

### **INTRODUCTION**

The Capital Regional District's (CRD), Integrated Watershed Management Program, in cooperation with municipalities, First Nations and community groups, works to identify and reduce contamination in stormwater, creeks and the ocean. This is accomplished through monitoring, assessment, collaboration and education. The work is done to meet Liquid Waste Management Plan (LWMP) commitments, address public concerns, monitor watershed health and prioritize areas of concern for our municipal partners and others.

To accomplish this, CRD staff monitor stormwater and creeks to identify contamination and impacts from stormwater due to various land use practices through bacterial and chemical sampling. The program assesses approximately 300 stormwater discharges and creeks on the Saanich Peninsula and assigns priority ratings for mitigative action to be undertaken by the appropriate jurisdiction(s). Recently, the program switched to *E.coli* and enterococci as monitoring parameters, to align the program with provincial and federal programs and use the best indicators for health risk from recreational water contact.

Program staff worked with the Island Health Authority to measure impacts from stormwater discharges on high-use public beaches during the rainy season from fall 2015 to spring 2016. Preliminary data showed elevated bacterial levels in the marine water adjacent to stormwater discharges previously assigned a high public health concern rating. This work continued in fall 2016 to measure bacterial levels during dry weather following a rainfall.

This report summarizes the results of work completed by the program in 2016. Water and sediment quality data, including details about how the discharges were rated for public health and environmental concern and sampling locations, are available on the CRD website (<https://www.crd.bc.ca/about/document-library/Documents/annual-reports/environmental-protection/integrated-watershed-management>).

### **Regulatory Background**

The CRD created the service to meet commitments in the Saanich Peninsula Liquid Waste Management Plan (SPLWMP, CRD, 1996). CRD commitments regarding stormwater quality and management are to:

1. *plan, promote and co-ordinate a program for management of stormwater quality and surface water resources in cooperation with the participating municipalities, communities and local governments to:*
  - a. *limit the impacts of stormwater runoff on the environment and public health and well being*
  - b. *protect freshwater and near-shore marine ecosystems and resources*
2. *promote education about water quality issues and to develop educational material*

Municipalities have authority over stormwater under the *Community Charter*. In the LWMP, participating municipalities make the following commitments:

1. *to act on priorities within their jurisdiction to protect stormwater quality, the physical environment and aquatic habitat, and to reduce the levels of contaminants in stormwater discharges to accepted government standards in watercourses and near-shore marine areas*
2. *to use resources available to municipal governments to achieve these reductions*
3. *to amend bylaws, as necessary, to ensure that new development takes place in accordance with appropriate best management practices*

## PUBLIC HEALTH

### Public Health Concern Ratings

The program prioritizes stormwater discharges annually to meet LWMP commitments and to help guide jurisdictions in directing limited funds to where they will have the greatest benefit. The program evaluated 79 stormwater discharges in 2016 and **identified 6 high-rated discharges for public health concern** (Table A). Twenty-three were assigned a moderate public health concern rating.

Staff collect a water sample from selected discharges in the wet and dry seasons for laboratory analysis of *E.coli*. Observations are made about the discharge flow, weather, animal presence, etc. Staff then assign a public health rating based on the level of bacterial contamination and the potential for public contact. A bacterial rating and a public shoreline use rating are summed to determine the public health concern rating. Details on the CRD rating system (Drinnan, 1997a) can be found by contacting the CRD's Integrated Watershed Management Program.

A selection of the roughly 300 discharges are assessed each year, including discharges assigned a high and moderate public health concern rating in the previous year, as well as a selection of the low-rated discharges to monitor for change. An attempt is made to sample each low-rated discharge every 5 years.

### Ratings over Time

The number of high-rated discharges has been decreasing in recent years and continued to decrease from 8 in 2015 to 6 in 2016 (Table A). Four discharges rated high in 2015 received a lower rating in 2016 due to a sewer-stormwater cross-connection repair in Sidney, closure of a business that was a source of contamination in Central Saanich, and lower bacterial counts for unknown reasons in 2 discharges. Conversely, 2 previously lower-rated discharges received a high rating in 2016; both have been rated high in the past and counts fluctuate.

Four of the current high-rated discharges have been of concern for a number of years. These sources are challenging to find, difficult or costly to repair, or the result of agricultural practices. Program staff have narrowed down the source in 1 of these discharges and identified agricultural practices as the source in another. One of the discharges drains an area that uses on-site sewage treatment and investigations over many years indicate multiple sources. The final discharge is in a sewered area where there are multiple small sources, likely due to damaged infrastructure. CRD staff will continue to make source identification a priority in 2017.

