

**APPENDIX A**

**STORMWATER PROTECTION ACTIVITES  
BY THE SAANICH PENINSULA  
JURISDICTIONS**



## APPENDIX A

### JURISDICTIONAL INVOLVEMENT WITH STORMWATER QUALITY ISSUES

#### TABLE OF CONTENTS

1.0 INTRODUCTION.....	4
2.0 ROLES AND RESPONSIBILITIES FOR THE PROTECTION OF STORMWATER QUALITY .....	4
2.1 Municipal .....	4
2.2 First Nations .....	4
2.3 Regional .....	4
2.4 Provincial Government.....	5
2.5 Federal Government .....	7
3.0 STORMWATER RELATED ACTIVITIES.....	9
3.1 Capital Regional District 1984 Saanich Peninsula - East Coast Stormwater Quality Survey.....	9
3.2 CRD Waste Management Permit Monitoring.....	9
3.3 Vancouver Island Health Authority.....	10
3.4 Health Canada .....	10
3.5 Saanich Inlet Study - Ministry of Environment .....	10
3.6 Victoria Airport Authority .....	12
3.7 Transport Canada .....	13
3.8 Institute of Ocean Sciences .....	14
3.9 Swartz Bay Ferry Terminal .....	15
4.0 SAANICH PENINSULA MUNICIPAL COMMITMENTS AND ACTIVITIES .....	16
4.1 District of Central Saanich .....	17
4.1.1 Discharges with a High Public Health Concern Rating.....	17
4.1.2 Discharges with a High Chemical Contaminant Rating .....	17
4.1.3 District of Central Saanich Commitments .....	19
4.2 Town of Sidney .....	20
4.2.1 Discharges with a High Public Health Concern Rating.....	20
4.2.2 Discharges with a High Chemical Contaminant Rating .....	20
4.2.3 Town of Sidney Commitments.....	20
4.3 District of North Saanich .....	21
4.3.1 Discharges Rated High for Public Health Concern.....	21
4.3.2 Discharges with a High Chemical Contaminant Rating .....	22
4.3.3 District of North Saanich Commitments.....	22
5.0 SAANICH PENINSULA FIRST NATIONS .....	22
5.1 Tsawout First Nation .....	23
5.2 Tseycum First Nation .....	23
5.3 Pauquachin First Nation.....	23
5.4 Tsartlip First Nation.....	24
6.0 REFERENCES.....	25
7.0 PERSONAL COMMUNICATION .....	25

#### LIST OF FIGURES

Figure 1. Areas Serviced by Sewage Collection Systems and Location of Sewage Outfalls in 2007..... 18

## APPENDIX A

### JURISDICTIONAL INVOLVEMENT WITH STORMWATER QUALITY ISSUES

#### 1.0 INTRODUCTION

The management of stormwater and its impact on the freshwater and marine environments is the responsibility of a number of jurisdictions and is of interest to various organizations and the public. The first section of this Appendix (Section 2.0) provides a general summary of roles and responsibilities of the different levels of government and First Nations involved with stormwater issues on the Saanich Peninsula. The second section (Section 3.0) provides more detailed information regarding water quality studies and other stormwater related activities that have been completed by various organizations on the Saanich Peninsula and surrounding waters. Most of the activities have been undertaken within the catchment areas of major creeks on the Saanich Peninsula due to fish habitat potential and on the west side of the peninsula, due to the sensitivity of the Saanich Inlet. Section 4.0 provides commitments and activities by the municipalities of Central Saanich, North Saanich and Sidney. Section 5.0 provides the activities within the boundaries of the four Saanich Peninsula First Nations.

#### 2.0 ROLES AND RESPONSIBILITIES FOR THE PROTECTION OF STORMWATER QUALITY

##### 2.1 Municipal

Municipalities are responsible for stormwater runoff (i.e. storm drains) and have powers to protect water quality through official community plans (OCPs) and bylaws. OCPs contain community goals and objectives and can state policies regarding protection of stormwater quality. The OCPs can also designate areas requiring special management and guidelines to protect water quality. Bylaws can also be developed to protect stormwater quality and quantity by prohibiting the discharge of contaminants, protecting riparian areas, preventing an increase in stormwater flows and requiring treatment of stormwater under certain circumstances.

In 1994 and 1995 the Capital Regional District (CRD) developed a draft Model Storm Sewer Bylaw for optional adoption by municipalities. This bylaw has been updated (now called the Model Storm Sewer and Watercourse Bylaw) and is currently available for adoption by the municipalities. The Model Storm Sewer and Watercourse Bylaw and its enhancements are discussed further in Section 2.3.

##### 2.2 First Nations

First Nations are responsible for stormwater on their lands. The First Nations and Health Canada usually address stormwater pollution issues on First Nation's land. Health Canada will carry out sampling investigations if requested by the band.

There are opportunities for First Nations to adopt a bylaw that will allow for protection of stormwater quality similar to the Model Storm Sewer and Watercourse Bylaw discussed in Section 2.3 (Humphry, pers. comm.).

##### 2.3 Regional

The authority for the CRD Stormwater, Harbours and Watersheds program to control pollution in stormwater runoff from the land by investigating, monitoring and reporting on stormwater and sediment quality on the Saanich Peninsula comes through the Saanich Peninsula Liquid Waste Management Plan (SPLWMP, CRD, 1996). This work is undertaken in consultation with the jurisdictions involved. The CRD does not have the authority to directly implement any mitigative measures. This is the responsibility of the municipalities under the *Community Charter* and *Local Government Act* and First Nations.

In 2001, CRD staff created the Model Storm Sewer and Watercourse Bylaw and presented it to the CRD Board. The objectives of this bylaw are to:

- protect stormwater collection systems
- protect the receiving environment, public health and safety
- develop consistent regulations throughout the CRD
- promote good waste management practices
- update existing municipal storm sewer regulations, particularly with regard to the quality of discharges to storm sewers and watercourses

The model bylaw is designed to allow the incorporation of stormwater codes of practice that set out regulatory requirements under which various business sectors will be required to operate to prevent stormwater contamination. Eleven business sectors were initially identified for model codes of practice development. To date, six of these codes and two best management practices (BMPs) (voluntary strategies for preventing stormwater pollution) have been developed and are available for municipal adoption with the bylaw:

#### **Code of Practice**

- *Code of Practice for Automotive and Parking Lot Operations*
- *Code of Practice for Development and Construction Activities*
- *Code of Practice for Streets and Roads*
- *Code of Practice for Recreation Facilities*
- *Code of Practice for Recycling Operations*
- *Code of Practice for Outdoor Storage Yard Operations*

#### **Sector Specific BMPs**

- *Painting Without Pollution*
- *Power Washing Without Pollution*

The codes and bylaw form a component of a stormwater source control program to reduce contaminant inputs to the stormwater system by working with businesses to reduce or eliminate their contaminant discharge to stormwater. In 2007, SHWP staff began investigating options to create a stormwater source control program on the Peninsula with the cooperation of the municipalities. Work will continue on this initiative in 2008 with the goals of protecting the environment and reducing the number of discharges rated high for environmental concern.

