

DISTRICT OF SOOKE  
WASTEWATER SYSTEM

OPERATED BY  
EPCOR WATER SERVICES INC.



ANNUAL REPORT  
2006  
PERMIT NUMBER RE-17300



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## INTRODUCTION

The Sooke wastewater collection and treatment system is owned by the District of Sooke and operated by EPCOR Water Services Inc.

Construction of the Sooke collection system and wastewater treatment plant began in 2004 and the system was commissioned in November 2006. Individual domestic and commercial hook-ups began in January 2006 and will continue through August 2007, with the majority completed by December 2006.

The project consists of a 27 km collection system, 3 lift stations and a secondary wastewater treatment facility. Secondary sewage treatment removes 90% of the total suspended solids and high levels of other contaminants, providing significant environmental benefits to the District of Sooke.

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## SYSTEM STATISTICS

- 27 km long collection system
- 1.7 km long, 30 m deep outfall
- 3 pump stations (Sooke Road, West Coast Road, Helgesen Road)
- 3,000 m<sup>3</sup>/day secondary wastewater treatment plant
- Sequential Batch Reactor Secondary Treatment process with UV disinfection
- Capacity: peak design of 3,000 m<sup>3</sup>/day, expandable by an additional 3,000 m<sup>3</sup>/day
- Servicing core area of 5,500 residents

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## OVERVIEW

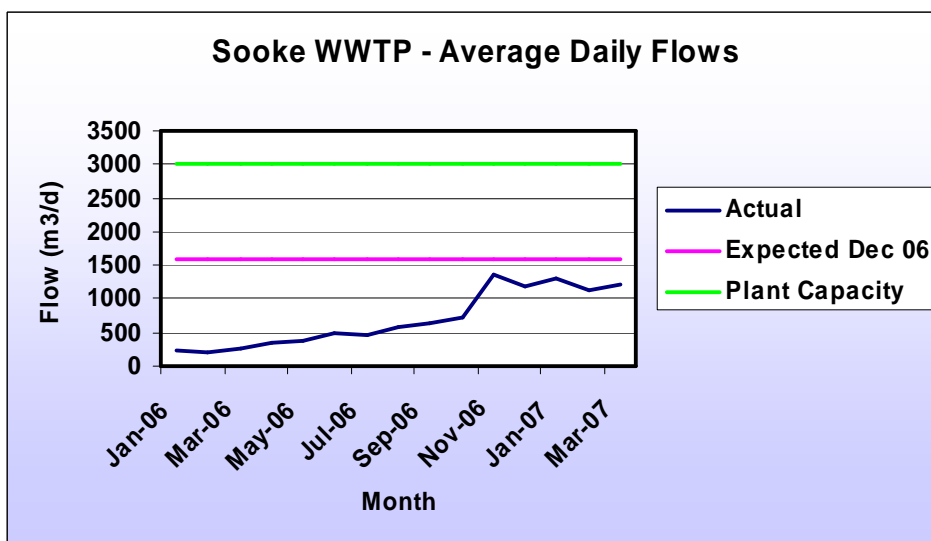
### Highlights

- As of December 31, 2006, 1045 of the 1350 anticipated plumbing permits had been issued, representing approximately 77% of total expected connections. The total number of anticipated permits (1350) is equivalent to approximately 5,500 residents.
- As of December 31, 2006, flows coming into the plant were averaging 1072 m<sup>3</sup>/day of the anticipated 1600 m<sup>3</sup>/day, representing 67% of the expected flow at completion of hook ups.

**OPERATIONS**

**WWTP & Collection System**

The wastewater treatment plant has successfully completed its commissioning period and is performing very well. Flows coming into the plant by the end of the year are averaging 1072 m<sup>3</sup>/day representing 67% of the anticipated 1600 m<sup>3</sup>/day expected flow at completion of hook-up. The flows increased enough to put both of the two SBR trains online in December.



Biosolids extracted from the centrifuge are trucked to the Hartland Landfill for disposal under Control Waste Permit # 2006-044. On average, 12,000 kg of biosolids per month are trucked to the landfill.

