



**REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE  
MEETING OF WEDNESDAY, 25 JUNE 2008**

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**SUBJECT**      **CORE AREA LIQUID WASTE MANAGEMENT PLAN – WASTEWATER OVERFLOW  
MANAGEMENT PLAN REPORT TO MINISTRY OF ENVIRONMENT**

**PURPOSE**

To present a summary of the sanitary sewer overflow management report as required in the minister of environment's 26 March 2003 approval letter of the Core Area Liquid Waste Management Plan (LWMP), and to request approval to submit the report to the Ministry of Environment.

**BACKGROUND**

When the Core Area LWMP was approved on 26 March 2003, the minister included the following condition No. 10 with respect to the sanitary sewer overflows:

*On or before March 31, 2008, develop a short term schedule and estimate of cost for the elimination of sanitary sewer overflows within the CRD to be consistent with the Municipal Sewage Regulation (MSR).*

Condition 16 (1) of the MSR states the following:

*On and after January 1, 2004, the discharger must ensure that no person allows a sanitary sewer overflow to occur during storm or snowmelt events with less than a 5-year return period.*

In response to these requirements, this staff report presents the *Capital Regional District Core Area Sanitary Sewer Overflow Management Report* dated June 2008 to outline a plan towards meeting the MSR. Capital Regional District (CRD) staff informed ministry staff in March that the report was being compiled and would be ready for submission to the ministry by the end of June 2008. A summary of overflow locations, frequency of overflows, accomplishments to reduce overflows, and proposed activities is provided in the report's executive summary (Attachment A). A full copy of the report is available on request from the Environmental Services department.

**Summary of Overflow Locations**

Significant progress has been made in identifying all of the municipal overflow locations. Three types of sewer overflow locations have been identified within the core area, including 80 pump station overflows, 24 relief point overflows and 212 combined manhole overflows for a total of 316 known potential overflow locations.

A majority of the pump station overflows are designed as emergency reliefs used as a last resort to prevent widespread flooding, and to protect human health, properties and sensitive environments. Many of them are rarely used but are there just in case. The relief point overflows were designed into the collection system at a time when occasional overflows were permitted and they are now being investigated and/or targeted for eventual elimination. The combined manholes were designed in the 1960-70s as a cost-saving measure by installing one manhole, instead of two, to access both the sanitary and storm drain systems. Based on available records, there is no evidence of overflows occurring from these manholes and progress is being made to separate them.

So, even though there are a large number of known potential overflow locations, there are less than 20 that are actively used.

A map identifying the location of all known potential overflow points is attached to the executive summary.

### **Frequency and Causes of Overflows from 2000 to 2007**

The frequency of overflows changes year by year, primarily in response to changes in precipitation and weather patterns. The primary cause of overflows is excessive inflow and infiltration (I&I) during storm events, which overwhelms the collection system. Based on available records submitted to the CRD, the highest, lowest and average number of overflows between 2000 and 2007 were 72, 17 and 39, respectively. Over the last eight years, 12%, 2% and 86% of the discharges have been into high, moderate and low sensitivity receiving environments. More than 90% of all overflows occurred from eight specific locations (five of which are screened) and discharged into low sensitivity environments.

Based on flow monitoring data and a consultant's hydraulic model, the estimated annual overflow volume based on one-year and five-year storm events can range from less than 0.1% to 0.2% of the total average annual flow for the entire core area sewer system.

This information indicates that, although the overflow frequency is relatively high, the majority of overflows occur from only eight specific locations, five of which are screened prior to being discharged into low sensitivity receiving environments, and the overall estimated overflow volumes are relatively low.

All of these overflows have been assessed and will be brought into compliance with the MSR, which is to have no overflows for up to a five-year storm event.

