

Saanich Peninsula Stormwater Quality

2020 Program Report

INTRODUCTION

The Capital Regional District (CRD), Stormwater Monitoring Program works to identify and reduce contamination from the land to stormwater and surface water (creeks and the ocean). CRD staff, in cooperation with municipalities and First Nations, accomplish this through environmental monitoring, assessment, collaboration and education. This work meets commitments in the Saanich Peninsula Liquid Waste Management Plan (LWMP; CRD, 1996), described below.

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 by the appropriate jurisdiction. When contamination is found, CRD staff conduct investigations and work with municipal staff to identify sources of contamination.

This report summarizes the results of work completed in 2020 (2021 data was considered when available). Data, sampling locations and details about the CRD stormwater discharge rating methods for public health and environmental concern are available in appendices A through G.

Regulatory Background

The CRD created the stormwater quality monitoring service to meet commitments in the Saanich Peninsula Liquid Waste Management Plan. 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 support local governments in directing funds to where they will have the greatest benefit. Discharges are prioritized through public health concern ratings, based on the concentration of bacteria in the discharge and the potential for public contact.

* https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/03026_00

Each year, CRD staff sample a selection of stormwater discharges in the wet and dry seasons for laboratory analysis of *E.coli*. CRD assigns discharges a high public health concern rating if the *E.coli* counts are over 200 colony forming units (CFU)/100 mL on a shoreline used by the public for swimming or diving, or greater than 5,000 CFU/100 mL on a shoreline used by the public for small boating (e.g., kayaking or paddle-boarding). A summary of the CRD rating system is in Appendix G.

In 2020, staff assessed 100 discharges of which 35 had one or more *E.coli* counts greater than 200 CFU/100 mL, a level that indicates sources of sewage or animal waste with potential to cause adverse effects for members of the public engaging in recreational activities. However, many of these discharges have low flows or are located where there is little risk of public contact. Considering the likelihood for contact, CRD staff assigned the following public health concern ratings:

- 73 low ratings
- 20 moderate ratings, and
- 7 high ratings (Table A, Figure A)

These ratings and the associated bacterial data are located in appendices B and C. Quality assurance and control data are located in Appendix D.

CRD source investigations indicate that malfunctioning on-site sewage treatment systems or agricultural practices are the source of bacteria leading to high ratings in three North Saanich discharges and Tseycum Creek. Two high-rated discharges are in Sidney and investigations indicate that there are multiple sources of sewage infiltrating into the aging stormwater infrastructure. The source of one high-rated discharge in Brentwood Bay, Central Saanich, is unknown and contamination is intermittent making source tracking difficult. Staff are working with the municipalities and the Island Health Authority (IHA) to mitigate these sources.

Ratings over Time

Overall, the high-rated discharges appear to be on the decreasing trend on the Saanich Peninsula. The number of high-rated discharges decreased by two in 2020, as staff removed four of the previously high-rated discharges from the list and added two new discharges (Table A).

Staff assigned a lower rating to one discharge that had been high-rated for more than six years. This discharge in Coles Bay (3118) has lower bacterial levels, due to continued effort from CRD and IHA staff that resulted in on-site treatment system repairs in the catchment.

Four of the 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.

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

Jurisdiction	Number of Discharges Rated High											
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Central Saanich	1	1	2	2	1	1	1	0	0	1	2	1
North Saanich	5	6	4	4	4	3	3	3	4	4	4	3
Sidney	5	4	5	4	5	6	3	2	1	2	2	2
Pauquachin First Nation	0	0	0	0	0	0	0	0	0	0	0	0
Tsartlip First Nation	0	0	0	1	1	0	0	0	0	0	0	0
Tsawout First Nation	1	0	0	1	0	0	0	0	0	0	0	0
Tseycum First Nation	1	1	1	1	1	1	1	1	1	1	1	1
Total	13	12	12	13	12	11	8	6	6	8	9	7

Bacterial Source Investigations

CRD, municipal and IHA 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.

Two of the high-rated discharges (3077 and 3078A in Deep Cove) drain areas that use on-site sewage treatment, and staff have narrowed down the sources and passed the information onto IHA for follow-up. Tseycum Creek (3095) has been rated high for more than 10 years, due to agricultural practices upstream in North Saanich. The fourth discharge is in Sidney (447) where there are multiple small sources, likely due to damaged infrastructure.