Extensive troubleshooting on the UV system occurred over the weekend of Oct 7 – 9 to improve the disinfection process and plant performance. Quality results for disinfection did not meet operational targets at the beginning of October, but were within the quality limits described in the Municipal Sewage Regulation for recreational water use. Adjustments to plant aeration, wasting and other operational parameters were made to recover the plant effluent quality as quickly as possible. The discharge of effluent to the outfall was stopped for two days while troubleshooting the plant by using the offline SBR basin for storage.

Two major events tested the system in the last quarter of 2006: the flooding due to extremely high rainfall that occurred on November 6 and the windstorm on December 15th. Both events provided valuable information on the performance of the system under extremely stressful conditions.

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During the floods, record flows were handled by the WWTP. A restriction in the line between the WWTP and the outfall due to an airlock in the system caused two small overflows of the effluent channel. Approximately 40 m<sup>3</sup> of effluent was released and the incident was reported to PEP. Modifications have been made to the line preventing further airlocks and improvements were made to the effluent channel level monitoring and alarming to provide more advanced warning of high level conditions.

No significant disruption to the treatment system occurred during the wind storm event. Power was interrupted to the wastewater treatment plant as well as the collection system lift stations, however, on-site standby diesel generators provided power until hydro was restored. Some facilities went without mainline power for 5 days. Special emergency support procedures were established for homeowners with residential pump systems. An emergency crew pumped down the chambers once a day with a backup generator, which worked very well and prevented any sewer backups or overflows.

Individual hook ups continue at a steady pace throughout the community as we worked toward the December 31, 2006 deadline. 1045 of the 1350 anticipated plumbing permits have been issued, representing approximately 77% of total expected connections. The deadline was extended to August 2007 due to weather-related construction delays in 2006.

The hook-up process is going smoothly with few problems reported. Less than a dozen properties have reported issues regarding odours inside their buildings after connection. These were believed to be the result of a variety of plumbing issues within the buildings, including vent stacks located too close to air circulation intakes, dried out p-traps and older plumbing installations.

Odours have been noticed at two of the lift stations and a variety of measures have been used to reduce the impact on neighbouring properties. These include installation of temporary carbon filters on the lift station vents; modifying lift station ventilation equipment, water flushing at key points throughout the system; adjusting the timing of pump cycles; and chemical odour control.

These odours were originally credited to low flows in the collection system creating septic conditions. This seems to have dropped off as the number of homes hooking into the system increased. We are also aware that septage from decommissioned septic tanks had been released into the collection system instead of being removed and disposed at authorized facilities. Further investigations are ongoing and appropriate action under the District of Sooke Sewer Use Bylaw will be taken if required. A public education program on septage vs. sewage was conducted in the summer and fall.

By the end of the year, most of the significant odour sources had abated. The final remaining source of odours was determined to be from the Sun River forcemain. Due to the long retention time in the forcemain, the wastewater goes septic and causes odours at the Sooke Road Lift Station and then at the West Coast Road Lift Station as the material goes through the system. Odour control upgrades will be required to manage this situation effectively.

During April and June, 2006, there were four domestic wastewater spills at local residential sewer inspection chambers. All of these spills, with the exception of one which flowed into a nearby ditch, were contained within the chamber and promptly remediated. None of the spills occurred near watercourses. The cause of these spills was determined to be contractor error in the installation of test valves within the low pressure portions of the system. The contractor inspected all of the test ports to ensure that they were in the closed position and there have been no similar occurrences since.

Also in June, a pipe failure at the Wastewater Treatment Plant from the onsite lift station allowed approximately 750 litres of effluent to be released into the gravelled area surrounding the lift station. The flow was confined to the gravel driveway at the lift station site and did not reach any watercourse. The pipe was repaired and the effluent cleaned up.

Two domestic wastewater spills occurred in late December; both were contained and reported to PEP. One spill occurred from around the Inspection Chamber at 6858 West Coast Road due to a plugged sewer line. The cause was determined to be damage that occurred during service hook-up construction. Approximately one cubic meter of domestic sewage was released to the gravel around the IC. The soil around the spill area was cleaned up after the repair was completed. The second spill occurred at the Throup Road blow off valve on the local low pressure sewer system. It resulted in a spill of approximately two cubic meters, which was released to the gravel and flowed down into the ditch. The soil around the spill area was cleaned up, and no domestic sewage was released to the storm water system. All spills were reported to PEP.

## General

The wastewater treatment plant is a Class III Wastewater Treatment Plant, Certification # 1358, in accordance with the Environmental Operators Certification Program.

