

INTRODUCTION

The Capital Regional District (CRD), in cooperation with municipalities, First Nations and community groups, works to identify and reduce contamination from the land to stormwater, creeks and the ocean. CRD staff accomplish this through environmental monitoring, assessment, collaboration and education. The work meets the Saanich Peninsula Liquid Waste Management Plan (LWMP) commitments.

As part of this work, 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.

This report summarizes the results of work completed in 2019. Staff conducted routine monitoring, assessed creek health and conducted upstream sampling to identify sources of contamination. Data, sampling locations and details about how the discharges are rated by 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 (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 support local governments in directing funds to where they will have the greatest benefit. Staff prioritize discharges through public health concern ratings, based on the concentration of bacteria in the discharge and the potential for public contact. Methods are discussed briefly below and in detail in Appendix G.

Staff assessed 86 discharges in 2019. Thirty-one of the discharges had one or more *E. coli* counts greater than 200 colony forming units (CFU)/100 mL, a level that indicates sources of sewage or animal waste with potential to cause adverse effects for public members engaging in primary recreational activities (e.g., swimming, diving). 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:

- 53 low ratings
- 24 moderate ratings, and
- 9 high ratings (Table A, Figure A)

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

The majority of the high-rated discharges (four) are in North Saanich. CRD investigations indicate that malfunctioning on-site sewage treatment systems or agricultural practices are the source of bacteria leading to high ratings in North Saanich discharges and Tseycum Creek. Intermittently elevated bacterial counts in Reay Creek are likely due to birds or other wildlife, but more investigation is required. Two high-rated discharges are in Sidney and investigations indicate that there are multiple sources of sewage infiltrating into the aging stormwater infrastructure. Staff recently discovered two high-rated discharges in Brentwood Bay (in 2018 and 2019). The sources are unknown and contamination is intermittent in one, making source tracking difficult.

Ratings over Time

The number of high-rated discharges increased by one in 2019, due to the addition of one discharge with fluctuating bacterial levels that was already being investigated (Table A).

Five 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. Three of the discharges (3118; Coles Bay, 3077; Deep Cove and 3078A; Deep Cove) drain areas that use on-site sewage treatment, and investigations over many years, indicate multiple sources in Coles Bay; while 3077 and 3078a have been narrowed down and passed onto Island Health Authority 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. CRD staff will continue to make source identification a priority in 2020.

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	2018	2019	
Central Saanich	2	0	1	1	1	1	2	2	1	1	1	0	0	1	2	
North Saanich	10	7	2	5	5	6	4	4	4	3	3	3	4	4	4	
Sidney	3	4	6	5	5	4	5	4	5	6	3	2	1	2	2	
Pauquachin First Nation	0	0	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	0	0	
Tsawout First Nation	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	
Tseycum First Nation	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	
Total	16	12	11	12	13	12	12	13	12	11	8	6	6	8	9	

Public Health Concern Rating Methods

Each year, CRD staff sample a selection of stormwater discharges in the wet and dry seasons for laboratory analysis of *E.coli*. Staff then assign a public health concern rating based on the level of bacteria and the potential for public contact. A summary of the CRD rating system is in Appendix G.

CRD assigns discharges a high public health concern rating if the *E.coli* counts are over 200 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 boating (e.g., kayaking or paddle-boarding).

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 five years.

Bacterial Source Investigations

CRD, municipal and Island Health Authority 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 2019, CRD staff investigated the catchment areas of five stormwater discharges on the Saanich Peninsula. Staff further narrowed down the sources of bacteria in these catchments and collected data that indicates the source of bacteria in Reay Creek is of animal origin. Staff will continue investigations in many of these stormwater catchments, and others that are a concern in 2020.

Table C. Status of 2019 Source Investigations

Stormwater Discharge #	Shoreline Jurisdiction	# of Visits	Status	Next Steps
441	Bazan Bay, North Saanich	1	No caffeine detected at three locations in the creek, suggesting an animal source	CRD to continue investigation
3005	Roberts Bay, Sidney	1	Inconclusive; narrowing	CRD to continue investigation
3007	Roberts Bay, Sidney	1	Narrowed down, but counts lower; need to confirm	CRD to continue investigation
3145	Brentwood Bay, Central Saanich	3	Inconclusive; narrowed down to a couple blocks; discharge dry in summer	CRD to continue investigation
3150	Brentwood Bay, Central Saanich	2	Inconclusive; access difficult	CRD to continue investigation

ENVIRONMENTAL CONCERN

CRD assesses environmental concern in water and sediment from stormwater, pipes, ditches and streams based on their potential impact to 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 (heavy metals and hydrocarbons). 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. These methods are described in Appendix G.

2019 Monitoring Results

In 2019, staff collected 18 sediment samples on the Saanich Peninsula: 12 at the point of discharge (to measure potential contamination to the marine receiving environment), and six upstream in stormwater catchments of concern (to determine sources of contamination or measure watershed health).

Staff assigned no new high contaminant ratings in 2019, but did assign a moderate rating in discharge 3021 (Sidney). Three discharges on the Peninsula (441, 3005 and 3138) are on the list of discharges requiring corrective action, due to multiple high ratings in previous years. Locations of these discharges are shown in Figure A and Appendix A. See below for more details on these discharges.

