

### **INTRODUCTION**

The Capital Regional District (CRD) 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 discharges and creeks to identify contamination and impacts from stormwater due to various land use practices. Staff assess approximately 300 stormwater discharges on the Saanich Peninsula and assign priority ratings for mitigative action to be undertaken by the appropriate jurisdiction.

This report summarizes the results of work completed in 2017. In 2017, staff conducted routine monitoring, creek health assessments and marine impact sampling with a focus on identifying sources of contamination previously identified. Data, sampling locations and details about how the discharges were rated for public health and environmental concern are available on the CRD website ([www.crd.bc.ca/about/document-library/Documents/annual-reports/environmental-protection/integrated-watershed-management](http://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**

Staff prioritize stormwater discharges annually to meet LWMP commitments and guide jurisdictions in directing funds to where they will have the greatest benefit. Staff evaluated 85 stormwater discharges in 2017 and **identified 6 high-rated discharges for public health concern** (Table A). Twenty-six discharges were assigned a moderate public health concern rating, while the remaining 53 were assigned a low rating.

Figure A presents high-rated discharges on the Saanich Peninsula, the majority, of which are in North Saanich. CRD investigations indicate that high ratings in North Saanich and Tseycum Creek are likely caused by malfunctioning on-site sewage treatment systems or agricultural practices. One high-rated discharge is in Sidney and investigations indicate that there are multiple sources of sewage infiltrating into the aging stormwater infrastructure.

### Public Health Concern Rating Methods

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. A summary of the CRD rating system can be found in Appendix G.

As an example, CRD assigns discharges a high public health concern rating if the *E.coli* count is 200 CFU/100 mL or more on a beach used by the public for swimming or diving, or greater than 5,000 CFU/100 mL on a beach used by the public for boating (e.g., kayaking or paddle-boarding) close to the shore.

A subset 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. Staff attempt to visit low-rated discharges every 5 years.

### Ratings over Time

The number of high-rated discharges has decreased in recent years but remains the same in 2017 as in 2016 (Table A).

Four of the 6 high-rated discharges have been of concern for a number of years. Contaminant sources are challenging to find, difficult to repair, or are the result of agricultural practices. Two of the discharges drain areas that use on-site sewage treatment, and investigations over many years, indicate multiple sources (1 system was repaired in 2017, but bacterial levels remain elevated due to other sources). Tseycum Creek has been rated high for more than 10 years due to agricultural practices upstream. The fourth discharge is in Sidney where there are multiple small sources, likely due to damaged infrastructure. CRD staff will continue to make source identification a priority in 2018.

**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	2017
Central Saanich	2	0	1	1	1	1	2	2	1	1	1	0	0
North Saanich	10	7	2	5	5	6	4	4	4	3	3	3	4
Sidney	3	4	6	5	5	4	5	4	5	6	3	2	1
Pauquachin First Nation	0	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	0
Tsawout First Nation	0	1	1	0	1	0	0	1	0	0	0	0	0
Tseycum First Nation	1	0	1	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>	<b>6</b>

## **Marine Impact Sampling**

In 2017, staff carried out marine impact sampling in Coles Bay and Bazan Bay to determine if stormwater contamination is impacting these areas. In addition, staff sampled Saanichton Bay to determine if a December 2017 sewage overflow event at the Turgoose pump station continued to impact the bay in early 2018.

### ***Coles Bay***

Stormwater discharge 3118 is assigned a high public health concern rating due to elevated bacteria in stormwater at the end of pipe; therefore, staff sampled Coles Bay to determine if the stormwater was impacting the marine receiving waters. Enterococci levels in Coles Bay were above Health Canada's primary recreation guidelines (single sample maximum of 70 CFU/100 mL) with particularly high levels (170 to 450 CFU/100 mL) during heavy rainfall. Source investigation data indicate that the sources are on-site sewage treatment systems and wild and domestic animals. Staff are working with Island Health staff to address these sources.

### ***Bazan Bay***

In June 2017, an inspection revealed 2 holes in the Bazan Bay wastewater outfall that carries treated effluent from the Saanich Peninsula Wastewater Treatment Plant. CRD staff carried out nearshore marine and stormwater sampling for bacterial levels from June 27, 2017 to July 25, 2017. The outfall was repaired on July 13, 2017 and sampling results indicated that bacterial counts were low near the outfall, but remained elevated near the shoreline and in some stormwater discharges. Bacteria from humans, birds, deer and raccoons were identified in marine water adjacent to stormwater discharges in November 2017. In the stormwater, staff measured elevated bacteria (>200 CFU/100 mL *E.coli*) at least once in 6 of the 9 stormwater discharges that flow into the bay and bacteria from humans was present in 4 of these. Staff sampled upstream in 2 of the stormwater catchments to determine the sources of contamination with inconclusive results. CRD staff will continue investigations in 2018.