Operators working at the Sooke WWTP to date:

Name	Position	Qualifications
John Reynolds	Senior Operator	Class IV MWWT (EOCP) Class III IWWT (EOCP)
Brian Thorburn	Senior Operator (Jan – April 06)	Class IV WWT (EOCP) Class III WWT (EOCP)
Mark Hayes	Operator (November 2006 forward)	Level II WWT (EOCP) Level II WT (EOCP)
Margaret Rossetti	Co-op Student Operator (May-Dec 2006)	Okanagan University College student
Tami Wetmore	Operations Manager	Level III WWT (AB) Level II WWC (AB) Level IV WT (AB) Level II WD (AB)

WWT- Wastewater Treatment; WWC – Wastewater Collection; WT – Water Treatment; WD – Water Distribution;  
IWWT – Industrial Wastewater Treatment

## Plant Design Parameters

Design Parameters of the Intermittent Cycle Extended Aeration System

F/M Ratio	.065 kg BOD/kg MLSS/day
SVI (after 60 minutes settling)	150 ml/gm (max)
MLSS at Bottom Level	5,104 mg/L
Normal Cycle Time	6 ea @ 4.0 hour cycles/day
Storm Cycle Time	8 ea @ 3.0 hour cycles/day
Number of ICEAS® Tanks	2
ICEAS® Tank Length	29.0 Meters
ICEAS® Tank Width	10.0 Meters
Water Depth a TWL	5.0 Meters
Water Depth a BWL	3.9 Meters
ICEAS® Tank Volume at TWL	1,450 Cubic Meters
Waste Sludge Produced (approx)	517 kg/day/basin
Volume of sludge produced (At 0.85% Solids)	50,304 L/d/basin
Normal Decant Rate	6,693 L/min/basin
Peak Decant Rate	9,585 L/min/basin
Hydraulic Retention Time	0.88 days
Sludge Retention Time	22.3 days

## Operating Permit

The Operating Permit for the Sooke Wastewater Treatment Facility states the following parameters:

- Biochemical Oxygen Demand (BOD) not to exceed 45 mg/L
- Total Suspended Solids (TSS) not to exceed 45 mg/L

## Monitoring Procedures

### Internal

- Influent and effluent flows are monitored and recorded each day that the plant is manned
- Influent is tested and recorded in-house for:  
Flow, Total Suspended Solids (TSS), Chemical Oxygen Demand (COD) and pH.
- Effluent is tested and recorded in-house for:  
Flow, Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), pH, Ultra Violet Transmittance (UVT's) and Ammonia (NH<sub>3</sub>-N)

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- Sequencing Batch Reactors are tested in-house for Mixed Liquor Suspended Solids (MLSS), 30 minute settling test
  - All in-house tests conducted are used for adjusting operational parameters only

### External

External monitoring was carried out by Cantest Labs of Victoria, BC, ISO 17025 registered.

They tested for:

- Influent:
  - Total Suspended Solid (TSS), Chemical Oxygen Demand (COD), pH and Ammonia (NH<sub>3</sub>-N)
- Effluent:
  - Total Suspended Solids (TSS), Chemical Oxygen Demand (COD), pH, Ammonia (NH<sub>3</sub>-N) and Biochemical Oxygen Demand (BOD<sub>5</sub>)
- Fecal Coliform Count (FCC); minimum 5 times monthly on a grab sample
- Toxicity testing must be carried out once every two years. The first of these test was scheduled for January 2007.





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**2006 MONTHLY AVERAGE DATA SHEET**

Month	Rainfall mm	Regulation Limit		INFLUENT			EFFLUENT			
		Permits Issued	Average Daily Flow (m3/d)	*BOD mg/L	*TSS mg/L	TBD <sup>1</sup> mg/L	45 mg/L *BOD mg/L	45 mg/L *TSS mg/L	TBD <sup>1</sup> mg/L *NH <sub>3</sub>	TBD <sup>1</sup> *Fecal Coliform CFU/100mL
JANURARY	294	35	220			34.7	<10	5	7.69	
FEBURARY	139	47	204				15	11		40
MARCH	89	136	264	1.9	<1	10.9	<10	21	11	20
APRIL	42	142	354				<10	<1		12
MAY	34	112	371	239	248	42	<11	<10	1	1
JUNE	49	94	497	272	152	37	<10	11	11	70
JULY	6	109	457	260	168	48	<10	5	8	20
AUGUST	7	93	578	>100	376	36	<10	6	8	40
SEPTEMBER	41	78	640	479	210	42	<10	<1	22	390
OCTOBER	74	71	725	250		46	15	24	29	130
NOVEMBER	454	46	1361	154		24	9	13	13	129
DECEMBER	228	84	1197	398		27	7.8	8	14	47

