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REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, MARCH 13, 2013

SUBJECT **CORE AREA LIQUID WASTE MANAGEMENT PLAN PROGRAMS – 2011 CONSOLIDATED ANNUAL REPORT**

ISSUE

To present a consolidated summary of the 2011 activities, results and accomplishments of the Core Area Liquid Waste Management Plan (LWMP) programs associated with the protection of human health and the environment.

BACKGROUND

The Capital Regional District (CRD) has the mandate to provide management of liquid waste in the core area through the regional trunk sewer and treatment system. Under the BC *Environmental Management Act* and Municipal Sewage Regulation, the LWMP provides the authority and framework for this service, which is implemented through a series of establishing bylaws and services. The functions include managing inputs of flow and contaminants, environmental monitoring and assessment, stewardship of the receiving environment and reporting. Reporting is required by the regulator to ensure public accountability as well as transparent data availability and review. The LWMP includes the following seven programs specifically focused on protection of human health and the environment:

- Wastewater and Marine Environment Program
- Regional Source Control Program
- Stormwater Quality Program
- Harbours Environmental Action Program
- Inflow and Infiltration Program
- Onsite Sewage Management Program
- Trucked Liquid Waste Management Program

This is the first year of consolidated reporting for these programs. Individual reports will also be forwarded to the appropriate agencies; however, this report and accompanying brochure will provide better clarity on the coordination and connection between the various components of the plan.

The *Core Area Liquid Waste Management Plan 2011 Consolidated Annual Report* brochure (Appendix A) and the executive summary or full annual report for the various programs are attached (Appendices B to I). The brochure provides the general scope and integration of the services provided by these seven LWMP programs, a summary of 2011 activities and 2012-2013 directions. Additional details about individual programs and 2011 results, including the implications of the Core Area Wastewater Treatment Project on LWMP activities, can be found in the annual reports available on the CRD website or upon request from the Parks and Environmental Services Department.

ALTERNATIVES

That the Core Area Liquid Waste Management Committee:

1. recommend to the Board that the following reports be received for information and direct staff to forward each report to the appropriate agency:

   (a) Core Area Liquid Waste Management Plan 2011 Consolidated Annual Report brochure

   (b) Gorge Waterway Initiative 2011 Annual Report; Esquimalt Lagoon Stewardship Initiative 2011 Annual Report; Trucked Liquid Waste Program 2011 Annual Report; executive summaries of the Macaulay and Clover Points Wastewater and Marine Environment Program 2011 Annual Report; Core Area Stormwater Quality Program 2011 Annual Report; Regional Source Control Program 2011 Annual Report; Core Area Inflow & Infiltration Program I&I Analysis Results April 2010 to March 2012; and Onsite Sewage Management Program 2011 Annual Report.

2. recommend to the Board that the reports listed above not be received and additional information be requested prior to being forwarded to the appropriate agency.

PUBLIC HEALTH AND ENVIRONMENTAL IMPLICATIONS

The CRD continues to meet its commitments to protect human health and the environment associated with the core area liquid waste management services. Activities of note in 2011 include:

- the continued close collaboration between the Wastewater and Marine Environment Program (WMEP) and the Regional Source Control Program (RSCP) to assess changes in wastewater and environmental contaminants. This collaboration allows the source control program to target efforts on contaminants that have the greatest potential to impact human health and the environment
- the shift of the Stormwater Quality Program (SQP) and the Harbours Environmental Action Program (HEAP) to a more integrated watershed management approach, which will allow for a more holistic assessment of impacts on the environment. This shift will also eventually allow for a more direct comparison of SQP and HEAP monitoring results to WMEP results, and aid in the evaluation of the region's overall impact on the marine environment
- the close interaction of the Inflow & Infiltration Program and SQP/HEAP to monitor and identify core area inflow and infiltration system issues, such as cross-connections, sewer leaks, etc. RSCP efforts also help protect stormwater quality and minimize inflow and infiltration through the application of various regulations
- the comprehensive public and industrial-commercial-institutional outreach and education campaigns undertaken by the RSCP, Onsite Systems Management Program and Trucked Liquid Waste Management Program to ensure that contaminants of concern do not enter the sewer systems and that liquid wastes are handled appropriately

Additional information about the above activities, along with information about other 2011 activities, can be found in the attached reports.

ECONOMIC IMPLICATIONS

Environmental reporting is a required component of the various services under the LWMP. Funding for the reports and consolidated brochure is included in the budgets for these services.

CONCLUSIONS

This is the first year for consolidated reporting of the seven programs focused on the environmental management of liquid waste in the core area. Staff from these programs continue to work collaboratively to ensure that the management of liquid waste in the core area meets regulatory requirements and protects human health and the environment.

RECOMMENDATION

That the Core Area Liquid Waste Management Committee:

1. recommend to the Board that the following reports be received for information and direct staff to forward each report to the appropriate agency:

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CL:cam
Attachments: 9

Appendix A – *Core Area Liquid Waste Management Plan 2011 Consolidated Annual Report*
Appendix B – executive summary, *Macaulay and Clover Points Wastewater and Marine Environment Program 2011 Annual Report*
Appendix C – executive summary, *Regional Source Control Program 2011 Annual Report*
Appendix D – executive summary, *Core Area Stormwater Quality Program 2011 Annual Report*
Appendix E – *Gorge Waterway Initiative 2011 Annual Report*
Appendix F – *Esquimalt Lagoon Stewardship Initiative 2011 Annual Report*
Appendix G – executive summary, *Core Area Inflow & Infiltration Program I&I Analysis Results October 2010 to March 2012*
Appendix H – executive summary, Onsite *Sewage Management Program 2011 Annual Report*
Appendix I – *Trucked Liquid Waste Program 2011 Annual Report*

Core Area
Liquid Waste Management Plan

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Capital Regional District | 2011 Consolidated Annual Report

View of the CRD's Macaulay Point Treatment plant.

The Capital Regional District (CRD) provides wastewater and stormwater management to residential, commercial, industrial and institutional customers on behalf of the core area municipalities of Colwood, Esquimalt, Langford, Oak Bay, Saanich, Victoria and View Royal. Wastewater and stormwater are managed according to strategies and activities outlined in the Core Area Liquid Waste Management Plan (LWMP) under the Environmental Management Act, a 25-year plan, which was approved by the BC Minister of Environment on March 26, 2003.

Since the original approval, the LWMP has gone through a series of amendments, the most recent being Amendment No. 8 on August 25, 2010. More information about the LWMP can be found at www.crd.bc.ca/wastewater/lwmp/ or is available upon request from the Environmental Sustainability Department.

Many of the activities in the LWMP have reporting requirements and commitments, both to satisfy regulatory needs and to inform and educate stakeholders. This year, program staff have consolidated reporting for the LWMP activities associated with protecting human health and the environment. These programs include:

1. **Wastewater and marine environment monitoring (LWMP Section 9)**
2. **Source control (LWMP Section 15)**
3. **Stormwater quality management (LWMP Section 17)**
4. **Harbours environmental action (LWMP Section 18)**
5. **Inflow & infiltration management (LWMP Section 5)**
6. **Trucked liquid waste management (LWMP Section 19)**
7. **Onsite systems management (LWMP Section 3)**

The programs will continue to make regulatory submissions as required. This overview document provides a summary of 2011 activities, 2012-2013 directions and describes the general scope and integration of the services provided in the LWMP.

Wastewater & Marine Environment Monitoring

The Macaulay and Clover points outfalls have discharged the region's wastewater for almost 100 years. Originally, discharge was through shorter shoreline outfalls which were lengthened in 1971 (Macaulay) and 1981 (Clover). Currently, the wastewater is fine-screened (6 mm) and passes through diffusers to enhance dilution and dispersion before release into the waters of Juan de Fuca Strait, at least 1,100 metres off-shore.

The BC Ministry of Environment (MOE) regulates the outfalls through permits that specify the wastewater quality and flow volume limits, and a required marine monitoring program. Much of the monitoring focuses on the initial dilution zone, an area that extends 100 metres around the end of each outfall. Regulatory requirements do not need to be met within this area; however, they must be met at the edge and beyond.

All monitoring is undertaken as part of the Core Area Wastewater and Marine Environment Program (WMEP) with the following objectives:

- to monitor and assess wastewater quality and quantity
- to monitor and assess the potential effects of the wastewater discharges to the marine environment
- to monitor and assess the potential effects of the wastewater discharges to human health
- to provide information to the CRD Regional Source Control Program
- to provide information to wastewater managers regarding treatment plant and outfall diffuser performance
- to provide compliance monitoring results to regulatory agencies
- to provide scientific assessment to the general public regarding the use of the marine environment for the disposal of municipal wastewater

The WMEP established regular monitoring in the late 1980s. In 2010, CRD and MOE staff completed the latest program review, addressing some gaps identified in previous reviews and the provincial direction for regional wastewater treatment. The revised program was implemented in 2011 and retains some historic monitoring components, but adds new ones and switches the program to a 5-year monitoring cycle. Reporting requirements changed to annual update reports during the first four years and a comprehensive assessment report after each cycle.

2011 Activities

Wastewater Monitoring

The 2011 wastewater monitoring program consisted of: regulatory compliance monitoring, a comprehensive assessment of wastewater contaminants, and wastewater toxicity testing. Overall, the results were consistent with previous years. Wastewater from both outfalls met the regulatory requirements of their permits, flow volumes did not exceed the allowable limits and effluent quality was equivalent to or better than typical screened municipal sewage.

A comprehensive wastewater assessment for up to 300 substances analyzes general wastewater quality, or conventional parameters, as well as a list of priority chemicals that potentially pose a high risk to the environment. Generally, only a small percentage of the priority substances will be detected: some may occur naturally, others are produced by residents, business and industry and some are persistent chemicals that, although banned decades ago, continue to cycle in the environment worldwide because they do not readily break down.

Staff sampling seafloor sediment off Clover Point.

Wastewater Monitoring continued

Priority substances detected in 2011 included metals, phenolics, polycyclic aromatic hydrocarbons, phthalates, miscellaneous volatile organics and terpenes; however, detection frequencies and concentrations were similar to previous years. Except for bacteriological indicators, when compared to applicable BC and Canadian water quality guidelines for potential effects on aquatic life, Clover and Macaulay results were all below the guidelines after minimum environmental dilutions were taken into account.

Similar to historic observations, 2011 wastewater toxicity tests indicated that undiluted wastewater from the outfalls is acutely toxic to fish and invertebrates. This result will likely improve with installation of further treatment as planned through Core Area Wastewater Treatment Project (CAWTP).

Surface Waters & Water Column Monitoring

Surface water samples are collected to assess risk to public health in the marine environment. In 2011, the CRD expanded this program to include water column monitoring at the edge of the initial dilution zone and sampling frequency was changed for a better comparison to the applicable human health water quality guidelines.

All 2011 results were below human health protection guidelines indicating that the potential for exposure to wastewater from recreational activities at the ocean surface was low. These results also indicate that outfall diffusers were operating as expected and the wastewater plumes were trapped at depth as designed.

Water column monitoring found that bacterial levels at depth occasionally exceeded guidelines indicating that there was a higher risk for human exposure below the surface of the ocean, for example, if someone was scuba diving around the outfalls. These results are typical due to the intended design of outfall diffusers.

Wastewater & Marine Environment Monitoring continued

Seafloor Monitoring

Seafloor monitoring had a number of changes in 2011. The program retained many of the historic components in the new 5-year cycle; however, the monitoring frequency is reduced to allow for the addition of new monitoring components.

The 2011 seafloor monitoring consisted solely of a pilot study to select new sediment toxicity and bioaccumulation tests for use in future years. Results are still being assessed and will determine monitoring methods for 2012.

Sediment quality is assessed by analyzing priority substances also analyzed in wastewater. Most sediment concentration results were similar to previous years. There are some exceedences of the guidelines, with the majority being within 200 metres and generally east of each outfall diffuser. Improved sediment quality around the Macaulay and Clover points outfalls is anticipated when further treatment is implemented.

Additional Investigations

Additional research to address emerging issues is also done, often in collaboration with universities and government agencies. Several investigations are ongoing and results from one were available in 2011. That investigation, in collaboration with University of Victoria, Fisheries and Oceans Canada and Metro Vancouver, involved comparison of the deposition behaviour of flame retardant chemicals discharged into the marine receiving environment from the CRD Macaulay Point outfall and the Metro Vancouver Iona outfall. Findings indicated that differences in receiving environment and level of wastewater treatment at the two sites resulted in differences in the environmental fate of the chemicals and uptake into the food chain. The results from these assessments were published in two scientific journals in 2012. Results from remaining ongoing investigations will be presented in future annual reports.

Looking Ahead to 2012-2013

In 2012-2013, the WMEP plans to:

- continue the revised regulatory compliance and priority substance wastewater monitoring.
- continue the revised surface water and water column monitoring.
- complete the assessment of the 2011 seafloor monitoring pilot study.
- implement the revised seafloor monitoring program based on the results of the 2011 pilot.
- continue any ongoing additional investigations.

Source Control

The Regional Source Control Program (RSCP) protects our regional sewage collection and treatment facilities, public health and safety, and the local marine environment by reducing the amount of contaminants discharged from industries, businesses, institutions and households before they enter the sanitary sewer system.

Large industries are regulated under a permit system, and commercial businesses and institutions follow regulatory Codes of Practice (COP) – all supported by innovative outreach initiatives. The RSCP meets or exceeds Canadian best practices for source control and the CRD is a nationally recognized leader in this field.

Program activities contributed to improvements in the quality of discharged effluent. Impacts on sewage infrastructure were also reduced, evidenced by trend assessments indicating stable or decreasing loads of many wastewater priority substances including metals, organic compounds, oil and grease.

2011 Activities

Regulation

The CRD Sewer Use Bylaw was adopted in 1994 and the region-wide program was implemented in 1995. An audited, performance-based permit system regulates larger industries, ensuring that permittees are eliminating or reducing contaminants to acceptable levels. Approximately 2,000 businesses, within 11 commercial sectors, are regulated under prescriptive COP.

There were many compliance successes for both permits and COP in 2011, including:

- a first-time 100% compliance level at industrial facilities operating under permits and authorizations
- achieving 5-year contaminant reduction targets for all COP sectors
- 97% overall compliance level for all regulated businesses (proper waste treatment installed)
- 100% use of proper waste treatment measures in six of the code sectors
- 14% increase in proper waste treatment within the printing sector
- 97% use of proper waste treatment in the food services sector

In addition, an inspection plan to target priority contaminants was continued for the third consecutive year.

A Source Control inspector educates a local business owner.

Source Control continued

Outreach

The CRD launched *Clean Green*, a new residential outreach campaign promoting non-hazardous cleaning alternatives and the proper disposal of household cleaners, to build on the *Clean Water Begins at Home* initiative.

The Medications Return Program collected more than 9.5 tonnes of medications, an increase from 2010 and a higher per-capita return rate than most other regional districts in the province. Future goals include expanding to the homecare sector, in partnership with the Vancouver Island Health Authority (VIHA).

There are three new social media initiatives, building on the success of the *Sustainable U* Source Control 101 initiative. These include the *Mad Man* video contest, the *Phat King* fats, oil and grease collection challenge and the *Slogan Master* contest to promote the Medications Return Program.

There are posters and videos promoting sound source control practices for food services and automotive repair sectors developed with stakeholder input. The tools include messaging from other CRD programs. Participants reported back that these resources made bylaw requirements easier to understand and more accessible to English as a Second Language employees.

Building Partnerships

Collaborative efforts between RSCP staff, other CRD programs and external partners continued in 2011, enhancing a *one window approach* to:

- provide augmented inspection services.
- provide superior customer service.
- promote high environmental performance within businesses

One of the busiest sectors for new partnership activities is the food services industry. In 2011, RSCP staff worked with Saanich, View Royal and Victoria to resolve various sewer grease blockages. RSCP staff also developed and co-facilitated a grease management workshop with the Metro Vancouver Regional Source Control Program at the 2011 BC Water and Waste Association conference. CRD and VIHA collaborated by sharing information about new restaurant applications and suspected health violations observed during routine RSCP inspections. RSCP staff also helped food services businesses prepare for the upcoming kitchen scraps diversion strategy by discussing the program and providing print resources.

CRD-municipal partnerships included the development of a process for permit applicants in View Royal and Colwood to connect new businesses with all CRD regulatory requirements and services.

Staff conducting a source control inspection at the dockyard.

Building Partnerships continued

The RSCP developed various partnerships with educational institutions in 2011. Along with Demand Management staff, RSCP finalized a comprehensive facility water audit that ultimately saved a post-secondary institution approximately 200,000 cubic metres of water annually. RSCP and Cross Connection Control programs worked with School District 61 to assess backflow prevention upgrades and COP compliance status. This partnership prevented duplication of CRD inspections and created an easy self-auditing process for busy teachers. The program sponsored a priority contaminant research project with undergraduates from the Royal Roads University Environmental Science Program and RSCP staff presented workshops for Camosun College Environmental Technology students and plumbing apprentices.

Finally, the program also partnered with the CRD Climate Action Program by linking RSCP customers to the *Livesmart BC* initiative. Additional information about this initiative can be found at www.livesmartbc.ca/green_business/.

Other 2011 Activities

Consultants reviewed existing priority contaminants and the current permit fee structure. Reports identified potential priority contaminant sources and reduction strategies, fee structuring options and possible bylaw and COP modifications.

The first phase of an integration of the RSCP database and CRD geographic information system commenced in 2011. The final product, scheduled for delivery in 2012, will improve compliance tracking, inspection planning, implementation plans, statistics reporting and assist with incident responses.

Looking Ahead to 2012-2013

In 2012-2013, the RSCP plans to:

- continue implementation of the RSCP 5-year plan for 2011-2015.
- commence blending of permit and COP inspection duties.
- continue collaboration with internal and external partners to enhance a *one window approach* to customer service.
- implement a Source Control 201 initiative.
- survey the public to measure the success of 2010-2011 outreach initiatives.
- undertake a pilot study to identify and evaluate new treatment technologies for the food services industry.

Stormwater Quality Management

The Stormwater, Harbours and Watersheds Program (SHWP) plans, promotes and coordinates the management of stormwater quality in the LWMP area, in consultation with the municipalities, the Department of National Defence and First Nations.

2011 Activities

Stormwater Discharge Monitoring

Monitoring covers the coastline between the Colwood/Metchosin border in the west and the Saanich/Central Saanich border in the east, including Esquimalt Lagoon, Esquimalt Harbour, Victoria Harbour, Gorge and Selkirk waters, Portage Inlet and the City of Langford coastline along Saanich Inlet.

Public Health – Fecal Coliforms

Staff evaluated stormwater discharges for public health concerns by sampling each discharge for fecal coliform bacteria and assigning a rating of high, moderate or low. The information generated provides participating jurisdictions with the ability to better manage limited funds and prioritize remedial measures where necessary.

In 2011, staff monitored discharges once during the winter and once during the summer to assess seasonal differences. In total, 186 stormwater discharges were analyzed for fecal coliform concentrations and 43 were rated high for public health concern.

The current level of high ratings does not indicate any lack of effort by municipalities to identify and repair problems. Municipalities deal with many infrastructure issues such as aging, collapsed and cracked pipes, old construction practices, cross-connections and inadequate separation of sewer and storm sewer pipes, all of which can contribute to high ratings.