#### **Vancouver Island Health Authority**

The Vancouver Island Health Authority (VIHA) investigates complaints if a sewage treatment system treats less than 5,000 gallons per day and is suspected of polluting stormwater. The *Health Act* and Sewage Disposal Regulation give them the power to complete the investigations. When a problem with a failing septic tank and field is identified the owner is notified and required to complete the repairs. Federal properties and First Nation's land are usually investigated by Health Canada.

#### **2.4 Provincial Government**

The following are the most pertinent pieces of provincial legislation related to stormwater quality. Most of this information was taken from *Tackling Non-Point Source Water Pollution in British Columbia* (Ministry of Environment, Lands and Parks, 1998):

- The Community Charter provides local municipalities with the power to adopt zoning, subdivision and other bylaws, permit construction, develop solid and liquid waste management plans, provide water and sewer services and address environment concerns. The municipalities can enact bylaws to control surface runoff, prohibit pollution and obstruction of flows in watercourses and allow the

development of environmental policies regarding protection and enhancement of the environment in OCPs.

- The Local Government Act provides regional government with the authority to adopt zoning, subdivision and other bylaws, permit construction, develop solid and liquid waste management plans, provide water and sewer services and address environment concerns.
- The Water Act provides for approval of all water use, storage and diversion of water and works in and about streams. This is important for preventing activities that may negatively impact a stream.
- The Water Protection Act confirms Crown ownership of surface and groundwater and prohibits large-scale diversion or removal of water. This allows for the protection of the amount of flows being diverted from a creek or stream, which is vital for survival of aquatic life.
- The Environmental Management Act (formerly the Waste Management Act) requires permits, approvals or operational certificates under a liquid and solid waste management plan for discharges to land, air and water, and handling of solid and toxic wastes; prohibits dumping/discarding litter and sewage. The Ministry of Environment (MOE) (previously Ministry of Water, Land and Air Protection (MWLAP)) regulates sewage treatment facilities with sewage flows greater than 5,000 gallons/day. The Act can also require the development of measures to prevent a spill of a potentially polluting substance by the person in possession of the substance. The Provincial Emergency program (PEP) was initiated to protect people and property during disaster situations and is also the contact for reporting spills that can cause harm to public health and the environment such as oil spills. When an incident is reported to PEP they will contact the agency responsible for investigating the problem. The phone number for PEP is 1-800-663-3465.
- The Environmental Assessment Act requires environmental impact assessment for specific development projects and activities. This will allow MOE to request proposed development projects to consider stormwater quality issues.
- The Fish Protection Act protects fish by ensuring healthy fish-bearing streams and plentiful stocks. Stormwater pollution can impact the health of streams and aquatic species.
- The Pesticide Control Act regulates the use and application of pesticides. Pesticides have the potential to contribute pollution to stormwater runoff if not applied properly.
- The Health Act regulates approval of construction camps, public water supplies, sewage disposal, sanitation and food supply operations. This Act can be used to prevent pollution of stormwater from the mentioned operations.
- The Fire Services Act provides approval of onsite fuel storage and dispensing. Through this Act proper installation of fuel storage and dispensing facilities can be ensured to protect stormwater quality.
- The Soil Conservation Act established permitting requirements for soil removal from an agricultural land reserve and regulates use of land in agricultural land reserves. Some agricultural activities have the potential to contribute stormwater pollution, especially if soil erosion occurs, causing sedimentation in streams.
- The Farm Practices Protection (Right to Farm) Act ensures that farmers can farm in agricultural land reserves; adds specific powers to local governments; may regulate farm conduct and prohibit specific farm operations.

In 1997, the provincial government passed the *Fish Protection Act* to protect fish from the negative impacts of development. *Section 12 of the act authorizes the Province to establish policy directives regarding the protection and enhancement of riparian areas that the Lieutenant Governor in Council considers may be subject to residential, commercial or industrial development* (Ministry of Environment, 2005).

Effective March 31, 2005 and enabled by the *Fish Protection Act*, the *Riparian Areas Regulation (RAR)* provides local government with the necessary tools to protect fish and fish habitat. The RAR applies to streams, rivers, ditches, ponds, lakes, springs and wetlands and sets out provisions to protect the stream side vegetation and soils during new residential, commercial and industrial development on land under local government jurisdiction. The following key components of the regulation were taken from the Riparian Areas Regulation Implementation Guidebook (MOE, 2006):

- Local government may permit development within 30 m of the high water mark of a stream or top of bank of a ravine provided the prescribed riparian assessment methods have been followed.
- A qualified environmental professional (QEP), using the riparian assessment method, shall provide an opinion -in an assessment report- that the development will not result in a harmful alteration of fish habitat and will provide required measures to protect the riparian area during development.
- The assessment methodology in the Schedule of the Regulation ensures that the assessment has been conducted to a standard level and that the standard reporting format is followed.
- The Regulation is based on current science regarding fish habitat, while recognizing the challenges in achieving science-based standards in an urban environment.

Also, in 2002, the provincial government developed *Stormwater Planning: A Guidebook for British Columbia*. This guidebook is intended to provide a framework for effective stormwater management that is usable in all areas of the province. The guidebook explains how stormwater systems have traditionally been developed and promotes an integrated approach to stormwater management which includes:

- identifying at-risk drainage catchments
- setting preliminary performance targets
- selecting appropriate stormwater management site design solutions

## **2.5 Federal Government**

The following are the most pertinent pieces of federal legislation related to stormwater quality. This information was taken from *Tackling Non-Point Source Water Pollution in British Columbia* (MWLAP, 1998):

- The Fisheries Act prohibits harmful alteration of fish habitat and the deposit of deleterious substances. This Act applies to creeks, streams and storm drains that flow into watercourses and the marine shoreline where fish are present and can be used to prevent pollution and destruction of watercourses with fish.
- The Canadian Environmental Protection Act requires certain facilities such as manufacturing or processing businesses to report when a toxic substance has spilled into a watercourse or storm sewer.
- The Canadian Environmental Assessment Act requires environmental impact assessment of all projects funded or authorized by the federal government or which take place on federal lands. An environment impact assessment usually includes impacts to water quality that will allow the awareness of a potential impact to stormwater quality and allow requirements to prevent the impact from occurring in advance.
- The Canadian Wildlife Act and the Migratory Bird Conventions Act protects wildlife, migratory birds and associated habitats. Associated habitats include wetlands and the marine shoreline, which can be sensitive to stormwater pollution.
- Canada Shipping Act regulates shipping, including ship-sourced pollution and the designation of water bodies under the Pleasure Craft Sewage Pollution Regulations and Non-Pleasure Craft Sewage Pollution Regulations.

- The Transportation of Dangerous Goods Act defines safety requirements for transport of dangerous goods. This can prevent accidental spills of toxic substances from occurring in watercourses and the marine shoreline while being transported.