**NOTE**

\*Tests have been completed by an external lab, Cantest, ISO 17025

<sup>1</sup>To Be Determined

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## ACHIEVEMENTS IN 2006

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### Community Involvement

EPCOR continues to be committed to investing in communities in numerous ways. These investments include direct contributions and sponsorships, employee volunteerism, and our support as a major contributor to the United Way.

One of the ways EPCOR supports the District of Sooke is by investigating opportunities in the community that provide us with a chance to connect with the customer. For example, we support annual sponsorships of Canada Day celebrations, Sooke Legion Remembrance Day ceremonies, the Sooke Salmon Enhancement Society fishing derby and Christmas skate and swim sessions.

In past years we have sponsored the Sooke Philharmonic Orchestra, the Sooke Arts Council, the District of Sooke golf tournament, the Safe Halloween event and the Sooke Volunteer Firemen. For 2006, in addition to our annual sponsorships, we chose to support the Chamber of Commerce Community Awards Gala, the YWCA Women of Distinction Award Gala, and the Seniors' Drop In Centre. As well, we participated in the Sooke Rotary Fair and Auction and the Chamber of Commerce Santa Claus Parade.

### Opening Ceremonies

Ceremonies were held Friday, March 3, 2006 at the treatment plant to officially mark the completion of the wastewater treatment plant and collection system. Guests included Minister Ida Chong, Ministry of Community Services, MP Keith Martin, MLA John Horgan, and Sooke Mayor Janet Evans. A reception at the Sooke Municipal offices followed and public tours of the plant were held throughout the day.

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## CUSTOMER SERVICE

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EPCOR operates a customer service phone line to address concerns and answer question for the public. In 2006, a total of 421 calls were received; they are summarized below.

2006 Customer Calls	
Construction Query	38
Pump Related Query	162
Service Area Query	14
Financial Query	3
Individual Service Query	26
General Query	125
Complaint	53*
Total	421

- Construction – driveway issues, depth of connection, issues connected to original construction
- General – info on contractors, permitting, hook-ups, inspections
- Complaints – odours in system and individual buildings
- Individual Service – location of connection
- Pumps – requests for distribution info, pump specs

\* Note: these were multiple calls from less than a dozen separate callers

In addition to the customer service line, EPCOR, in conjunction with the District of Sooke, published and distributed three community newsletters for residents of the Sewer Specified Area.

Ongoing public information sessions were held through presentations to community groups such as the Chamber of Commerce and the Sooke Rotary Club.

**MAJOR MILESTONE DATES**

<b>Description</b>	<b>Date</b>	<b>Comments</b>
Collection system design commences	Apr 13, 2004	
Official Project Kick-off Ceremony	Apr 22, 2004	
Outfall design commences	Aug 3, 2004	
Outfall completion	Aug 1, 2005	
Plant construction completion	Nov 4, 2005	Two months ahead of schedule
WWTP began receiving & treating wastewater	Dec 2005	
WWTP Official Opening Ceremony	March 2006	
Commence residential hook-ups	Dec 15, 2006	Ongoing; first hook up two weeks ahead of schedule
Collection system construction	March 31, 2006	Completed three months ahead of schedule

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## ADDENDA

1. Pacificus Report for April 2006
2. Pacificus Report for September 2006
3. Pacificus Report for January 2007
4. Stormwater Quality Report, District of Sooke - 2005/2006 – online link:  
[http://www.crd.bc.ca/es/environmental\\_programs/stormwater/monitoring.htm](http://www.crd.bc.ca/es/environmental_programs/stormwater/monitoring.htm)

# Wastewater Treatment Plant Outfall Receiving Waters Monitoring in Sooke Bay



April 2006

**Prepared for:**  
**Lee Ward**  
**Manager, Vancouver Island Operations**  
**Epcor Water Services**  
**2050D Townsend Road S.**  
**Sooke, B.C.**  
**V0S 1N0**

**Prepared by:**



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## **Introduction**

Sooke Bay is located approximately 35 km east of Victoria on the southwest coast of Vancouver Island, British Columbia (Figure 1). Epcor Water Services was contracted to construct a new wastewater treatment facility and outfall infrastructure to accommodate present and future population growth in the municipality of Sooke. This newly constructed system began operation in December 2005. To comply with the regulations outlined by the Ministry of Environment; discharge of effluent must be monitored to ensure that the guidelines outlined in the Municipal Sewage Regulation are adhered to.

