transducer, Misc. station equipment)	\$10,000
Co-ordination and Installation	\$15,000
<i>Total Installation Costs</i>	<i>\$25,000</i>
Rating Curve Development (including manual discharge measurements)	\$15,000 (in first year)
On-going maintenance (Maintenance Visits, On-going flow measurements, Telemetry, Data Quality Reviews)	\$15,000/year to \$20,000/year on going
Climate Station (Local – Mobile Data Network Communication)	
Equipment (Data Logger, Temperature, Precipitation, Relative Humidity, Misc. station equipment)	\$6,000
Equipment co-ordination and Installation (recon, co-ordination and installation)	\$7,500
<i>Total Installation Costs</i>	<i>\$13,500</i>
On-going maintenance (Maintenance Visits (2 per year), Telemetry, Monthly Data Quality Review, etc.)	\$6,000/year to \$8,000/year
Climate Station (Remote – Satellite Communication)	
Equipment (Data Logger, Temperature, Precipitation, Relative Humidity, Misc. station equipment)	\$20,000
Equipment co-ordination and Installation (assume 3 day equipment co-ordination , 1 day installation including travel)	\$15,000
<i>Total Installation Costs</i>	<i>\$35,000</i>
On-going maintenance (Maintenance Visits (4 per year), Telemetry, Monthly Data Quality Review, etc.)	\$6,000/year to \$8,000/year



Snow Pillow Site	
Equipment (data logger, snow pillow, temperature, total precipitation gauge, solar panels, etc.)	\$25,000
Co-ordination and Installation (assumes 3 person crew over 4 days plus travel and initial co-ordination to test equipment, construction of instrument shed, etc.)	\$25,000
<i>Total Installation Costs</i>	<i>\$50,000</i>
On-going Maintenance (assumes 2 visits per year)	\$10,000
<p>Notes: Local stations assume mobile/cellular network coverage, relatively simple access and installation. Example: local climate station installed in Municipal Public Works Yard or other existing facility. Remote stations assume satellite telemetry, more difficult access and installation conditions. Example: remote climate station in the mountains</p> <p>Costs assume installation within lands or at facilities that are provided free of charge. Installation and maintenance costs assume ground access. Helicopter access is approximately \$1500/hr</p> <p>The costs included in the table are based on cost estimates prepared for previous similar projects and discussion with other climate and hydrometric station operators in the region. They reflect approximate costs at time of preparation (2015). They are considered suitable for budgetary purposes and should be revised after site reconnaissance.</p>	

4.4 Data Collection, Cataloguing and Distribution

Once stations are installed, data needs to be collected, catalogued and distributed to end users. Although development of a full data model is beyond the scope of this study, some of the key elements to consider are:

1. Data Transfer - Real-time versus Manual

In real-time stations, data collected at the monitoring station is transferred via telemetry to a central database. Depending on the location of the station, telemetry can be either via satellite, mobile data (cellular) network, radio (SCADA) systems, or hard wired through internet connection. This has the advantage that data can be monitored continuously. However, there are costs associated with initial station set-up and on-going communication costs.

In manual stations, data is collected by a data logger at the station which consists of a digital memory platform that records digital data from the sensors. The data is then manually downloaded periodically by field staff during maintenance visits. Often there can be a significant delay in getting data from these stations because of the manual download. However, there are both initial and on-going cost savings in not having real-time data.

2. Data Storage – Central Database versus Network of Databases.

Once the data is collected and transferred, it needs to be stored in a database. There are two broad categories with a central database operated by a single agency which pulls together data from various sources into a single database or a network of databases in which each agency continues to collect and store data individually but there is an overarching database which links the data to each other.



Some of the key items to consider in development of database are:

- Is there an agency that is already collecting and storing data such as WSC?
- Is there a need to extract data from existing databases or link to existing databases?
- What is the data format?
- How is data to be collected by local stakeholders to be incorporated into the database?
- Who will be responsible for on-going maintenance and costs of operating the database?

Data collected and stored in database need to be reviewed to confirm data quality and remove any erroneous data. This typically involves a skilled technologist who understands data collection methodology and can interpret if data requires adjustment or complete removal from the database. Prior to review, data is often considered to be "Provisional Data" while after this process the data is often considered to be "published data".