### **3.0 STORMWATER RELATED ACTIVITIES**

#### **3.1 Capital Regional District 1984 Saanich Peninsula - East Coast Stormwater Quality Survey**

In 1982 and 1983, CRD staff carried out a shoreline discharge survey along the east coast of Saanich Peninsula from Cowichan Head to Roberts Point (Lomas, 1984). All stormwater discharges along this coastline were sampled and analyzed for fecal coliform bacteria. Each discharge was rated low, moderate or high based on their level of public health concern. The survey rated nine discharges (414, 419, 426, 428, 432, 449, 450, 451, 458) high for public health concern. Of these nine discharges, only one (449) was rated high in the *Stormwater Quality Annual Report, Saanich Peninsula - 2005*. However, the ratings system used in 1984 to determine the ratings has since been enhanced and is not the same as the rating system used in 2006.

#### **3.2 CRD Waste Management Permit Monitoring**

The CRD has been operating the Saanich Peninsula wastewater treatment plant (SPWWTP) since February 2000. The SPWWTP discharges into Bazan Bay approximately 1580 metres from the shoreline at a depth of approximately 25 metres.

As part of the SPLWMP, commitments to develop a long-term monitoring program were made. Pre-discharge monitoring results (1999) combined with post-discharge monitoring results (2000 to 2004) were used to develop a long-term monitoring program in consultation with the Marine Monitoring Advisory group (MMAG).

The 2006 Wastewater and Marine Environment program (WMEP) consisted of the following components:

- wastewater monitoring for compliance and treatment plant performance and to profile the chemical and physical constituents of influent and effluent
- biosolids monitoring for land application regulatory guidelines for the protection of human and environmental health
- surface water monitoring for fecal coliforms to assess the potential human health risk related to the SPWWTP wastewater discharge
- marine surface water monitoring for nutrient concentrations in the receiving environment to validate the variability observed in the pre- and post-discharge assessment program and to evaluate any potential effects related to the SPWWTP discharge on the marine receiving environment

Overall, the results of the effluent quality and surface water monitoring conducted in 2006 have indicated no negative effects from the SPWWTP discharge on the receiving environment. Effluent quality was within expected parameters and met all operating certificate compliance requirements. Substances for which there are British Columbia Water Quality Guidelines met these guidelines after minimum initial dilution of the effluent. Most substances met the guidelines before minimum initial dilution was taken into consideration, indicating that the substances measured in the discharge were not at concentrations of concern. Effluent and biosolids trend analyses indicated a general decrease in concentrations of many substances (e.g., some metals) over time. All biosolids results were well below the BC Organic Matter Recycling Regulations (BC OMRR) Class A limits, indicating they can be applied to land. All surface water data were below 200 CFU/100 mL indicating that risk to recreational primary contact is not expected. Nutrient concentrations showed no effect from the discharge.

For more information on the SPWWTP WMEP results, please refer to the *CRD Saanich Peninsula Treatment Plant Wastewater and Marine Environment Program 2006 Annual Report (2007)*. Prepared by the Capital Regional District, Victoria, BC.

### **3.3 Vancouver Island Health Authority**

The VIHA collects bathing season fecal coliform samples from nearshore marine waters and lakes where swimming occurs to determine whether beach advisories are necessary. The VIHA also undertakes investigations for sources of fecal coliform bacteria.

The VIHA has reviewed data on the number of onsite sewage system failures in North Saanich and Central Saanich from 1985 to 1995 (Bender and Dyck, 1996). Onsite sewage system data from Central Saanich indicated no significant clustering of failures. The entire Town of Sidney has a sewage collection system and therefore this study did not apply. However, the study found that the southeast quadrant of North Saanich and Deep Cove had onsite sewage system failure rates of approximately 50%.

Since the VIHA report, the District of North Saanich has constructed a sanitary sewer collection system in the south east quadrant area and began connecting properties to the system in 2002. Some storm sewer upgrading was also carried out in conjunction with this work. In addition, the District of North Saanich completed the construction of a sanitary sewage collection system in McDonald Park, Deep Cove and Patricia Bay in November 2007. Residential connection to the system has commenced and all properties are expected to be connected in the spring of 2009 (Robinson, pers. comm.). The goal of the District of North Saanich is to meet the criteria as set out in the SPLWMP (Parry, pers. comm.).

### **3.4 Health Canada**

Health Canada is involved with environmental health of federal properties and areas of public use such as the Institute of Ocean Sciences (IOS) and the BC Ferry terminals and fleet. They also provide an environmental health advisory role to First Nations. Their assistance to First Nations includes sampling investigations when health concerns are raised.

In 1997, at the request of Tseycum First Nation and due to concerns of high fecal coliform counts in Tseycum Creek, Health Canada undertook an investigation to identify the source of elevated fecal coliform bacteria in Tseycum Creek. From this investigation, Health Canada identified a farm in North Saanich as a possible contributor.

Water samples from Tseycum Creek were also collected to analyze for ammonia, nitrates, nitrites, phosphate and total suspended solids (TSS). The result of the sample analysis was provided in a letter to Chief Vern Jacks (Tseycum First Nation) from Mr. Don MacVicar, Health Canada, dated July 11, 1997. The letter states that "although some of the results are low, overall the results are indicative of water rich in nutrients with the possibility of human or animal contamination".

### **3.5 Saanich Inlet Study - Ministry of Environment**

In 1995, the MOE funded a water quality assessment for Saanich Inlet (Drinnan et al., 1995). This assessment included sampling stormwater discharges for a variety of contaminants such as metals, polycyclic aromatic hydrocarbons (PAH), fecal coliform bacteria and nutrients. The report also included a review of historical data collected in the inlet and from major tributaries on the peninsula.

The following summarizes the findings of the Saanich Inlet report for water quality studies:

### **Fecal Coliform Bacteria**

The available data clearly shows that the bivalve shellfish harvesting standard is exceeded in many areas of Saanich Inlet. These closures have been identified as evidence of overall pollution of the inlet and are unacceptable to most users. The long-term objective identified by respondents to the Saanich Inlet study is to be able to harvest bivalve shellfish.

Monitoring by regional health authorities have shown that fecal coliforms at popular beaches are within the criterion of 200 FC/100 mL. However, these programs are conducted only during the summer when public use is high. Contamination of nearshore waters is greatest during wet weather and there is evidence that some areas of Saanich Inlet would exceed the primary contact criterion for other water uses such as scuba diving in winter (Drinnan et al., 1995).

According to the 1995 sampling results of the study and Environment Canada data, the nearshore marine waters off Deep Cove and Patricia Bay had the highest fecal coliform levels. There were two stations in Deep Cove with fecal coliform counts of 330 FC/100 mL and one with 110 FC/100 mL. Patricia Bay had fecal coliform counts of 640 FC/100 mL and 830 FC/100 mL at two different stations. These elevated levels are likely related to activities on land. The 1995 survey also indicated that higher fecal coliform levels existed in discharges from more heavily populated and unsewered areas, especially Deep Cove and Patricia Bay. Recent construction of a sanitary sewage collection system in McDonald Park, Deep Cove and Patricia Bay is expected to lower fecal coliform input into these areas.