Staff occasionally measure elevated *E.coli* counts in Bazan Bay discharges, but on average these discharges have low counts (<200 CFU/100 mL) with the exception of discharges 431 and 432. CRD has rated none of these discharges high for public health concern, as the beach is not regularly used by the public for swimming or boating. To obtain a high public health concern rating, the *E.coli* levels would have to be at least 5,000 CFU/100 mL.

### ***Mermaid Creek Estuary – Discharge 3005***

Mermaid Creek has been of concern, due to elevated metals and polycyclic aromatic hydrocarbons (PAH), since 2005. In 2017, CRD staff conducted marine sampling at 3 locations stepped-out from the end of pipe to assess whether contaminants found in the pipes were having an impact on the marine environment. Copper, lead, mercury and zinc levels were above Canadian Council of Ministers of the Environment Interim Sediment Quality Guidelines for protection of marine aquatic life. Exceedances occurred in the 2 stations closest to the discharge and the contaminants matched those previously found upstream (with the exception of mercury) indicating that the copper, lead and zinc contamination are likely due to stormwater. Staff will continue sampling to determine the sources of contamination.

### ***Saanichton Bay – Turgoose Pump Station Overflow***

In December 2017, surface water from construction activities, at 7874 Lochside Drive, was inadvertently discharged into the Central Saanich sanitary sewer system causing a sanitary sewer overflow at CRD's Turgoose Pump Station, Saanichton Bay. Central Saanich staff worked with the contractors to determine the cause of the incident and prevent a repeat of the situation. CRD conducted shoreline sampling until bacterial levels were below recreational guidelines.

In February 2018, at the request of the Tsawout First Nation, CRD staff undertook follow-up sampling in Saanichton Bay, Tetayut Creek and the stormwater discharges into the bay to determine if the sewage overflow was still impacting the bay. Bacteriological results indicated a short-lived (i.e., days) impact of the sewage overflow. February results showed no indication of remaining sewage overflow influence in the area. The storm drain results were typically higher than the marine results, indicating stormwater was likely the predominant bacterial influence close to shore. Samples collected further offshore by boat were all low relative to nearshore marine samples.

### **Bacterial Source Investigations**

CRD, Island Health Authority and municipal staff continue to work together to identify bacterial sources in stormwater discharges of concern so they can be addressed by the appropriate jurisdiction. The sources of contamination include malfunctioning on-site sewage treatment systems, agricultural practices, aging stormwater and sewage infrastructure, sewage-stormwater cross-connections and wild and domestic animals.

In 2017, CRD staff investigated the catchment areas of 14 stormwater discharges over 29 sampling events. These investigations resulted in the repair of 1 malfunctioning on-site sewage system in Coles Bay and have narrowed down the source of 2 others. In addition, staff reconfirmed that the source of bacteria in Tseycum Creek is agricultural. Staff are continuing investigations in 12 of these stormwater catchments.

Investigations in 2017 identified bacteria of human origin in 8 stormwater catchments (some catchments have multiple sources). These discharges are located in Bazan Bay (428, 430A, 431, 432), Deep Cove (3078A, 3079), Coles Bay (3118) and upstream locations of Hagan Creek (3133). The source of contamination in these discharges is unknown in Bazan Bay and Hagan Creek, and mainly from malfunctioning on-site sewage treatment systems in Deep Cove and Coles Bay. Staff are working with Island Health to identify and repair sources from on-site sewage treatment systems.

## **ENVIRONMENTAL CONCERN**

### **Watercourses**

Staff continued to monitor Hagan/Graham, Reay, Tetayut, Tatlow, Tén Tén, Tod and Tseycum creeks in 2017, to provide information about creek and watershed health.

Each year, staff collect water quality data twice at the discharge of each creek providing a snapshot of creek health in the wet and dry seasons. In 2017, Tod and Noble/McHugh creeks were assessed more extensively (water quality was measured 5 times in 30 days in summer and fall at various locations in the watershed and a health assessment of the benthic invertebrate animals living in the Tod Creek was carried out). Sampling 5 times in 30 days allows for direct comparison to British Columbia water quality guidelines.

The 2017 data indicated that water quality in Saanich Peninsula creeks is similar to the last 5 years, indicating that water quality has not improved or declined during that time.

The parameters of most concern in Saanich Peninsula creeks are *E.coli*, phosphorus and turbidity with some creeks also experiencing low dissolved oxygen and elevated metals. Poor water quality is likely the result of failing on-site systems, spills and agricultural practices.