In 2020, CRD staff investigated the catchment areas of five stormwater discharges on the Saanich Peninsula. Staff continued to narrow down the sources of bacteria in these catchments using upstream sampling for parameters, such as bacteria, caffeine and genetic analysis to determine if the origin of the bacteria is animal or human (See Table C for status of investigations). Staff will continue investigations in many of these stormwater catchments, and others that are a concern in 2021.

Table C. Status of 2020 Source Investigations

Stormwater Discharge #	Shoreline Jurisdiction	# of Visits	Status	Next Steps
3145	Brentwood Bay, Central Saanich	2	Inconclusive; narrowed down to a couple blocks; discharge dry in summer	CRD to continue investigation
3079	Tatlow Creek, North Saanich	2	Narrowed, confirming source; human source confirmed	CRD to continue investigation
3124	Pauquachin/ North Saanich	1	Inconclusive; counts lower; no caffeine upstream	CRD to continue investigation
3133	Hagan Creek, Central Saanich	3	Main source identified; checking for other sources and following-up on repairs	Waiting for repairs to main source
3150	Brentwood Bay, Central Saanich	2	Counts lower, problem appears to be resolved	CRD to continue monitoring

Coles Bay

CRD has facilitated discussions between First Nations, Saanich Peninsula municipalities and other jurisdictions to look at ways to open shellfish harvesting on the Saanich Peninsula. CRD bacterial sampling and source investigations in the stormwater discharges around Coles Bay will help inform those discussions.

ENVIRONMENTAL CONCERN

CRD assesses environmental concern in water and sediment from stormwater, pipes, ditches and streams, based on their potential to impact the marine receiving environment. Staff also assess watercourse health in seven freshwater streams through water quality and benthic invertebrate sampling.

Chemical Contaminant Sampling

Sediment

The program evaluates sediment from within stormwater discharges (pipes, ditches and streams) for potential environmental impact, due to contaminant levels. Sediment data and ratings are located in Appendix E.

CRD staff assign 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 [eight metals and high and low molecular weight polycyclic aromatic hydrocarbon (PAH)] to sediment quality guidelines protective of marine life. Methods are described in Appendix G.

2020 Monitoring Results

Staff collected 12 sediment samples on the Saanich Peninsula: nine at the point of discharge (to measure potential contamination to the marine receiving environment), and three upstream in stormwater catchments of concern (to determine sources of contamination or measure watershed health).

Staff assigned the following contaminant ratings to the 12 discharges assessed in 2020:

- 8 low ratings,
- 3 moderate ratings, and
- 1 high rating (Figure A)

Staff assigned one high contaminant rating in 2020 at discharge 3021 (Tsehum Harbour; North Saanich), due to elevated mercury and lead levels in sediment. A water sample collected at this location had low concentrations of lead (mercury was not analyzed). Staff will confirm the contaminants of concern and start source investigations at this location in 2021, if concentrations remain elevated.

Discharges Requiring Corrective Action

Remedial work resulted in lower contamination in two of the three discharges that have been a concern for many years, allowing removal from the list of discharges requiring corrective action. The 2020 data indicates lower levels of contaminants in 441 (Reay Creek) and 3138 (Tsartlip Boat launch), as described below:

- Reay Creek Pond was designated a Class 1 contaminated site by Transport Canada in 2016, due to elevated metals, including cadmium, chromium, lead and zinc. Transport Canada remediated Reay Creek on Victoria Airport Authority lands in 2019, and the pond in summer and fall of 2020, including dredging of contaminated sediments. Coinciding with this work, the Town of Sidney replaced the dam at Reay Creek Pond and installed a fish ladder in fall 2020. Sediment samples collected by CRD staff in Reay Creek in December 2020 had lower concentrations of metals, resulting in a moderate contaminant rating. Staff will continue to monitor this creek over time.
- Discharge 3138 carries flows from Tsartlip land and was a concern for a number of years, due to elevated zinc concentrations. Tsartlip replaced aged corrugated pipes (deemed the likely source) along Stelly's Cross Road in 2018. CRD measured lower zinc levels in this discharge in 2019 and 2020, which resulted in a low ratings and removal of this discharge from the corrective action list.