### **Metals Contaminants**

Bottom sediments in Tod Inlet and adjacent to the marinas in Brentwood Bay had high concentrations of several metals. The sources of contaminants in marinas such as Brentwood Bay include anti-fouling materials used on boats and permanent structures, dumping of materials from boats and from shore and stormwater runoff. In Tod Inlet the terrestrial source of contaminants may be historical, originating from Hartland landfill leachate or from private marina and mooring (Drinnan et al., 1995).

Please note that the MOE guidelines were used to assess metal concentrations in sediment in Saanich Inlet. These guidelines are more stringent than the CRD Marine Sediment Quality Guidelines.

### **Organic Contaminants**

Elevated PAHs were measured in sediment from Tod Inlet and Brentwood Bay (near the marinas and at the mouth of Tén Tén Creek). Pesticide concentrations in sediments were not elevated.

### **Nutrients**

No nearshore sampling for nutrients was carried out during this study, however, observations of increased seaweed and benthic diatom mats near the shoreline and at the mouth of some tributaries, indicate increased nutrients. Estimates of nitrogen generated within the watersheds show septic fields and agricultural areas to be the largest contributors, entering via tributaries or runoff water (Drinnan et al., 1995).

### **Suspended Solids**

The study found that Saanich Inlet has low levels of suspended solids entering from tributaries and runoff compared to other coastal inlets. However, there are concerns over occasional increases in suspended solids from land use activities such as road construction, land clearing and agricultural activities.

### **3.6 Victoria Airport Authority**

In 1998, the Victoria Airport Authority (VAA) developed a Stormwater Management Plan (Delcan, 1998) to address stormwater quantity and quality issues at the airport. Most of the stormwater runoff from the Victoria International Airport (VIA) flows through two creeks, Tén Tén Creek (discharge 3104) and Reay Creek (Discharge 441). Both creeks have been sampled by CRD staff for fecal coliform and chemical contaminant concentrations to assess risk to public health and the environment respectively.

The following summarizes recent activities undertaken by the VAA to improve stormwater quality in the area:

- The VAA conducts water quality monitoring in Reay and Tén Tén Creek. The current monitoring program includes weekly 24-hour composite samples taken at one location in each of Reay Creek and Tén Tén Creek at the border of airport lands. Some of the parameters monitored include dissolved oxygen (DO), temperature, pH, hardness, TSS, ammonia, phosphates, oil and grease, total glycol, fecal coliform and metals.
- Farming operations are also carried out on VIA land. VAA monitors their farm operations through weekly and monthly fecal coliform and E.coli counts. Monthly grab samples are also taken at sites on and off airport property to monitor receiving waters and determine if there are any downstream impacts.
- There are many tenants on VIA property with industrial uses. Although all tenants discharge wastewater to sanitary sewer, improper storage, handling or disposal practices can result in stormwater pollution. The VAA undertakes annual tenant inspections to ensure that the tenant's operations and facilities are in compliance with federal, provincial and airport regulations. In 2006, the VAA retained Bethell Associates Ltd. to undertake an independent environmental audit of seven facilities operating at VIA. These audits were a follow-up to the recommendations identified in the 2005 audit completed by SEACOR. Information from these audits was used to make recommendations for addressing potential environmental risk and frequency of future site audits.
- As well, the authority has an active surveillance program to ensure all construction activities are strictly controlled with respect to pollutant release.

The following discusses issues related to stormwater quality at the Victoria Airport.

#### **Parking Lot Expansion**

In 2006, the VAA undertook an expansion of their long-term parking lot. The newly expanded parking lot encompasses rainwater management and landscaping techniques meant to minimize runoff and maximize environmental protection. The parking lot brings together rain gardens, vegetated swales, bioretention ponds and landscaped berms that consist of native vegetation adapted to flooding in the winter and drought in the summer. The intent of the parking lot concept was to ensure that all runoff from the impervious surface was directed into vegetated catchment areas where it can be held and treated before being discharged into the local watercourses.

#### **Reay Creek**

Flows for Reay Creek (discharge 441) originate from Victoria Airport land, flow through Sidney and discharges along the North Saanich coastline near Bazan Bay. In 1999, Town of Sidney and CRD staff identified a source of high fecal coliform bacteria during upstream investigations. This source, located within the Town of Sidney, was remediated in 1999. The creek had low fecal coliform counts in 2000, 2001 and 2002. However, in 2003, fecal coliform counts were slightly elevated and the discharge was rated moderate for public health concern. Since 2004 this creek has had low fecal coliform counts and has been rated low for public health concern. Reay Creek will continue to be monitored for change in 2008.

In 2004, sediment sampled by CRD SHWP staff in Reay Creek had high cadmium and zinc concentrations at the point of discharge and slightly elevated cadmium concentrations at an upstream location. In 2005, quarterly monitoring of this creek was undertaken. Although contaminant levels fluctuated from station to station throughout the year (see Appendix G), cadmium and zinc continue to be the contaminants of concern. A source of cadmium contamination has been identified and remedial efforts were initiated in 2007. VAA has removed contaminated sediment and surrounding soil from Reay Creek and there are plans to remove more contaminated material in 2008.

CRD will continue monitoring sediment quality for spatial and temporal changes in contaminant levels in Reay Creek. It is anticipated that the efforts taken by VAA to remove contaminated material and limit additional contaminant inputs into Reay Creek, along with continued water quality monitoring will assist in restoring the health of Reay Creek.

### **De-icing at the Victoria International Airport**

De-icing substances are used at VIA to remove ice from aircraft and runways for safety reasons. In 1999, as requested by the Saanich Peninsula Wastewater Committee, CRD staff investigated the use of de-icing substances at the airport to determine if they pose a risk to the environment (Larose, 1999). The following are the results of the investigation.

De-icing substances are generally used at the airport between November and March depending on the weather. A glycol based substance is used for de-icing the aircraft and urea is used for de-icing the runways. Environmental issues related to the use of these substances include the toxicity of glycols, ammonia (from the breakdown of urea) and the unknown additives included in the products that are proprietary. Glycol toxicity is low according to some studies; however the additives associated with glycol have been shown to be more toxic than glycol. The amount of de-icing substances used at the Victoria airport is small and the potential impacts related to their use are probably minor.

To address possible contamination from de-icing, VAA purchased a vacuum sweeper for collecting the glycol waste on the terminal apron where the aircrafts are de-iced. Each morning after de-icing has taken place, the sweeper is used. In consultation with the CRD Regional Source Control program (RSCP), VAA installed a valve, which allows airport staff to send urea and glycol to the sanitary sewer during application (Ouellette, pers. comm.).

The airport is currently under permit with the RSCP for the discharge of ethylene glycol to sanitary sewer. This permit requires the VAA to contain the glycol and implement a waste glycol management plan. Presently, specific limits must be met (RSCP Sewer Use Bylaw limits) to discharge the waste to the sanitary sewer from the airport's 27 m<sup>3</sup> glycol tank. In addition, the VAA has a program in place to deal with fuel spills and a maintenance program for hydrocarbon removal in the catchbasins and glycol tank.