Pacificus Biological Services was contracted to perform a marine environmental water sampling survey on April 24, 2006. The objectives of this survey were to measure several water quality parameters including the following:

<b>Parameter</b>
Biological Oxygen Demand
Total Suspended Solids
pH
Ammonia
Conductivity
Dissolved Oxygen
Salinity
Temperature
Fecal Coliforms





Figure 1: General Location of sample sites, Sooke Bay, British Columbia

## **Methodology**

Four sampling points had been determined for the pre-discharge monitoring program by Epcor and provincial ministry staff including (figure 2):

1. One at the outfall location;
2. One at 100m initial dilution zone to north of the outfall diffuser, as required by the Ministry of Sustainable Resource Management;
3. One at 1 00m initial dilution zone to the south of the outfall diffuser, as required by the Ministry of Sustainable Resource Management;
4. One at 300m point toward the shore away from the outfall diffuser, as required by Environment Canada;



Figure 2: Sooke Bay receiving water-sampling locations (approximate).

The acquisition of samples at each sample location was at 2m (to avoid any freshwater floating on the surface) and at 9m (the pycnocline) where a plume would be likely to trap.

A pycnocline is a layer of rapid change in water density with depth. In oceans, changes in water density are mainly caused by changes in water temperature and salinity. A study completed by Komex Environmental and Water Resource Engineering Ltd. states: “The profile data indicate that the water column in Sooke Bay is generally well-mixed (unstratified) throughout the year”. At the time of sampling, the water column in Sooke Bay was very weakly stratified. To determine the pycnocline, temperature and salinity measurements were taken at various depths using a digital meter. At 9 m vertical depth a slight change in temperature and salinity were noted. These changes remained constant at deeper depths, thus, 9m vertical depth was deemed the pycnocline.

A Pacificus biologist navigated to the sample sites using a handheld Garmin GPS (with pre-recorded sample site waypoints) and gathered water samples at the appropriate depths using an economy water sampler. Dissolved Oxygen, salinity, pH, turbidity and temperature readings were taken and recorded in the field. A YSI Model 85 handheld multi parameter testing system was used to measure oxygen, conductivity, salinity and temperature.

BOD, TSS, Ammonia and Fecal coliform parameters were stored in sample jars and analyzed by North Island Laboratories (within 6 hours). Fecal coliform concentrations were measured using: Standard Methods for the Examination of Seawater and Shellfish. This methodology is used and recommended by Environment Canada. Selected volumes of sample were incubated based on a 5:5:5 MPN table in specific media for 24 hours and examined for gas. BOD concentrations were measured using: Standard Methods for the Examination of Water and Wastewater :method 5210. A bottle was filled with specific sample dilutions and incubated at a specific temperature for 5 days. The BOD was computed from the difference between the initial dissolved oxygen and the final dissolved oxygen. TSS concentrations were measured using: Standard Methods for the Examination of Water and Wastewater :method 2540. A well-mixed sample was filtered and dried to constant weight. The increase in weight of the filter represented the total suspended solids.

The detection limits for BOD, Fecal Coliforms and TSS are as follows:

BOD	5 mg/L
Ammonia	0.002 mg/L
Fecal Coliforms	2 MPN/100mL
Total Suspended Solids	5 mg/L

Please contact North Island Laboratories Ltd (250-338-7786) if you require more information with respect to sampling methodologies and procedures.

## **Results**

Specific results for each of the sites are listed in Table 1. The receiving waters surrounding the Sooke outfall contained low levels of ammonia, BOD, fecal coliform, pH and total suspended solids (well within acceptable limits). Photo 1 represents, in general, the areas designated for sites 1 through 4.



Photo 1: General location of sites 1 through 4

Table 1: Epcor wastewater treatment plant outfall receiving waters sampling results April 24, 2006.