One discharge remains on the list of discharges requiring corrective action and is discussed below:

- Mermaid Creek (discharge 3005) has been of concern, due to elevated metals and PAHs, since 2005. CRD staff conducted numerous source investigations, however, sediment is difficult to find within the infrastructure. Marine sampling results indicate that metals from stormwater may have impacted the marine receiving environment.

- 2019 and 2020 water quality results did not detect PAHs, but copper and zinc concentrations were elevated just above guidelines for marine and freshwater aquatic life and consistent with road runoff. However, in December 2020, staff measured higher concentrations of copper, chromium and iron in the catchment. Unfortunately, these results did not point to a source. Staff will continue sampling the previous locations and upstream, and will work with the Town of Sidney to determine sources.

Locations of these discharges are shown in Figure A and Appendix A.



0 0.5 1 2 Kilometres
Projection: UTM ZONE 10N NAD 83

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

- 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
- Municipal and First Nations Boundary
- Major Roads
- Stormwater Monitoring Area
- Significant Ditches, Streams, Rivers, and Storm Drains

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 this map.

Aqueous Metals

Staff measured the concentration of metals in 20 stormwater discharges in 2020. Staff assessed four of the discharges twice and took additional samples upstream in Reay Creek and Mermaid Canal. Staff chose discharges with the following environmental concern ratings: low (nine discharges), moderate (five), and high (four) and two not previously assessed for environmental concern.

Copper and zinc were most often at concentrations that exceeded BC ENV marine and freshwater guidelines for protection of aquatic life (see Appendix E). Concentrations were highest in discharges 449 (south of the Anacortes Ferry Terminal; Bazan Bay) and 3077 (Deep Cove), with copper concentrations greater than 10 times the marine guideline in 3077, and zinc concentrations greater than five times the marine guideline in both discharges.

Metals concentrations will be diluted once the stormwater enters the marine environment; however, the constant flow from some discharges could result in loadings that adversely affect the marine environment. CRD staff will confirm these concentrations in 2021 and further work could involve measuring impact to the receiving environment in areas of concern.

A summary of the exceedances of BC ENV maximum aquatic life guidelines follows:

- the freshwater guidelines were exceeded for copper (four discharges), iron (five discharges) and zinc (two discharges).
- total aluminum concentrations were elevated compared to the dissolved aluminum freshwater guideline in 15 discharges. Staff will measure dissolved concentrations in these discharges in 2021. However, comparison of the total concentration to the dissolved guideline is only used for screening purposes and exceedances do not necessarily indicate environmental concern. Previous CRD data (n = 646) indicates that only 6% of total measurements that are above the dissolved guideline have an elevated dissolved measurement.
- the marine guidelines were exceeded for copper (12 discharges) and zinc (11 discharges). Reay Creek had a cadmium measurement that equaled the guideline, but was lower when measured a week later and upstream samples were below the guideline.

The use of water for contaminant measurement in storm drains is relatively new to the program. Both sediment and water have benefits and shortcomings in measuring potential environmental impact from storm drain discharges. A comparison of the discharges analyzed for both sediment and water showed that discharges assigned high to moderate ratings, based on sediment (449, 3005, 3021, 3077 and 3138), also had exceedances of water quality guidelines, indicating that both methods of assessment may be effective for indicating potential environmental effects. CRD will continue to measure contaminants in both media to better assess both methods and to use water to conduct monitoring or source investigations when sediment is unavailable.

Watercourses

Staff continued to monitor Hagan/Graham, KÉL,SET (Reay), Tetayut, Tatlow (Chalet), TĒNTEN, Tod and Tseycum creeks in 2020, 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. Approximately every second year, staff conduct more comprehensive monitoring throughout one of the watersheds that includes more locations, water quality parameters and benthic invertebrate monitoring. In 2020, the Hagan/Graham watershed was sampled more intensively. This data is presented in Appendix F.

Based on the CRD monitoring data, 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 development, business waste (historical and ongoing), agricultural practices and malfunctioning on-site sewage treatment systems.

Hagan/Graham Creek Watershed

Staff sampled four locations of Hagan/Graham Creek five times in 30 days in both the summer and fall of 2020 and collected an additional sample during the first flush conditions on September 24, 2020. Staff also completed additional sampling in the watershed (the input from Keating Industrial Park and an upstream manhole) to look for sources of contamination in Stevens Creek (refer to Figure B for sample locations).