3. Data Retrieval – Online Access vs. Manual

Given the wide range of stakeholders that may be interested in the data, there may be a need for a user-friendly online interface to access the data. Some agencies have already developed on-line portals for access of data while others provide an online map showing locations of stations and information about the station and a contact person to access data.

4. Data Information - Metadata and Data Quality

The final piece of data cataloguing and retrieval is the collection and cataloguing of information about the collected data. This includes such information as location, elevation, type of equipment, date of installation, photographs, field visit notes, maintenance logs, agency contact information and if the data is provisional or published.

One very important piece of information about the data is the relative quality of the data. Providing information on data quality is essential for stakeholders understanding of how the data should be used. Data quality can be affected by many different factors including monitoring site conditions, frequency of data records, accuracy of monitoring equipment, methodology used for measurements and instrument calibration, etc. The Resource Information Standards Committee (RISC) have developed standards for hydrometric monitoring and snow measurement which provide guidelines on how to assess data quality. Environment Canada also provides guidance on standards to be used for collection of climate data. These standards can be used to assess the relative quality of the data which should be included with the metadata.



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Section 5

Recommendations and Submission



5. Recommendations and Submission

5.1 Recommendations

Based on the results of the hydrometric and climate monitoring network assessment, we recommend that:

1. Further field reconnaissance be carried out to review field conditions for the recommended sites starting with high priority sites;
2. Initiate discussion with potential partners identified regarding cost sharing, operation or in-kind assistance with implementation of stations;
3. Initiate discussion with land owners at sites to obtain access permission and land tenure for the stations;
4. Identify streamflow data collection locations for smaller urban streams within municipalities based on findings of the community watershed monitoring network report;
5. Continue streamflow measurement training for interested stewardship groups to assist with on-going summer low flow spot measurements in smaller coastal watersheds; and
6. Conduct a review of data collection, cataloguing and retrieval to develop a regional water monitoring database which can provide access to collected data.

5.2 Report Submission

Prepared by:

KERR WOOD LEIDAL ASSOCIATES LTD.

Craig Sutherland, P.Eng.
Water Resources Engineer

Reviewed by:

David Sellars, P.Eng.
Senior Technical Review



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Appendix A

Hydrometric and Climate Monitoring Network Assessment Framework and Analysis



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Appendix B

Field Reconnaissance

Water Survey of Canada - Site Reconnaissance

Location Information

River: Haslam Creek

Address/Location:

Latitude: 49° 2'23.18"N

Longitude: 123°54'32.94"W

Station Name: Haslam Creek near Cassidy (former WSC station 08HB003)