Between 2008 and 2011, a collaborative effort with municipal staff and VIHA identified contaminant sources through upstream investigations at 51 discharges previously rated high. The project identified and eliminated the source of contamination in 8 investigations, while rankings at other discharges dropped due to natural level changes, resulting in only 33 high ratings in 2011 – which is a 35% reduction.

Environment – Chemical Contaminants

The program evaluates for environmental concerns based on the level of metals and organic contaminants identified in sediment from each stormwater discharge. The 2008 to 2011 sediment sampling program focused on 62 discharges and only 12 of these received a high rating in 2011.

Receiving Environment Surveys

Nearshore Marine Investigations

The SHWP nearshore marine sampling program added more water quality parameters and increased sampling frequency in 2011. The highest number of water quality exceedances occurred in Victoria Harbour compared to Esquimalt Harbour and Esquimalt Lagoon. The goal is to gather comprehensive baseline knowledge of water quality in the various embayed marine waterbodies of the Core Area and, working with CRD Harbours Environmental Action Program and MOE, to develop site-specific water quality objectives for the harbours.

Watercourse Investigations

The program evaluated water quality in 11 creeks in the core area. Although most of the creeks exceeded at least one provincial guideline, there has been some variability in data in past years and water quality remains relatively constant over the long term. Impacts from ongoing and proposed land-based activities pose the biggest threat to the health of watercourses and continued sampling is required to monitor changes over time.

Stormwater quality sampling.

Special Projects

Staff undertook a study to assess the effects of stream exposure to fish in Bowker and Colquitz creeks. Survival rates were good, indicating that the water quality is sufficient to support early life development of salmonids. This technique will be reviewed for potential future use.

In partnership with municipalities and community groups, SHWP created an Integrated Watershed Management (IWM) program as a strategy to build on previous work and begin protecting watersheds as regional assets. A proposed program plan was developed containing the following four goals:

1. protect clean water and effectively manage flows
2. protect and enhance terrestrial, aquatic and nearshore marine habitats
3. improve the resiliency and adaptive capacity of watersheds to a changing climate
4. pursue effective and collaborative watershed management and stewardship

The IWM strategy addressed these goals by undertaking the following activities in 2011: discussion of stream flow monitoring in key watersheds; discussion of potential municipal low-impact development design standards; discussion with municipalities to define watershed health monitoring objectives; assessment of existing watershed inventory information and identification of any gaps; and creation of public outreach materials.

Looking Ahead to 2012-2013

In 2012-2013, the SHWP plans to:

- continue working with municipal partners to identify stormwater discharges for public health and environmental concern, and investigate the sources of contamination as resources allow.
- shift nearshore marine investigations to a more intensive semi-annual sampling regime of five samples in a 30-day period (in both dry and wet seasons) every 3 years, a design that is more scientifically rigorous, allows for direct comparison to BC water quality guidelines and follows advice provided by MOE.
- shift watercourse health assessments to a similar 5/30 sampling regime to allow stormwater source control efforts to focus on regions and parameters of most concern and provide a more reliable baseline of knowledge to assess changes in water quality over time.

Harbours
Environmental Action

The Harbours Environmental Action Program (HEAP) coordinates environmental protection and improvement efforts in Victoria and Esquimalt harbours, Portage Inlet, the Gorge Waterway and Esquimalt Lagoon. HEAP works with community groups, municipal partners and other agencies to achieve the following goals:

- decrease contaminant inputs
- protect and enhance habitat quality
- set environmental quality objectives
- achieve environmentally protective land uses
- monitor environmental quality

Coordinated Initiatives

HEAP goals are achieved through partnerships including the Victoria and Esquimalt Harbours Environmental Action Program (VEHEAP) and coordinated initiatives like the Esquimalt Lagoon Stewardship Initiative (ELSI) and the Gorge Waterway Initiative (GWI). These groups meet regularly to share information and work on harbour program objectives through a variety of projects highlighted in this report. Details are available in annual updates on the initiatives' websites at www.elsi.ca and www.gorgewaterway.ca.

2011 Activities

Harbours Program Review

During 2011, an inter-municipal working group reviewed the program, developing a 5-year work plan and budget and recommending that HEAP services be broadened to include harbours environmental protection and other improvement initiatives not specifically referred to in the LWMP. During the year, community members voiced strong support for the work being done by GWI and ELSI, and encouraged the CRD to continue coordination of these harbour initiatives.

Water Quality

CRD staff started developing water quality objectives specific to the 5 core harbour areas. In addition to regular stormwater sampling, there are 35 new marine locations established throughout the harbours. Fall sampling conducted at all 35 locations captured an accurate picture of high-flow contaminant inputs. Sampling will be repeated during the low-flow period in mid-summer 2012 to measure fecal coliform, polycyclic aromatic hydrocarbons, heavy metals and nutrients. There will be a public consultation process after the sampling program to discuss the results.

An understanding of flow dynamics and freshwater inputs to the harbours through the use of flow meters is essential to establishing realistic water quality objectives. HEAP staff worked with municipal colleagues to ensure that flow monitoring locations were chosen for high priority watersheds.

Habitat Improvement

The CRD website www.crd.bc.ca/watersheds/ contains extensive information about Victoria and Esquimalt harbours, Portage Inlet, the Gorge Waterway and Esquimalt Lagoon. The website includes detailed ecological information on the wildlife, plants, ecosystems and geology of the harbours, historical facts and photos as well as information on how to help to protect the harbours. Detailed data on intertidal and subtidal harbour features are available at www.crdatlas.ca.

Habitat Restoration

Community action and engagement, through ELSI and GWI partnerships and other volunteer groups, resulted in the removal of a significant amount of invasive plants from harbour shorelines and increased replanting with native vegetation. To date, volunteers removed more than 20 tonnes of ivy have been removed from the Point Ellice Woodland Shore on the Gorge Waterway. Broom bashes organized by ELSI volunteers also resulted in the removal of all visible Scotch broom from Coburg Peninsula at Esquimalt Lagoon.

Stormwater staff member testing human health indicators.

Surveys and Monitoring

Staff initiated a pilot project to survey the Olympia oyster population in the Gorge Waterway and Portage Inlet. The Gorge supports one of the few remaining BC populations of this federally designated "species of special concern." Data from this survey will be posted on the Regional Community Atlas website when available.

ELSI volunteers continued to monitor the fish populations in creeks entering Esquimalt Lagoon. In partnership with the Canadian Wildlife Service, beached bird surveys continue at the lagoon, and coastal water bird surveys in Esquimalt Lagoon and the Gorge Waterway.

Outreach

Every year, HEAP staff and volunteers attend various community events and celebrations, sponsor free public talks and participate in a variety of outreach and educational events to promote the importance of community stewardship when undertaking activities to improve the health of our shorelines and waterways.

Looking Ahead to 2012-2013

In 2012-2013, the HEAP plans to:

- work with municipal colleagues to create a 5-year program work plan. Key components of the plan will include flow monitoring in large and small creeks entering the harbours, establishing water quality guidelines in consultation with provincial agencies and conducting habitat inventories and protection activities.
- work with Songhees and Esquimalt Nations, and the City of Colwood to install interpretive signs and a carved cedar mural in Esquimalt Lagoon honouring the human history of the lagoon.
- continue dune habitat restoration monitoring in Esquimalt Lagoon in partnership with Camosun College.
- complete the Gorge Waterway Olympia oyster survey.
- continue restoration work along the Point Ellice shoreline, including installation of interpretive signs to inform visitors about the extensive ecological restoration work done at the site.
- continue promoting activities that engage the community in stewardship of the harbours, shorelines and watersheds of the Victoria and Esquimalt harbour areas.

Program Linkages

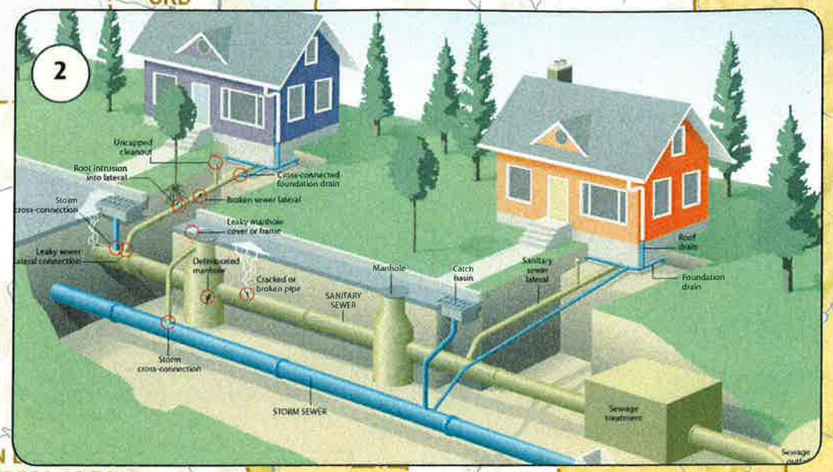
1. The CRD's Regional Source Control Program, Trucked Liquid Waste Program and Onsite Management Program all work together to ensure potential contaminants are properly disposed of and do not enter into the environment.

2. Inflow and infiltration issues occur throughout the core area. The CRD's Inflow & Infiltration Program works with stakeholders to reduce the amount of rain and groundwater entering the sanitary sewer system.

3. The CRD's Wastewater and Marine Environment Monitoring Program monitors and assesses the impacts of wastewater discharged through the two core area outfalls.

4. The CRD's Stormwater, Harbours and Watersheds Program monitors and assesses the impacts of stormwater discharged at over 1,000 locations in the core area.

5. The CRD's Harbours Environmental Action Program coordinates environmental protection and improvement efforts in Victoria and Esquimalt harbours, Portage Inlet, the Gorge Waterway and Esquimalt Lagoon.



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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.

- Stormwater Sampling Station
- Outfall Sampling Station
- Sewer Overflow Discharge Point
- Harbour Area
- Trunk Sewer
- Sewer Outfall
- Streams
- Storm Drain / Ditches
- Lakes
- CRD Boundary
- Municipal Boundaries
- LWMP Boundary
- Freeway/Highway
- Major Collector
- Minor Collector

CORE AREA LWMP PROGRAMS TO ASSESS IMPACTS ON HUMAN HEALTH AND THE ENVIRONMENT

Inflow & Infiltration Management

The purpose of the Core Area Inflow & Infiltration (I&I) Program is to work with the municipalities to reduce the amount of rain and groundwater entering the sanitary sewer system.

Inflow refers to rainwater that enters the sewer system through improper plumbing connections, and infiltration refers to groundwater that seeps into the sewer through cracks or bad joints in sewer pipe and manholes (see diagram on page 12). A certain amount of I&I is unavoidable and is accounted for in routine sewer design. However, too much I&I results in excessive sewer flows that can lead to:

- overflows and groundwater contamination that can impact the environment and create public health concerns.
- sewage back-ups into buildings and homes that can destroy belongings and require expensive restoration.
- increased operation and maintenance costs to convey and treat the flows.
- consumption of sewer capacity which could lead to expensive premature upgrades to the system

I&I is predicted to increase in the region as a result of aging infrastructure and increased rainfall due to climate change. In response to this, the CRD has prepared an I&I Management Plan to address I&I and meet the commitments in the Core Area LWMP.

The I&I program supports the following CRD Strategic Plan commitments:

- ongoing reliable sewer service for the community
- cost effective sewer repairs. I&I analysis helps to identify sewers that can be proactively repaired, which is much less expensive than replacing sewers after they have collapsed/failed
- compliance with regulations related to overflows
- dedication to sustainable infrastructure

In addition, the program routinely provides technical services for:

- municipalities and First Nations
- sewer system design, maintenance, and repair
- treatment plant planning
- other CRD programs such as the Regional Source Control Program and Stormwater, Harbours and Watersheds Program

2011 Activities

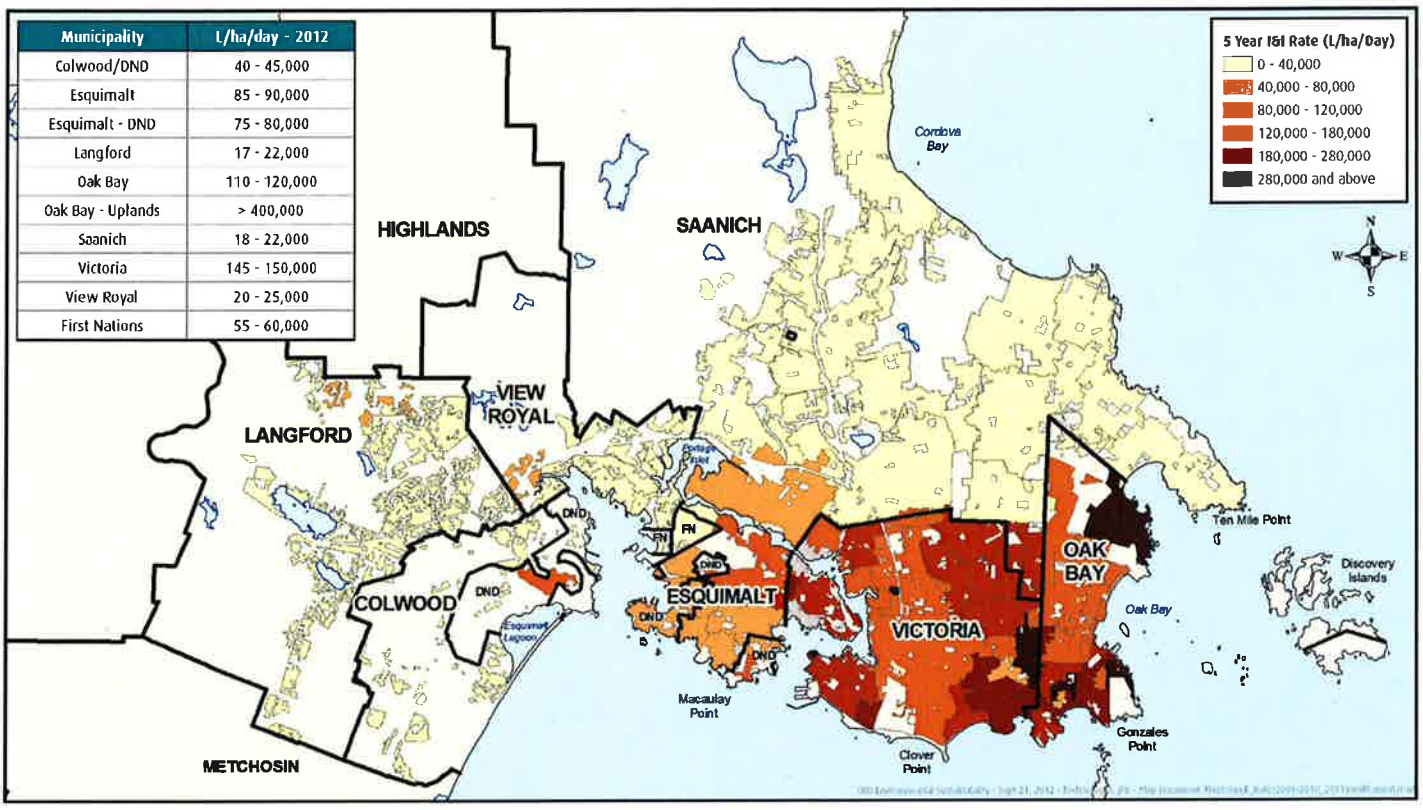
Flow Monitoring

From October 2010 to March 2012, staff collected flow monitoring data from 66 catchments in the core area. The figure on page 15 shows the resulting weighted average I&I rates for each municipality in the Core Area.

I&I Management Plan

The CRD submitted a long-term comprehensive I&I Management Plan to MOE. The plan will guide the CRD and its municipal partners towards I&I reduction in a responsible, cost effective, integrated and well-planned manner. The primary objectives of the plan are to reduce overflows and I&I to less than four times average dry weather flow at Clover Point and the wastewater treatment plants by 2031.

Overflowing sewer manhole.



I&I rates in the Core Area.

Private Property I&I

The CRD held a number of meetings and workshops with municipal staff, CRD directors and the CRD's consultant to review case studies and discuss options for private property I&I programs. Staff recommended an approach that includes education, incentives, targeted pilots and regulatory options. The private property program will be further developed over a 5-year period.

Education & Outreach

The CRD initiated an educational program that included a number of new educational materials and outreach events. New educational materials included: an I&I brochure for residents, a comprehensive website, and educational videos. The CRD had the I&I display at 17 outreach events in 2011 and staff answered questions and invited members of the public to complete an I&I survey questionnaire. To date, more than 1,000 surveys have been completed. The feedback and information received will be used for future initiatives.

Looking Ahead to 2012-2013

In 2012-2013, the I&I program plans to:

- move forward on Phase 1 implementation of the private property I&I management plan. This involves consultation with key stakeholders such as the plumbing and realtor associations and groups representing the public.
- investigate and develop Private Property I&I Reduction rebate programs.
- implement CRD and municipal I&I management plans.
- continue monitoring sewer flows, I&I rates, and overflows.
- continue support of municipalities, other CRD programs and First Nations.

Trucked Liquid Waste Management

Within the LWMP, the CRD coordinates the collection and disposal of Trucked Liquid Waste (TLW). TLW consists of non-domestic liquid wastes that cannot be legally discharged to sanitary sewer or stormwater systems, and must be transported by truck offsite disposal.

The objective of the program is to protect human health and the environment by ensuring that TLW is handled and disposed of in an appropriate and responsible manner. The four goals of the program are to:

1. ensure appropriate disposal of TLW by generators
2. ensure there are proper and affordable disposal services available for all TLW
3. promote appropriate government services
4. build public support for the TLW program

2011 Activities

In 2011, the following projects were initiated to assist the TLW program in achieving its goals:

- advertisements posted through print media promoting catch basin cleanout
- a service provider directory on the CRD website was routinely updated
- municipal operations sites visited and their TLW practices reviewed
- an annual stakeholder meeting hosted by the CRD and attended by various TLW service providers
- an assessment was undertaken to determine baseline catch basin volumes
- a review of the regulatory requirements for waste handling was undertaken
- a study was undertaken to evaluate catch basin waste and oil/water separator clean-out procedures

Looking Ahead to 2012-2013

In 2012-2013, the TLW program plans to:

- consult with industry stakeholders on the results of the catch basin and oil/water separator cleanout study results.
- facilitate the formation of a government liaison stakeholder group.
- continue an advertising series promoting catch basin cleanout throughout the fall season.
- continue to maintain website content and the service provider directory.
- continue working with service providers to improve estimates of catch basin waste volumes going to the private sector.
- investigate whether there are any trucked liquid wastes that could be used as resources

Onsite Systems Management

The Onsite Systems Management Program (OMP) aims to protect public health and safety, local surface and groundwater supplies, and the environment. The program strives to reduce the number of malfunctioning onsite sewage disposal systems (septic systems) through promoting proper care and maintenance and regulating pump-out frequency.

The OMP has successfully established a regional data set identifying residents with septic systems, and has developed effective practices for monitoring compliance with the CRD Onsite Sewage System Maintenance Regulation Bylaw 3479. The program delivers a successful Septic Savvy education and outreach program, which includes web and print materials, outreach events, and consumer and stakeholder workshops to approximately 27,000 households with septic sewage systems. The OMP is the first of its kind in BC, and the CRD is recognized as a leader in the field of septic management by other regional districts and municipalities.

