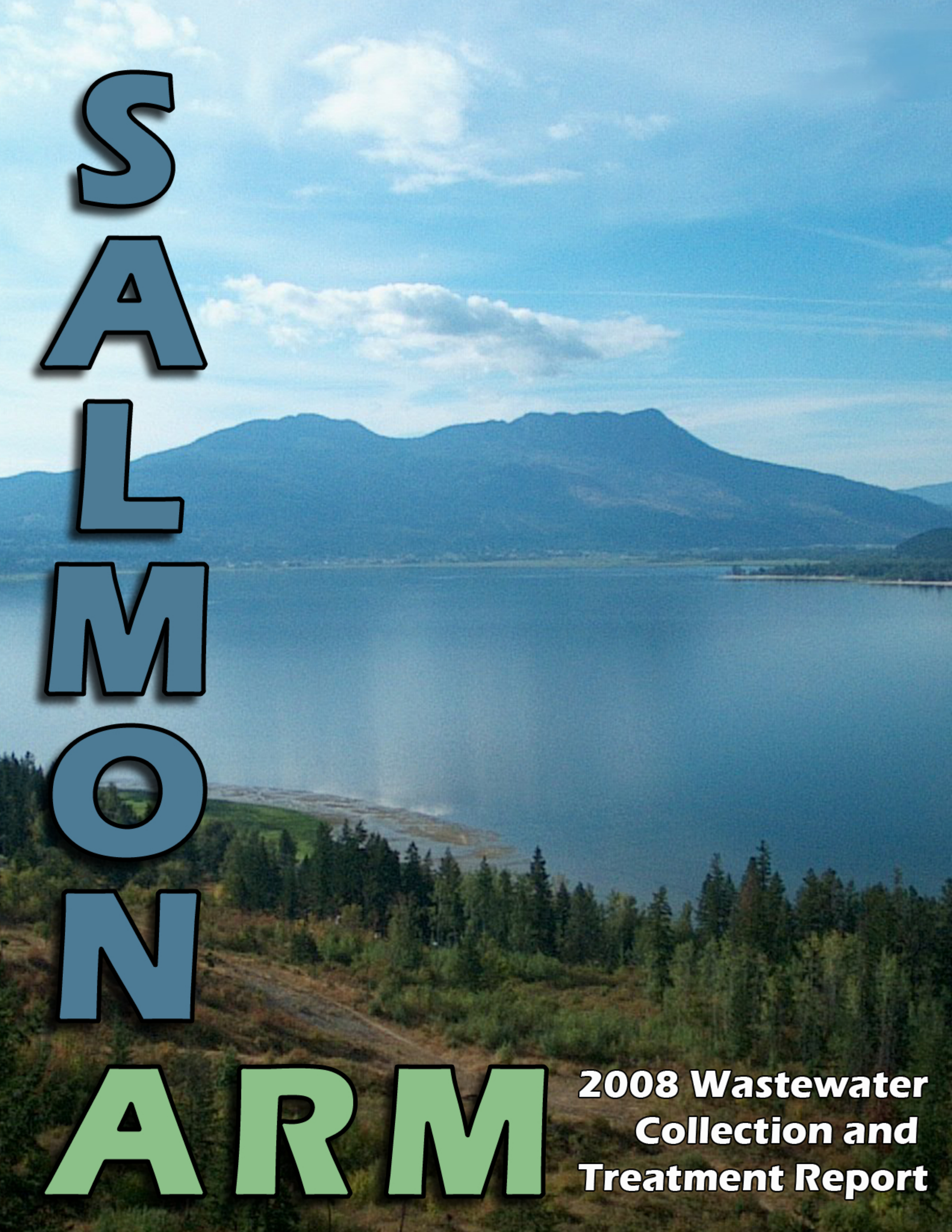

SALMON ARM

2008 Wastewater Collection and Treatment Report

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1.0 Community General

The City of Salmon Arm is located in the southern interior of British Columbia on the southwest shoreline of the extensive Shuswap Lake system. With over 17,000 residents, Salmon Arm is the largest urban centre in the Columbia Shuswap Regional District. It serves as the commercial, cultural and administrative hub for an additional 35,000 residents of the Shuswap Lake region. Located at the junction of the Trans Canada Highway (TCH) and Highway 97B, Salmon Arm is a one-half day drive to Vancouver or Calgary and a 70 minute drive to Kelowna or Kamloops.

With a land base of 175 km², Salmon Arm is a relatively large municipality by area with most of the population concentrated within a few kilometers of the Trans Canada Highway and the downtown core. The surrounding terrain varies from the low lying marsh flats of Salmon Arm Bay to the extinct volcanic peak of Mt. Ida and the ridge lines of Fly Hills to the west and Larch Hills to the east. These highlands form the Canoe Creek and Salmon River watersheds which empty into Shuswap Lake. Sustainable land use planning over the years has resulted in the formation of an attractive, bustling, compact community surrounded by thousands of hectares of arable farmland, green space and natural shorelines.