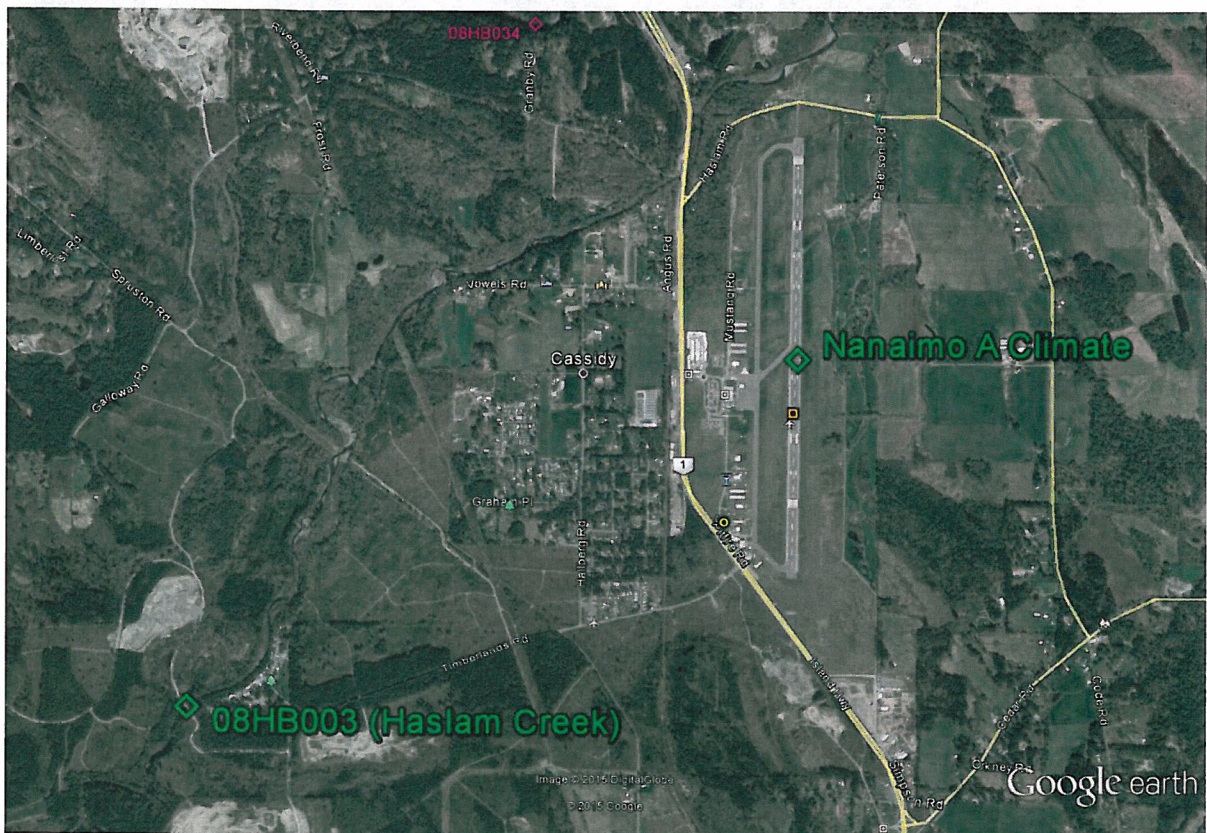
Date Completed: February 12, 2015

Company: Rob Mathewson (WSC), Craig Sutherland (KWL), Julie Pisani (RDN)

Analysis Completed By: Rob Mathewson

Detailed Site Information

West on Timberlands Road. Forestry road takes off to right just after Rondalyn Resort Campground/RV Park at 1350 Timberlands Road. Station could be near bridge roughly 650 m beyond gate at Timberlands Road.





Control Type:

Riffle / constriction ~ 40 m upstream from bridge across Haslam Creek



Streambed Type:

Fairly stable cobble boulder bed similar to Jump Creek or South Nanaimo River

Stream Banks:

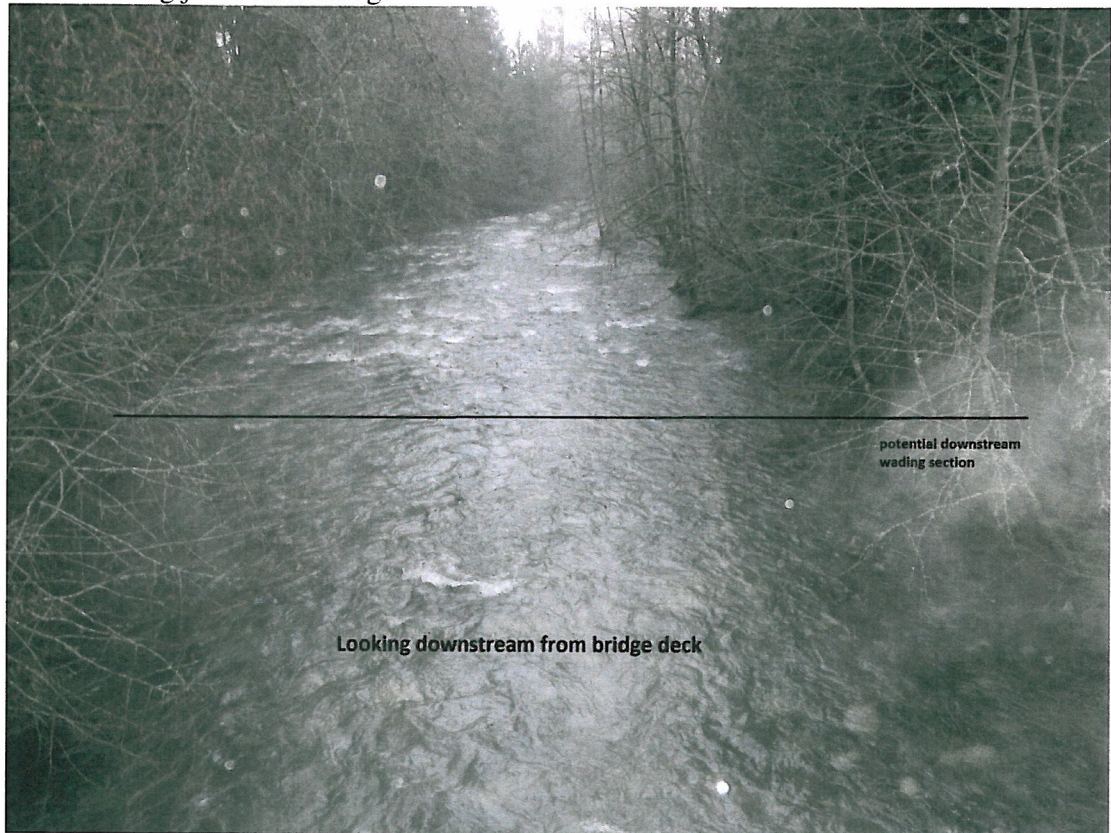
LB – high bedrock & moss; RB - cobble & vegetation (trees & shrubs). Both banks would need clearing at measurement sections of minor sweepers and overhangs but work could easily be done at low water