2011 Activities

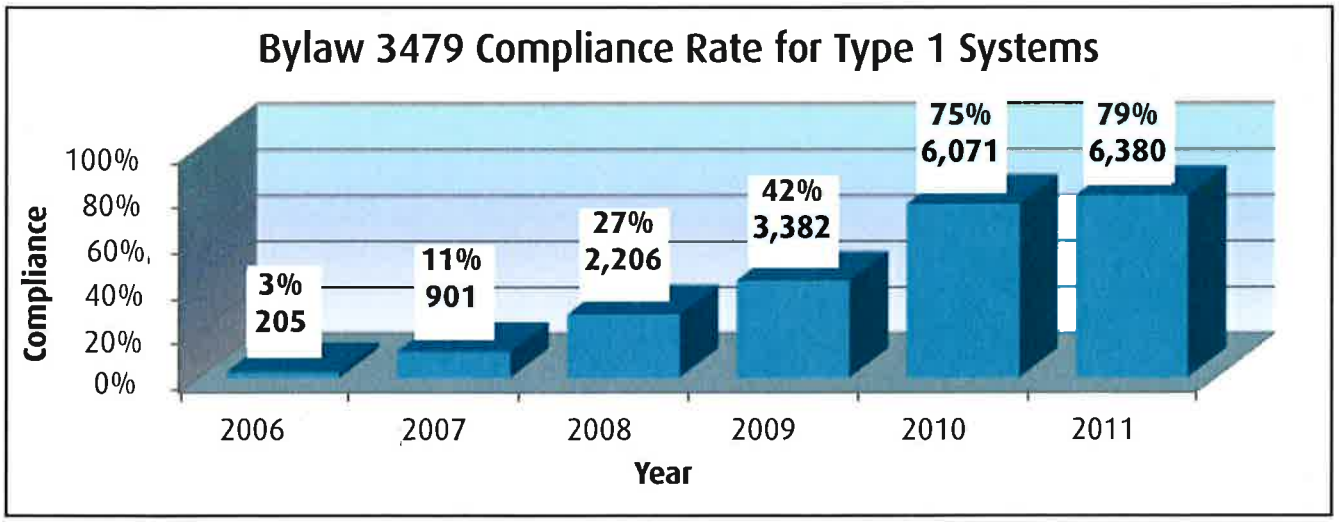
Bylaw

Bylaw 3479 is in its second year of regulating pump-out frequencies for the approximately 10,000 septic systems in the four participating municipalities within the CRD. The Bylaw establishes enforcement procedures and provides alternate pump out frequencies for homeowners. Bylaw compliance reached 79% for Type 1* systems in the second year, exceeding the 71% target for 2015. Type 2/3* systems represent 5% of total septic systems in the CRD and are currently under review to determine compliance as they are more difficult to assess.

Maintenance Assessment Pilot Study

The program conducted a Maintenance Assessment Pilot (MAP) study, in partnership with industry, to explore the components necessary for a maintenance assessment of residential septic systems in support of Bylaw 3479. The MAP determined that maintenance assessments would not be the same as provincial requirements for a performance inspection, as defined under the Applied Science Technologists & Technicians of BC's guidelines for inspections.

The study also identified that 80% of the inspected septic systems were in a state of malfunction and in need of repair or replacement.



*Type 1 systems represent treatment by septic tank only, where sewage is held in a tank before discharging into a drainfield. Type 2 and Type 3 systems introduce further treatment to produce a higher quality effluent that can be discharged into smaller drainfields. Type 2/3 systems are commonly referred to as package treatment plants and have mechanical and electrical parts requiring more frequent maintenance.

Onsite Systems Management continued

Education & Outreach

The integration of the Onsite Management Program (OMP) into the Environmental Partnerships Division (Environmental Sustainability Department), and the coordination and collaboration of outreach events, have resulted in a substantial increase in the number of outreach events attended and a subsequent increase in the number of stakeholders engaged in education and information exchange. In 2011:

- 5 Septic Savvy workshops were delivered to homeowners and realtors reaching a total of 134 participants.
- 1,667 consumer engagements were made at outreach events (20% of all engagements since 2001), up from 350 engagements at outreach events in 2008.
- 3,958 visits were made to Septic Systems webpages on the CRD website.
- 3,383 downloads were made of the Septic Savvy household information kit materials.

Since 2001, 7,800 people have attended a Septic Savvy workshop or engaged with CRD staff about septic systems at a community event.

Survey of Septic System Owners

A survey of septic system owners within OMP participating municipalities focused on identifying reasons for non-compliance, identifying challenges with compliance, gathering baseline data about what owners know about their septic systems and septic system maintenance, and seeking a better understanding of how the CRD should be communicating with residents. A few survey highlights are that:

- 77% of respondents reported having heard about the new mandatory requirements through a letter from the CRD.
- not all owners feel they should have to be compliant with the new bylaw, many citing that their system does not need to be pumped out as regularly as the bylaw requires.
- cost is regarded as the dominant barrier to compliance among owners.
- 76% of respondents had not heard about the CRD's free 2 hour Septic Savvy workshop.
- 58% of non-compliant respondents believe they have met the bylaw requirements.

Sepic Savvy outreach display.


Industry professional conducting an inspection.

Industry professionals conducting an inspection of a residential onsite septic system.

Videos

The program developed 3 *Residential Septic Systems* videos for the CRD website. They were also used at workshops and outreach events to provide updated information on the care and maintenance of septic systems. These videos can be found at www.crd.bc.ca/wastewater/septic/savvy.htm.

Industry Stakeholder Meeting

The program partnered with the TLW and the RSCP programs, delivering a collaborative workshop to industry partners to better streamline CRD service through unified messaging. These annual workshops are part of an ongoing initiative to engage with industry stakeholders through more frequent direct communications.

Looking Ahead to 2012-2013

In 2012-2013, the OMP plans to:

- develop a bylaw support plan to maintain compliance rate.
- develop an inspection program to identify malfunctioning septic systems with potential risks to human health.
- establish compliance rate for Type 2/3 onsite septic systems.
- promote the OMP at the BC Water and Waste Association Annual Conference and Trade Show.
- conduct focus groups building on the 2011 Consumer Survey.
- develop consumer protection initiatives.
- implement an alternate pump out frequency procedure.
- engage industry stakeholders to develop and promote program partnerships.
- work with municipalities and electoral areas to deliver a consistent program throughout the Capital Region.

Clover Point.

Activity Linkages

The LWMP programs cover several aspects of an overall management plan with the goal of coordinated, comprehensive and effective conveyance, treatment and environmental management of liquid waste in the core area.

The Stormwater Quality, HEAP and WMEP programs are designed to assess specific components of potential impacts of liquid wastes entering the region's marine environment. SHWP is currently focused on qualitatively identifying hotspots of stormwater-related liquid waste contamination and span a relatively large portion of the region's coastline. The program does not monitor or assess any effects of this contamination beyond identifying concentrations above environmental benchmarks. It is designed to provide information to municipal engineering programs to manage their sewer infrastructure. In contrast, WMEP assessments are focused on the relatively small geographical areas surrounding the outfalls. WMEP quantifies loadings of contaminants entering the marine environment through the Macaulay and Clover points outfalls, and comprehensively assesses any potential effects from these point sources in order to meet the requirement of the discharge permits. These differences in program goals currently preclude any integration of program data and cannot aid in the evaluation of the region's overall impact on the marine environment.

However, the programs continue to work within their mandates to reconcile these differences in an attempt to provide a more comprehensive picture of the region's relative impacts on the marine environment from liquid waste. For example, there is an effort to shift SHWP and HEAP to a more integrated watershed management approach which takes a more holistic approach to the overall environment. Given that there are more than 1,000 stormwater discharges in the region, integrated watershed management helps to prioritize and focus limited resources in the appropriate areas. For example, a number of key watersheds that discharge into the harbours have been chosen for

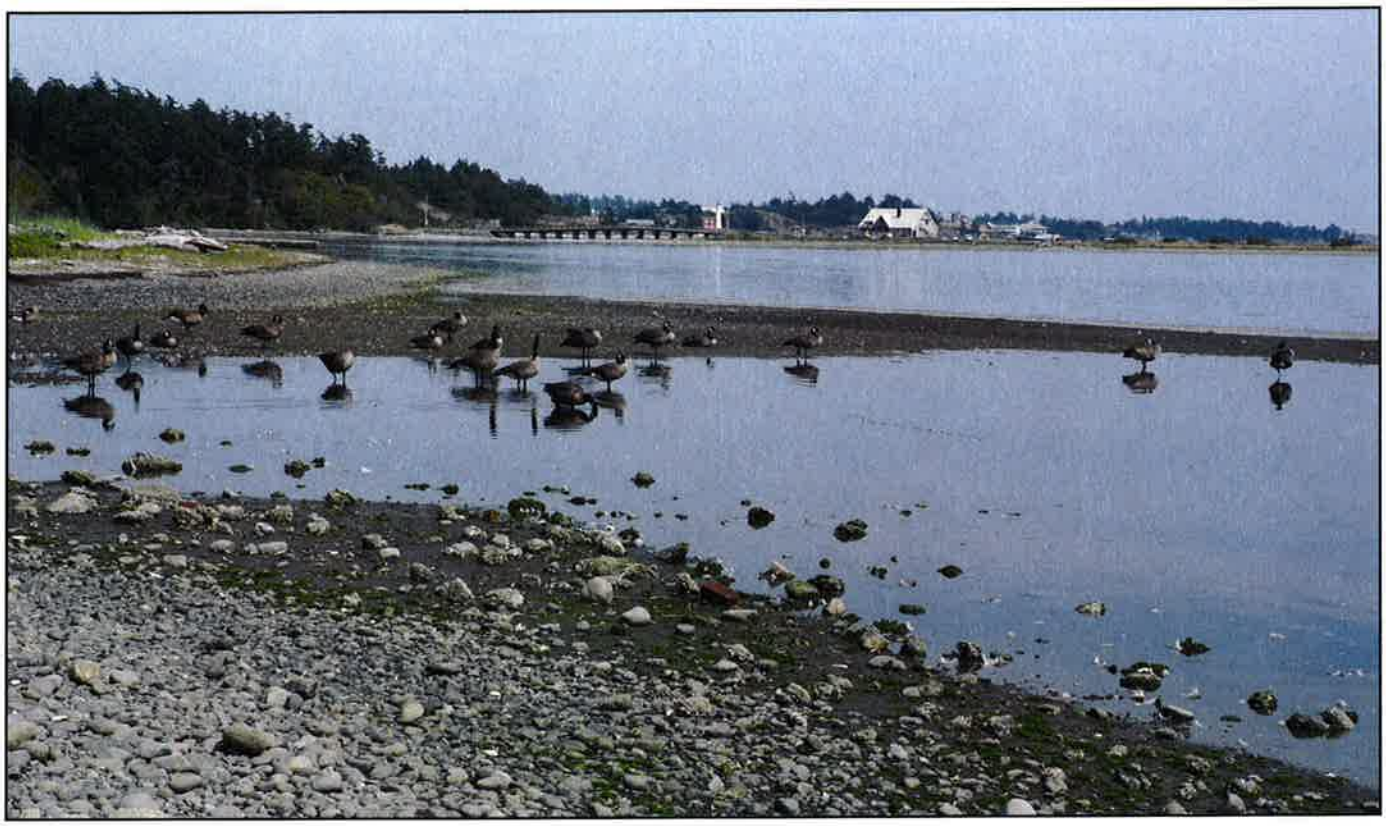
Surface water sampling off Macaulay Point.

more monitoring, including the installation of flow volume monitoring equipment, real-time water quality sensors and the application of revised sampling protocols. As well, HEAP and SHWP are working with MOE to develop water quality objectives for the harbour water bodies. These projects and program enhancements allow for more accurate calculations of the loadings of stormwater-carried contaminants into the marine environment, help prioritize actions to reduce loadings and lead to better protection of human health and the environment.

The marine, harbours and stormwater programs are also standardizing monitoring programs to better assess risks to human health. For example, the implementation of revised surface water monitoring by all 3 programs, including monitoring regimes that involve collecting five samples over a 30-day period, means that results are more directly comparable to BC and federal water quality guidelines set to protect human health, as well as across the 3 programs.

WMEP's mandate to focus on outfall-related impacts precludes any examination of other potential stressors on the marine environment. However, the recent monitoring data indicate that organisms around the Macaulay outfall may be impacted by low oxygen conditions related to climate change. As a result of these potential findings, the program is looking to examine this hypothesis through monitoring program enhancements as well as collaborative studies with external agencies.

The WMEP and RSCP continue to work closely together. WMEP results inform the RSCP about changes in contaminant loadings over time and allow them to target efforts on contaminants that have the greatest potential to impact human health and the environment. However, of the 23,000 chemicals registered for use in Canada today, only about 300 are monitored as part of the WMEP.



Canadian geese at Esquimalt Lagoon.

Activity Linkages continued

Based on guidance from various agencies, WMEP and RSCP continually review and prioritize the wastewater chemicals that the CRD monitors. While the CAWTP will reduce loadings of many contaminants, the CRD wastewater monitoring list will continually evolve as new and emerging chemicals of concern are identified.

The I&I and stormwater programs are also very closely linked. Inflow and infiltration have the potential to reach the environment through two main routes: through direct overflows of the wastewater conveyance system to the marine environment, or through overflows of the wastewater system into the stormwater system and then into the environment. Because of the wastewater and stormwater conveyance system linkages, a number of the core area I&I system issues have been identified through SHWP monitoring efforts. Ultimately, any efforts to reduce I&I in the wastewater system will directly reduce the potential for these wastes to enter the environment and impact human health and the environment. The recent LWMP amendments have committed the CRD and its participating municipalities to reduce overflows and I&I to less than four times average dry weather flow levels. In addition, the region has committed through the CAWTP project, to installing large wastewater holding tanks. These tanks will help attenuate flows within parts of the wastewater system, particularly along the east coast. The new tanks will substantially reduce the volume of overflows to the marine environment during heavy rain events and also reduce the frequency of overflows from their current annual occurrence to every 5 years or less.

In many instances, the application of RSCP regulations also helps protect stormwater quality and minimize I&I. Examples include redirection of treated street waste, as well as treated stormwater from construction and remediation sites, to sanitary sewer under permits. Inflow of stormwater to sanitary sewer is also minimized, under permit, through the installation of berming, reduction of surface drainage areas, or installation of ground covers.

The RSCP regulation of kitchen equipment cleaners, carpet cleaners, recreation facilities and other COP sectors also helps to protect stormwater quality through the application of best management practices including spill prevention and response, wastewater treatment and diversion to sanitary sewer.

Regional Source Control officer conducting an insepction at a local car wash.

The onsite and TLW programs are also closely linked. Both activities are ultimately intended to ensure proper treatment of liquid wastes that are not discharged directly to the sewer system, and to prevent unauthorized discharges of these wastes to the sewer system and the environment. Discharges of liquid wastes to the environment, either through unauthorized trucked liquid waste disposals or improper maintenance of onsite systems, have a much greater potential for adverse human health and environmental effects than if the wastes are handled and treated properly. These two programs work to enhance stakeholder knowledge of proper disposal techniques.

The effects of unauthorized environmental discharges of onsite and TLW wastes are amplified by stormwater events. For example, heavy rains can overwhelm improperly maintained onsite systems and lead to larger volumes of onsite liquid waste leaking into the environment through both the natural (e.g., creeks and lakes) and constructed (e.g., pipes) stormwater conveyance systems. In addition, improper disposal of TLW can occur directly into the environment and be dispersed more rapidly by stormwater. These examples highlight the link with SHWP. SHWP helps to identify many of the problem onsite systems through upstream investigations, and has the potential to detect unauthorized TLW environmental discharges. The TLW program also supports both RSCP and SHWP by providing information to liquid waste generators, through the service provider directory, on companies that service pre-treatment devices. These devices remove contaminants from the effluent stream prior to discharge to sewer. Residual contaminants need to be removed from the pre-treatment devices and properly disposed.

Overall, the CRD LWMP programs and activities described in this report are designed to help protect human health and the environment from the adverse effects of the region's liquid wastes. The above programs and activities continue to review and revise their work plans and priorities as new information and research are collected. The focus remains on providing a coordinated approach to meeting regulatory requirements and ensuring protection of human health and the environment.

Outfall at Clover Point.

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CRD
Making a difference...together

Core Area
Wastewater Treatment Project

On July 21, 2006, the provincial government mandated that the CRD implement secondary sewage treatment by 2020. Federal and provincial funding for the project was confirmed recently and project completion is anticipated in 2018.

The Core Area Wastewater Treatment Project significantly impacts a number of the LWMP activities and further details are provided in this report.

MACAULAY AND CLOVER POINTS
WASTEWATER AND MARINE ENVIRONMENT PROGRAM
2011 ANNUAL REPORT

EXECUTIVE SUMMARY

Monitoring of wastewater discharges, surface waters and the seafloor environment in the vicinity of the Macaulay and Clover points outfalls is conducted as part of the Wastewater and Marine Environment Program (WMEP) on a regular basis since the late 1980s. Additional investigations were undertaken to more clearly define the effects of the outfalls on the receiving environment. The program has undergone a number of changes over the years but is relatively unchanged since 2000.

In March 2003, the British Columbia Ministry of Environment (MOE) approved the Capital Regional District (CRD) Core Area Liquid Waste Management Plan (LWMP). The LWMP outlined CRD plans to manage liquid waste for the next 25 years. Commitments made in this plan are designed to protect public health and the environment from the impacts of liquid waste discharges. On July 21, 2006, the CRD received a letter from the minister of environment requiring an amendment to the Core Area LWMP, and detailing a schedule for the provision of sewage treatment. The minister also requested that the CRD continue the current monitoring program. Liquid Waste Management Plan amendment #7 was submitted to the MOE in December 2009, with follow-up amendment #8, in June 2010. Both amendments outline plans to implement advanced sewage treatment for the core area (i.e., Greater Victoria and western communities). The amendments, and current status of ongoing treatment plans, can be found at www.wastewatermadeclear.ca.

The 2011 WMEP consisted of the following components:

- wastewater monitoring and analysis for a list of substances, including conventional parameters, metals and other priority substances (conducted monthly for each outfall)
- surface water and water-column monitoring and analysis of bacteriological indicators with potential for human exposure to wastewater in the marine environment and a list of substances, including conventional parameters, metals and other priority substances (conducted quarterly at each outfall)
- seafloor monitoring and analysis for a list of substances, including conventional parameters, metals and other priority substances (sediment contaminant concentrations) and a pilot sediment toxicity and bioaccumulation assessment (to pick the most suitable test species and methods for future years within the five-year cycle)
- additional investigations that address specific questions about wastewater, water-column and seafloor monitoring components and that look into emerging scientific issues regarding wastewater discharges and environmental effects

The 2011 annual report presents results and updates for the different elements of the Macaulay and Clover points WMEP, including the routine monitoring components and additional investigations. In 2011, WMEP shifted from monitoring annually to monitoring based on a five-year cycle. This report is largely an update report on the 2011 activities. A more comprehensive assessment of results will be prepared at the end of the five-year cycle.

WASTEWATER MONITORING

Wastewater monitoring results for conventional parameters (i.e., pH, biochemical oxygen demand (BOD), total suspended solids (TSS) and nutrients) indicated that the quality of the effluent from Macaulay and Clover points outfalls in 2011 was similar to previous years. Concentrations of all conventional parameters were within the expected range for fine-screened wastewater. The estimated receiving environment concentrations, as predicted by applying a minimum initial dilution factor (based on oceanographic modelling) expected at the edge of an initial dilution zone (IDZ), did not exceed applicable British Columbia (BC) or Canadian Council for Ministers of the Environment (CCME) water quality guidelines (WQG). Flow volumes did not exceed the allowable daily maximums stipulated in the Operational Certificates for the outfalls.