The VAA has constructed a glycol storage and dispensing facility that will centralize and minimize glycol used at the terminal apron. The new facility is expected to be in operation by winter of 2008 and will allow for a greater dilution of glycol to water thus minimizing potential environmental impacts.

### **3.7 Transport Canada**

Transport Canada owns the property on which the VIA resides. Since 1997, the VAA has been operating the airport under a 60-year lease. At the time of transfer, the federal government had five contaminated sites at the VIA. These contaminated sites include:

1. an east airport dumpsite located on the east side of Tén Tén Creek
2. a west airport dumpsite located on the west side of Tén Tén Creek
3. fuel contaminated soil at Transport Canada's de-commissioned fire training area
4. fuel contaminated soil at the Department of National Defence's (DND) fuel depot
5. lead contaminated soil at Transport Canada's de-commissioned rifle range

To date, the fire training area has been remediated by VAA, the fuel depot has been remediated by the DND and the rifle range has been remediated by Transport Canada. Transport Canada maintains the dumpsites in its contaminated sites inventory and is managing them in accordance with Transport Canada's Contaminated Sites Management Plan (Watson, pers. comm.). In recent years, Transport Canada has undertaken several environmental projects relating to VIA and Tén Tén Creek. These projects are as follows:

- An investigation of Tén Tén Creek in 1999/2000 was conducted in partnership with VAA and DND to assess the environmental condition of the creek with respect to potential contaminants and their sources. The report titled, Airport (Tén Tén) Creek Investigation at Victoria International Airport, August 2000 details the program, results and recommendations.
- Transport Canada completed a detailed environmental assessment of dumpsites in 2000. The work did not identify any contamination in groundwater exceeding freshwater criteria. TC maintains the dumpsites in its contaminated sites inventory and is managing them in accordance with Transport Canada's Contaminated Sites Management Plan.
- A geo-technical assessment of the east and west landfills along Tén Tén Creek was undertaken in 2001. The program included topographic survey of Tén Tén Creek, geophysical survey, preliminary geo-technical assessment, hydraulic assessment of areas where potential bank erosion may be of concern and mapping assessment of debris exposed in and along the creek banks.
- In 2002, Transport Canada conducted a debris removal and slope stabilization program along Tén Tén Creek. This program involved mapping of debris locations and assessment of geo-technical conditions, including slope stabilization and erosion potential, prior to debris removal. Nearly 80 tonnes of debris, comprised of building and demolition materials and refuse, were removed by Golder Associates Ltd. and Royal Roads University during this program.
- In October 2002, Transport Canada commissioned Golder Associates Ltd. to conduct a technical review of the stream enhancement along Tén Tén Creek. The review was commissioned to ensure appropriate in-stream design, hydrological analyses and the Department of Fisheries and Oceans Canada (DFO) review and was undertaken to ensure minimal impact on downstream features such as the landfills.
- In 2004, the dumpsites were classified with respect to the Canadian Council of Ministers of the Environment (CCME) National Classification System for Contaminated Sites. Both dumpsites scored as Class 3 sites meaning that the available information indicates that this site is currently not a high concern.

### **3.8 Institute of Ocean Sciences**

There are five stormwater discharges that carry flows from the IOS property into Patricia Bay. In 2007, discharge 3105 was visited. Although there was no flow from the discharge during the visit, it was rated moderate for public health concern due to its function as a sewage pump station overflow. This discharge was also rated moderate for the same reason in 2005 and 2006. The pump station overflow has now been capped to prevent discharge to the marine environment. In 2006, discharge 3104B was rated low and therefore it was not resampled in 2007.

DFO with the assistance of Public Works and Government Services Canada have installed a number of stormwater treatment devices over the last few years. Program changes have been made to the processes for dealing with boat washing facilities to contain, collect and dispose of hazardous waste materials in an environmentally responsible manner.

The following summarizes previous activities undertaken at the Institute of Ocean Sciences (IOS) to improve stormwater quality in the area:

- In 2001, IOS installed an oil skimming/sediment trapping American Petroleum Institute gravity separator system to treat stormwater flows and minimize contaminant entry into the marine environment. There is no sampling location downstream of the interceptor that is not subject to tidal influence and therefore it is not possible to obtain a sediment sample that is reflective of current IOS discharge. However, water column samples collected on behalf of F&OC staff indicate that contaminant levels discharged to the marine receiving environment are below the CCME environmental quality guidelines.
- In 2001, an inline pipe oil filtering device was installed in the catchment area of discharge (Area E - boat washing facility). When in use, flows from the boat-washing facilities are redirected so that materials removed from hulls of vessels can be collected in a sump and pumped into storage containers for removal as hazardous waste. Once the debris in the sump is removed, stormwater flows are again redirected for discharge to the marine receiving environment.
- The following outlines the maintenance procedures in place for all installed devices:
  - all catchbasins and interceptor pits are inspected monthly
  - all catchbasins are cleaned semi-annually
  - all catchbasins with oil/sediment filter material have sediment material removed, tested and disposed of as hazardous waste (if required). The removal, testing and disposal are undertaken semi-annually. The filter media is replaced annually.
- Interceptors are pumped out annually. The fluids and sediments are tested prior to disposal to ensure that the material is disposed of in an appropriate manner. The interior of the interceptors are examined for structural defects annually.
- Several spill containment centres are located onsite. Spill containment kits are checked monthly and missing supplies are replenished. Back up supplies are located onsite.

In 2003, DFO had major repairs and work completed on the building drainage systems throughout the IOS site. Studies and testing of the drainage systems were completed and potential problem areas were identified and a preliminary plan for implementation of further improvements is in place. The IOS has a trained spill response team onsite and a spill response plan in place, which was developed by the Science Branch Health, Safety and Environment Management System Officer (Barley, pers. comm.).

In 2007, cuck bill check valves have been attached to the outfalls to prevent high water infiltration into the systems.

A Stormwater Management report has been completed for 2006/2007 which sampled and analyzed discharge from the outfalls for a variety of parameters.

For more information regarding IOS activities related to stormwater contact Linda Barley at [Linda.Barley@dfo-mpo.gc.ca](mailto:Linda.Barley@dfo-mpo.gc.ca) or John Cade, Operations Manager at [John.Cade@dfo-mpo.gc.ca](mailto:John.Cade@dfo-mpo.gc.ca).

### **3.9 Swartz Bay Ferry Terminal**

Activities or areas that have the potential to pollute stormwater at the Swartz Bay ferry terminal include large paved parking areas, oil tanks and various maintenance activities for the property.

There are seven stormwater discharges along the coastline of the Swartz Bay ferry terminal property. In 2007, three discharges were sampled (3044, 3045, and 3049); and rated low for public health concern. In 2006, two discharges were rated low (3044 and 3049) and one was not rated (3045) as it could not be accessed a second time due to construction. Discharge 3049 was rated high in 2005 and has been investigated. It was determined that birds roosting in the area were the source of contamination.

