



**REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE  
MEETING OF WEDNESDAY 10 JUNE 2009**

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**SUBJECT**      **CORE AREA LIQUID WASTE MANAGEMENT PLAN INFLOW AND INFILTRATION  
BIENNIAL REPORT FOR 2007-2008**

**PURPOSE**

To present the Inflow and Infiltration (I&I) biennial report which provides details of the measures taken in the last two years to address I&I.

**BACKGROUND**

The Core Area Liquid Waste Management Plan (LWMP) sets out goals and commitments for the municipalities and Capital Regional District (CRD) to manage inflow and infiltration. When the LWMP was approved in 2003, the minister of environment added a requirement that the CRD submit a report to the regional environmental protection manager every two years that provides details of the measures taken in the preceding two years to address inflow and infiltration. This report is known as the I&I Biennial Report.

This staff report summarizes the *Management of Inflow and Infiltration Biennial Report for 2007 and 2008* which is available upon request. Some of the key accomplishments were already presented to the committee at its 28 January 2009 meeting. The biennial report provides additional details and progress in the following specific categories:

- infrastructure management
- flow monitoring results
- summary of I&I accomplishments and/or initiatives
- public education
- private property I&I; and
- sanitary sewer overflow management plan

The key progress made in each of these areas is summarized in Appendix A of this staff report.

**ALTERNATIVES**

1. That the committee receive this report for information and direct staff to submit the biennial report to the Ministry of Environment in fulfillment of the Core Area LWMP.
2. That the committee request additional information be included in the report and then direct staff to submit it to the Ministry of Environment.

**FINANCIAL IMPLICATIONS**

There is no direct financial implication. The I&I program is included in the core area annual budget.

## **SUMMARY**

In 2007-08, the core area municipalities made significant progress in addressing inflow and infiltration. Infrastructure is being well maintained by means of regular cleaning, inspection, and rehabilitation where required. Flow monitoring has indicated improvements in pilot rehabilitation areas where work has been targeted specifically for I&I reduction. Increased awareness in I&I resulted in a successful grant application to rehabilitate James Bay and further opportunities are being developed to educate the public on the importance of I&I. The creation and implementation of a sanitary sewer overflow management plan has resulted in prioritizing improvements and has reduced overflows.

In 2009, the main focus will be to look at options and prepare a strategy for addressing I&I that comes from private property. Furthermore, the CRD and municipal staff are continuing to work together in preparing short- and long-term implementation plans for I&I management as requested by the Ministry of Environment. The successes to date are due to the hard work and cooperative effort from municipal staff.

## **RECOMMENDATIONS**

That the Core Area Liquid Waste Management Committee:

1. receive the Inflow and Infiltration biennial report for information; and
2. direct staff to submit the report to the Ministry of Environment.

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Larisa Hutcheson, PEng  
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Concurrence

## **COMMENTS**

Attachment: 1  
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**MANAGEMENT OF INFLOW AND INFILTRATION  
SUMMARY OF 2007-2008 ACCOMPLISHMENTS NOTED IN THE BIENNIAL REPORT**

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**Infrastructure Management**

Total length of sewers inspected and cleaned = 119,225 meters

Total length of sewers rehabilitated and/or replaced = 15,111 meters

Total number of manholes inspected and cleaned = 1,300

Total number of manholes rehabilitated and/or replaced = 206

Total number of services laterals to private property inspected and/or cleaned = 779

Total number of services laterals to private property repaired = 520

Total number of pump stations upgraded = 21

Total cost of I&I related works completed over the 2 year biennial period = \$7,115,131

**Flow Monitoring**

Flow monitoring data was generated and analyzed for the first time from 40 permanent facilities such as pump stations. Efforts are being made to increase the number of permanent facilities that will provide data for long-term I&I analysis.

Results from the October 2006 to March 2008 flow monitoring period were documented in the Flow Monitoring Analysis Report that has been reviewed and submitted to each municipality for its records.