Priority substances frequently detected in wastewater in 2011 were similar to previous years. Substances detected at a frequency greater than or equal to 50% of the time included a number of conventional parameters: total and dissolved metals, organotins, two phenolic compounds, polycyclic aromatic hydrocarbons (PAH), two phthalates, a few miscellaneous volatile organics and terpenes. Ten parameters were above applicable BC or CCME WQGs in undiluted effluent, including bacteriological indicators, WAD cyanide, ammonia, sulphide, cadmium, copper, iron, manganese, zinc and trichloromethane. However, only bacteriological indicators exceeded guidelines after the application of the predicted IDZ minimum initial dilution factor.

Wastewater toxicity testing was reintroduced to the program in 2011. The results indicated that undiluted wastewaters continue to be acutely lethal to fish and invertebrates, similar to historical results.

Overall, the 2011 wastewater monitoring results were generally consistent with previous years. Macaulay and Clover points wastewater met all flow, TSS and BOD requirements stipulated under their draft operational certificates, indicating that wastewater plants were operating as expected. Bacteriological indicators, and some priority substances, were above WQGs in undiluted wastewater. All except the bacteriological indicators met guidelines once the minimum dilution factors were applied. The Macaulay and Clover wastewaters were acutely lethal to fish and invertebrates in 2011, also similar to previous results. The guideline exceedences and toxicity test failures will likely continue until the installation of the Core Area Wastewater Treatment Project (CAWTP).

Surface Water and Water-Column Monitoring

The surface water component of the WMEP was expanded to include water-column monitoring at the edge of the IDZ of each outfall in 2011. Changes in monitoring frequency were also made to allow for more direct comparisons to human health protection guidelines by shifting from monthly to quarterly sampling, with five sampling events occurring within 30 days each quarter.

Results of the quarterly surface water monitoring at both outfalls indicated that all surface water monitoring results were far below the applicable BC MoE water quality guidelines. Although there were no WQG exceedences at the surface, some individual results were relatively high. These high values were all observed in the winter when human recreational activities were unlikely to occur around the outfalls. Overall, the surface monitoring results indicated that the risk to human health was low. The outfall plumes were predominantly trapped below the ocean surface (typically around 40 m depth) and the diffusers were working as expected.

Water-column monitoring at the edge of the IDZ, however, indicated that MOE WQGs were exceeded below the surface of the ocean, around both outfalls. These exceedences were expected based on the bacteriological concentrations of the wastewaters and the intended outfall diffuser designs. Even though there were exceedences, risks to human health were still considered low as the CRD is unaware of any recreational activities taking place below the surface of the ocean near the outfalls. These WQG exceedences are expected to continue until the installation of the CAWTP.

Seafloor Monitoring

The 2011 seafloor monitoring component involved a pilot study to select new sediment toxicity and bioaccumulation techniques for use in future years. Results of the pilot study are still being assessed and will be used to choose appropriate methods for the 2012 monitoring year.

Samples were collected to assess sediment quality around both outfalls in 2011. Results were similar to previous years, with the concentrations of some parameters exceeding sediment quality guidelines set to protect aquatic life. Exceedences at Macaulay Point included: a number of PAH, 1,4-dichlorobenzene, bis(2-ethylhexyl) phthalate, dimethyl phthalate, m & p xylenes, and phenol. At Clover Point, only butyl benzyl phthalate, m & p xylenes and phenol exceeded guidelines. Except for phenol, all of the exceedences were limited to within 200 m of each outfall. Phenol has been detected frequently in both sediments and wastewaters over the years. Statistical trend assessments have indicated concentrations have been constant or decreasing in wastewaters and slowly increasing in sediments.

The CRD will continue to monitor the changes in phenol concentrations. Overall, the parameters and spatial extent of exceedences were similar to previous years and, similar to WQG exceedences, are expected to continue until installation of the CAWTP.

ADDITIONAL INVESTIGATIONS

Additional investigations are important elements of the program and are conducted to address specific questions or issues pertaining to the WMEP, to clarify aspects of the program and to provide concurrent data for the assessment of environmental effects. Some additional investigations are also requirements under the Core Area LWMP approval. Studies undertaken as part of additional are recommended and reviewed by the Marine Monitoring Advisory Group (MMAG) on a regular basis. In 2011, one ongoing additional investigation was completed and results from the remaining investigation are still under review and will be presented in future annual reports.

Sediment Core and Benthic Invertebrate Analyses

Sediment chemistry data collected as part of the WMEP have shown some variations from year to year. Variations in the measured surface sediment concentration of a contaminant may not only reflect variations in the source; the local rates of sedimentation and mixing also affect the observed surface concentration. Therefore, collecting only surface sediment can potentially be misleading. A sediment core study was recommended as part of the additional investigations prioritized by the MMAG. Sediment cores record past contamination history, and rates of sediment accumulation and mixing can be interpreted from them.

The CRD initiated a sediment core study in 2006 in collaboration with Fisheries and Oceans Canada, Institute of Ocean Sciences, University of Victoria and Metro Vancouver. Benthic invertebrate samples were collected for comparison. The concentrations of flame retardant and other environmentally persistent compounds were assessed in each sample. Findings indicated that differences in receiving environment and level of wastewater treatment between the CRD Macaulay Point outfall and the Metro Vancouver Iona outfall led to the differences in the amount of flame retardant substances deposited in sediments around the outfalls, as well as the amount taken up into tissues of organisms living around the outfalls. Results from these assessments were published in two scientific journals in 2012.

OVERALL CONCLUSIONS

Results of wastewater monitoring showed that some substances were above water quality guidelines in undiluted wastewater but all substances, except the bacteriological indicators, were below guidelines once the minimum dilution factors were applied. As expected, in 2011 undiluted wastewater from both outfalls was acutely lethal to fish and invertebrates. Surface water and water-column monitoring indicated that both the Clover and Macaulay wastewater plumes were predominantly trapped at depth, with occasional surfacing events which occurred mostly in winter. Below the ocean surface, water quality guidelines for the protection of human health were exceeded at both outfalls. However, the likelihood for human exposure to pathogens that reached the marine environment via discharged wastewater is low as the CRD is unaware of any recreational activities occurring at depth (typically 40 m) near the outfalls. Seafloor monitoring indicated that some sediment contaminants exceeded applicable guidelines, primarily within 200 m of the outfalls. Sediment and water quality guideline exceedences and wastewater toxicity test failures are expected to continue until further wastewater treatment is installed as part of CAWTP.

CAPITAL REGIONAL DISTRICT
REGIONAL SOURCE CONTROL PROGRAM 2011 ANNUAL REPORT

EXECUTIVE SUMMARY

The purpose of the Capital Regional District (CRD) Regional Source Control Program (RSCP) is to protect sewage collection and treatment facilities, public health and safety, and the marine receiving environment by reducing the amount of contaminants that industries, businesses, institutions and households discharge into the district's sanitary sewer systems.

The CRD adopted a Sewer Use Bylaw in 1994 to regulate sanitary sewer discharges. Implementation of a region-wide program began in 1995 with regulation of larger industries under a permit system, followed by adoption of the first regulatory codes of practice (COP) for commercial sectors in 1999. Codes of practice were developed, adopted and implemented by the end of 2005 to regulate discharges from approximately 2,000 businesses within 11 sectors. The RSCP works to ensure that the bylaw and its associated policies and procedures are applied consistently within all CRD sewage collection areas.

As part of the Environmental Partnerships Division (Partnerships), the RSCP shares a mission to deliver collaborative and responsible environmental services that engage and inspire changes in behaviour for the stewardship, protection and well-being of our region.

Efforts to share information and coordinate inspections with two other programs within Partnerships – Cross Connection Control (CCC) and Demand Management (DM) – have been very successful, with 135 coordinated inspections being completed in 2011. It is anticipated that there will be increased collaboration between these programs, municipalities, business groups, institutions and other agencies in 2012 and beyond.

In 2011, the overall percentage of regulated businesses with proper waste treatment installed reached 97%, the highest level achieved to date. Sectors operating under COP maintained high levels for installation and use of proper waste treatment measures. Compliance levels at permitted industrial facilities reached 100% for the first time and facilities operating under authorizations also maintained full compliance levels.

A statistical assessment of local wastewater trends over the period 1990-2011 was undertaken in 2012. Preliminary trend results have confirmed findings of previous studies indicating stronger evidence of stable or decreasing loads in a range of priority substances in wastewater discharged from the region's main sewage outfalls. These continuing decreasing trends and recent changes in loads are thought to be largely due to a combination of the success of source control efforts at regulating contaminants, increasing public and industry awareness regarding product selection, and use of proper waste treatment practices.

The residential outreach campaign *Clean Green* was launched in 2011 as part of the ongoing *Clean Water Begins at Home* initiative. This new campaign targeted the proper disposal of household cleaners and promoted the use of non-hazardous alternatives. In addition, three new social media initiatives were developed to make source control messaging more available to younger audiences in the region. Information obtained from the provincial Medications Return Program has again shown that residential outreach messaging continues to be successfully delivered.

The source control program continues to play an important part in achieving wastewater contaminant reductions and protecting sewage collection and treatment facilities throughout the region. This role will be particularly important in view of the recent initiation of the core area sewage treatment project.

The 2011 annual report presents background information, a summary of program activities and accomplishments over the period January to December 2011, and a brief account of initiatives planned for 2012. The main activities and accomplishments of the program in 2011 are outlined as follows.

Industrial, Commercial and Institutional (ICI) Liquid Waste Regulation

- 100% use of proper waste treatment measures was maintained in six code sectors (treatment works installed or offsite waste management used): dental, laboratory, dry cleaning, carpet cleaning, fermentation and recreation.
- Greatest increase in the level of proper waste treatment (14%) was recorded within the printing sector.
- A record high level of proper waste treatment was attained in the food services sector (97%); this was a 2% increase over that reported in 2010.
- A new COP inspection plan focusing on businesses discharging priority contaminants to sewer was implemented for the third consecutive year.
- All permit inspections scheduled at the beginning of 2011 were completed within the year. Permits discharging priority contaminants received at least one or two additional inspections.

Monitoring

- All monitoring targets set at the beginning of 2011 were met.
- The goal of collecting audit samples from each permitted site twice per year was achieved.

Enforcement

- No tickets were issued under the CRD Ticket Information Authorization Bylaw.
- No charges were laid under the Sewer Use Bylaw in 2011.

Contaminants Management

- A consultant's report, completed in June 2011, provided a review of the existing priority contaminants list, made recommendations for possible modifications, identified potential priority contaminant sources and developed reduction strategies and targets. Several of the recommendations from this report were considered during the development of the RSCP five-year implementation plan.

- The RSCP sponsored a project through the Royal Roads Environmental Science Undergraduate Program to predict the partitioning and degradation of pharmaceuticals and personal care products (PPCPs) following secondary sewage treatment and to prioritize those PPCPs found in local wastewaters for potential action by the RSCP. The project report and presentation of the findings was delivered in August 2011.

Contaminant Reductions

- Preliminary effluent trend assessment results for Macaulay and Clover points and Saanich Peninsula Wastewater Treatment Plant (SPWWTP) influent and effluent monitoring over the period 1990-2011 have confirmed findings of previous studies indicating stronger evidence of stable or decreasing loads in a range of priority substances in wastewater discharged from the region's main sewage outfalls.
- Loads of priority metals (those presenting the greatest concern regarding aquatic toxicity) including cadmium, chromium, copper, lead, mercury, manganese, nickel and zinc exhibited significant decreases ranging from 1% to 19% per year in core area effluent.
- Organic compounds, including certain PAHs, 1,4-dichlorobenzene and PCE showed significant decreases in loads, ranging from 2% to 16% per year in core area effluent.
- A significant decrease of 6% per year was also observed for total oil and grease at core area outfalls.
- For the third consecutive year, Ganges Wastewater Treatment Plant (GWWTP) mixed liquor results met the Class A criteria for all metals, including mercury.
- Biosolids quality at SPWWTP continued to meet Class A criteria.
- Five-year contaminant reduction targets have been successfully achieved for all COP sectors.

Significant Incident Response

- There were five incidents involving high hydrogen sulphide levels recorded in CRD trunk sewers and pump stations in 2011 that were investigated by RSCP staff.

Residential Outreach

- 2011 saw the development and implementation the *Clean Green* campaign as part of the ongoing *Clean Water Begins at Home* initiative. This new campaign targeted the proper disposal of household cleaners and promoted the use of non-hazardous alternatives.
- The program maintained the promotion of the original three *Clean Water Begins at Home* campaigns (Fats, Oils and Grease Reduction, Surfactant Reduction and Medications Return) through print, radio and web-based advertisements and outreach events.
- In 2011, the CRD continued to record a higher medication return rate per capita than most regional districts in the province and demonstrated an increase over returns in 2010. More than 9.5 tonnes of medications were collected – representing a 200% increase over the amount collected in 2007, the year before the CRD Medications Return campaign was launched.
- The program continued to use social media to engage residents and make source control messaging available to males 18-34 years of age throughout the CRD. Following the success and experience of *SustainableU Source Control 101*, three new initiatives were developed in 2011.
- In 2011, continuing discussions with home care professionals from the Vancouver Island Health Authority (VIHA) were held with the goal of promoting proper waste medication disposal within the home care sector.

Business Outreach

- Based on input from stakeholder meetings with food services and automotive repair sector representatives, new outreach tools were developed to promote compliance and commitment to source control practices. Tools developed included posters and videos.
- The 2011 CRD EcoStar award event was co-sponsored by RSCP and staff again participated in the evaluation committees for the Water Stewardship, Community Environmental Leader and Youth Leader categories.

Partnerships Initiatives

- RSCP staff continued to undertake coordinated inspections with two other programs within the division (CCC and DM), successfully completing 135 such inspections in 2011.
- Staff worked with several municipal partners to resolve sewer incidents, share discharge information and enhance reporting procedures.
- Partnerships with external agencies in 2011 included Metro Vancouver, VIHA, Royal Roads University, Camosun College and School District 61.

Data Management

- The new database for the program, implemented in 2010, was further developed to ensure consistency between division partners that use a similar format.
- Work commenced on the integration of the database with the CRD geographic information system (GIS). The final product, scheduled for delivery in 2012, will improve compliance tracking, support inspection planning, track implementation plans, provide ad hoc and regular statistics, and assist with spill or incident response.

Program Planning and Development

- The findings of the third five-year independent review of the program for the period 2004-2008 (Morrison Hershfield, 2010) were used to develop a five-year plan for the RSCP covering the period 2011-2015. This plan was delivered in September 2011.
- A consultant's review of the current RSCP permit fee structure was delivered in June 2011. The review determined that a wide variety of fee structures has been utilized in the five large jurisdictions studied and that the CRD fee structure had some deficiencies. Four fee structure options were developed for future consideration.

Performance Measures

- Highest percentage of regulated businesses with proper waste treatment installed to date (97%).
- For the third consecutive year, the percentage of biosolids and mixed liquor samples that meet Class A standards for metals was 100%.
- Percentage of priority contaminants showing no increase in loads to the core area environment – 97% – based on a recent trend assessment for 1990-2011 core area wastewater data.

Next Steps–2012/13

The main areas of program development in 2012/2013 include:

- Continue implementation of the RSCP five-year plan for 2011-2015
- Commence blending of permit and COP inspection duties
- Continue to collaborate with internal and external partners to enhance the division's "one window approach" to customer service
- Implement a *Source Control 201* initiative
- Survey the public to measure the success of 2011/2012 outreach initiatives
- Undertake a pilot study to identify and evaluate new treatment technologies for the food services sector

ANNUAL STORMWATER QUALITY REPORT

CORE AREA — 2008 to 2011

EXECUTIVE SUMMARY

INTRODUCTION

The Capital Regional District (CRD) Stormwater, Harbours and Watersheds Program (SHWP) plans, promotes and coordinates the management of stormwater quality in the Core Area Liquid Waste Management Plan (LWMP) area, in consultation with the municipalities, Department of National Defence (DND) and First Nations.

The 2011 annual report covers five main areas of activity:

1. **Stormwater Discharge Surveys** – carried out along the entire coastline of the core area to investigate public health and environmental concerns of stormwater discharges.
2. **Upstream Investigations** – undertaken to identify the sources of contaminants in stormwater.
3. **Nearshore Marine Investigations** – carried out in Esquimalt Lagoon and, Esquimalt and Victoria harbours to determine the health of the waterbodies and monitor for change over time.
4. **Stormwater Source Control** – promoted through the creation of a Model Storm Sewer and Watercourse Protection Bylaw and associated codes of practice (COP) for business sectors that have the potential to impact stormwater quality.
5. **Special Projects** – to improve stormwater quality in the region.

This annual report has been discussed with the seven core area municipalities, the two First Nations and the DND.

RESULTS AND DISCUSSION

1. Stormwater Discharge Surveys

The stormwater discharge survey covers the coastline between the Colwood-Metchosin border in the west and the Saanich-Central Saanich border in the east, including Esquimalt Lagoon, Esquimalt Harbour, Victoria Harbour, Gorge and Selkirk waters, Portage Inlet and the City of Langford coastline along Saanich Inlet.

Public Health – Fecal Coliforms

Stormwater discharges are evaluated for public health concerns. This is done by sampling each discharge for fecal coliform bacteria and assigning a rating of high, moderate or low using the CRD rating system. This allows the jurisdictions involved to better manage limited funds and undertake remedial measures where necessary.

In 2011, 186 stormwater discharges were analyzed for fecal coliform concentrations. Discharges were visited once during the winter and once during the summer to represent seasonal differences. Of the 186 discharges assessed, 43 were rated high for public health concern (refer to Table A, and Figures A and B), 42 were rated moderate and 101 were rated low.

From 1993 to 1999, the number of stormwater discharges assigned a high level of concern for public health dropped dramatically (from 49 to 22). Since then, the total number of high-priority discharges has increased, back up to 43 in 2011 (Table A). The 18-year pattern of the numbers of high priority discharges does not tell the whole picture of improvements to stormwater quality during this time period. The municipalities and other jurisdictions have worked hard to reduce problem discharges and have addressed most of the stormwater discharges with obvious contaminant sources. Many of the high-priority discharges have been repaired and are now rated moderate; however, new issues are found

regularly. Of the 41 discharges rated high in 2007, 12 were rated low or moderate for public health concern in 2011, indicating a measurable improvement to stormwater quality that is not evident by comparing total high-rated discharges alone. The majority of the remaining discharges have proven difficult to address; where contaminant sources are a challenge to identify or a new source has developed in the discharge.

Table A. Number of Discharges with a High Public Health Concern Rating from 1993 to 2011

Area	1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2011
Colwood	0	2	2	1	0	0	0	0	1	1	0	0	0	0	1
View Royal	1	0	0	0	0	0	0	0	0	1	0	1	2	1	1
Esquimalt	12	10	9	9	9	6	6	5	5	5	5	7	7	8	7
DND	0	0	1	2	1	1	1	0	0	0	0	0	0	0	0
Saanich	6	2	1	2	1	0	2	2	1	0	4	1	1	2	2
Victoria	22	17	12	10	9	11	13	9	8	13	14	14	15	15	20
Victoria private discharges[1]	*	*	*	*	*	*	*	*	*	*	*	2	3	5	3
Oak Bay	8	7	3	4	3	4	5	6	8	6	5	9	9	10	9
Langford[2]	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0
Total	**49**	**38**	**28**	**28**	**23**	**22**	**27**	**22**	**23**	**26**	**28**	**34**	**37**	**41**	**43**

[1] Discharges that drain from private property do not fall under municipal jurisdiction. Starting in the 2006 report, discharges within the City of Victoria survey area that drain from private properties to the ocean are indicated separately. Other municipalities will be reported similarly in future annual reports.