Discharges Requiring Corrective Action

Discharge 3138 (Tsartlip Boat launch) and two others [Mermaid Creek (3005) and 441 (Reay Creek)] have been a concern for a number of years and are on the list of discharges requiring corrective action. However, discharge 3138 received a low rating in 2019, indicating that the contamination may have been removed. 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 conducted numerous upstream investigations, however, sediment is difficult to find within the infrastructure. Sampling results indicate that metals from stormwater have impacted the marine receiving environment. CRD staff will continue to work with Sidney to determine 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, to address concerns about contamination in the creek. Transport Canada has designated Reay Creek Pond as a contaminated site and remediated Reay Creek on Victoria Airport Authority lands in 2019. Transport Canada plans to remediate the pond in summer and fall of 2020.
- Discharge 3138 carries flows from Tsartlip land and is a concern, due to elevated zinc concentrations. Aged corrugated pipes are a potential source. In 2018, Tsartlip installed a new stormwater pipe along the ditch at Stelly's Cross Road and CRD measured lower zinc levels in this discharge in 2019, which resulted in a low rating. CRD staff will confirm these lower measurements in 2020 and if zinc remains low, this discharge will be removed from the action list.

Aqueous Metals

In 2019, staff measured the concentration of metals in stormwater from the discharge of 15 pipes and streams. Staff randomly chose the sampling locations that included discharges with low (eight), moderate (two), and high (one) environmental concern ratings and four that have not been previously assessed for environmental concern.

Metal concentrations in samples from three of the discharges [3005 (Robert's Bay), 449 (Tulista Park), 405 (Island View Beach)] exceeded guidelines for freshwater aquatic life (copper, iron and/or zinc), as follows:

- discharge 3005 (Robert's Bay) had elevated copper,
- discharge 449 (Tulista Park) had elevated copper, iron and zinc, and
- discharge 405 (Island View Beach) had elevated iron.

Staff also compared the data from these discharges to guidelines protective of marine aquatic life as they flow into the ocean, with the following results:

- nine of the discharges exceeded the marine guideline for copper (416, 445, 449, 3005, 3021, 3090, 3133, 3138, 3146),
- five of these exceeded the marine guideline for zinc, as well (445, 449, 3005, 3090, 3146),
- discharge 405 from Island View Beach exceeded the guideline for cadmium, and
- concentrations of copper and zinc were highest in 449, with concentrations more than five times greater than the marine guideline.

The concentration of metals will be diluted once the stormwater enters the marine environment; however, the constant flow from some discharges could result in loadings that impact the marine environment. CRD staff will confirm these concentrations in 2020 and further work could involve measuring impact to the receiving environment in areas of concern.

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. While sediment indicates contamination accumulated over a longer time, it can also reflect historical practices that are no longer occurring. In addition, sediment is often not available in some catchments, making it challenging to get samples over time and to track sources.

However, measuring contaminants in water only provides a snapshot assessment of potential contaminant concentrations and results are influenced largely by precipitation; therefore, relative to sediment, more sampling is needed to properly assess potential environmental impact. However, contaminants in water are more ecologically relevant as an indicator, given that they are more bioavailable to aquatic life in the receiving environment.

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, 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 for another year, to better assess both methods. Finally, staff will continue to use both media, depending on availability and budget, to conduct source investigations.

Watercourses

Staff continued to monitor Hagan/Graham, Reay, Tetayut, Tatlow (Chalet), Tén Tén, Tod and Tseycum creeks in 2019, 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 2019, creeks were only sampled at the discharges and none was selected for focused sampling.

Changes over Time

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 land-clearing, agricultural practices and malfunctioning on-site sewage treatment systems. Recent watercourse data is presented in Appendix F.

The 2019 data indicated that water quality in Saanich Peninsula creeks is similar to previous years, with a few exceptions:

- While phosphorus levels are elevated in nearly all urban creeks in the CRD, staff have measured lower ortho-phosphate level in Tén Tén, since 2014. Conversely, ortho-phosphate appears to be increasing in Reay, Hagan and Tod creeks in recent years.
- Nitrate spiked in Tén Tén Creek in fall of 2018, but data indicates it may have stabilized since then.
- Data indicates that turbidity has increased in Tod Creek since 2018.

In 2020, CRD staff will continue to monitor these creeks and work with municipal staff to locate sources of bacterial and chemical contamination. In 2020, CRD staff will be conducting focused sampling in the Hagan/Graham watershed.

Quality Assurance

The 2019 data met quality assurance/quality control 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. Two of the 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.

Staff have collected baseline data in two creeks that drain industrial areas, and sediment sampling continues to identify metal and hydrocarbon 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.

Education

CRD data has indicated that poor agricultural practices and malfunctioning on-site sewage systems are the most common sources of bacterial contamination in stormwater on the Peninsula. CRD staff continue to work with the Saanich Peninsula and Area Agriculture Commission on effective water management (stormwater and potable water). In addition, CRD conducted a septic savvy workshop near Elk Lake in Saanich, which was advertised in the Saanich Peninsula in 2019. Two other workshops were conducted in the region; all were well attended.