The creek had a number of water quality exceedances (mainly during wet weather) indicating impacts from road runoff, business waste and agricultural practices.

Data collected at the mouth of the watershed (downstream of West Saanich Road) indicate that this portion of the creek is moderately healthy with the least number of water quality guideline exceedances. In 2020, there were elevated measurements of *E.coli* (fall), total phosphorus (up to 10 times the guideline during first flush and early fall), turbidity and suspended solids, along with low dissolved oxygen in summer.

Stevens Creek, which drains the west side of Keating Industrial Park, had the most exceedances with the highest concentration of contaminants that included aluminum, chromium, copper, *E.coli*, iron, phosphorus, suspended solids and zinc. Central Saanich and CRD staff are working with business owners in the area to find and mitigate the contamination.

In 2021, CRD staff will continue to monitor these creeks and work with municipal staff to locate sources of bacterial and chemical contamination. In addition, CRD staff will be conducting focused sampling in the Tetayut Creek watershed.

Quality Assurance

The 2020 data met quality assurance/quality control requirements for the program. For bacterial analysis, quality assurance includes annual 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 discharge and marine surface water samples collected. Five of the 34 field splits exceeded the precision criterion; however, the bacterial counts in those samples were low (below 200 CFU/100 mL) and, therefore, 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.

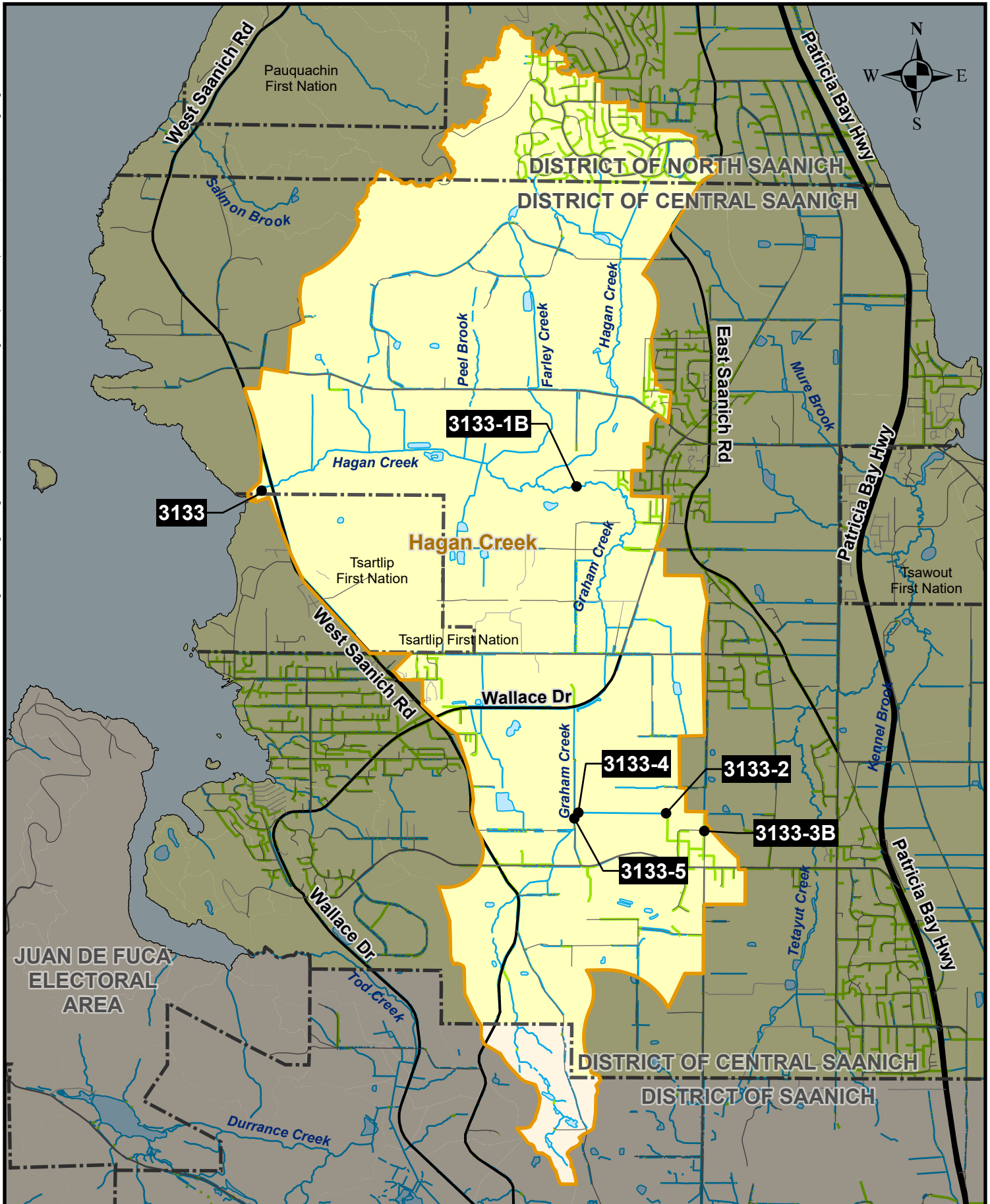
Saanich Peninsula Stormwater Source Control Service