In 2004, discharge 3043 was rated high for environmental concern due to elevated concentrations of zinc. In 2000, elevated concentrations of arsenic, mercury and zinc were measured in discharge 3043. No investigations to determine the source of the contaminants were undertaken; however, the most likely source is from automobile-related runoff from the large parking areas.

The following actions have been undertaken by the Swartz Bay terminal to limit sewage and other contaminants associated with the terminal from entering the marine environment:

- Since 2007, oil/water separators have been installed in all seven stormwater systems at the terminal. These separators are designed to remove contaminants prior to discharge to the marine environment, are inspected once a year and are pumped out every two years.
- In 2002, recommendations were made to BC Ferry staff regarding increased maintenance of onsite catchbasins and proper handling and disposal of materials. Currently, catchbasins are inspected twice a year and materials are removed to reduce contaminant migration to the downstream separators.
- There are two above-ground oil tanks on the property, which are double walled and are inspected once a month. In 2003, the last underground tank was replaced with a double walled above-ground tank.
- All of the sewage from the Swartz Bay ferry terminal is treated by secondary sewage treatment. The treatment facility is operated under a permit from the MOE and effluent quality is monitored by MOE and UMA Engineering. The treated water is dechlorinated before discharge to the marine environment.
- All of the ferries that visit the terminal have their own sewage treatment and bilge water oil/water separators. Treated oily-water from the ferries is discharged away from Swartz Bay. Onboard sewage treatment plants discharge continuously following requirements under the Canadian Shipping Act.
- The ferries that use this terminal are re-fuelled by tanker truck. Spill contingency plans are in place and Swartz Bay staff undertakes quarterly spill response exercises. Where possible, staff is trained to contain the spill and cleanup as required. Spills over 100 L in volume are reported to PEP. All spills to the marine are reported to Marine Communication and Traffic Services.

#### **4.0 SAANICH PENINSULA MUNICIPAL COMMITMENTS AND ACTIVITIES**

The following section discusses the commitments made by the three municipalities in the SPLWMP. Comments by municipal staff regarding the status of the commitments have also been provided. Some of the information in this section comes from the Interim Independent Performance Audit of the Saanich Peninsula Liquid Waste Management Plan (Hagarty, 2000). During discussions with each of the municipalities, discharges with a high public health concern were further prioritized for upstream investigations. This information is included within each municipal section. Please note the First Nations on the peninsula do not have commitments in the SPLWMP, therefore, the section on their activities is addressed in a different format.

##### **Sewage Collection and Treatment on the Saanich Peninsula**

In 2000, the Saanich Peninsula Wastewater Treatment Plant (SPWWTP) and marine outfall at Bazan Bay in North Saanich, replaced two of the three older treatment plants on the peninsula. The outfalls connected to the decommissioned plants are used as emergency sewage overflows. The Central Saanich Pollution Control Centre is owned by the Tsawout First Nation and treats sewage flows from their properties. There is also a sewage treatment plant at the Swartz Bay ferry terminal, which treats sewage from the terminal and discharges through a marine outfall. At the North Saanich marina, at Tsehum Harbour, an outfall exists which discharges effluent from a small number of individual sewage treatment plants.

Many other areas of North and Central Saanich are serviced by onsite sewage treatment facilities which have been a source of fecal coliform contamination to stormwater. However, the District of North Saanich constructed a sanitary sewer collection system in the south east quadrant area and began connecting properties to the system in 2002. Some storm sewer upgrading was also carried out in conjunction with this work. In addition, the District of North Saanich completed the construction of a sanitary sewage collection system in McDonald Park, Deep Cove and Patricia Bay in November 2007. Residential connection to the system has commenced and all properties are expected to be connected in the spring of 2009 (Robinson, pers. comm.).

Figure 1 shows the areas that are serviced by a sewage collection system on the Saanich Peninsula.

#### **4.1 District of Central Saanich**

##### **4.1.1 Discharges with a High Public Health Concern Rating**

Discharge 416 (at Ferguson Road beach access) was the only discharge rated high for public health concern along the Central Saanich coastline in 2007, this discharge also received a high rating in 2005 and 2004. Fecal coliform concentrations have varied over the years, but have been elevated in the summers of 2004, 2005 and 2007. A sample collected in 2006 underwent BST analysis; the results did not measure humans as a source. There is some evidence that an otter occasionally inhabits this discharge, therefore fecal coliform sampling in the summer of 2008 will occur after Central Saanich staff has cleaned out the line.

##### **4.1.2 Discharges with a High Chemical Contaminant Rating**

In 2007, one discharge along the Central Saanich coastline (3153; Butchart Gardens, Brentwood Bay) received a high chemical contaminant rating due to copper and zinc. This discharge will be resampled in 2008 to confirm the rating. In 2006, there was one discharge (3154 – Tod Creek) rated high for environmental concern due to a high zinc concentration. This discharge was sampled a second time in 2006 at the point of discharge and at an upstream location. Both of these samples were rated moderate due to elevated zinc concentrations. In 2007, a low rating was assigned for the point of discharge, but the upstream station received a moderate rating. Both the point of discharge and the upstream location will be sampled again in 2008.

**Figure 1. Areas Serviced by Sewage Collection Systems and Location of Sewage Outfalls in 2007**

#### 4.1.3 District of Central Saanich Commitments

In the SPLWMP, related to stormwater quality, the District of Central Saanich has completed or is committed to:

- development of an integrated stormwater management plan for the Hagan Creek, Sandhill Creek and McHugh Ditch watersheds. The terms of reference and request for proposals were developed in 2006 and implementation was initiated in 2007. Stakeholders were invited to participate
- monitoring of water quality in Hagan and Graham creeks by CRD staff, District of Central Saanich, Peninsula Streams Society and Streamkeepers (ongoing)
- adoption of a surface water runoff bylaw to implement no net increase in stormwater flows within the District of Central Saanich
- maintenance and monitoring of rainfall recording stations by municipal staff to generate data for coordination of rainfall data with storm flows in sewers and drains (ongoing)
- adoption of a bylaw for the regulation and protection of natural watercourses, ditches and drains (ongoing)
- adoption of a development cost charge bylaw to generate funds for drainage channel improvements (completed)
- adopting development permit area designations and guidelines for development near riparian areas as part of the OCP (draft OCP being reviewed)
- implementing a requirement for the provision of oil/water separators for stormwater runoff from paved areas associated with commercial and industrial properties (every commercial/industrial building and plumbing permit requires oil/water separators) (ongoing)
- conducting smoke tests, as required, to identify improper connections and correction of problems (as required)
- regular surveillance and maintenance of storm drain systems, including video inspections (video inspections of the entire system is completed every seven to eight years, depending on budgets, and this work is probably the reason for the relatively low number of stormwater discharges rated high for public health concerns along the Central Saanich coastline)
- encouraging and permitting systems to promote groundwater recharge on lots with estate, residential and agricultural zoning (ongoing)
- use of stormwater retention systems and bio filtration swales in new rural and semi-rural subdivisions (ongoing)
- establishing design criteria for stormwater retention ponds (criteria developed and considered at the time of development proposal, however, not formally adopted)
- working towards understanding the needs of agriculture and habitat in stormwater management (Central Saanich staff are working with Department of Fisheries and Oceans (DFO) and BC Ministry of Environment (MOE) regarding ditch maintenance in agricultural zones)
- immediate action on spills (when notified)
- implementing a regular street sweeping program to reduce the introduction of street litter and contaminants into waterways, including a regular catchbasin cleaning program to ensure that catchbasins effectively intercept and retain street litter and contaminants (ongoing)

In addition to the commitments provided in the SPLWMP, Central Saanich upgraded six sewage pump stations for monitoring by the supervisory control and data acquisition (SCADA) in 2004 and seven pump stations in 2005. This telemetric communication network allows for quick response to prevent spills of effluent to watercourses.