[2] City of Langford stormwater discharges were sampled for the first time by the Stormwater Quality Program in 1998.

* Private discharges included in the City of Victoria totals.

The high public health concern ratings occurred primarily in the three municipalities of Esquimalt, Oak Bay and Victoria (Table A). These increases do not indicate any lack of effort to identify and repair problems on the part of these municipalities but do indicate the larger infrastructure issues that they have to deal with. These municipalities have some of the oldest sewer and stormwater infrastructure in the region. Issues including aging, collapsed and cracked pipes, old construction practices such as inadequate separation of sewer and storm sewer pipes, and cross connections all can cause sewage contamination of stormwater. The other four core area municipalities tend to have newer infrastructure and this is likely the reason for the lower number of high ratings in those areas.

To address the increasing trend of high-priority stormwater discharges, in June 2008, CRD Environmental Protection staff held discussions with the municipal engineers from the seven core municipalities to plan a refocused CRD Stormwater Quality Program. The focused program redirected efforts from rating discharges to identifying contaminant sources through upstream investigations. Annual sampling was restarted in 2011 to survey stormwater discharges and measure the success of the source investigations. Source investigations were carried out in the catchment areas of 51 discharges between 2008 and 2011, and repairs were carried out when possible. In 2011, only 33 of the 51 discharges were still rated high for a public health concern, a 35% reduction (Table B). Discharges selected for source investigations will be monitored over the coming years, to see if the decrease in the number of high ratings continues. Monitoring of this subset of discharges can be used to track improvements that are masked by new problems identified by increased sampling efforts.

Table B. Success of Source Investigations

Jurisdiction	Number of discharges rated high for public health concern before and after source investigations	
	2007	2011
Township of Esquimalt	13	7
District of Oak Bay	11	8
District of Saanich	3	0
City of Victoria	22	18
Town of View Royal	2	0
Total	**51**	**33**

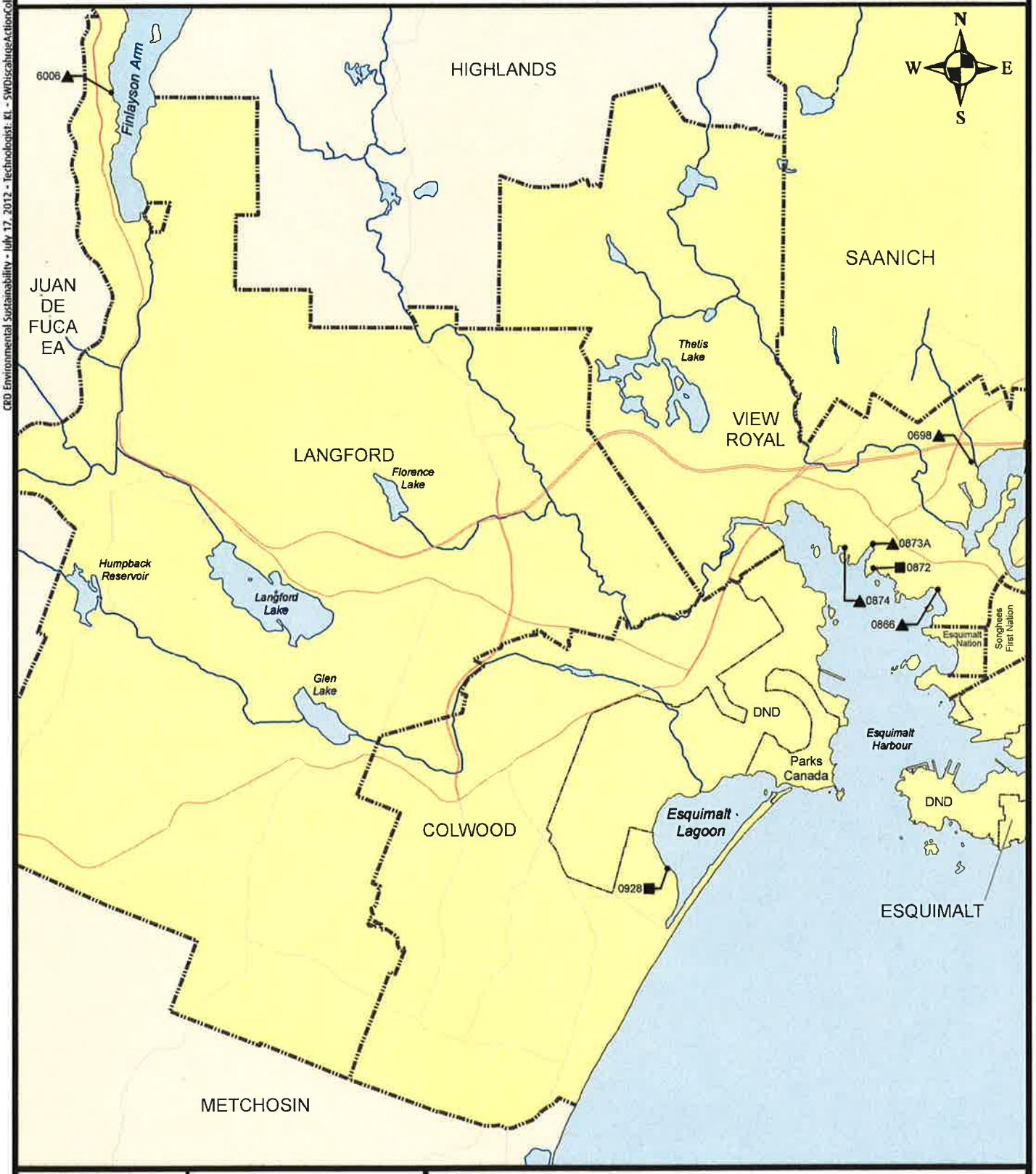
Environment – Chemical Contaminants

Stormwater discharges are evaluated for environmental concerns based on the level of metals and organic contaminants identified in sediment from each flow. Discharges with high chemical contaminants are then prioritized for action, based on environmental factors including habitat sensitivity, discharge flow rate and the flushing characteristics of marine receiving waters. This prioritization is undertaken in consultation with the appropriate jurisdictions and may result in a detailed investigation to locate the sources of contamination. All chemical contaminant data from previous years were considered because sampling is discontinued at discharges consistently rated high for three years until some form of remediation is implemented. This allows limited funds to be reallocated for sampling other discharges while continuing to report the need for action in each annual report.

The 2008 to 2011 sediment sampling program focused effort on 62 discharges in order to undertake upstream sampling in an attempt to locate sources of contaminants. These stormwater discharges were sampled for polycyclic aromatic hydrocarbons (PAH) and metals and were assessed for environmental concern. Twelve of the 62 stormwater discharges received a high contaminant rating. Twenty discharges received a moderate contaminant rating and 30 were rated low.

All chemical contaminant data collected from 122 discharges since 1993 were used to assess environmental concerns in 2011. Data from previous annual reports were included in the assessment to allow continued reporting of discharges recommended for mitigative measures where sampling has been discontinued until remediation is implemented.

Figure A - Core Area 2011
Stormwater Discharges Requiring Action for Public Health and Environmental Concerns
(Metchosin to Esquimalt Border)



Making a difference...together

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Projection: UTM ZONE 10N NAD 83

Discharges Requiring Action
- High Public Health Rating
- High Environmental Rating and Recommended for Action
- Stormwater Monitoring Area
- Municipal Boundaries
- DND Boundaries
- Major Roads

CRD Environmental Sustainability - July 17, 2012 - Technologist: KL - SWDischargeActionColwood_2011.mxd

CRD Environmental Sustainability - July 16, 2012 - Technologist: KL - SWDischargeActionVictoria_2011.mxd

Figure B - Core Area 2011
Stormwater Discharges Requiring Action for Public Health and Environmental Concerns (Esquimalt to Central Saanich Border)

Making a difference...together

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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.

Discharges Requiring Action
- ■ High Public Health Rating
- ▲ High Environmental Rating and Recommended for Action

- Municipal Boundaries
- DND Boundaries
- Streams and Rivers
- Major Roads
- Stormwater Monitoring Area

When chemical contaminant ratings remain high for two years and the parameter(s) of concern are determined, recommendations for action are made to find and eliminate the source. In 2011, 21 discharges were recommended for action based on sampling data from 1993 to 2011. Eighteen of the discharges recommended for action in 2011 were also recommended for action in 2007. Four discharges (737, 847, 849 and 926) were removed from the action list in 2011.

Table B. Discharges Recommended for Action Due to Elevated Chemical Contaminant Levels

Jurisdiction	Priority for Discharges Requiring Action[1]			Total
	Highest Priority	Moderate Priority	Lower Priority	
City of Colwood	-	-	-	0
City of Victoria	-	603, 614, 619A, 619B, 620, 627, 629, 634, 767	613A	10
DND	-	854	-	1
District of Oak Bay	-	-	250, 310	2
City of Langford	-	-	6006	1
District of Saanich	654	-	-	1
Parks Canada	-	-	-	0
Township of Esquimalt	806	780, 812	-	3
Town of View Royal	-	866, 873A, 874	-	3
Total	**2**	**15**	**4**	**21**

Sediments associated with stormwater discharges have been collected and analyzed for chemical contaminants since 1993. To date, monitoring for environmental concern has been successful in defining problem areas. However, a review of the sampling program was started in 2006 and, if required, the program will be redesigned to measure the effectiveness of the municipal and SHWP source control initiatives.

The four discharges removed from the action list in 2011 were 737, 847, 849 and 926.

- **Discharge 737** (Esquimalt) was removed due to lower contaminant levels; it received a moderate rating in 2011. Discharge will be sampled again in 2012 to confirm results.
- **Discharge 847** (DND) was removed due to a lower contaminant rating in 2011. Discharge will be sampled again in 2012 to confirm results.
- **Discharge 849** (DND) was removed due to a lower contaminant rating in 2011. Discharge will be sampled again in 2012 to confirm results.
- **Discharge 926** (Colwood) was removed due to a low rating for four consecutive years. Therefore, no action is required at this time.

Three discharges were added to the action list in 2011 (603 [foot of Niagara at Dallas Rd.], 780 [Head St.; Victoria Harbour], 806 [foot of Kinver St., Fleming Bay]). Discharge 603 was added because of high contaminant ratings for four consecutive years, due mainly to PAH, and discharge 806 for two consecutive years of high ratings, due to cadmium, chromium, zinc and PAH. Discharge 780 was added because both samples collected within the last three years were rated high due to zinc. Efforts will be made to identify the source(s) of contamination in 603, 806 and 780 in 2012.

2. Upstream Investigations

Upstream investigations by municipal staff, VIHA and SHWP were undertaken in the catchment areas of 51 stormwater discharges for biological contaminant sampling and 25 for chemical sampling, including 10 discharges that were sampled for both biological and chemical contaminants. As a result of these investigations, the source of biological contamination was eliminated in five discharges. One source was eliminated in another nine discharges, although an additional source remains. Additional findings are shown in Table C. SHWP staff continue to work cooperatively with municipal staff, senior government and stakeholders to identify and reduce and/or eliminate contaminants at the source.

Table C. Results of Upstream Investigations from 2008 to 2011

Status	Number of Discharges
Source eliminated	5
One source eliminated – investigating another source	9
Source location narrowed down – municipalities repairing	16
Source location narrowed down	7
No sources identified, contaminant levels have decreased over time	3
No sources identified, contaminant levels remain high	11
Total	**51**

3. Nearshore Marine Investigations

Marine surface water samples were collected in Esquimalt Lagoon, Esquimalt Harbour and Victoria Harbour up to Portage Inlet. The CRD nearshore marine sampling program underwent a change in 2011, measuring numerous water quality parameters in addition to fecal coliform levels, with the goal of providing baseline knowledge of water quality in the embayed marine waterbodies in the core area of the CRD.

Samples were collected on five occasions over a 30-day period to measure fecal coliform and enterococci bacteria, metals, nutrients and water quality parameters such as temperature, dissolved oxygen, pH and salinity. The sampling program will be repeated in the summer of 2012 and the combined data used to establish water quality objectives for the harbours. Average concentrations of each parameter from the five days of sampling in 30 days were compared to BC Ministry of Environment (MOE) water quality guidelines.

In 2011, the highest number of water quality exceedences occurred in Victoria Harbour, where Enterococcus sp., fecal coliform, zinc and copper exceeded BC MOE water quality guidelines (WQG). Enterococcus sp. and fecal coliform exceedences were observed at several stations and are likely due to human sewage reaching the harbours via stormwater. Copper was high near the mouth of Cecelia Creek, which collects rainwater runoff from numerous industrial and urban sites.

In Esquimalt Harbour, Enterococcus sp. was the only parameter that exceeded WQG. Enterococcus sp. are a bacteria indicator of sewage contamination and could be due to birds, or to human sewage reaching the harbour via stormwater. In Esquimalt Lagoon, copper, nitrate and zinc exceeded WQG in 2011. Nitrate is likely due to stream input or birds, and copper and zinc are present in many stormwater discharges draining road surfaces.

Boron also exceeded WQG in all three waterbodies; however, Boron levels are consistent with natural levels throughout southern Vancouver Island, including at reference sites, and are, therefore, not a concern.

Water quality sampling will be repeated in summer 2012 and results compared to winter data. Summer samples are expected to lack the influence of stormwater input, and can, therefore, be compared to winter samples to estimate the impact of stormwater on water quality in the harbours. Both sets of data will be shared with MOE and used to develop water quality objectives for the harbours.

Watercourses

Between 2008 and 2011, water quality in 11 watercourses was measured once in the dry season and once in the wet season. Flow, fecal coliform concentration, temperature, pH, dissolved oxygen, conductance, turbidity, nitrate and phosphorus were analyzed. BC WQG were exceeded in 10 of the 11 creeks sampled. Five of these creeks showed consistent exceedences (Bowker, Cecelia, Douglas, Noble, Colquitz, and Selleck). The main areas of concern are in the lower portions of Bowker and Cecelia creeks and the upper portion of Noble Creek. Although there has been some variability in data over the past nine years, overall water quality in the 12 watercourses has not changed significantly. The exception is Selleck Creek, which showed much higher fecal coliform levels than in past years.

The water quality parameters of most concern from 2008 to 2011 were fecal coliforms, turbidity and phosphorus. Turbidity continues to be at levels that could impact aquatic life in areas of higher development due to increases in impervious areas that lead to higher stormwater volumes entering creeks. Phosphorus continues to be present at levels that may impact aquatic life in all of the watercourses monitored. The highest frequencies of exceedences were in Bowker, Cecelia and Noble creeks. This is mainly due to sewage infiltrating the stormwater system from leaking sewer lines or from the use of fertilizers and pesticides in the catchment area. Dissolved oxygen appears to have improved in the past three years, in comparison to previous levels. There were sporadic exceedences only, in Bowker, Craigflower and Colwood creeks. Dissolved oxygen levels in the creeks fluctuate from year to year and season to season.

Impacts from ongoing and proposed land-based activities pose the biggest threat to the health of watercourses and continued sampling is required to monitor for change over time. The limited number of samples collected at each creek annually makes it difficult to obtain statistically robust data that can be compared between seasons and year to year. Provincial and federal WQG are generally developed to be compared against a suite of five samples collected within a 30-day period, rather than single samples. The watercourse sampling design will be reviewed in 2012, with the goal of intensively sampling three creeks per year on a five-year cycle.

4. Stormwater Source Control

In 2007, SHWP investigated obtaining authority for stormwater source control in order to develop options to better protect the environment from stormwater-carried chemical contamination. As an initial step to determine how such a program will function on a regional scale, SHWP is moving forward with this approach on the Saanich Peninsula. In the core area, SHWP is focusing attention on the immediate issue of locating contaminant sources that are resulting in steadily increasing numbers of discharges rated high for public health concern. A stormwater source control program will be evaluated on the Saanich Peninsula over the next two years and SHWP will continue to discuss stormwater source control with the core area municipalities.

Model Stormwater Bylaw

In the LWMP, the CRD committed to coordinating a Stormwater Source Control program in cooperation with municipal partners. This program, initiated in 2001, is now primarily focused on the promotion of the Model Storm Sewer and Watercourse Protection Bylaw and associated COP. This regulatory framework is specifically targeted at activities that have the potential to impact stormwater quality.

In 2004, the province enacted the Community Charter. This, combined with a desire to produce a more streamlined version of the bylaw, resulted in a new draft of the model bylaw in the spring of 2006. The model bylaw is ready for adoption and enforcement by the municipalities.

Codes of Practice

The bylaw was designed to allow the incorporation of stormwater COP that set out municipal regulatory requirements under which various business sectors will be required to operate to prevent the pollution of stormwater.

The six COP, which have been completed and are ready for adoption, are:

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

Best Management Practices

A best management practice (BMP) is a voluntary strategy for preventing stormwater pollution and often uses the same methods and strategies as in a code of practice but without the regulatory mechanism for compliance.

Two sector-specific BMP, which have been completed and are ready for region-wide use, are:

- Painting without Pollution
- Power Washing without Pollution

Outreach and Promotion Component

SHWP staff continue to provide assistance to the municipalities, as required, with the adoption and implementation of the model bylaw and COP. Staff also respond to inquiries from businesses and the public around these issues.

5. Special Projects

Water quality in Bowker and Colquitz creeks was further tested by evaluating the effect on fish through hatchbox studies. Fish box studies evaluated survival, growth and incidence of deformities among rainbow and cutthroat trout embryos reared in situ in the creeks. Survival rates related to water quality in Bowker Creek were good, suggesting that the water in Bowker Creek is of sufficient quality to support development of salmonid early life. High flow after a storm event did cause fish mortality at a downstream station; therefore, rapid creek volume changes, due to impermeable surfaces in this urban watershed, may be of more concern than water quality in Bowker Creek. Water quality in Colquitz Creek was also of sufficient quality to support early salmonid life, and flow variance may be less extreme than in Bowker Creek.

2012 SAMPLING PROGRAM

SHWP will continue to work with municipal partners to identify stormwater discharges of public health and environmental concern, and will spend as much time as possible investigating the sources of contamination.

Nearshore marine investigations will shift from single samples twice a year in Esquimalt Lagoon, and Victoria and Esquimalt Harbours, to a more intensive, but less frequent, sampling regime of five samples in a 30-day period in both the dry and wet seasons, completed every three years. This plan will allow results to be compared to BC WQG, and has been formulated on the advice of MOE. The more robust data generated will allow water quality objectives to be developed for the harbours.