**Table A. Number of Discharges Rated High for Public Health Concern over Time**

Jurisdiction	Number of Discharges Rated High											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Central Saanich	2	0	1	1	1	1	2	2	1	1	1	0
North Saanich	10	7	2	5	5	6	4	4	4	3	3	3
Sidney	3	4	6	5	5	4	5	4	5	6	3	2
Pauquachin First Nation	0	0	0	0	0	0	0	0	0	0	0	0
Tsartlip First Nation	0	0	0	0	0	0	0	1	1	0	0	0
Tsawout First Nation	0	1	1	0	1	0	0	1	0	0	0	0
Tseycum First Nation	1	0	1	1	1	1	1	1	1	1	1	1
<b>Total</b>	<b>16</b>	<b>12</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>12</b>	<b>12</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>8</b>	<b>6</b>

## High-use Beach Marine Wet Season Sampling

In 2015 and early 2016, staff worked with the Island Health Authority to conduct a study of stormwater impacts on public beaches during the wet season. Marine bacterial levels indicate a number of high-use public beaches on the Saanich Peninsula have conditions that exceed Health Canada guidelines for recreational use during and after winter rainfall events. Further analysis identified bacteria from humans, dogs and ruminant animals in the marine water of all the beaches assessed.

In fall of 2016, staff completed additional sampling to observe how changes in rainfall levels over consecutive days may influence the data, however, the results were inconclusive. The sampling will be attempted again in 2017.

## Bacterial Source Investigations

CRD and municipal staff continue to work together to identify bacterial sources in stormwater discharges of high public health concern so they can be repaired by the appropriate jurisdiction. The sources of contamination include aging stormwater and sewage infrastructure, sewage-stormwater cross-connections, malfunctioning on-site sewage systems, wild and domestic animals, and poor agricultural practices. In 2016, CRD staff investigated the catchment areas of 9 stormwater discharges during 20 sampling events.

Program staff narrowed down a source of bacterial contamination in Hagan Creek to a property in the Keating Industrial Area; Central Saanich and CRD staff are working with the owners to resolve the problem.

Bacteria of human origin were identified in 7 discharges; 3 in North Saanich [1 in Coles Bay (3118), 2 in Deep Cove (3078A and 3079 (Tatlow Creek)], 2 in Central Saanich [Island View Beach (405) and upstream in the Hagan Creek catchment and 2 discharges in Sidney (447 and 449A)]. Bacteria from dogs were also found in each of these locations.

Finding bacterial sources is challenging due to multiple sources (humans and animals), fluctuating levels of bacteria and intermittent flow. In 2017, an enhanced investigation program will direct more effort to this work.

## ENVIRONMENTAL CONCERN

### Watercourses

Program staff continued to monitor water quality in Hagen, Reay, Tetayut, Tatlow, Tén Tén, Tod and Tseycum creeks in 2016 to provide information about creek and watershed health.

CRD data shows that water quality in Saanich Peninsula creeks appears to have remained consistent over the past 5 years and was assessed as good in Tod Creek only.

Tod Creek had no exceedances of guidelines with the exception of phosphorus, which is elevated in all CRD streams. The remaining streams have exceedances of *E.coli*, turbidity, phosphorus or metals (only monitored in some streams). Of particular concern were phosphorus levels greater than 0.1 mg/L in Tén Tén and Tseycum, an unusually low dissolved oxygen measurement in Tén Tén (3.85 mg/L) and elevated bacteria in nearly all the creeks, but especially Tseycum (*E.coli*: 3,300 CFU/100 mL). Poor water quality is likely the result of higher levels of human settlement, spills or agricultural practices.

Intensive sampling in Tetayut Creek indicated that the levels of nutrients (nitrite and phosphorus), bacteria (fecal coliform and *E.coli*), and metals (aluminum, cadmium, chromium, copper, iron and zinc) are a concern in the creek, particularly upstream near Cooperidge Park.

In 2017, staff will work with municipal staff to locate sources of bacterial contamination and increase sampling of chemical contaminants in streams. As part of the overall stormwater education initiative on the Peninsula, staff will also educate property owners about methods to reduce the amount of sediment and phosphorus leaving their properties and ultimately ending up in the creeks.

## **Stormwater Discharge and Stream Sediment Sampling**

The program evaluates sediment from within stormwater discharges (pipes, ditches and streams) for potential environmental impact due to contaminant levels (metals and hydrocarbons). Contaminant levels are compared to sediment quality guidelines for protection of marine or freshwater aquatic life.

The program assigns contaminant ratings to the stormwater discharges from sediment samples taken at the point of discharge into the marine environment. Ratings are determined by comparing the concentration of each contaminant [8 metals and polycyclic aromatic hydrocarbons (PAH)] to guidelines protective of marine life. For each discharge, the ratios of each sediment contaminant concentration compared to the guideline are added to account for potential effects caused by combining the contaminants.