Sample No	Depth (m)	pH	Cond (µS/cm)	D.Oxygen mg/L	Salinity (ppt)	Temperature °C	Fecal Col. CFU/100mL	BOD mg/L	TSS mg/L	Ammonia mg/L
# 1 Outfall	2	8	32.98	9.75	30.4	9.4	<1	<5.0	38	<0.002
	9	7.9	33.04	9.22	30.7	9	<1	<5.0	23	0.042
# 2 100m north of outfall	2	8.1	31.87	9.74	30.1	9.5	<1	<5.0	21	<0.002
	9	8	33.67	9.31	31.1	9.1	1	<5.0	32	0.056
# 3 100m south of outfall	2	8.1	32.8	9.74	30.2	9.7	<1	<5.0	21	<0.002
	9	8.1	15.3	9.9	30.6	9.9	<1	<5.0	18	<0.002
# 4 300m south of outfall	2	8.1	32.87	9.77	30.2	9.5	<1	<5.0	12	0.027
	9	8	18.95	9.87	30.9	9.2	<1	<5.0	43	<0.002

\* note: Ammonia samples at sites (100m north(2), outfall(2) and 300m(1)) were damaged by North Island Laboratories. The owner Sandra Felgenhauer has signed of on the fact that the samples could still be properly analyzed.

**Conclusion**

The environmental monitoring of the Sooke outfall receiving waters is complete. All of the required samples were taken and results were obtained for future comparison. Additional monitoring will be required (mid summer 2006) as per government regulations, to ensure the plant is operating properly and the oceanic environment is not being negatively impacted.

Reference:

Komex International Ltd. 2005. *Dilution Modelling Report District of Sooke Treated Wastewater Outfall (9)*.



# Wastewater Treatment Plant Receiving Waters Monitoring in Sooke Bay



September 2006

**Prepared for:**

Lee Ward  
Epcor Utilities Inc.  
#215 – 10451 Shellbridge Way  
Richmond, B.C.  
V6X 2W8

**Prepared by:**



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Pacificus Biological Services was contracted to perform a marine environmental water sampling survey on September 18, 2006. The objectives of this survey were to measure the following within the receiving waters environment:

<b>Parameter</b>
Biological Oxygen Demand
Total Suspended Solids
pH
Ammonia
Conductivity
Dissolved Oxygen
Salinity
Temperature
Fecal Coliforms



Figure 1: General Location of sample sites, Sooke Bay, British Columbia

## **Methodology**

Four sampling points had been determined for the pre-discharge monitoring program by Epcor and provincial ministry staff including (figure 2):

1. One at the outfall location;
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4. One at 300m point toward the shore away from the outfall diffuser, as required by Environment Canada;



Figure 2: Sooke Bay receiving water-sampling locations (approximate).

The acquisition of samples at each sample location was at 2m (to avoid any freshwater floating on the surface) and at 12m (the pycnocline) where a plume would be likely to trap.

A pycnocline is a layer of rapid change in water density with depth. In oceans, changes in water density are mainly caused by changes in water temperature and salinity. A study completed by Komex Environmental and Water Resource Engineering Ltd. states: “The profile data indicate that the water column in Sooke Bay is generally well-mixed (unstratified) throughout the year”. At the time of sampling, the water column in Sooke Bay was very weakly stratified. To determine the pycnocline, temperature and salinity measurements were taken at various depths using a digital meter. At 12 m vertical depth a slight change in temperature and salinity were noted. These changes remained constant at deeper depths, thus, 12m vertical depth was deemed the pycnocline.

A Pacificus biologist navigated to the sample sites using a handheld Garmin GPS (with pre-recorded sample site waypoints) and gathered water samples at the appropriate depths using an economy water sampler. Dissolved Oxygen, conductivity, salinity, pH and temperature readings were taken and recorded in the field. A YSI Model 85 handheld multi parameter testing system was used to measure oxygen, conductivity, salinity and temperature.