The CRD established the Saanich Peninsula Stormwater Source Control Service in 2014, with the goal to prevent the release of contamination into the municipal drainage system through education and guidance, maintenance of catch basins, appropriate business practices, and the proper disposal of waste. Since then, staff have focused on creating a regulatory bylaw and its supporting framework. Regulatory bylaws (*Bylaw No. 4168* and amending *Bylaw No. 4229*) that set out the requirements for discharges to the municipal drainage system were finalized in December 2019. The CRD worked with municipalities, stakeholders and dischargers to implement the bylaw in 2019, and implementation strategies expanded in 2020.

Bylaw 4168 Inspections

In 2020, the CRD conducted in-person inspections to a number of businesses to provide education on stormwater source control and solutions for managing business waste on site to prevent contamination of the stormwater system and the freshwater or marine receiving environment.

In 2020, the first year of inspections under Bylaw 4168, CRD conducted 132 inspections that included code of practice parking lot operations, code of practice outdoor storage operations, and general bylaw.





CRD
Making a difference...together

0 250 500 1,000 Metres

Projection: UTM ZONE 10N NAD 83

**Figure B - Hagan Creek Watershed
Stormwater Monitoring Locations**

● Stormwater Sampling Site

▭ Watershed Boundary

--- Municipal and First Nations Boundary

~ Stream & Ditch

— Storm Drain

■ Stormwater Monitoring Area

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 this map.

Results of the 132 CRD inspections were as follows:

- 26 compliant business that were cleaning-out stormwater retention units annually and received education on keeping records and spill response plans and kits
- 12 non-compliant with business wastewater discharging to storm sewer (only six remaining non-compliant going into 2021)
- 3 non-compliant with inadequate containment for their outdoor storage operation (only one remaining non-compliant going into 2021)
- 39 businesses had practices that were not applicable to Bylaw 4168 (e.g., the business discharges waste to ground or the ocean, have off-site waste management, were residential, agriculture, etc.)
- 29 on First Nations land
- 23 duplicate facilities (administrative clean-up)

In addition, staff have collected baseline data in three creeks that drain industrial areas, and sediment sampling continues to identify metal and PAH contamination from parking lots, roads, spills and business waste. Staff anticipate that the environmental monitoring program's sampling results will be used to assess the performance of the stormwater source control program over the coming years.

SAANICH PENINSULA HARBOURS AND WATER MONITORING AND COORDINATION SERVICE

In 2020, a new CRD service was established at the request of the Saanich Peninsula municipalities for the purpose of coordinating and implementing harbours, waterbodies and watercourses environmental protection and improvement initiatives on and surrounding the Saanich Peninsula. The service is to include monitoring, mapping, reporting and public education on issues relating to the marine and shore area environments; coordination and collaboration with public authorities and other persons on issues relating to the marine and shore area environments; and, implementing programs related to rehabilitation and improvement of the marine and shore area environments. CRD staff are meeting with municipalities and engaging First Nations to determine next steps.

2021 PROGRAM

The program will continue to work with municipal partners, First Nations and the community to achieve LWMP goals to identify stormwater discharges of public health and environmental concern. CRD staff will continue to work with its partners to identify and reduce bacteria and contaminant concentrations in stormwater discharges, creeks and the marine receiving environment. Focused water quality and benthic invertebrate sampling will be undertaken in Tetayut Creek Watershed in 2021.

REFERENCES

CRD, 1996. Saanich Peninsula Liquid Waste Management Plan.