The results from the 2006-08 flow monitoring sites have been added to the overall core area I&I map and are attached in Figure 1. 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.

**Summary of I&I Accomplishments and/or Initiatives (by each Core Area LWMP participant)****CRD**

The entire 5.2 km long northeast trunk-Bowker (NET) system, which was transferred to the CRD in 2003, has been cleaned, inspected, rehabilitated and/or replaced, and Trent pump station is now complete and commissioned.

**Colwood**

The sewers in Colwood are mainly constructed of PVC "plastic" pipe which is known for its leak resistant joints and corrosion resistance. Therefore, Colwood focuses its efforts on inspection and maintenance. However, as highlighted in past reports, an old DND Belmont area that was rehabilitated a few years ago resulted in about a 40% I&I reduction.

Esquimalt

The \$6.75 million capital sewer upgrade program in Esquimalt is now about 90% complete, which included relining some 12 km of sewer mains, construction of 68 new manholes and upgrading of all eleven pump stations with new controls. Although this work was primarily targeted at fixing structural defects, the various catchments are being flow monitored to measure potential I&I reductions as well.

Langford

Langford is a relatively young municipality and, therefore, I&I is not much of a problem. In 2007-08, five new pump stations were constructed or upgraded and about 12 km of new mains were installed. A pilot rehabilitation area was completed a couple of years ago in the old Phelps subdivision, which resulted in about a 30% I&I reduction.

Oak Bay

A multi-year I&I reduction plan for the Windsor area has commenced and the first phase, sealing the manhole lids, is complete. The other phases include sealing manhole barrels, mainline sewers and, finally, the private laterals. Flows will be measured after each upgrade to deduce the cost effectiveness of each type of upgrade. In addition to this work, Oak Bay continues to work with consultants to refine options for complying with the provincial Municipal Sewage Regulations and the CRD's LWMP for eliminating combined sewers in the Humber and Rutland catchments.

Saanich

The I&I rates in Saanich are low and generally fall within traditional design allowances, but Saanich is continuing to replace its older asbestos cement mains and service connections by about 1,000 metres and 100 laterals, respectively, per year. Flow monitoring will continue to track any potential I&I reduction resulting from this work. Saanich has also commissioned its new Dysart pump station and upgraded seven other pump stations to increase efficiency/redundancy and eliminate potential overflows.

Victoria

The City of Victoria's \$3 million James Bay I&I reduction pilot project will study differing approaches to I&I rehabilitation using a variety of trenchless technologies. Work will commence in 2009 and will include a detailed pre- and post-rehab study of the area over a two-year period with the goal of identifying the best I&I reduction strategy for all of Victoria.

View Royal

A consultant has been retained by View Royal to assist with analyzing their pump station flow data to identify potential I&I areas of concern. If a particular area of concern is identified, View Royal then plans to undertake further investigation using smoke tests.

**Public Education**

A better understanding of I&I is required to explain what I&I is, 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 might be more willing to accept the work.

Consequently, in collaboration with the core area municipalities, the CRD has created an I&I brochure and an I&I website. This information will be 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 link to the website are available upon request.

### **Private Property**

Property owners generally do not take action to deal with potential I&I on their properties because:

- they are generally unaware I&I is an issue
- their properties are generally not affected by the problems associated with I&I (overflows usually occur downstream in the system)
- they don't test their laterals for leaks and are not regulated to do so; and
- they have a disincentive to test for private property I&I because, if needed, the repair costs are high (generally between \$2,000 and \$5,000) and the repair work might not appear to result in noticeable benefits to the property owner.

Municipalities generally do not take action to deal with private property I&I because:

- technically, private property sewers are not owned by the municipality and the municipality does not have the authority to enter onto private property
- testing for private property I&I (i.e., smoke testing for inflow, video inspection for infiltration) can be expensive and time-consuming
- working on private property could create liability issues for the municipality; and
- potentially, there could be a perception of unfairness when dealing with private property I&I since some home owners might think they are being singled out to pay for expensive repairs or if the municipality pays for the repairs, then property owners in the rest of the municipality might feel their tax dollars are being spent to improve someone else's property.