Stream Channel:

Good gauge pool ~ 40 m u/s from bridge (centre of photo above) All flow in 1 channel under bridge, u/s & d/s, straight for at least 5 x width

Measurement Sections:

Low: wading just below bridge



Medium: wading or bridge – photo above is mid-stage

High: bridge and/or tethered ADCP

Accessibility:

Road - Good road to site; need key for gate on Timberlands Road;

Parking - not really a good parking spot, but could be developed

Traffic- Active logging road – signage & traffic control may be necessary for bridge measurements or they should be coordinated to occur outside logging traffic hours.

Services Available:

While electricity and telephone lines are both likely available within 500 m of potential location, it is recommended that satellite transmitter (GOES) be installed with a solar power system to maintain independence and allow data to be available in realtime

Benchmarks:

Bedrock and bridge abutments both available depending on station location

Backwater Considerations:

Beaver evidence noted during visit, banks overflow into forest. Logs could potentially jam under bridge

Ice Considerations:

High energy stream in a relatively warm climate so conceivable for short periods only between say December and April

Additional Comments:

Summary/Conclusion:

This would be an ideal location for a gauge. There was formerly a WSC gauge at this site and discharge data are available from 1914-1915; 1949-1962; and seasonally from 1993-1998. As well as having all the attributes necessary to develop a sound stage-discharge relationship, the station is easily accessible and could be measured through most of its range effectively with existing infrastructure. Additionally the station is located within 3 km of Nanaimo Airport meteorological station (CID 1025365) compounding the value of any hydrological data collected.

Signature _____

Date _____

Water Survey of Canada - Site Reconnaissance

Location Information

River: Nanoose Creek

Address/Location: 19.0 km N of Northfield Road on Nanaimo Parkway BC-19N, where Inland Highway crosses Nanoose Creek, 400m WNW of intersection of Northwest Bay Road and Inland Island Highway, 100 m W of Morello Rd Intersection