Intensive sampling in Tod Creek indicated that the mouth of the creek is healthy (with very few exceedances of water quality guidelines), but upstream sites, particularly near Farmington Road, are unlikely to be able to support aquatic life. Dissolved oxygen levels were below guidelines for protection of aquatic life (averages were 1.4 and 3.5 mg/L in summer and fall). Staff also measured elevated phosphorus, turbidity, iron and zinc.

In Noble/McHugh Creek, a number of water quality parameters were elevated above water quality guidelines. The source of poor water quality appeared to be from agricultural sources rather than runoff from the highway during summer and fall of 2017. Increased flows in the creek were not observed upstream and downstream of the ditch that runs along Martindale Road, however flow was only visually estimated.

The parameters of concern were dissolved oxygen, iron, phosphorus, temperature, turbidity nitrite, nitrate, *E.coli* measurements were outside the guidelines with poorer water quality upstream. Nitrite is not elevated in many creeks and although phosphorus is elevated in nearly all creeks, levels were 10 to 90 times above the draft Vancouver Island Objective. Compared to other Saanich Peninsula creeks measured by CRD staff, the highest *E.coli* levels were in Noble/McHugh Creek. These results indicate that agricultural practices may be affecting the creek.

In 2018, staff will work with municipal staff to locate sources of bacterial and chemical contamination. 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.

### **Sediment Sampling**

The program evaluates sediment from within stormwater discharges (pipes, ditches and streams) for potential environmental impact due to contaminant levels (heavy metals and hydrocarbons).

The program assigns contaminant ratings to 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 PAH) to sediment quality 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 2017, staff collected 35 sediment samples on the Saanich Peninsula: 17 at the point of discharge (to measure potential contamination to the marine or freshwater aquatic environment), 12 upstream in stormwater catchments of concern (to determine sources of contamination), and 6 in the marine environment (to assess potential impact from stormwater discharges of concern).

The CRD assigned high contaminant ratings to 3 of the 17 discharges assessed: 3005 (Mermaid Creek), 3104 (Tén Tén Creek), and 3122 (Coles Bay). Staff will confirm high ratings on 3104 and 3122, in 2018. Mermaid Creek (3005) and 2 others (3138; Brentwood Bay and 441; Reay Creek) (Figure A) have been a concern for a number of years and are on the list of discharges requiring corrective action. One discharge was removed from this list in 2017 (discharge 449), due to lower zinc levels. A discussion of the discharges of concern follows:

- Mermaid Creek (discharge 3005) has been of concern, due to elevated metals and PAH, since 2005. CRD staff have conducted numerous upstream investigations, however, sediment is difficult to find within the upstream infrastructure. Sampling results in 2017 indicate that metals from stormwater have impacted the marine receiving environment. CRD staff will continue to work with Sidney to determine the upstream sources.
- In Reay Creek (discharge 441; Figure A), sediment concentrations of metals and PAH are at levels that may adversely affect aquatic life. CRD participates on the Reay Creek Technical Working Group, formed by the Town of Sidney in 2015 to address concerns about contamination in the creek. Transport Canada has categorized Reay Creek Pond as a contaminated site with high priority for action and is determining the extent of contamination to identify remedial and risk management options. Meanwhile, the Town of Sidney has hired a professional biologist to assess the habitat value surrounding the Reay Creek Pond to help determine whether to upgrade or remove the current dam, as it does not meet seismic design standards.
- 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 residual contaminated sediment. Staff will determine the extent of contamination in 2018.

## **Quality Assurance**

The 2017 data met QA/QC requirements for 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. Precision and accuracy of the laboratory analysis were estimated from the results of these replicate and Standard Reference Materials samples. A detailed discussion on the quality assurance program is provided in the supplementary data report found on the CRD's website.

## **Education and Keyline Design Workshops**

CRD data indicates that agricultural practices are one of the sources of contamination in stormwater and creeks on the Saanich Peninsula. In 2017, the CRD co-sponsored and hosted a Keyline Plow field day on a farm on the Saanich Peninsula and workshops 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 final 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 were presented in late 2017 and can be found on the project website [www.crkeyline.ca](http://www.crkeyline.ca)

## **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 2018.

## **REFERENCES**

CRD, 1996. Saanich Peninsula Liquid Waste Management Plan.



**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

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- High Public Health Concern Rating in 2017
- ▲ High Environmental Concern Rating in 2017 or previous years (and recommended for corrective action)
- Sewage Treatment and Outfall
- ~ Significant Ditches, Streams, Rivers, and Storm Drains
- - - Municipal and First Nations Boundary
- Major Roads
- Stormwater Monitoring Area