However, many studies have indicated that 30-70% of I&I comes from private property sources (through leaky pipes or cross-connected roof, foundation or lawn drains). Therefore, a holistic approach for cost-effectively reducing I&I from the sewer system must include a plan to address I&I from private property. As a result, the main focus over the next year will be to work together with the municipalities to investigate private property options and opportunities that could be developed into a regional plan.

### **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.

**TABLE 1  
SUMMARY OF CORE AREA MUNICIPAL PEAK FIVE-YEAR I&I RATES FOR 2008**

Municipality	Average Age of Sewers <sup>(6)</sup>	Estimated Five-Year Peak I&I Rate (L/ha/day) <sup>(1,2)</sup>			
		1996 <sup>(3)</sup>	2004/05 <sup>(4)</sup>	2005/06 <sup>(5)</sup>	2006/08 <sup>(7)</sup>
Colwood (including DND) Excluding DND	20 9	not sewered	40-45,000 18-22,000	40-45,000 18-22,000	40-45,000 18-22,000
Esquimalt (including DND)	82	80-90,000	95-100,000	95-110,000	100-115,000 <sup>(8)</sup>
Langford	8	not sewered	15-20,000	17-22,000	17-22,000
Oak Bay Uplands	69 74	80-110,000 > 120,000	110-115,000 > 400,000	110-120,000 > 400,000	110-120,000 > 400,000
Saanich	33	18-22,000	18-22,000	18-22,000	18-22,000
Victoria	89	130-140,000	160-165,000	150-160,000	145-150,000
View Royal (incl. Reserves)	21	15-20,000	18-22,000	18-22,000	20-25,000

**Notes Related to Table 1:**

- I&I rates are determined at each flow meter location and then interpolated into a weighted average over each particular municipality.
- A five-year storm event I&I flow rate is used since the Municipal Sewage Regulation stipulates that a sewer system must be able to convey flow under this condition without an overflow.
- The 1996 I&I rates were calculated by Kerr Wood Leidal Associates Ltd. (reference reports – *Northwest Trunk Sewer Flow Analysis and Monitoring Station Review, January 1995* and *Northeast Trunk Sewer and East Coast Interceptor Flow Analysis and Monitoring Station Review, September 1996*). The rates for Esquimalt, Oak Bay and Victoria were estimated based on flow results from a few neighbouring catchments within Oak Bay and Victoria and likely underestimated
- The 2004/05 I&I rates were calculated by Kerr Wood Leidal Associates Ltd. and CRD Environmental Services (reference reports – *Northeast Trunk/East Coast Interceptor Upgrade Capacity Deficiency Study, May 2003*; *I&I Analysis Results: 2001 – 2004 Flow Monitoring Sites, July 2005* and *I&I Analysis Results: 2004/2005 Flow Monitoring Sites, May 2006*).
- The 2005/06 I&I rates were calculated by CRD Environmental Services (reference reports – *I&I Analysis Results: 2004/2005 Flow Monitoring Sites, May 2006* and *I&I Analysis Results: 2005/2006 Flow Monitoring Sites, June 2007*).
- The rate of I&I tends to increase in proportion to the age of the system. Older systems usually need more work than newer systems.
- Changes in the I&I rates from 2005/06 to 2006/08 are more attributed to additional flow monitoring coverage and updating of municipal averages than to actual I&I escalation or reduction.
- Esquimalt's 2006/08 I&I rate is based mainly on storm event data collected prior to the completion of their major rehabilitation work. Flow data was only available for one post-rehabilitation storm event and the data indicates I&I was reduced. Additional storm event flow data is being collected to calculate Esquimalt's post-rehabilitation I&I rate.