### **Overflow Policy in the Core Area LWMP**

As noted in the Core Area LWMP, the long-term objective of eliminating overflows is recognized. The CRD and participating municipalities have followed the general approach outlined in the LWMP, as modified by the minister's approval letter, to determine the relative acceptability of overflow sites and prioritizing them for corrective action as follows:

1. Overflow sites into highly sensitive receiving environments – highest priority for corrective action to eliminate overflows for storm events with less than a five-year return period and to retrofit pump stations with appropriate backup systems, such as better controls, additional pumps, standby power or generator plug-in receptacles.
2. Overflow sites into moderately sensitive receiving environments – high priority to reduce I&I or carry out works to eliminate overflows for storm events with less than a five-year return period.
3. Overflow sites into low sensitivity receiving environments – long-term plan to reduce I&I or increase capacity to reduce and eliminate overflows for storm events with less than a five-year return period.
4. Screening – investigate chronic overflow sites into all receiving environments to determine whether interim screens (6 mm or less) should be installed to reduce fouling of the receiving environment, with the eventual plan to eliminate overflows for storm events with less than a five-year return period.

**Overflow Reduction Accomplishments**

Significant efforts have been made to reduce the volume and number of overflows since the LWMP was approved in 2003. A few key overflow reduction accomplishments are summarized below:

- Construction of Marigold storage tank and Trent pump station will eliminate overflows, in accordance with the MSR, into Colquitz River and Bowker Creek.
- Inspection, cleaning, rehabilitation and replacement of sections of the northeast trunk sewer, since it was transferred to the CRD in 2003, which has increased the system's capacity and prevented certain sections from failing and/or leaking into Bowker Creek.
- Installation of 6 mm mechanical screens at Humber and Rutland pump stations will minimize the discharging of solids from these two combined sewer systems.
- Upgrading of more than 20 pump stations, including new backup generators, alarm systems, etc., will help to prevent overflows from occurring at these locations.
- Elimination of 40 combined manhole overflows by installing new separate manholes for the sanitary system.
- Elimination of three pump station and relief point overflows after improvements were made to the system.

In addition to the overflow reduction accomplishments, there have been numerous and significant I&I reduction accomplishments, which also help to reduce the frequency of overflows.

More details on all of the initiatives and accomplishments are included within the report.

**Proposed Action – Next Steps**

The CRD and participating municipalities have outlined priorities and action plans to address and correct overflows for the next several years and decades. A few key priorities for each jurisdiction are summarized below:

<b>Jurisdiction</b>	<b>Priority 1</b>	<b>Priority 2</b>
CRD	Complete and commission Trent pump station, which will eliminate overflows to Bowker Creek.	Install backup generator at Macaulay Point pump station, which will keep the pumps and screens running.
Colwood	Upgrade supervisory control and data acquisition (SCADA) at all pump stations to collect flow data.	Continue with regular inspection and maintenance of its system, which is only about 11 years old.
Esquimalt	Complete the \$6.75 million rehabilitation upgrades to its sewers.	Continue to separate and eliminate all combined manholes (40 have been completed to date).
Langford	Continue with infrastructure upgrades as identified in Langford's Sewer Master Plan.	Continue with regular inspection and maintenance of its system, which is only about 10 years old.
Oak Bay	Commence with the Uplands combined sewer separation program.	Continue with the South Oak Bay I&I rehabilitation pilot project.
Saanich	Complete Dysart pump station, which will eliminate overflows to Colquitz Creek.	Continue to rebuild all pump stations, add standby power and remove overflows where possible.
Victoria	Commence with James Bay rehabilitation / I&I reduction project.	Complete hydraulic model to confirm if combined manholes and relief overflows can be removed.
View Royal	Upgrade pump stations where required to provide standby power and collect better data.	Continue with regular inspection and maintenance of its system, which is only 20 years old.

### **FINANCIAL IMPLICATIONS**

For the CRD, individual improvement projects are brought forward to the committee and CRD Board, complete with financial implications, prior to proceeding. Staff time to manage the overflow and I&I programs is included in the annual budgets.

Each municipality establishes its own budget to carry out the work required to meet its LWMP commitments.

### **SUMMARY/CONCLUSIONS**

The minister of environment's approval letter of the Core Area LWMP, dated 26 March 2003, requires the CRD to submit a short-term schedule and estimate of cost for the elimination of sanitary sewer overflows within the CRD consistent with the MSR. The *Capital Regional District Core Area Sanitary Sewer Overflow Management Report*, dated June 2008, has been prepared in response to this condition.