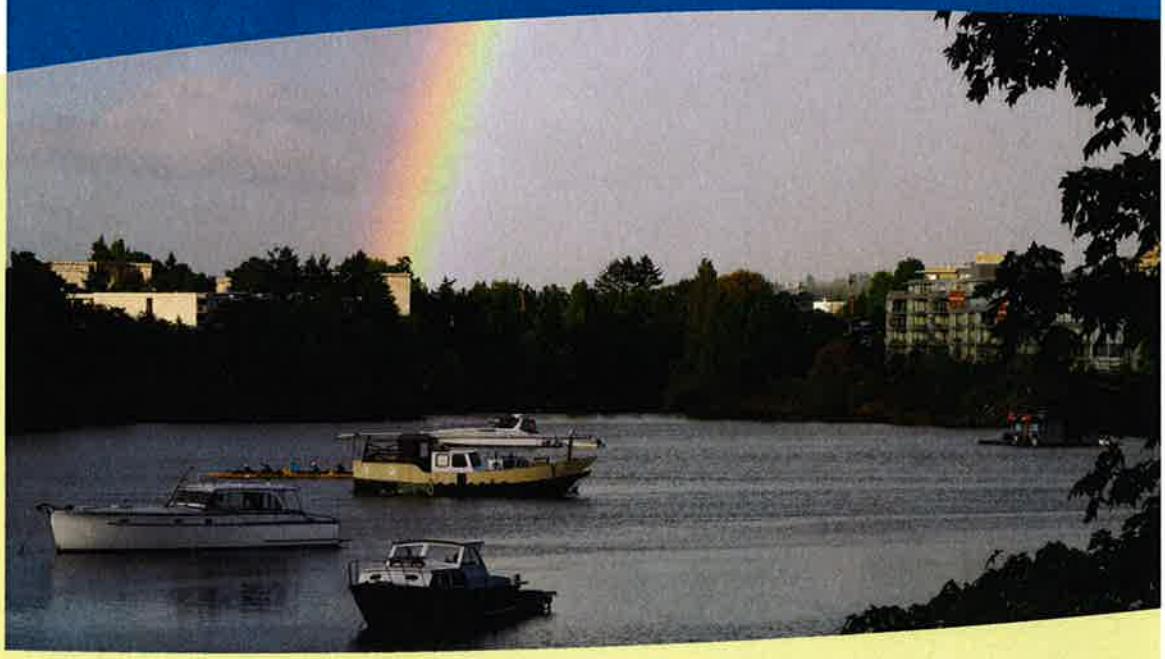
Assessment of watercourse health in the core area will also be shifted from two single samples per year to a more intensive sampling regime. SHWP will assess the habitat and water chemistry of approximately two watercourses per year by collecting five samples in a 30-day period and analyzing for water chemistry, as well as conducting a benthic invertebrate assessment used as a stream health indicator. In addition, continuous monitoring of flow, turbidity, temperature, and pH will be conducted in Colquitz and Colwood creeks beginning in 2012. Shifting to more intensive monitoring of approximately three creeks

per year on a five-year cycle would allow the collection of data more representative of water quality in each creek, while staying within budget limitations.

More intensive data collection in CRD streams and harbours will allow stormwater source control efforts to focus on regions and parameters of most concern with a solid scientific backing. It will also provide reliable baseline knowledge to judge changes in water quality over time.

GORGE WATERWAY INITIATIVE

2011 Annual Report



Rainbow over the Lower Gorge Waterway.

Our Vision

Promotion of a healthy environment for all life in the Gorge Waterway, Portage Inlet, and their watersheds and communities for the wellbeing of present and future generations.

Our Goals

- provide a forum for the exchange and sharing of information regarding the Gorge Waterway, Portage Inlet and their watersheds
- promote education and awareness programs on appropriate land and water use
- establish and encourage activities that show care and concern for the natural environment

Background

The Gorge Waterway Initiative (GWI) is a collaborative, community-driven group of organizations working to protect, enhance and restore the natural and cultural features of the Gorge Waterway, Portage Inlet and the surrounding watersheds.

The GWI provides a unique framework for a coordinated approach to environmental stewardship of the Gorge Waterway, Portage Inlet and their watersheds through sharing information and fostering partnerships. GWI members come from community and environmental groups, landowners, local governments, local government advisory committees and recreational users, ensuring a broad array of interests are represented.

GWI is led by a consensus-based steering committee responsible for guiding the implementation of the Gorge Waterway Stewardship Strategy. GWI is facilitated by the CRD. A part-time coordinator initiates and manages projects, seeks funding and provides administrative support.

2011 Accomplishments

GWI members provided coordinated reviews of the View Royal and Victoria Official Community Plans, and gave their input to municipal staff involved in designing the Craigflower Bridge replacement. During the two-year review of the CRD Harbours Environmental Action Plan through which GWI operates, members voiced their strong support for the continuation of CRD coordination of the area-based initiatives in the harbour region.

Throughout the year GWI continued to:

- improve community appreciation and stewardship for the waterway
- protect threatened and endangered wildlife on the waterway
- inventory and monitor environmental quality
- provide input on development projects
- conduct habitat restoration projects

Visit us at:
www.gorgewaterway.ca

GWI Partners

Community Members

- Burnside Gorge Community Association
- Friends of Cuthbert Holmes
- Gorge Tillicum Community Association
- Gorge Waterway Action Society
- Habitat Acquisition Trust
- Portage Inlet Protection Society
- Portage Inlet Sanctuary Colquitz Estuary Society
- SeaChange Marine Conservation Society
- Seaquaria in Schools
- Victoria Canoe and Kayak Club
- Victoria West Community Association
- World Fisheries Trust

Local Government Members

- Capital Regional District
- City of Victoria
- District of Saanich
- Township of Esquimalt
- Town of View Royal
- View Royal Parks, Recreation and Environment Advisory Commission

A water quality monitoring program was established at 15 sampling sites (●).

Water Quality Objectives

A major new initiative of the CRD Harbour Environmental Action Program is the establishment of water quality objectives for the Gorge Waterway and Portage Inlet. Fifteen marine sampling sites were established along the waterway and into Victoria Harbour. These sites were sampled for contaminant levels during a high flow period in fall 2011.

Preliminary results indicated that contaminants were generally low in the Gorge Waterway and Portage Inlet. In the Upper Harbour (Johnson St Bridge to the Selkirk Trestle) there were exceedances of nitrates, phosphates, fecal coliform and metals (notably copper, iron, zinc, lead and magnesium) and dissolved oxygen levels were low. Another round of sampling during the low flow period will be conducted in July-August 2012.

When results from both flow periods have been analyzed, GWI will play an important role in the public consultation process for developing water quality objectives for the Gorge Waterway and Portage Inlet.

Land and Water Use

GWI members continued to correspond with engineering staff from View Royal and Saanich about the planned replacement for Craigflower Bridge. A presentation was made by municipal staff at a GWI meeting, showing the three design concepts under consideration. GWI members provided input regarding ecological considerations for bridge placement, including height, passage for wildlife and mitigation for Olympia oyster and eelgrass habitat that will be affected. Members also urged BC Hydro to locate power lines underneath the new bridge.

The Official Community Plan updates for both View Royal and Victoria were carefully reviewed by GWI members and comments on the aspects of these documents that affect the Gorge Waterway and Portage Inlet were submitted to the municipalities.

Members of the public approached GWI in 2011 with concerns that boating on the Colquitz River was disturbing birds there. GWI consulted with Saanich and a sign was installed under the Admirals Bridge informing boaters that the area is a sensitive area for birds and wildlife.

Olympia Oyster Survey

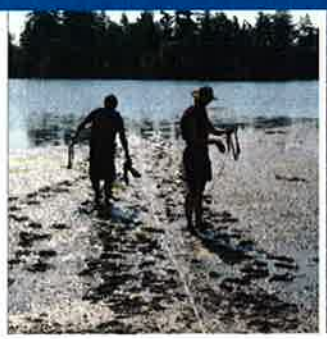


Image left: Staff monitoring the Olympia oyster habitat.
Image right: Three Olympia oysters.

A pilot project was initiated to survey and assess the thriving population of Olympia oysters (Ostrea conchaphila) in the Gorge Waterway and Portage Inlet. The only BC native oyster, they are federally designated as a "species of special concern" and the Gorge supports one of the few remaining populations on the coast. The survey will be conducted by World Fisheries Trust, a GWI member organization that has been conducting oyster monitoring and research in the waterway for several years. The work will add greatly to our understanding of the habitat needs of the Olympia oyster, potential threats posed by invasive marine species and other factors that affect the distribution and abundance of the Olympia oyster.

Point Ellice Shoreline Restoration

GWI continued work on a major shoreline restoration project begun in 2008 at Point Ellice House. This ecologically significant site supports a unique remnant of the native forest ecosystems that once lined the shores of the Gorge Waterway. Volunteers continued the removal of invasive plants, primarily English ivy and periwinkle, and replanted with native vegetation. More than 2,500 hours of volunteer labour resulted in the removal of 20 tonnes of invasive plants from the site. Over 500 native trees, shrubs, perennials and native grasses were planted in the cleared areas. The Fido Evergreen grant program chose this project as one of 10 across Canada to compete for funding in an online contest. As a result, GWI was awarded $2,500 which was used to hire an experienced contractor to remove ivy and replant in the more challenging areas on the site.

The Outreach Committee of GWI undertook the creation of three interpretive signs for this significant restoration site. This project will be completed and signs installed in 2012.

Thank you!

Community Volunteers

- St. Michaels University School
- Numerous local residents

Government and Business Supporters

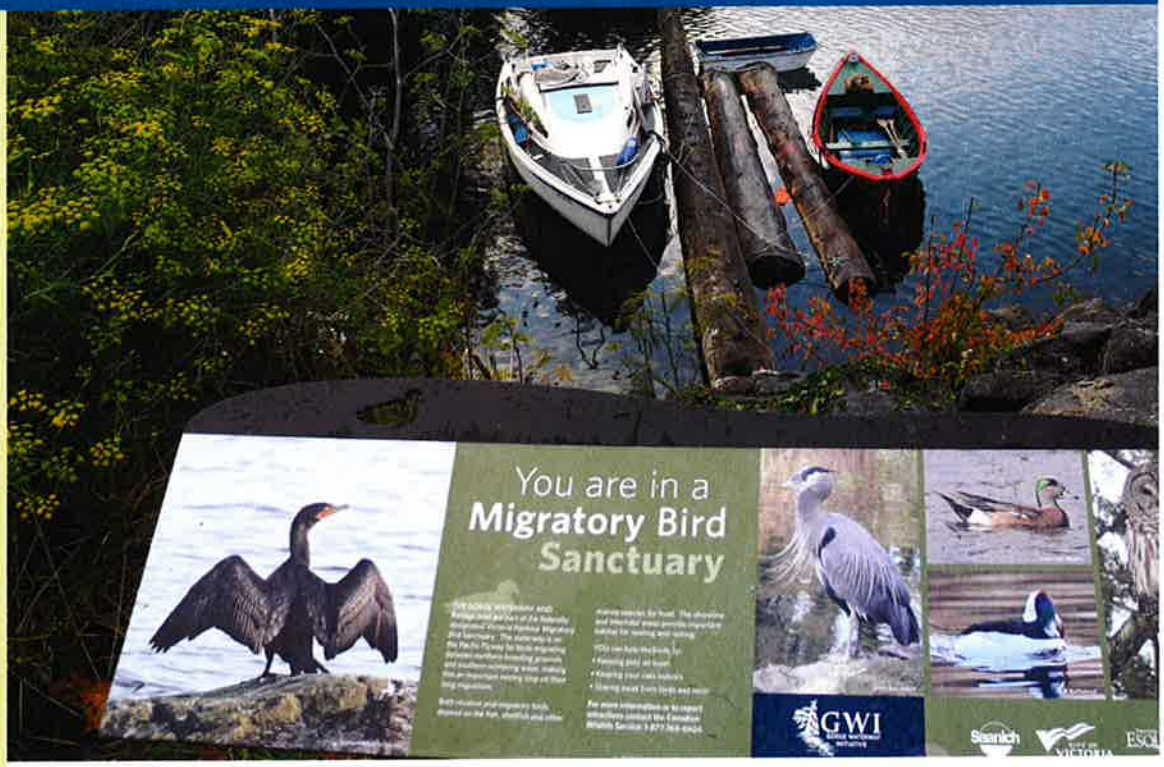
- Ellice Recycling
- BC Heritage Branch
- Point Ellice House staff and volunteers
- City of Victoria Parks

Financial Supporters

- Fido Evergreen
- Capital Regional District

Image left: Native trees and shrubs, planted by volunteers, are flourishing now that invasive plants have been removed.
Image right: Volunteer removing ivy from the rocky outcrop at the Point Ellice shoreline.

Gorge Tillicum Community Association cited GWI as a "Local Hero" for the successful completion of the interpretive signs and other stewardship and education efforts along the Gorge Waterway.



One of 12 interpretive signs along the Gorge Waterway.

Community Outreach

GWI hosted another event in the popular Gorge Waterway Speakers Series, part of a free public lecture series on various waterway and watershed topics. Nikki Wright, executive director of SeaChange Marine Conservation Society, and Alicia Donaldson, University of Victoria graduate student, gave a presentation entitled "Eelgrass, Oysters and the Gorge Waterway: A Living Legacy". This well-attended event provided many residents an opportunity to learn more about these iconic species that inhabit our urban waterway.

Member volunteers hosted the GWI information display, the interactive Gorge watershed model and the Seaquaria marine touch tank at Canada Day on the Gorge in the Gorge Waterway Park in Saanich, Oceans Day in Esquimalt Gorge Park and Rivers Day in Cuthbert Holmes Park.

Focus for 2012

In 2012, GWI will focus on:

- conducting Olympia oyster surveys in Portage Inlet and Gorge Waterway
- providing input to View Royal and Saanich regarding the replacement of Craigflower Bridge, including creation of interpretive signs for the bridge and its approaches
- establishing water quality objectives for the Gorge Waterway and Portage Inlet as part of the Harbours Environmental Action Program
- establishing a flow monitoring program for Colquitz Creek
- providing input to the Liquid Waste Management Plan Harbour Review Working Group to develop a 5-year work plan for the Gorge Waterway and other harbours
- completing the removal of invasive species and replanting with native plants at the Point Ellice shoreline restoration project and installing interpretive signs at the site
- promoting activities that engage the community in stewardship of the Gorge Waterway

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GWI
GORGE WATERWAY INITIATIVE

ESQUIMALT LAGOON STEWARDSHIP INITIATIVE 2011 Annual Report

ELSI volunteers pulling broom at the Esquimalt Lagoon.

Our Vision

To protect, enhance and restore the health of Esquimalt Lagoon for future generations of people, plants and animals.
Founded 2001

Our Goals

- Promote and support lagoon stewardship and education
- Prevent further loss or destruction of habitat and wildlife
- Reduce contaminant inputs to the lagoon
- Promote environmentally protective recreation uses in the lagoon area
- Promote environmentally protective land uses

Visit us at:
www.elsi.ca

Background

The Esquimalt Lagoon Stewardship Initiative (ELSI) is a broad coalition of community and environmental groups, institutions, government and First Nations working together to protect, enhance and restore the Esquimalt Lagoon and Coburg Peninsula.

After its founding in 2001, ELSI developed a Stewardship Plan for Esquimalt Lagoon which provides the framework for a coordinated approach to environmental management. ELSI creates opportunities for collaboration on environmental projects and outreach activities, and provides a forum for exchange and sharing of information.

ELSI is led by a consensus-based steering committee responsible for guiding the implementation of the Esquimalt Lagoon Stewardship Plan. ELSI is chaired by the Capital Regional District (CRD) Harbours and Watersheds Coordinator. A part-time assistant coordinator, funded through the CRD, initiates and manages projects, seeks funding and coordinates ELSI.

2011 Accomplishments

ELSI focused on ongoing projects, completion of multi-year projects and participating in the two-year review of the CRD Harbours Environmental Action Plan. ELSI members voiced their strong support for the continuation of CRD coordination of harbours environmental protection and improvement initiatives in the area, and appreciation of CRD support for community engagement.

Through volunteer and staff time, 2011 accomplishments included:

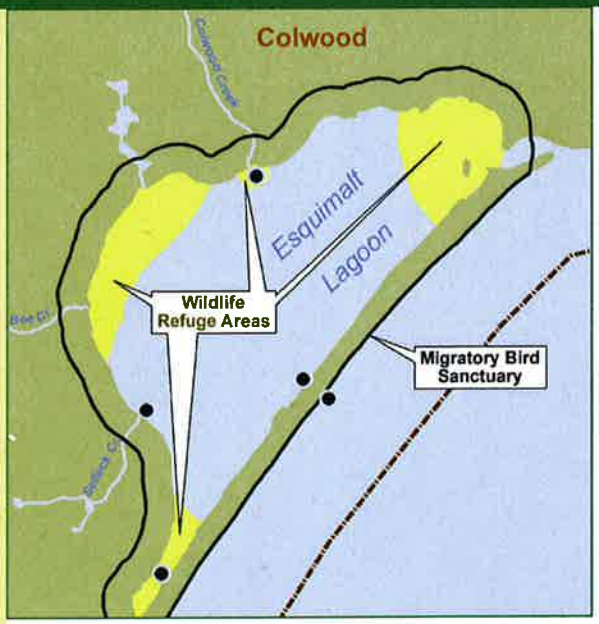
- Continuation of Dune Habitat monitoring in partnership with Camosun College
- Continuation of the historical and First Nations interpretive sign and mural project
- Volunteer participation in a broom pull, beached bird surveys, coastal water bird surveys, fish monitoring and the Canada Day celebrations at Fort Rodd Hill National Historic Park and Historic Sites
- Continuation of water quality and microalgae monitoring in the lagoon with the CRD Stormwater, Harbours and Watersheds Program (SHWP) and the University of Victoria

ELSI Committee

- Canadian Wildlife Service
- Capital Regional District
- City of Colwood
- City of Langford
- Esquimalt Lagoon Enhancement Association
- Habitat Acquisition Trust
- Local residents
- Parks Canada
- Royal Roads University
- SeaChange Marine Conservation Society
- Victoria Natural History Society

Advisory Members

- BC Ministry of Environment
- Capital Regional District Parks
- Department of National Defence
- Environment Canada
- Esquimalt Nation
- Fisheries and Oceans Canada
- Songhees Nation



The above map indicates the water sampling sites at Esquimalt Lagoon which are part of a partnership with the Province to develop Water Quality Objectives for the core area harbours of the CRD.

Water Quality Monitoring Program

Parallel to the long-term water quality monitoring delivered by CRD SHWP, a major new initiative of the CRD Harbour Environmental Action Program is the development of Water Quality Objectives specific to each core area harbour of the CRD, dependent on use, including Esquimalt Lagoon. Five marine sampling sites at Esquimalt Lagoon were established in strategic areas along the shore. These sites were sampled for contaminant levels during a high-flow period in fall 2011. Results indicated no concerns for metal contamination. However, elevated nitrate levels were found around the mouth of the creeks, with bird feces as a possible source.

Arielle Jensen Kobryn, UVic Master Student conducting research into macro algal blooms at Esquimalt Lagoon

The same five sites will be sampled during low-flow periods in summer 2012, along with upstream sampling in fall of 2012, to find possible sources of any contaminants. When results from both seasons have been analyzed, ELSI and the communities within the watershed will play an important role in the public consultation process for developing the water quality objectives for Esquimalt Lagoon.

Water Quality Research

Research at the University of Victoria (UVic) investigating the dynamics of micro-algal blooms and nutrients in Esquimalt Lagoon continued in 2011. The findings emerging from this study are five-fold: 1) micro-algal blooms occur in the spring and late summer or fall, but these blooms are dominated by different types of micro-algae; 2) Spring blooms are dominated by diatoms that are sustained by the high concentrations of nitrate, ammonium, phosphate and silicic acid that build up in the lagoon during the winter; 3) Average concentrations of these nutrients in the winter are quite similar to those in the Juan de Fuca Strait, despite the fact that streams feeding Esquimalt Lagoon can be quite enriched in nutrients (based on work by the CRD); 4) Late summer and fall blooms are dominated by red tide species. These flagellated micro-algae flourish when nutrients are substantially depleted, so they are probably taking advantage of short nutrient pulses from streams and supplementing their diets with more complex forms of nutrients that are recycled within the lagoon—they may even be consuming other microbes; 5) Some degree of oxygen depletion occurred near the sediments during August and September of both 2009 and 2010, possibly because bacteria were thriving on organic matter produced by the long-duration red tides, but also because tidal ranges are narrow at this time, reducing flushing rates in the lagoon.