BOD, TSS, Ammonia and Fecal coliform parameters were stored in sample jars and analyzed by North Island Laboratories (within 6 hours). Fecal coliform concentrations were measured using: Standard Methods for the Examination of Seawater. This methodology is used and recommended by Environment Canada. Selected volumes of sample were incubated based on a 5:5:5 MPN table in specific media for 24 hours and examined for gas. BOD concentrations were measured using: Standard Methods for the Examination of Water and Wastewater :method 5210. A bottle was filled with specific sample dilutions and incubated at a specific temperature for 5 days. The BOD was computed from the difference between the initial dissolved oxygen and the final dissolved oxygen. TSS concentrations were measured using: Standard Methods for the Examination of Water and Wastewater :method 2540. A well-mixed sample was filtered and dried to constant weight. The increase in weight of the filter represented the total suspended solids.

The detection limits for BOD, Fecal Coliforms and TSS are as follows:

BOD	5 mg/L
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Fecal Coliforms	2 MPN/100mL
Total Suspended Solids	5 mg/L

Please contact North Island Laboratories Ltd (250-338-7786) if you require more information with respect to sampling methodologies and procedures.

## **Results**

Specific results for each of the sites are listed in Table 1. The receiving waters surrounding the Sooke outfall contained acceptable levels of ammonia, BOD, fecal coliform, pH and total suspended solids. Photo 1 represents, in general, the areas designated for sites 1 through 4.



Photo 1: General location of sites 1 through 4

Table 1: Epcor wastewater treatment plant outfall receiving waters sampling results September 18, 2006.

Sample No	Depth (m)	pH	Cond (µS/cm)	D.Oxygen %	Salinity (ppt)	Temperature °C	Fecal Col. CFU/100mL	BOD mg/L	TSS mg/L	Ammonia mg/L
# 1 Outfall	2	8.3	35.5	65.8	30.7	10.8	<1	<5.0	18	0.023
	12	7.9	35.29	63.5	31.7	10.5	45	<5.0	20	0.023
# 2 100m north of outfall	2	7.9	35.56	66	30.6	10.8	4	<5.0	23	0.02
	12	7.8	35.34	60.7	31.8	10.5	39	<5.0	21	0.018
# 3 100m south of outfall	2	7.8	35.48	63.1	30.5	10.7	104	<5.0	18	0.018
	12	7.8	35.39	60.1	31.2	10.5	36	<5.0	18	0.016
# 4 300m south of outfall	2	7.8	35.59	63.6	31.1	10.9	56	<5.0	17	0.022
	12	7.8	35.38	59.4	31.8	10.5	52	<5.0	29	0.016

**Conclusion**

The September 2006 environmental monitoring of the Sooke outfall receiving waters is complete. Additional monitoring will be required (Feb 2007) as per government regulations, to ensure the plant is operating properly and the oceanic environment is not being negatively impacted.

Reference:

Komex International Ltd. 2005. *Dilution Modelling Report District of Sooke Treated Wastewater Outfall (9)*.



# Wastewater Treatment Plant Receiving Waters Monitoring in Sooke Bay



January 2007

**Prepared for:**

**Tami Wetmore**  
Operations Manager  
7113 West Coast Road Sooke, BC  
V0S 1N0

**Prepared by:**





## **Introduction**

Sooke Bay is located approximately 35 km east of Victoria on the southwest coast of Vancouver Island, British Columbia (Figure 1). Epcor Water Services was contracted to construct a new wastewater treatment facility and outfall infrastructure to accommodate present and future population growth in the municipality of Sooke. This newly constructed system began operation in December 2005. To comply with the regulations outlined by the Ministry of Environment; discharge of effluent must be monitored to ensure that the guidelines outlined in the Municipal Sewage Regulation are adhered to.

Pacificus Biological Services was contracted to perform a marine environmental water sampling survey on January 16, 2007. The objectives of this survey were to measure the following within the receiving waters environment:

<b>Parameter</b>
Biological Oxygen Demand
Total Suspended Solids
pH
Ammonia
Conductivity
Dissolved Oxygen
Salinity
Temperature
Fecal Coliforms



Figure 1: General Location of sample sites, Sooke Bay, British Columbia

## **Methodology**

Four sampling points had been determined for the pre-discharge monitoring program by Epcor and provincial ministry staff including (figure 2):

1. One at the outfall location;
2. One at 100m initial dilution zone to north of the outfall diffuser, as required by the Ministry of Sustainable Resource Management;
3. One at 1 00m initial dilution zone to the south of the outfall diffuser, as required by the Ministry of Sustainable Resource Management;
4. One at 300m point toward the shore away from the outfall diffuser, as required by Environment Canada;



Figure 2: Sooke Bay receiving water-sampling locations (approximate).