Significant progress has been made in identifying the overflow locations, prioritizing them for corrective action and completing several major upgrades to reduce and/or prevent them from overflowing. Implementation of the management plan report will help to ensure that overflows can be further reduced and provide continued improvement to the receiving environment.

### **RECOMMENDATIONS**

That the Core Area Liquid Waste Management committee:

1. receive this report for information; and
2. instruct staff to forward copies of the report to the Ministry of Environment and all core area municipalities.

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Malcolm J. Cowley, PEng  
Manager, Engineering Design Services

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Dwayne Kalynchuk, PEng  
General Manager, Environmental Services  
Concurrence

### **COMMENTS**

Attachment: 1  
MJC:cl

## CORE AREA SANITARY SEWER OVERFLOW MANAGEMENT PLAN EXECUTIVE SUMMARY

As stated in Chapter 13 of the Capital Regional District's (CRD) Core Area Liquid Waste Management Plan (LWMP), "the goal of the CRD and its municipal partners is to eliminate overflows of wastewater to the environment at points of significant public health and environmental sensitivity, and to reduce or eliminate overflows at points of lower sensitivity."

When the Ministry of Environment approved the LWMP on March 26, 2003, the minister included an additional condition, No. 10, with respect to overflows, which is to provide "a short-term schedule and estimate of cost for the elimination of sanitary sewer overflows within the CRD to be consistent with the Municipal Sewage Regulation."

The purpose of this report is to fulfill that requirement.

The CRD and core area municipalities have identified all of their known sewer overflow locations, which are summarized in the following table by the three known overflow location categories.

**Table ES.1 Number of Known Potential Overflow Points**

Jurisdiction	Pump Stations <sup>1</sup>	Relief Points <sup>2</sup>	Combined Manholes <sup>3</sup>	Total
CRD	14	8	0	22
Colwood	0	0	0	0
Esquimalt	11	0	114	125
Langford	0	0	0	0
Oak Bay	6	0	Uplands is a combined collection system	6 plus Uplands
Saanich	30	0	0	30
Victoria	7	16	98	121
View Royal	12	0	0	12
<b>Total</b>	80	24	212	316

- Notes:
1. Sanitary pump station overflows are those that have a designed overflow point included within or just upstream of the pump station.
  2. Relief point overflows include overflow pipes designed into the collection system that spill into storm drains or nearby waterways.
  3. Combined manhole overflows are those where both sanitary and storm pipes are located within the same manhole but are separated by a concrete dividing wall. All of these manholes were installed as a cost-saving measure in the 1960-70s, as it was cheaper to install one manhole instead of two.

A map showing all of the known potential overflow points is attached as Figure ES-1 at the end of this executive summary and is further detailed on individual maps included in Appendix B of this report.

It must be emphasized that, even though there are a large number of known overflow locations, the majority of them are never or infrequently used (such as the combined manholes or emergency pump station overflows).

Based on available records submitted to the CRD, the following matrix summarizes the average annual rainfall, cause, frequency and receiving environment sensitivity of all overflows that have occurred by each jurisdiction from the year 2000 to 2007.