Camosun College ecology students conducting the monitoring of the dune habitat restoration plots.

Stewardship and Outreach Events

ELSI volunteers organized a broom pull on Coburg Peninsula, participated in shoreline clean-ups and Canada Day celebrations at Fort Rodd Hill National Historic Site. Regular on-going beached bird surveys and coastal water bird surveys were also undertaken in partnership with Canada Wildlife Services (CWS).

Fish Monitoring

Since 2004, ELSI volunteers have conducted a Community Fish Monitoring Program in the creeks that flow into Esquimalt Lagoon. The goal is to determine what types of fish use the creeks during different seasons and any changes in this pattern over time. Monitoring has confirmed that there are resident populations of cutthroat trout throughout Bee Creek and Colwood Creek, and coho salmon fry are regularly found in Colwood Creek.

Coho fry found in Bee Creek by ELSI volunteer fish monitoring program.

Pilot Dune Habitat Restoration Project

In 2007, ELSI initiated a Dune Habitat Restoration Pilot project to restore native dune habitat by establishing and monitoring demonstration restoration plots, realigning benches with beach access points and promoting stewardship and awareness of dune habitat. In 2011, Camosun students started semi-annual evaluations of the restoration plots, in the spring and fall.

Since the fall of 2007, David Blundon, a professor in the Camosun College Biology Department, has brought over 250 ecology students to the ELSI Dune Habitat Restoration plots to monitor the sites. The goal of this monitoring is to establish a quantitative knowledge base to help determine if restoration of the dune habitat can be achieved strictly by keeping people and dogs off the dune habitat or if supplemental planting of native plants is also necessary. Thus far, results are encouraging and show that the planted native species, silver burweed and dunegrass, are now the dominant cover. However, trampling remains a strong factor in deterring plant growth. In 2011, Professor Blundon presented the monitoring results at a biodiversity conference in Ecuador.

Thank you!

Many thanks go to the dedicated volunteer members of ELSI and the community who gave many hours of their time to help accomplish the major projects undertaken in 2011.

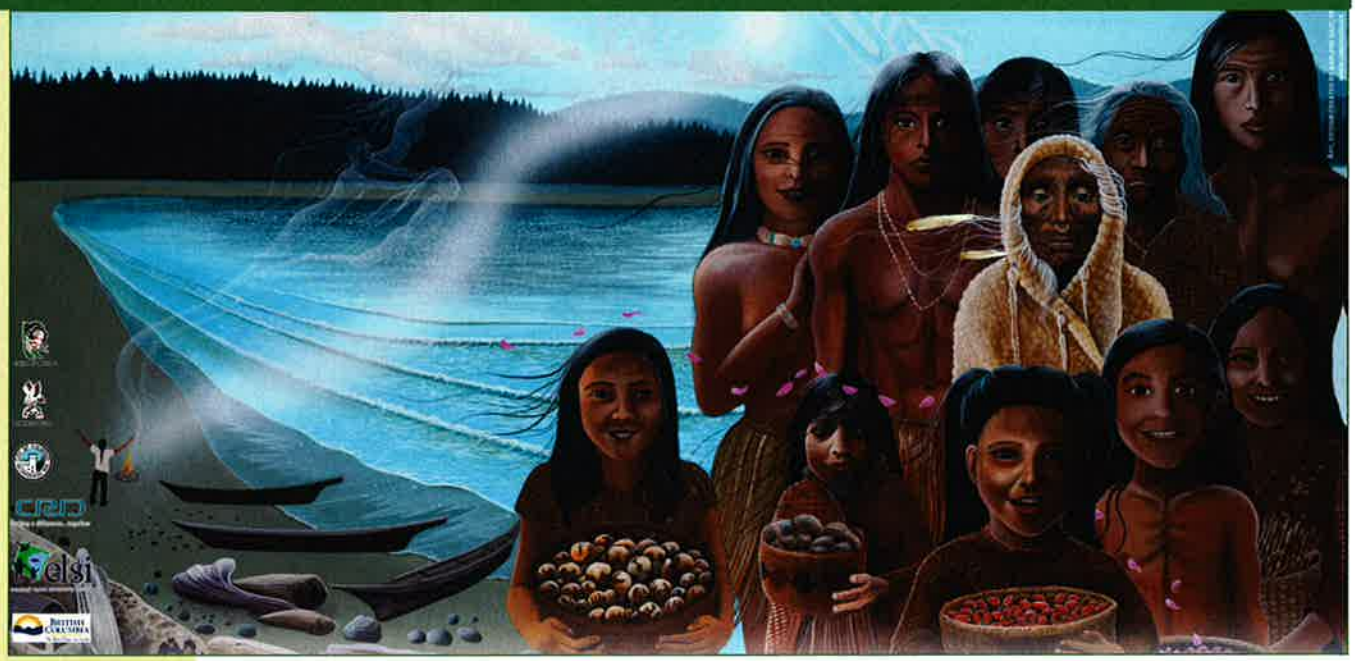


Image from the new interpretive sign at the Esquimalt Lagoon will welcome visitors to the traditional territory of the Esquimalt and Songhees Nations.

Honouring the Peoples' History

ELSI continued working with Esquimalt Nation, Songhees Nation, City of Colwood and other ELSI partners to recognize and honour the history of the lagoon area. Darlene Gait, an Esquimalt Nations artist, completed the interpretive sign—a painting depicting 11 individuals whose bone fragments and artifacts were found near the site where it will be installed in 2012. The interpretive sign speaks to the relationship the Lekwungen people, ancestors of the Songhees and Esquimalt Nations, had with the sea, land and spirits, and of Esquimalt Lagoon as a significant place in their culture.

The colonial history has also been illustrated on a second interpretive panel, with help from ELSI partners, community members and Cindy Moyer, a local artist. This interpretive sign will be dedicated in memory of Dale Mumford, a long-time member of ELSI, dedicated staff member at Fort Rodd Hill National Park and Historic Sites and local historian.

What's Next?

In 2012, ELSI will focus on:

- working with Songhees and Esquimalt Nations, and the City of Colwood to install and bless the interpretive signs and cedar mural with a dedication ceremony.
- working with our partners to improve water quality in the lagoon and investigating nutrient sources entering the lagoon and its tributary creeks.
- working with the Ministry of Environment and CRD SHWP to establish water quality objectives for Esquimalt Lagoon as part of the Harbours Environmental Action Program.
- conducting flow monitoring of Colwood Creek.
- providing input to the Liquid Waste Management Plan Harbour Review Working Group to develop a 5-year work plan for Esquimalt Lagoon and other harbours.
- promoting activities that engage the community in stewardship of the Esquimalt Lagoon watershed.

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MANAGEMENT OF INFLOW AND INFILTRATION
EXECUTIVE SUMMARY OF THE I&I ANALYSES RESULTS REPORT
FOR OCTOBER 2010 TO MARCH 2012

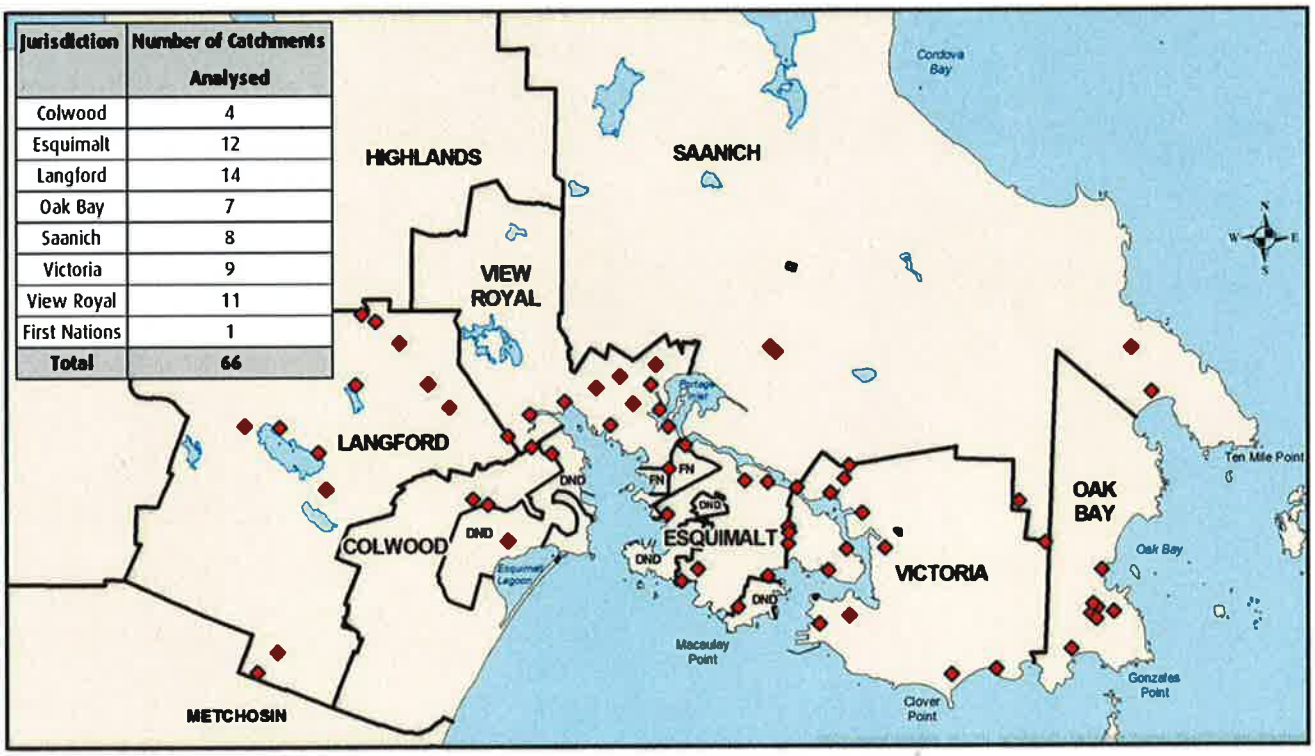
Introduction

Results from the October 2010 to March 2012 flow monitoring period are documented in the draft I&I Analyses Results Report that will be reviewed by each municipality then finalized. The report details how the updated I&I rates were calculated and documents the status of the Core Area I&I Management Plan; Public Education, Private Property I&I Plan and the Core Area Overflow Management Plan.

Flow Monitoring

Sixty six flow monitoring locations were analyzed as part of this report. Of these, 17 were monitored and analyzed for the first time. Sixty one of the flow monitoring locations are permanent meters that collect ongoing, cost effective data. The other five locations were monitored with portable meters, on a temporary basis, to investigate particular areas of interest. Figure 1 summarizes all of the locations where flow meter data was analyzed.

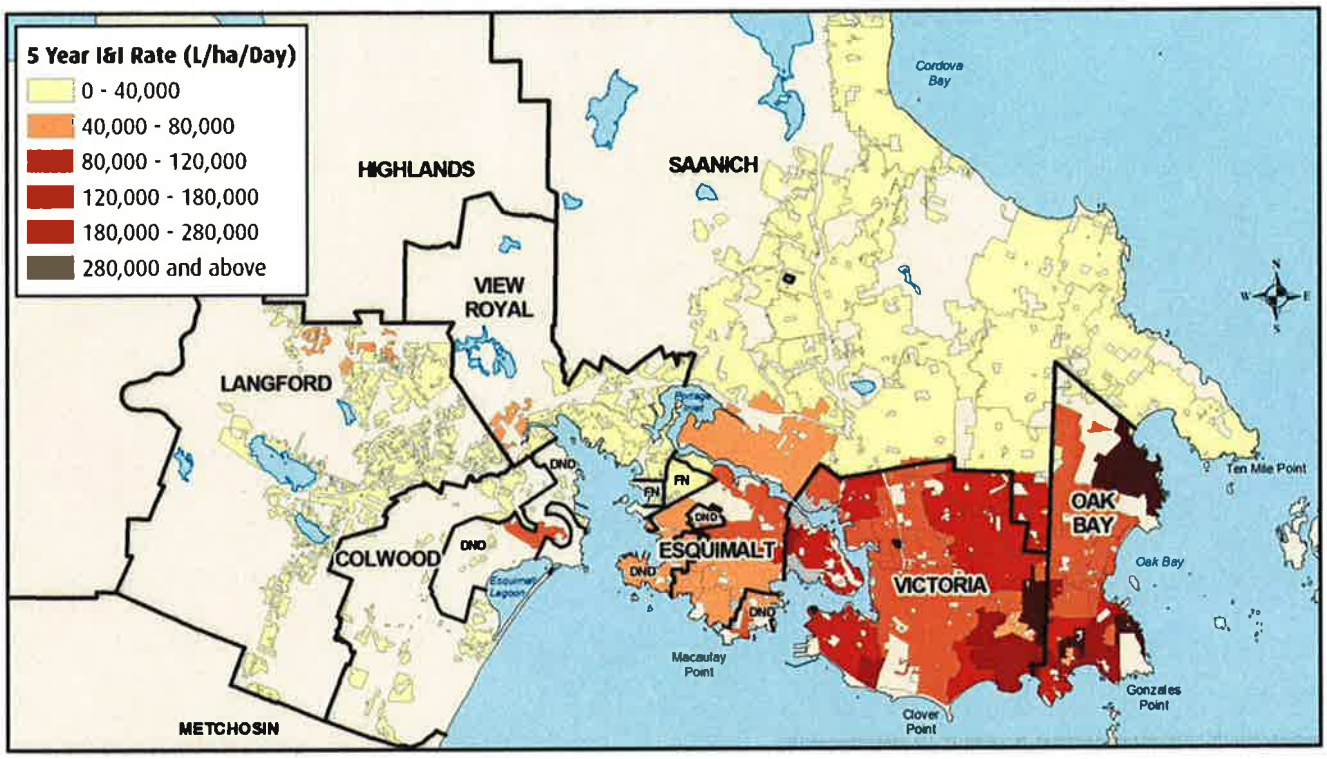
Figure 1: Flow Meter Locations and Data Analyzed for this Report



The flow data for each of the monitoring locations was analyzed for I&I. The I&I rates are based on a five-year storm event I&I flow rate because the Municipal Sewage Regulation stipulates that a sewer system must be able to convey flow under this condition without an overflow.

The results from the 2010-12 flow monitoring sites have been added to the overall core area I&I map as shown in Figure 2.

Figure 2: Updated I&I Rates Map for the Core Area



The individual I&I rates within each municipality have been converted into an overall weighted average for each **municipality and compared with previous years' estimated I&I** rates (see Table 1). This table is useful in providing a performance measure benchmark for each municipality to track overall I&I trends, but it must be interpreted with caution because it summarizes a vast amount of data into single municipal averages. For instance, one very high I&I sub-area could skew the overall municipal average, or one year of erratic weather and/or flow data could lead to wrong conclusions. Therefore, it is prudent to allow sufficient time to measure the full effect of any I&I reduction work in addition to gathering, compiling and analyzing weather patterns and I&I rates to track overall trends.

It should be noted that I&I tends to increase with sewer age due to sewers deterioration over time, sewer materials used, and the installation practices of the day.

Table 1: Summary Core Area Municipal Peak 5-Year I&I Rates

Municipality	Average Age of Sewers	Estimated 5-Year Peak I&I Rate (L/ha/day)				
		2004/05	2005/06	2006/08	2008/10	2010/12
Colwood						
Including DND	22	40-45,000	40-45,000	40-45,000	40-45,000	40-45,000
Excluding DND	11	18-22,000	18-22,000	18-22,000	18-22,000	18-22,000
Esquimalt						
Excluding DND	84	95-110,000	95-110,000	100-115,000	85-90,000	85-90,000
DND only		75-80,000	75-80,000	75-80,000	75-80,000	75-80,000
Langford	10	15-20,000	17-22,000	17-22,000	17-22,000	17-22,000
Oak Bay		110-115,000	110-120,000	110-120,000	110-120,000	110-120,000
Uplands	76	> 400,000	> 400,000	> 400,000	> 400,000	> 400,000
Saanich	35	18-22,000	18-22,000	18-22,000	18-22,000	18-22,000
Victoria	91	160-165,000	150-160,000	145-150,000	145-150,000	145-150,000
View Royal	23	18-22,000	18-22,000	20-25,000	20-25,000	20-25,000
First Nations	35	50-55,000	50-55,000	55-60,000	55-60,000	55-60,000

I&I Management Plan

The Core Area I&I Management Plan was completed and submitted to the Province in April 2012. In preparing the municipal portion of the plan, each municipality was divided into appropriately sized sewer catchments. Each catchment will be flow monitored and classified into one of the following three phases.

Phase 1: Routine Data Collection

All catchments start out in this phase. There is a commitment to flow monitor each catchment at least once every 10 years and to analyze the data for I&I. Catchments that remain below the agreed upon I&I threshold will remain in this phase. Catchments that exceed the threshold are recommended for Phase 2 work.

Phase 2: Detailed Investigation Work

This phase involves investigation work to determine the sources of the I&I. It may include camera inspections (CCTV), smoke testing, detailed investigations, etc. The resulting data is analyzed to determine if Phase 3 sewer rehabilitation is warranted.

Phase 3: Rehabiltation Work

This phase involves creating sewer rehabilitation plans, prioritizing the plans, and systematically carrying out the rehabilitation work. The amount of work carried out is determined based on available resources (i.e. annual budgets, grants).

The following sections provide a summary of actions being carried out by the Core Area Municipalities regarding the plan:

CRD
The CRD prepared the Core Area I&I Management Plan, with municipal input, and will now be monitoring its implementation. The CRD is also working with the municipalities to prepare a plan for addressing private property I&I in the Core Area (see Private Property I&I section.) The CRD recently completed an inspection of the Shoreline Trunk Sewer and will be inspecting the Northwest Trunk Sewer later this year. The regional sewers are inspected and cleaned on an ongoing basis to maintain hydraulic performance.

Colwood
Each of Colwood's catchments are in Phase 1 and require flow monitoring within the next 10 years. Currently, 3 of the catchments are flow monitored using the CRD SCADA system. Colwood is planning to collect data from their remaining catchments by programming their SCADA system to collect flow data from their pump stations.

Esquimalt
Esquimalt has aging sewers. From 2000 to 2010, Esquimalt's carried out extensive sewer rehabilitation work which helped reduce I&I. Esquimalt is currently carrying out rehabilitation work to separate combined manholes. In addition, all of Esquimalt's sewer catchments are flow monitored using permanent meters and Esquimalt's sewers have been smoke tested and camera inspected (CCTV). Future private property I&I reduction efforts will reduce Esquimalt's I&I further.

Langford
Each of Langford's sewer catchments are in Phase 1 and currently have permanent flow meters. Langford is vigilant in ensuring the I&I remains low to ensure that the sewer capacity is reserved for future growth.

Oak Bay
Oak Bay has aging sewers and will be using the I&I management plan data to help prioritize future rehabilitation works. In 2011, Oak Bay purchased additional flow meters to collect sewer flow data from their remaining un-metered catchments. The data will be used to rank Oak Bay's catchments, from best to worst, based on I&I rates. In addition, Oak Bay has plans to collect CCTV data and smoke testing data from the entire municipality. Once complete, the data will be used to prioritize I&I reduction efforts and will be useful when applying for grants to fund the work.