In 2019, the CRD conducted regulatory education and outreach to local government, business owners and property management companies in relation to the *Saanich Peninsula Stormwater Bylaw (No.4168)*. This outreach concentrated on public and municipal engagement and communication, as well as creating tools for inspection officers and business owners. This included educational mail-outs, rack card production, media releases, presentation at the BC Water and Waste Association conference, direct communication with municipal directors, updating brochures on preventing stormwater contamination from storage areas and parking lots, and the creation of a stormwater bylaw landing page.

Finally, CRD provided watershed educational programs and engaged 166 elementary-aged kids and 24 adults. CRD also continued to award Ollie the Otter Watershed Warden badges to elementary-aged kids who have done activities to restore or protect our regional watersheds.

REFERENCES

CRD, 1996. Saanich Peninsula Liquid Waste Management Plan.

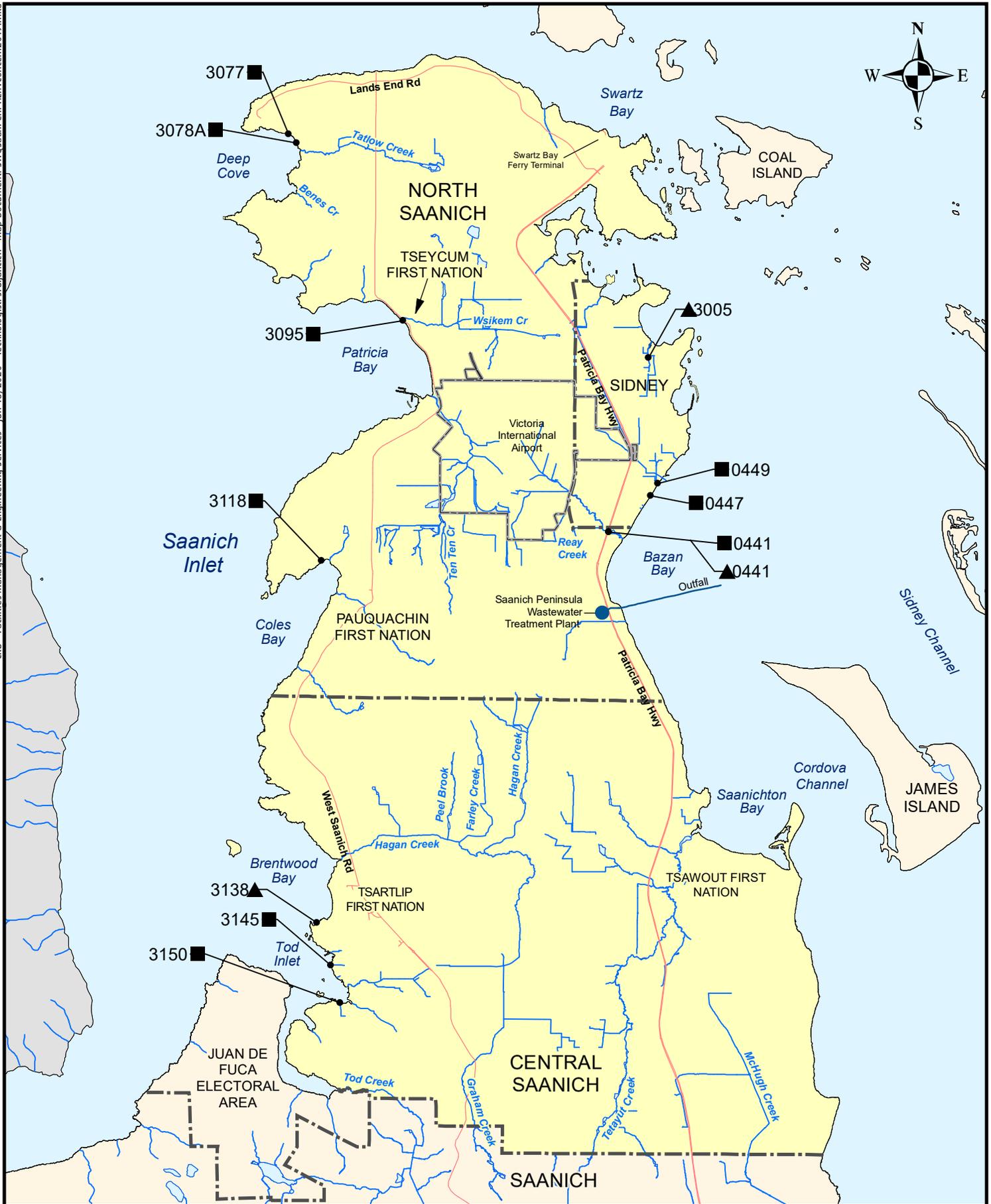


Figure A- Saanich Peninsula - Stormwater Discharges Rated High for Public Health or Environmental Concern

CRD
Making a difference...together

0 0.5 1 2 Kilometres

Projection: UTM ZONE 10N NAD 83

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 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