**Table ES.2 Frequency of Overflows classified by Cause and Receiving Environment Sensitivity**

Jurisdiction/Cause of Overflow	2000			2001			2002			2003			2004			2005			2006			2007		
<b>Total Annual Rainfall (mm) <sup>1</sup></b>	711.8			873.5			699.9			1053.2			876.0			766.5			1045.0			1093.9		
	Receiving Environment Sensitivity of where Overflows were Discharged <sup>2</sup>																							
	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
<b>Capital Regional District</b>																								
Cause																								
1. Power Outage			1																	1		1	1	
2. Pump station failure																				1			1	
3. Blocked pipe																								
4. Storm event < 5-yr.	7		1	15			14			18	2		6			17		11	16		9	30	2	9
5. Storm event > 5-yr.							3		1	16	2								7		2	4		1
6. Upland comb. sewers	8			9			3			13			11			16			15			12		
<b>TOTAL</b>	17			24			21			51			17			44			52			60		
<b>City of Colwood</b>																								
Cause																								
1. Power Outage																								
2. Pump station failure																								
3. Blocked pipe																								
4. Storm event < 5-yr.																								
5. Storm event > 5-yr.												1	←(This overflow is attributed to DND Belmont pump station)											
<b>TOTAL</b>	0			0			0			1			0			0			0			0		
<b>Township of Esquimalt</b>																								
Cause																								
1. Power Outage																								
2. Pump station failure																								
3. Blocked pipe	Esquimalt upgraded all their pump stations in 2007 to start recording overflows, no information was available prior to then.																							
4. Storm event < 5-yr.																								
5. Storm event > 5-yr.																								
<b>TOTAL</b>	---			---			---			---			---			---			---			0		
<b>City of Langford</b>																								
Cause																								
1. Power Outage																								
2. Pump station failure																								
3. Blocked pipe																								
4. Storm event < 5-yr.																								
5. Storm event > 5-yr.												1	←(This overflow was from Selwyn pump station)											
<b>TOTAL</b>	0			0			0			1			0			0			0			0		
<b>District of Oak Bay</b>																								
Cause																								
1. Power Outage										1								--		7				
2. Pump station failure																								
3. Blocked pipe																								
4. Storm event < 5-yr.																								
5. Storm event > 5-yr.																								
<b>TOTAL</b>	0			0			0			1			0			5			7			0		
<b>District of Saanich</b>																								
Cause																								
1. Power Outage																				8			4	
2. Pump station failure																								
3. Blocked pipe																								
4. Storm event < 5-yr.										8		5		10					5				4	
5. Storm event > 5-yr.										7														
<b>TOTAL</b>	0			0			0			15			5			10			13			8		
<b>City of Victoria</b>																								
Cause																								
1. Power Outage																								
2. Pump station failure	1																							
3. Blocked pipe						3					1													
4. Storm event < 5-yr.																								
5. Storm event > 5-yr.																								
<b>TOTAL</b>	1			3			0			1			0			0			0			0		
<b>Town of View Royal</b>																								
Cause																								
1. Power Outage																								
2. Pump station failure																								
3. Blocked pipe	The Town of View Royal has no known overflows that were documented.																							
4. Storm event < 5-yr.																								
5. Storm event > 5-yr.																								
<b>TOTAL</b>	0			0			0			0			0			0			0			0		

Notes: 1. The total annual rainfall was provided by the AES Rain Gauge located at Victoria International Airport.  
 2. Low, Moderate, and High ratings of receiving environment sensitivity were determined by Seaconsult Marine Research Ltd.  
 3. The highlighted cells identify additional overflows that were transferred to the CRD with the northeast trunk Bower sewer (these overflows into Bowker Creek at Monterey Avenue were not monitored prior to 2005).

The causes of overflows have been broken down into the following six categories:

1. Power outage (by BC Hydro) – usually due to windfall on power lines that causes the pumps to stop running
2. Pump station failure (within the station) – typically includes mechanical, electrical or instrumentation breakdowns
3. Blocked pipe – generally due to root intrusions, grease/grit build-up or pipe collapses
4. Storm events less than a five-year return period – usually caused by excessive inflow and infiltration (I&I) into the sanitary sewer that exceeds the collection system capacity
5. Storm events greater than a five-year return period – caused by significant rainfall or snow-melt storms that overwhelm the collection system
6. Combined sewers – applies only to the Uplands area of Oak Bay where there is only one pipe that collects both sanitary and stormwater, so even moderate rainfall triggers an overflow

The purpose of categorizing the causes of overflows and cross-referencing them with the receiving environment sensitivity enables each jurisdiction to prioritize their correction. For example, pump station failures and blocked pipes must be addressed immediately since they have instant and significant impacts, usually into highly sensitive environments. Overflows that occur during storm events that are less than a five-year return period must also be addressed in accordance with the Municipal Sewage Regulation (MSR). This usually requires I&I to be reduced and/or the collection capacity to be increased. Power outages are beyond the control of the sewer utility but can be mitigated by providing back-up power to the pump stations, and overflows that occur during storm events greater than five-year return periods have less priority due to the relative infrequency of those events. Combined sewer overflows, of course, should be corrected by separating the stormwater from the sanitary sewer.