In 2016, the CRD assigned high contaminant ratings to 2 of the 10 discharges assessed. These discharges [441 (Reay Creek) and 3138] and 2 others (449 and 3005) are on the list of discharges requiring corrective action. One discharge was removed from this list (discharge 3016) due to removal of contaminated sediment by Sidney staff. Subsequent sampling results, at the point of entry into the marine environment and upstream, indicate that arsenic and zinc levels are lower.

In Reay Creek (discharge 441), metals and PAH are at levels that may adversely affect aquatic life. CRD participates on the Reay Creek Technical Working Group, which was formed by the Town of Sidney in 2015 to address concerns about contamination in the creek. In 2016, the Reay Creek site was categorized as Class 1 (High Priority for Action) in accordance with the federal Aquatic Site Classification System. The site will be incorporated into Transport Canada's portfolio of contaminated sites, where it will be prioritized to determine its eligibility for funding to undertake a review of upstream conditions and a preliminary remedial/risk management options evaluation for the Reay Creek Pond.

Discharge 3138 carries flows from Tsartlip land and is a concern due to elevated zinc concentrations. Tsartlip replaced some aged corrugated pipes in 2014 and it is likely that contamination observed is from historical practices and residual contaminated sediment. Staff will resample this discharge in 2017.

Two other stormwater discharges have been of concern for a number of years based on sediment contamination. CRD staff have narrowed down the contaminant sources to within a few blocks for 1 of the discharges and Sidney has plans to remove contaminated sediment from the catchments.

## **Quality Assurance**

The 2017 data were acceptable for the purpose of the program. For bacterial analysis, quality assurance includes yearly establishment of a precision criterion based on a range of Saanich Peninsula stormwater sample triplicates. Staff collect blanks and field splits for 10% of the discharges and marine surface water samples collected. None of the field splits exceeded the precision criterion with the exception of 2 pairs with counts below 200 CFU/100 mL. Counts this low are not expected to meet the criterion.

Quality assurance for sediment analysis included field duplicates, laboratory triplicates and Standard Reference Materials (SRM). Precision and accuracy of the laboratory analysis were estimated from the results of these replicate and SRM samples. A detailed discussion on the quality assurance program is provided in the supplementary data report found on the CRD website.

## **Saanich Peninsula Stormwater Source Control Service**

The CRD established the Saanich Peninsula Stormwater Source Control Service in 2014 (Bylaw No. 3906). Staff refined the companion regulatory bylaw, started developing inspection protocols and performed trial inspections with several Peninsula businesses in 2014 and 2015. Staff collected baseline data in 2 creeks that drain industrial areas, in order to assess change after the bylaw has been in place for a few years.

Sediment sampling continues to identify metal and hydrocarbon contamination from parking lots, roads, spills and business waste. It is anticipated that the sediment sampling program will assess the success of the stormwater source control program. The CRD will be working with municipalities and stakeholders to finalize the regulatory bylaw for the stormwater source control program in 2017.

## **Education and Keyline Design Workshops**

CRD data indicates that agricultural practices are 1 of the sources of contamination in stormwater and creeks on the Saanich Peninsula. In 2016, the CRD sponsored and hosted a Keyline Plow field day on a farm on the Saanich Peninsula and workshop titled "Farm Water Management Seminar", to address concerns about agricultural runoff into watercourses and the ocean. The project worked with local farmers to increase awareness and develop skills for improved rainwater management on their properties. This was the second year of a 3-year initiative titled "Keyline Water Management: Field Research and Education in the Capital Region, BC" funded by Growing Forward 2, BC Farm Adaptation Innovator Program, Ministry of Agriculture. Results of the field studies will be presented in late 2017.

## **Outlook for 2017**

In 2017, the Stormwater Quality Program will receive \$30,000 supplemental funding to improve service delivery. In addition to the regular program activities to identify and reduce existing sources of contamination, CRD staff will use these additional resources to:

- improve investigative efforts to identify sources of contamination and collect more bacterial source tracking samples;
- increase administrative oversight, intergovernmental cooperation, coordination and engagement with stewardship groups, and undertake special projects and data analysis; and
- enhance agriculture outreach and, in cooperation with the agricultural sector, promote alternative solutions and best management practices for water, nutrient and manure management.