The acquisition of samples at each sample location was at 2m (to avoid any freshwater floating on the surface) and at 12m (the pycnocline) where a plume would be likely to trap.

A pycnocline is a layer of rapid change in water density with depth. In oceans, changes in water density are mainly caused by changes in water temperature and salinity. A study completed by Komex Environmental and Water Resource Engineering Ltd. states: “The profile data indicate that the water column in Sooke Bay is generally well-mixed (unstratified) throughout the year”. At the time of sampling, the water column in Sooke Bay was not stratified, however samples were taken at 12m depth to ensure consistency with respect to sample design.

A Pacificus biologist navigated to the sample sites using a handheld Garmin GPS (with pre-recorded sample site waypoints) and gathered water samples at the appropriate depths using an economy water sampler. Dissolved Oxygen, conductivity, salinity, pH and temperature readings were taken and recorded in the field. A YSI Model 85 handheld multi parameter testing system was used to measure oxygen, conductivity, salinity and temperature.

BOD, TSS, Ammonia and Fecal coliform parameters were stored in sample jars and analyzed by Cantest Laboratories (within 4 hours).

## **Test Methods**

### Ammonia in Water

Analysis was performed based on Standard Methods for the Examination of Water and Wastewater, 19<sup>th</sup> Ed. (1995); Method 4500-NH<sub>3</sub>.

### Conventional Parameters

Analyses performed at Cantest’s Victoria facility follow procedures based on those described in the most current editions of “British Columbia Environmental Laboratory Manual” and “Standard Methods for the Examination of Water and Wastewater”.

Microbiological Parameters

Analyses were performed using procedures based on those described in “B.C. Environmental Laboratory Manual for the Analysis of Water, Wastewater, Sediment and Biological Materials (2003 Edition) and “Standard Methods for the Examination of Water and Wastewater”, 20<sup>th</sup> Edition (1998). Analysis was performed at CANTEST Ltd. Victoria Laboratory.

The detection limits for BOD, Fecal Coliforms and TSS are as follows:

BOD	5 mg/L
Ammonia	0.002 mg/L
Fecal Coliforms	2 MPN/100mL
Total Suspended Solids	5 mg/L

Please contact CANTEST Ltd (1-800-865-8566) if you require more information with respect to sampling methodologies and procedures.

**Results**

Specific results for each of the sites are listed in Table 1. The receiving waters surrounding the Sooke outfall contained acceptable levels of ammonia, BOD, fecal coliform, pH and total suspended solids. Photo 1 represents, in general, the areas designated for sites 1 through 4.



Photo 1: General location of sites 1 through 4

Table 1: Epcor wastewater treatment plant outfall receiving waters sampling results January 16, 2007.

Sample No	Depth (m)	pH	Cond (µS/cm)	D.Oxygen %	Salinity (ppt)	Temperature °C	Fecal Col. CFU/100mL	BOD mg/L	TSS mg/L	Ammonia mg/L
# 1 Outfall	2	8.3	46.7	75.9	30	7.2	1	<5.0	<1	0.01
	12	7.9	31.4	75.6	30.4	7.3	2	<5.0	4	<.01
	2	8	31.52	75.8	30.9	7.1	<1	<5.0	4	<.01
# 2 100m north of outfall	12	8	31.61	75.6	30.7	7.3	1	<5.0	5	<.01
# 3 100m south of outfall	2	8	31.56	78.1	30.8	7.1	<1	<5.0	3	<.01
	12	8	31.59	79.2	30.7	7.3	1	<5.0	3	<.01
# 4 300m south of outfall	2	8	31.62	76.9	30.3	7.2	2	<5.0	2	0.01
	12	7.9	31.58	79.3	30.4	7.4	2	<5.0	2	<.01

## **Conclusion**

The January 2007 environmental monitoring of the Sooke outfall receiving waters is complete. Fecal Coliform concentrations have drastically declined as compared to the September 2006 analysis. Additional monitoring will be required in 6 months time as per government regulations to ensure the plant is operating properly and the oceanic environment is not being negatively impacted.

## Reference:

Komex International Ltd. 2005. *Dilution Modelling Report District of Sooke Treated Wastewater Outfall (9)*.