It is important to note that the number of overflows is usually related to the quantity and intensity of precipitation for the year. Therefore, the apparent reduction and subsequent increase in the number of overflows from 2002 to 2003 was likely due to weather variability rather than specific changes to the collection system.

Based on the information provided, 35 overflows occurred into high sensitivity receiving environments at only four locations over the past seven years. In fact, 31 of 35 have occurred from the northeast trunk-Bowker Monterey sewer overflow, which was transferred to the CRD in 2003. Since then, the CRD installed monitoring equipment and is now constructing Trent pump station to eliminate overflows at this location for up to a five-year storm event.

The core area municipalities and the CRD have collectively spent well over \$25 million in the past seven years to reduce the number of overflows and to eliminate three pump station and relief point overflows and 40 combined manhole overflows.

Furthermore, the CRD and core municipalities have a collective annual budget of more than \$1 million to carry out I&I programs that will, over time, further reduce the frequency of storm event overflows.

A few highlights of some I&I work undertaken and/or completed in the core area in the last two to three years include:

- Video inspection of more than 85 kilometres of sewer pipe
- Smoke testing of about 2,500 metres of sewer pipe

- Rehabilitation and/or replacement of more than 10,000 metres of sewer pipe
- Inspection, rehabilitation and/or replacement of more than 750 manholes
- Joint testing and sealing of more than 1,000 metres of sewer pipe
- Point repairs in some 700 metres of sewer pipe
- Extensive flow monitoring of about 80% of the entire core area to determine I&I rates
- Upgrading of about 20 pump stations, including sealing leaks, better controls, alarms, flow measurement, etc.

Detailed descriptions for the initiatives and work completed by the CRD and each core area municipality is included in Section 4 of this report.

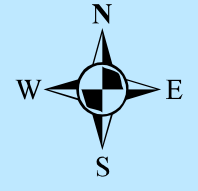
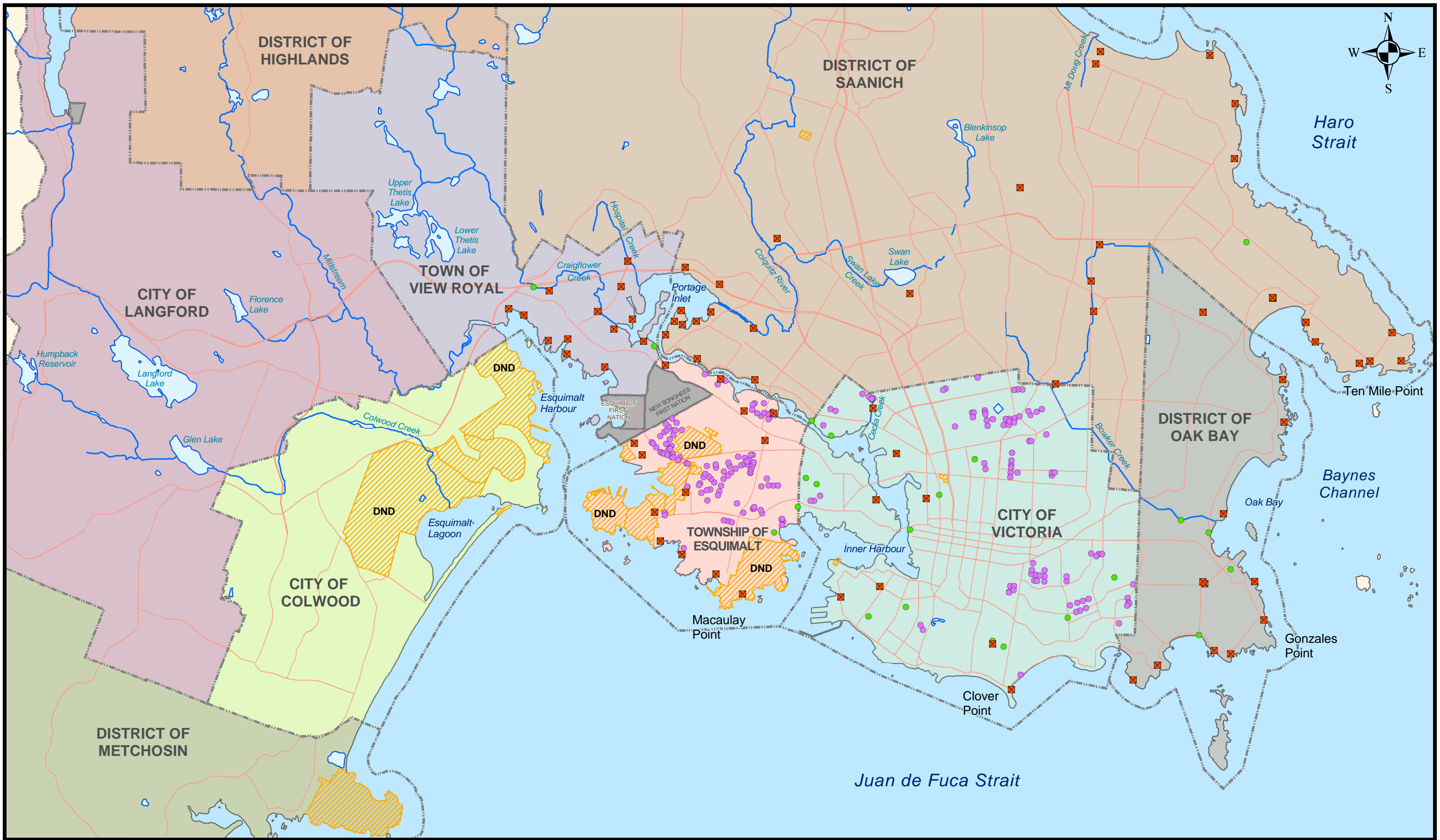
The CRD and participating municipalities have outlined their priorities and action plan to address and correct their overflows for the next several years and decades. A few key priorities for each jurisdiction is summarized below:

**Table ES.3 Top Two Overflow Priorities for Each Jurisdiction**

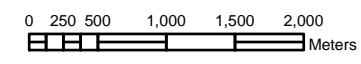
Jurisdiction	Priority 1	Priority 2
CRD	Complete and commission Trent pump station, which will eliminate overflows to Bowker Creek at the Monterey overflow.	Install backup generator at Macaulay Point pump station, which will keep the pumps and screens running during power outages.
Colwood	Upgrade supervisory control and data acquisition (SCADA) at all pump stations to collect flow data.	Continue with regular inspection and maintenance of its system, which is only about 11 years old.
Esquimalt	Complete the \$6.75 million rehabilitation upgrades to their sewers.	Continue to separate and eliminate all combined manholes.
Langford	Continue with infrastructure upgrades as identified in Langford's Sewer Master Plan.	Continue with regular inspection and maintenance of their system, which is only about 10 years old.
Oak Bay	Commence with the Uplands combined sewer separation program.	Continue with the South Oak Bay I&I rehabilitation pilot project.
Saanich	Complete Dysart pump station, which will eliminate overflows to Colquitz Creek.	Continue to rebuild all pump stations, add standby power and remove overflows where possible.
Victoria	Commence with James Bay rehabilitation / I&I reduction project.	Complete hydraulic model to confirm if combined manholes and relief overflows can be removed.
View Royal	Upgrade pump stations where required to provide standby power and collect better data.	Continue with regular inspection and maintenance of their system, which is only 20 years old.

Meanwhile, the frequency of overflows will continue to be tracked to measure the success of the work completed. It is recommended that an annual overflow report update be included with the annual I&I progress report that has been submitted to the Core Area Liquid Waste Management committee for the last several years now.





- Pump Station Overflow Points
- Sanitary MH/Chamber Overflow Points
- Combined Waste Water Manhole
- Municipal and First Nation Reserve Boundaries
- Major Roads
- Streams
- First Nations Reserves
- Department of National Defence Land



Projection: Universal Transverse Mercator  
Zone 10 North - North American Datum 1983

### Summary of Core Area Known Potential Overflow Points

Figure: ES-1