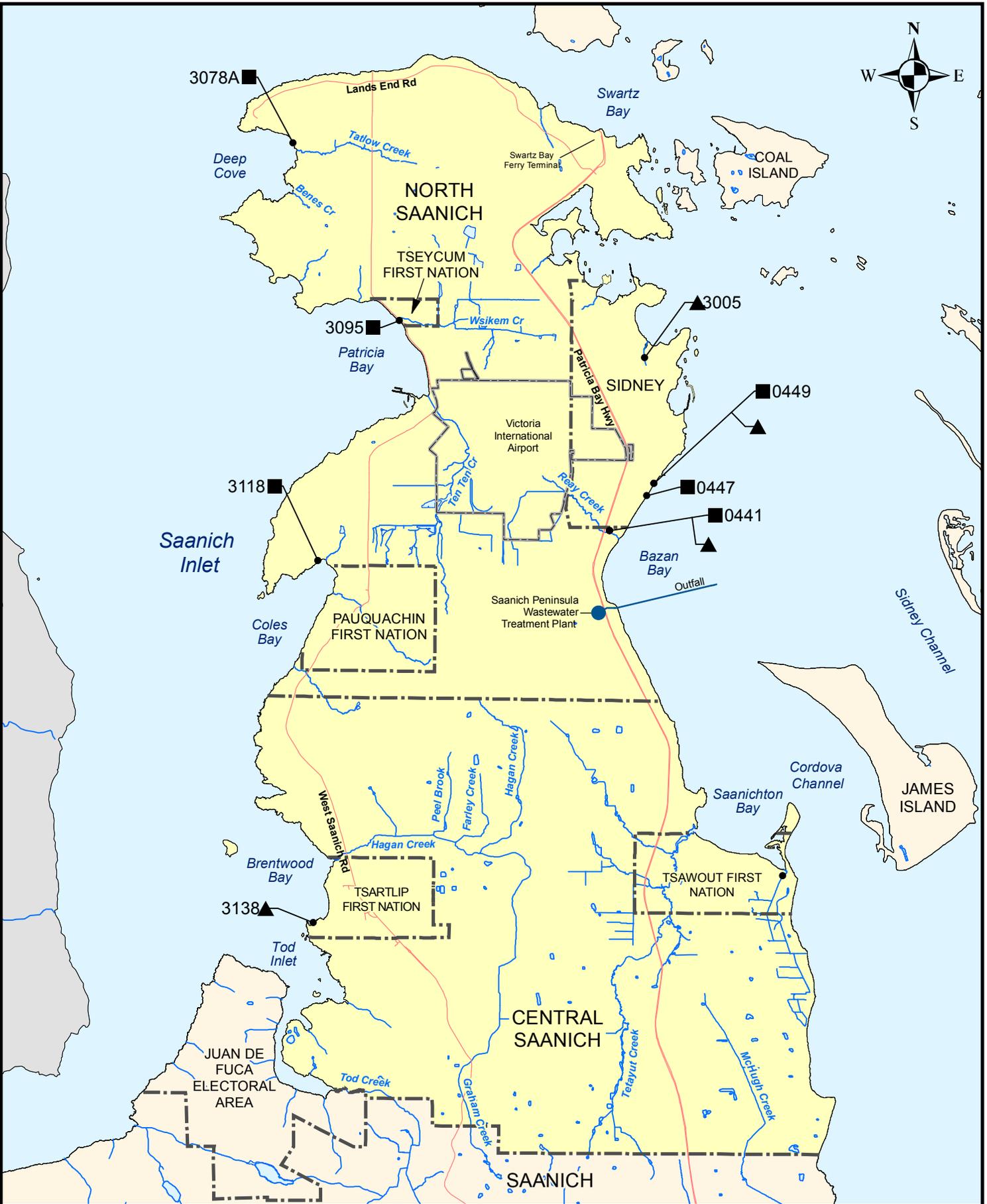
Additionally, the Stormwater Source Control Program will have \$15,000 supplemental funding to:

- enhance the Stormwater Source Control service to increase the number of business sectors, inspections and communication opportunities; and
- investigate more storm drains for chemical contaminants.

## **REFERENCES**

CRD, 1996. Saanich Peninsula Liquid Waste Management Plan.

Drinnan, R.W., 1997a. Stormwater Discharge Rating System for the Capital Regional District. Prepared for the Capital Regional District, Engineering department.



**Figure A- Saanich Peninsula - Stormwater Discharges Rated High for Public Health or Environmental Concern**

**CRD**  
Making a difference...together

0 0.5 1 2 Kilometres

Projection: UTM ZONE 10N NAD 83

**Important** This map is for general information purposes only. The Capital Regional District (CRD) makes no representations or warranties regarding the accuracy or completeness of this map or the suitability of the map for any purpose. **This map is not for navigation.** The CRD will not be liable for any damage, loss or injury resulting from the use of the map or information on the map and the map may be changed by the CRD at any time.

- High Public Health Concern Rating in 2016
- ▲ High Environmental Concern Rating in 2016 or previous years (and recommended for corrective action)
- Sewage Treatment and Outfall
- ~ Significant Ditches, Streams & Rivers
- Municipal and First Nations Boundary
- Major Roads
- Stormwater Monitoring Area