Saanich
Each of Saanich's catchments are in Phase 1 and require flow monitoring within the next 10 years. Currently, 6 of the catchments are flow monitored using the CRD SCADA system. Saanich is planning to collect data from their remaining catchments by programming their SCADA system to collect flow data from their pump stations. The programming is anticipated to be complete by the end of 2013.

Victoria
Victoria has aging sewers and will be using the I&I management plan data to help prioritize future rehabilitation works. In late 2012, Victoria will be purchasing additional flow meters to collect sewer flow data from their remaining catchments. The data will be used to rank Victoria's catchments, from best to worst, based on I&I rates. In addition, Victoria is in the process of smoke testing and camera inspecting (CCTV) their entire sewer system, which should take a few years. Once complete, the data will be used to prioritize I&I reduction efforts and will be useful when applying for grants to fund the work.

View Royal
Each of View Royal's sewer catchments are in Phase 1 and currently have permanent flow meters. View Royal is currently in the process of upgrading sewer pump stations.

First Nations
In 2009/2010, the CRD completed sewer investigation work of the Esquimalt Nation's sewers. The work included flow monitoring, smoke testing, camera inspections, manhole inspections and an analysis of the pump station. The data was compiled into a report that the Nation will use to prioritize and get funding for sewer rehabilitation

work. In addition, the CRD currently flow monitors the sewer flows from the Songhees First Nation.

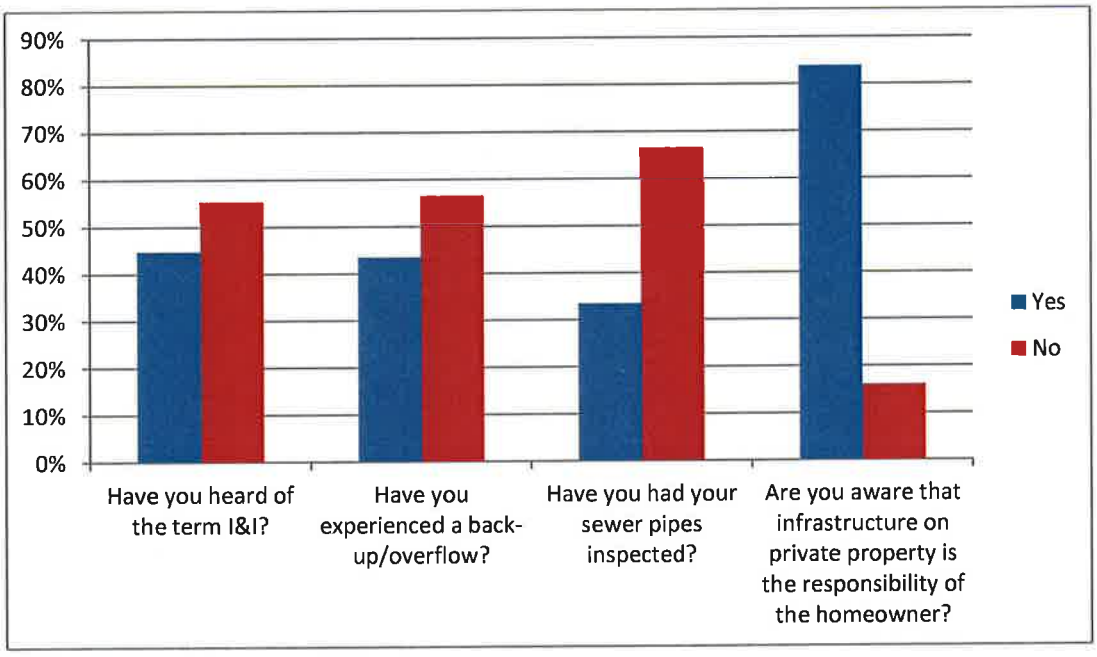
Public Education

The CRD is taking steps to educate the public on the issue of I&I, where it comes from, and the problems it creates so that when funding is required and/or rehabilitation work is proposed in local neighbourhoods, the public will have a better understanding of why the work is required.

To do this the CRD, in collaboration with the core area municipalities, created an I&I brochure, two sets of videos to help explain I&I, and an I&I website. This information is valuable when staff are providing notification to neighbourhoods of upcoming video inspection, smoke testing, sewer rehabilitation or other work related to I&I management. The brochure and videos can be found on the CRD website at the following link: *http://www.crd.bc.ca/wastewater/ii/index.htm*

Starting In 2011 , I&I information was added to CRD outreach events. I&I materials were made available at 17 events in 2011 and at 14 in 2012. The outreach events included a display, trained personnel to answer questions and an I&I survey questionnaire for the public. As of September 2012, a total of 1223 surveys were completed. The results of the survey are summarized in Figure 3 below.

Figure 3: Summary of I&I Survey Results



Based on the response to date the following preliminary conclusions can be drawn:

- A significant proportion of residents surveyed had experienced a sewer back-up.
- Although there is growing awareness of responsibility for infrastructure on private property, relatively few property owners have had their sewer pipes inspected.
- Homeowners clearly recognize that infrastructure on private property is their responsibility. Future educational material should highlight that pipes underground are part of their infrastructure and therefore their responsibility as the homeowner.

Private Property I&I

Presently there is no region wide program for addressing private property I&I. On an individual basis, each municipality sets standards for new lateral installations and requires that laterals be tested prior to connection to the municipal sewer main. A few municipalities have carried out small pilot projects that included the repair or replacement of private sewer laterals. Two municipalities within the Core Area require that laterals be inspected and fixed, if required, when applications are made for major building permits.

On an ongoing basis, CRD staff have reviewed case studies of jurisdictions taking steps to deal with I&I, met with various experts and shared information with Metro Vancouver who will also be establishing programs to address private property I&I.

In 2010, the CRD commissioned a report, completed by Stantec, showing potential management options for addressing private property I&I. The report included a summary of private property I&I programs used throughout North America, costs / effectiveness of these programs, and legal options for implementing programs in the CRD. A copy of this report is on the CRD I&I website.

In 2010, a workshop was held with municipal and regional staff to initiate discussion about options for implementing private property I&I programs, objectives, and potential barriers. A summary of this workshop is located in the Stantec report.

In 2011, the CRD provided an overview of the Stantec report to elected representatives and recommended a full workshop in 2012.

In January 2012, the CRD finalized the Core Area I&I Management Plan, which included a section addressing private property I&I. The action steps for this section are located in Table 2.

Table 2: Anticipated Next Steps for Addressing Private Property I&I

Timeline	Action
2011 Ongoing	Public Education Campaign
2012	Consult with the public and stakeholders: Phase 1 • Provide specific education on private property I&I programs • Compile and consolidate comments, issues and concerns
2013	Consult with the public and stakeholders: Phase 2 • Identify options for scope of management activities to be included in program • Prepare options for addressing private property I&I • Consider options for phasing in the program • Review the options based on a triple bottom line • Compile and consolidate comments, issues and concerns
2014	Consult with the public and stakeholders: Phase 3 • Report out the preferred option and how it was arrived at. • Compile and consolidate comments, issues and concerns
2015	Recommend an appropriate management structure, activities and schedule for CRD Board and/or Municipal Council approval. If required, implement legislative authority (i.e. Bylaws)
2016	Implement the private property I&I management program

In June 2012, the CRD hosted a workshop focused on private property I&I for elected representatives. The purpose of the meeting was to present background information, options for moving forward, and to open dialogue on the topic. New ideas were discussed and those who were present endorsed the implementation of the consultation portion of the private property I&I plan.

Photo taken during the I&I Workshop

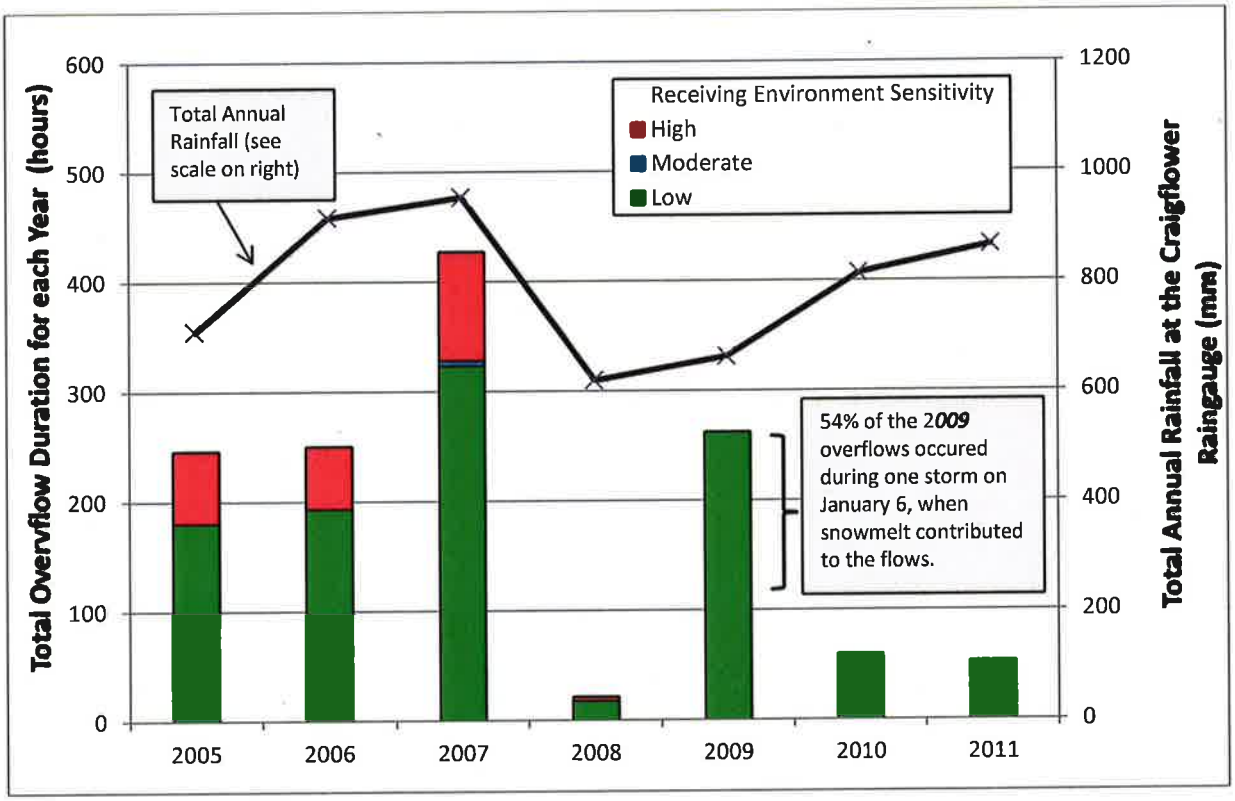
On November 30, 2012, the CRD will be putting on a workshop for the Victoria Real Estate Board. The workshop will be a collaborative effort between the CRD's I&I Program, Onsite Program (i.e. septic systems) and Cross Connection Program. The purpose of the workshop is to provide education and to promote the use of infrastructure inspection in the real estate industry.

Sanitary Sewer Overflow Management Plan

Sanitary sewer overflows are releases of raw sewage into storm drains and/or local waterways. The majority of overflows are caused from excessive I&I during moderate to heavy rain when so much rainwater finds its way into **the sanitary sewer that it exceeds the system's capacity, resulting in overflows.**

In June 2008, the CRD submitted a sanitary sewer overflow management plan to the Ministry of Environment. The plan documents the known overflow locations in the core area and includes short- and long-term action plans from the CRD and each of the core area municipalities. Significant accomplishments have already been achieved. For example, since Trent pump station was commissioned in November 2008, there have been no overflows into Bowker Creek, whereas in previous years there were about 10 per year. As of 2012, each of the core area municipalities is generally on-track regarding their commitments in the plan. Of note, Esquimalt is ahead of schedule on its commitment to separate their combined manholes.

Figure 4: Graphical Comparison of Rainfall vs. Overflows



Note: The small number of overflow hours in 2008, 2010, and 2011 is attributed to some infrastructure improvements and also due to relatively small storm events or few back-to-back storms when the ground is saturated.

Onsite Sewage Management Program
2011 Environmental Partnerships Annual Report
Executive Summary

The Capital Regional District (CRD) Onsite Management Program (OMP) is a pollution prevention program that aims to protect public health and safety, local surface and groundwater supplies, and the environment. The effectiveness of this protective program relies on reducing the number of malfunctioning onsite systems through proper care and maintenance. The current Onsite Management Program meets the commitments of the CRD Liquid Waste Management Plan (LWMP) set out by the provincial Sewage Systems Regulation Act.

Since the adoption of the CRD Onsite Sewage System Maintenance Bylaw No. 3479 (Bylaw No. 3479), OMP has improved upon the Onsite Management Information System (OMIS) database for recording and reporting onsite system activity, promoted voluntary compliance with Bylaw No. 3479, and enhanced the outreach and education component for empowering the consumer to properly maintain their onsite septic systems. As a result of this combination of strategies over the years, Bylaw No. 3479 compliance reached 79% for Type 1 systems in the second year, exceeding the 71% target for 2015. Type 2/3 systems represent 5% of total septic systems in the CRD, are more difficult to assess, and are currently under review to determine compliance.

The integration of OMP into Environmental Partnerships (EPar) and the coordination and collaboration of outreach events has resulted in a substantial increase in the number of outreach events attended and subsequently the number of consumers engaged in education and information exchange. In 2011, 1667 people attended a Septic Savvy Workshop or engaged with CRD staff about septic systems at a community event; which represents 20% of all the 7800 engagements since 2001. There have been approximately 4000 visits to the Septic Systems in the CRD webpage with as many downloads of the Septic Savvy Household Information Kit., indicating a trend to online access for education and informational materials. OMP conducted a survey of septic system owners resulting in a refocus of efforts to connect the public with the education, launched 3 new onsite education videos to provide more accessible septic education to homeowners, and continued stakeholder engagement with industry partners.

In order to address concerns that all septic systems may not require the same maintenance schedule, the CRD provided accommodations within Bylaw No. 3479 Appendix B Enforcement Policy and Procedure (Bylaw Appendix B) for an alternate pump out frequency, which is currently being developed following a Maintenance Assessment Pilot Study to explore the maintenance assessment requirements. The Study determined that maintenance assessments would not be different than the provincial requirements for a Performance Inspection. The study did expose that 80% of septic systems are in some state of malfunction and in need of repair or replacement, far higher than 20% previously indicated.

OMP is scheduled to present at the BC Water and Waste Association Annual Conference and Trade Show the *Onsite Septic System Management Programs at the Regional Level – Do's and Don't's*, spotlighting the program's successes and challenges, taking a critical look at the role that regional governments can play in effectively delivering septic management programs, reviewing the

effectiveness of CRD's current maintenance requirements, and recommending program modifications with suggestions for moving forward in a challenging political climate. As a provincially recognized leader in the field of onsite management, other districts and municipalities across the province are using OMP education and outreach tools, and OMP's success and challenges, in the development of their own onsite wastewater management program.

OMP is looking to develop a Bylaw support plan to maintain compliance rates and an inspection program to identify malfunctioning septic systems with risks to human health. OMP is looking to conduct more in-depth focus groups building on the 2011 Survey to determine compliance and education barriers, explore program delivery options, and develop consumer protection initiatives. OMP will continue to work with municipalities and electoral districts to deliver a consistent program throughout the Capital Region.

TRUCKED LIQUID WASTE PROGRAM 2011 ANNUAL REPORT

BACKGROUND

Under Chapter 12 of the Core Area Liquid Waste Management Plan (LWMP), the Capital Regional District (CRD) committed to a program to coordinate the collection and disposal of Trucked Liquid Waste (TLW). TLW is non-domestic liquid wastes that cannot be legally discharged to sanitary sewer or stormwater systems and must be transported by truck to be disposed of offsite. Examples of TLW include catch basin, grease interceptor and oil/water separator wastes.

The overall objective of the TLW program is to ensure that the waste is handled and disposed of in an appropriate and responsible manner, to protect public health and the environment. The four goals of the program are:

1. Appropriate disposal of TLW by generators.
2. Proper and affordable disposal services available for all TLW.
3. Promote appropriate government services.
4. Build public support for the TLW program.

The TLW program uses an educational approach to continue to provide information and increase awareness of proper disposal options at the generator and hauler level, as well as to promote appropriate and affordable disposal options for the region. Generators continue to become more aware of requirements of pre-treatment and maintenance requirements under Sewer Use Bylaw and the Municipal Stormwater Bylaw.

TRUCKED LIQUID WASTE PROJECTS

In 2011, the annual budget for the TLW program was $53,532. Seven projects were initiated to assist the TLW program in achieving its four goals. The details of these projects are outlined below.

Communications

The program ran advertisements in numerous news publications in fall of 2011 to remind waste generators to maintain their catch basins. The list of news publications included the following:

- Black Press Daily
- Monday Magazine
- Business Examiner
- Chamber of Commerce – Business Matters
- Chamber of Commerce – Business News E-Mail newsletter

Service Provider Directory and Website

The TLW program maintained material on the CRD website. The website includes information on proper management and disposal of wastes, catch basin facts, technical reports and tools for waste haulers. The CRD also maintains a service provider directory to assist waste generators in finding a hauler. The website and directory continue to be reviewed regularly and updated as needed.

Municipal Operations

CRD staff visited the City of Victoria public works yard and viewed the catch basin waste dewatering facility, where staff collected samples of stormwater rehabilitation unit waste. The waste samples were then sent for analysis to determine contaminant levels. As a result, staff identified that Hartland Landfill was an appropriate option for disposal. Staff plan to offer further assistance to municipalities regarding waste disposal options.

Stakeholder meeting

In September 2011, the TLW stakeholders met in a combined meeting with the CRD Onsite Management program service providers. Items discussed at the meeting included the TLW program five-year review and key accomplishments, challenges and opportunities, the current focus on catch basins, tools for service providers and waste generators, and the new five-year plan. Anecdotal feedback from stakeholders indicated an increase in catch basin cleaning business.

Collection of Baseline Catch Basin Volumes

An annual review of catch basin waste volumes disposed of at Hartland Landfill is done for comparison to previous years. Data indicates annual totals vary. CRD staff are working with service providers to identify volumes of waste sent to private disposal sites, with the goal of using the information as a measure of the success of outreach to catch basin owners.

Review of Regulatory Requirements for Waste Handling

The TLW program contracted Enviro-Chem Services Inc. to conduct a review of regulatory requirements related to waste disposal. This review provided updates on changes to regulations that impact disposal of TLW and will be used to guide future outreach messaging.

Evaluation of Catch Basin Waste and Oil/Water Separator Clean-out Procedures

Enviro-Chem Services Inc. was contracted by the TLW program to evaluate procedures for catch basin and oil/water separator clean-out. A key finding of the study was that catch basin and oil/water separators should be completely emptied when they are cleaned out. This finding was discussed with other CRD programs that are involved with catch basin and oil/water separator maintenance and disposal. Conclusions from the report will help to ensure catch basin and oil/water separators are cleaned out in a way that will help to prevent environmental contamination.

CONCLUSIONS

The TLW program continues to make progress in the regional coordination of TLW disposal. Baseline data continues to be collected for future program performance measures. Outreach and educational activities continue to focus on promotion of proper maintenance practices for catch basins. A review of regulations related to TLW was conducted. The program continues to work with waste generators, haulers and other stakeholders to achieve program goals and to meet requirements under the Core Area LWMP.