Central Saanich is also encouraging all developers to use the Water Balance Model as a guide in designing onsite retention/ground water recharge.

## **4.2 Town of Sidney**

### **4.2.1 Discharges with a High Public Health Concern Rating**

There were six stormwater discharges (449, 451, 458A, 3014, 3015, 3016) rated high for public health concern along the Sidney coastline in 2007. Discharge 458A was also rated high in 2006 and discharge 449 (Oakville and 8<sup>th</sup>) was rated high in 2005.

Upstream investigations by SHWP and Town of Sidney staff in the catchment area of discharge 458A have narrowed down an area of contamination. A sample analyzed by BST, measured humans as one of the sources of fecal coliform bacteria. Sidney staff has conducted dye-testing in the area and worked with a local business to redirect the roof drainage of a nearby building away from a possible source of contamination; however a source of fecal coliform bacteria still exists in this discharge. Investigations will continue in 2008.

Upstream investigations in 2007, for the three discharges that enter All Bay (3014, 3015 and 3016) were inconclusive. The fecal coliform concentrations in the three discharges were lower upon further investigation. Sidney staff has investigated discharge 3016, however a source was not found. SHWP staff will continue work to identify the sources in 2008.

Most of the sources of contamination within the Town of Sidney are suspected to be infiltration of the sanitary sewage collection system into the storm drain system as infrastructure ages.

### **4.2.2 Discharges with a High Chemical Contaminant Rating**

There were two discharges (445 and 3005) rated high for environmental concern along the Town of Sidney coastline in 2007. Discharge 445 was rated high due to zinc and 3005 was rated high due to zinc and PAH. Upstream investigations for all three discharges are discussed in Section 4.4 in the main body of the report. Old corrugated pipes in the stormwater system are a possible source of zinc. The Town of Sidney has plans to initiate upgrading some of the infrastructure within the Town of Sidney in 2008. Discharge 3016 was rated high due to zinc in 2006, but was rated low at the point of discharge and moderate upstream in 2007. Sampling will continue at both locations in 2008 to confirm the lower contaminant ratings.

### **4.2.3 Town of Sidney Commitments**

In the SPLWMP, relative to stormwater quality, the Town of Sidney has completed or is committed to:

- work cooperatively with Sidney's Advisory Planning Commission on environmental matters (ongoing)
- work cooperatively with the District of North Saanich, DFO and volunteer groups on the Reay Creek Salmon Enhancement project (ongoing)
- immediate action on spills (ongoing)
- a regular street sweeping program to reduce the introduction of street litter and contaminants into waterways (ongoing)
- a regular catchbasin cleaning program to ensure that catchbasins effectively intercept and retain street litter and contaminants (ongoing)
- provision of traps in catchbasins in sensitive areas to reduce the discharge of petroleum oils to surface waters (ongoing)

- completion of a \$1.5 million sewer rehabilitation program designed to reduce the amount of inflow and infiltration to sanitary sewers and the related incidence of sewage overflows to surface waters (completed but still continuing with program)
- provision of audible alarms, lights, signage indicating emergency phone numbers and power connections for portable generating capability at all wastewater pump stations (all are inspected once a week)
- future provision of a SCADA system to monitor wastewater pump stations (completed)
- a requirement for the provision of oil/water separators for stormwater runoff from private parking areas (completed)
- adoption of a stormwater management bylaw for the regulation and protection of natural watercourses, ditches and drains (completed)
- undertaking a review of the Town of Sidney OCP in 2006 (completed) and updating information pertaining to stormwater management practices
- regular inspection and maintenance of the storm drain system, including video inspection, smoke testing and dye testing as necessary (manhole inspections annually and flushing of storm drains every three years with de-chlorinated water)
- elimination of sanitary sewer and storm drain cross connections (ongoing, as needed)
- upgrading generators to ensure adequate capacity to power all sewage pump stations in the event of a power failure (completed)
- establishing permanent stand-by power at the largest pump station (Amelia Pump Station) in 2004 to meet provincial criteria (completed)
- education programs, including mail-outs to residents on appropriate use of property, driveway, house and street drains (completed)
- working towards understanding the needs of agriculture and habitat in stormwater management (ongoing)
- working cooperatively with the VAA staff (ongoing)

### **4.3 District of North Saanich**

#### **4.3.1 Discharges Rated High for Public Health Concern**

In 2007, there were two stormwater discharges rated high for public health concern along the North Saanich coastline (3118AA [18m east of Hartfell Beach Access] and 3100 [below 10177 West Saanich Road]).

The number of high-rated discharges in North Saanich has been decreasing since 2005. CRD staff in cooperation with VIHA staff determined that the sources of high fecal coliform bacteria for many of the previously high-rated discharges involved failing septic tanks and fields. The reduction in high-rated discharges is likely the result of recent efforts by North Saanich to provide sewage collection systems to many of its residents.

North Saanich has completed construction of a sanitary sewage collection system in the southeast quadrant area and approximately 60% of the homes in this area are currently connected to this system. Some storm sewer upgrades were also carried out in conjunction with this work. Fecal coliform levels in this area were considerably lower in 2005 than in previous years.

In 2007, North Saanich completed the construction of a sanitary sewage collection system in the Deep Cove, McDonald Park and Patricia Bay areas. Residential connection to the system has been initiated

and is expected to be completed by summer of 2009. This work is part of a resolution to commitments in the SPLWMP.

One of the high-rated discharges (3100) is located in the proposed sewerage area. It is anticipated that as residents connect to sewer systems the source of contamination will cease.

#### **4.3.2 Discharges with a High Chemical Contaminant Rating**

In 2007, there was one discharge (441 [Reay Creek] rated high for chemical contaminants. Discharge 441 was rated high based on elevated concentrations of cadmium. This discharge was also rated high in 2004, 2005 and 2006. Recently, the VAA removed contaminated sediment and soil from in and near Reay Creek and undertook steps to ensure all tenants on VAA property have adopted appropriate chemical storage, handling and disposal practices as part of their operating practices. SHWP staff will continue to monitor this discharge in 2008 on a quarterly basis at the point of discharge and two upstream stations to narrow down the area of contamination and to identify changes in contaminant levels.