Latitude: 49 15'52.94" N

Longitude: 124 12'17.72" W

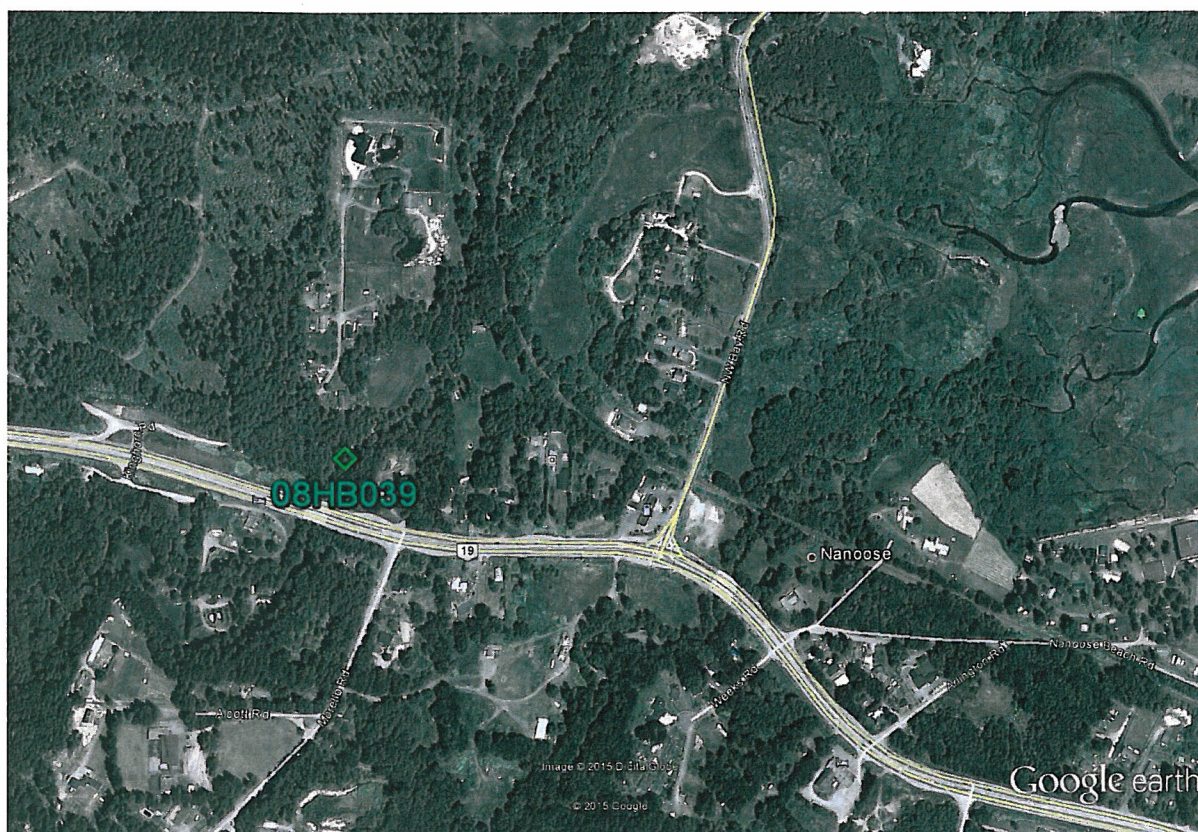
Station Name: Former WSC Station Nanoose Creek at the Mouth (08HB039)

Date Completed: February 12, 2015

Company: Rob Mathewson (WSC), Craig Sutherland (KWL), Julie Pisani (RDN)

Analysis Completed By: Rob Mathewson

Detailed Site Information



Control Type:

Channel control to roughly 2 m depth, then bank control with significant vegetation on RB overflow- d/s riffle noted at mid-stage. Also likely interference from d/s vegetation



Streambed Type:

Unstable sand/gravel likely moving with large scale events. Sandy loam on RB overflow bench.



Stream Banks:

Comments: *(height/erosion/weeds)*

0~1.5m gravel channel with clay/sand/loam banks; low slope on RB with small to mid-sized riparian vegetation; Steep slope on LB with larger trees

Stream Channel:

Comments: (*gauge pool/straightness*)

Width during visit roughly 10 m. Channel straight for roughly 50 m above potential gauge pool at measurement location roughly 60 m below bridge. Potential pool perhaps u/s of bridge as well, though control will be shifty.

Measurement Sections:

Low: Wading ~ 50 m below bridge

Medium: Wading ~ 50 m below bridge

High: Tethered boat ADCP ~ 50 m below bridge

Accessibility:

Comments: (*Road/parking/traffic*)

Station location has good pull out, however high traffic volume at higher speed (posted 60, but 90 km/h shortly after crossing bridge, so traffic is accelerating). If station located on LB d/s side of bridge, short access trail will be required through the brambles (~150-200m), however location would be easily accessible at all stages. LB will allow location above maximum anticipated WL

Services Available:

Hydro: Available close by, but recommend staying off-grid

Solar: Fairly clear shot to South

Phone: Rogers cellular coverage, and Shaw cable close by

GOES: Fairly clear shot to South

Benchmarks:

Comments: (*locations/bedrock*)

Good location in concrete bridge abutments

Backwater Considerations: (*vegetation/beavers/obstructions*)

Downstream vegetation would cause backwater at higher flows

Ice Considerations:

Little to no chance of ice (very close to sea-level)

Additional Comments:

Summary/Conclusion: *(Ideal/not suitable)*

This would be a suitable location for a stream gauge. Previous location of station was not located during this reconnaissance; however there is evidence of a concrete sump on d/s LB, close to matching the location and description of one referenced in the previous station description. No bench mark was found during visit.

Signature _____

Date _____



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Revision History

Revision #	Date	Status	Revision	Author
A	March 27, 2015	DRAFT	Submitted for Review	CS
0	April 13, 2015	FINAL		CS