#### **4.3.3 District of North Saanich Commitments**

In the SPLWMP, relative to stormwater quality, the District of North Saanich has completed or is committed to:

- updating the District of North Saanich master drainage plan in 2008 (the McDonald Park Road catchment areas was completed in 2005 and Tseycum Creek will be the next catchment to be studied)
- working cooperatively with the Town of Sidney, DFO and volunteer groups on the creek salmon enhancement projects (ongoing)
- working cooperatively with the Tseycum First Nation to resolve stormwater runoff problems associated with Tseycum Creek and its tributaries (ongoing, however, many of the problems concern tributaries in the Agricultural Land Reserve)
- immediate action on spills (ongoing)
- a regular catchbasin cleaning program (done yearly)
- the provision of oil/water separators for stormwater runoff from paved areas associated with commercial, industrial and institutional properties (ongoing)
- adoption of a stormwater management bylaw for the regulation and protection of natural water courses, ditches and drains (in progress)
- regular inspection and maintenance of the storm drainage system (ongoing)
- working towards understanding the needs of agriculture and habitat in stormwater management (ongoing)
- a North Saanich Agriculture committee task force was formed in 2005 to work with the agricultural community to evaluate present practices and look for ways to improve them

A commitment made in the North Saanich OCP was to complete an analysis of environmentally sensitive areas. To meet this commitment an inventory of some watercourses, wetlands and riparian zones was completed as a pilot project. The project involved mapping the riparian zones of a number of watercourses using a global positioning system. The conditions of the creeks and surrounding riparian area (up to 50 m) were also inventoried.

## **5.0 SAANICH PENINSULA FIRST NATIONS**

There are four First Nation properties along the coastline of the Saanich Peninsula. CRD staff monitors stormwater discharges for public health and environmental concern on all four properties. Some of the First Nations discharges receive flows from other jurisdictions. SHWP staff communicates with First Nations and other jurisdictions involved regarding the protection and improvement of stormwater quality. The following sections provide relevant information regarding stormwater quality for each of the four First Nations.

### **5.1 Tsawout First Nation**

There are 13 stormwater discharges along the coastline of the Tsawout First Nation. Two of the flows are creeks (407 and 412) and both carry flows from Central Saanich.

- One stormwater discharge (411AA [between Church and 2769 Mount Newton Road]) was rated high for public health on Tsawout First Nation land in 2007. If fecal coliform counts remain high in 2008 upstream investigations will be undertaken to determine the source.
- No stormwater discharges were rated high for environmental concern in 2007.
- All developed properties on Tsawout lands are serviced by a sewage collection system (see Figure 1) except for two properties with septic tanks and fields.
- In 2003, all Tsawout pump stations were upgraded and are monitored by the CRD SCADA system.
- A dewatering system was installed at the Tsawout wastewater treatment facility in 2003. This system removes biosolids from effluent discharged to the marine receiving environment.
- Effluent quality at the Central Saanich treatment plant is being monitored monthly to ensure it is meeting provincial criteria.
- Effort is being made to meet with various levels of government to deal with flooding issues on Tsawout land.

### **5.2 Tseycum First Nation**

There are six stormwater discharges along the coastline of Tseycum First Nations land. One discharge is Tseycum Creek (3095) which carries flow from North Saanich.

- One stormwater discharge (3095; Tseycum Creek) was rated high for public health on Tseycum First Nation lands in 2007. In September 2007 the fecal coliform count was 61,968 FC/100 mL. Upstream investigations were carried out and possible sources narrowed down. Bacterial source tracking analysis on a sample collected in 2007 identified ruminant animals as a source of contamination.
- No discharges were rated high for environmental concern on Tseycum First Nation lands in 2007.
- In 2000/2001, all but one Tseycum property were connected to a sewage collection (see Figure 1) which discharges to the Saanich Peninsula wastewater treatment plant.
- Members of the Tseycum First Nation are participating in a marine fecal coliform monitoring program designed to evaluate Saanich Inlet shellfish beds for harvesting.

### **5.3 Pauquachin First Nation**

There are four stormwater discharges along the coastline of Pauquachin First Nations land.

- No discharges were rated high for public health or environmental concern on Pauquachin First Nation lands in 2007.
- Most of the developed properties on Pauquachin First Nation lands are serviced by a sewage collection system (see Figure 1). Two properties are on septic tank and field.

- The stormwater discharges on Pauquachin lands do not carry flows from outside their property line.

#### **5.4 Tsartlip First Nation**

There are nine stormwater discharges along the coastline of Tsartlip First Nations land. Some of the discharges carry flow from Central Saanich.

- No stormwater discharges were rated high for public health concern on Tsartlip First Nation lands in 2007.
- One stormwater discharge (3138) located along the Tsartlip First Nation coastline was rated high for environmental concern in 2007. The following discusses this discharge:
  - discharge 3138 had high zinc concentrations at the point of discharge and moderate zinc concentrations at an upstream station in 2007. This discharge was also rated high for arsenic and zinc in 1999, 2000, 2004 though 2006. Efforts will continue to identify the source(s) of contamination in 2008.
- Most of Tsartlip developed properties are serviced by a sewage collection system (see Figure 1).
- A master drainage plan is being developed for Tsartlip First Nation land. This plan identifies all major stormwater catchment areas and develops initiatives to attenuate stormwater flows.

## **6.0 REFERENCES**

Bender, C. and E. Dyck, 1996. Update and Review of On-Site Sewage Failure for North and Central Saanich. Prepared for CRD Health Department (now Capital Health Region).

Capital Regional District, 1996. Saanich Peninsula Liquid Waste Management Plan.

Delcan, 1998. Stormwater Management Plan: The Victoria Airport Authority. Prepared for the Victoria Airport Authority.

Drinnan, R.W., B. Emmett, B. Humphrey, B. Austin and D.J. Hull, 1995. Saanich Inlet Study: Water Use Inventory & Water Quality Assessment. Prepared for Water Quality Branch, B.C. Ministry of Environment, Lands and Parks (now Ministry of Environment).

Hagarty, D., 2000. Interim Independent Performance Audit of the Saanich Peninsula Liquid Waste Management Plan. Prepared for the Saanich Peninsula Wastewater committee by Hagarty Management Consulting.

Larose, C., 1999. Environmental Issues Associated with De-icing/Anti-Icing Fluids at the Victoria Airport. Prepared by Capital Regional District, Environmental Services group.

Lomas, N.T., 1984. Capital Regional District Shoreline Discharge Survey Report No. 3: Cowichan Head to Roberts Point Saanich Peninsula - East Coast. Prepared for the Capital Regional District Engineering department.

Ministry of Water Lands and Air Protection (MWLAP), 1998. Tackling Non-Point Source Water Pollution in British Columbia.

Ministry of Environment (MOE), 2006. Riparian Areas Regulation Implementation Guidebook.

## **7.0 PERSONAL COMMUNICATION**

Barley, L. Institute of Ocean Sciences

Benn, R. District of Central Saanich

Watson, G. Transport Canada

Gibson, G. Vancouver Island Health Authority

Humphry, P. Department of Indian Affairs

Ouellette, P. Capital Regional District

Parry, J. District of North Saanich

Robinson, B. District of North Saanich

Yao, W. UMA Engineering