Salmon Arm's commercial and industrial base is continuing to diversify. The housing market continues to remain tight. Retail, construction, professional services and healthcare, along with a wide array of entrepreneurial activities, are major sources of employment. Small businesses flourish in Salmon Arm's business friendly environment. Key economic drivers are value-added wood processing, high tech and traditional manufacturing, tourism and agri-business. The continuing surge in construction activity points to a healthy market demand for new housing and floor space for commercial, industrial and institutional uses. By all indications, an average annual growth rate of 1.5% - 2% with an increase to be expected over the next three to four years.

1.1 Staffing

The City of Salmon Arm Engineering and Public Works Department is responsible for this municipal function. The Utilities Division is responsible for the operation and maintenance of the sanitary collection system and the Water Pollution Control Centre (WPCC) staff is responsible for the operation and maintenance of the Wastewater Treatment facility and the main lift Station located at Wharf Street. The WPCC is manned seven days of the week with 24-hour standby provisions for after hour alarm response.

Staff Overview:

Engineering and Public Works
Dale Mc Taggart, P. Eng., Director of Engineering and Public Works
Robert Niewenhuizen, A.Sc.T., City Engineer
John Rosenberg, A.Sc.T., Manager of Public Works

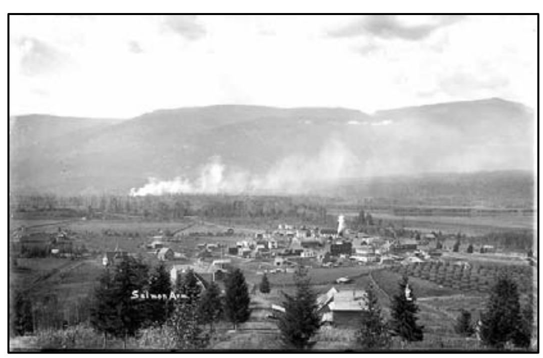
Utilities Division	
Gerry Rasmuson, B. Sc. ***Utilities Forman*** ◆ Level IV - Water Distribution ◆ Level IV - Wastewater Treatment ◆ Level I - Wastewater Collection	**Rodger Parks** ***Utilities Sub-Forman*** • Level I - Wastewater Collection
Mike Davie ◆ Level II - Wastewater Collection ◆ Level I - Wastewater Treatment	**Don Smith** ◆ Level II - Wastewater Collection
Rick Webb ◆ Level II - Wastewater Collection	**Larry Kipp** ◆ Level I - Wastewater Collection

Water Pollution Control Centre	
Hart Frese, WPCC Manager ***Chief Operator*** ◆ Level IV - Wastewater Treatment	**Doug Stalker**, Dip. Water Quality ***Operator III*** ◆ Level IV - Wastewater Treatment ◆ Level I - Wastewater Collection
Lee Robinson ***Senior Operator*** ◆ Level II - Wastewater Treatment	**John Kalinczuk** ***Operator II*** ◆ Level II - Wastewater Treatment

2.0 Wastewater Treatment & Collection System History

2.1 Wastewater Collection System - History

The District of Salmon Arm and the Village or Salmon Arm amalgamated in 1971 to form the District Municipality of Salmon Arm on January 1, 1971, and then became the City of Salmon Arm in 2005. The Village was the original urban core area and sewer lines were installed during the 1930's to collect septic tank effluent and some crude wastes which were then discharged into an open ditch leading into Shuswap Lake. The surrounding District Municipality relied on septic systems as sewer collection was not an issue until the urban development of the Village overflowed into the surrounding Municipality. By 1964, the Village had initiated plans for sewage treatment which included the construction of a lagoon along the waterfront for treatment. The lagoons would also service the Adams lake Indian Band lands. Concerned about the level of treatment that a lagoon offered, the Village decided to review their plans and objectives. By 1966, the review board recommended that the Village and District combine in their efforts to collect and treat wastewater. However, unable to agree upon implementation of various plans the Village applied to the Pollution Control Board for a permit to discharge highly treated effluent into Shuswap Lake. By the time this permit was granted in 1972, the Village and District had amalgamated.



Ultimately the Engineering firm of Dayton and Knight Ltd were hired to undertake a Wastewater survey in 1972 to study various different treatment and effluent disposal methods. The Survey resulted in the construction and official opening of the existing Water Pollution Control Centre on May 14, 1977. Furthermore, the survey identified collection system priorities and set in motion the construction of the infrastructure that currently exists. The City's sewage collection and treatment systems have evolved into a well maintained collection system and a state of the art Wastewater Treatment Centre.

2.2 Wastewater Treatment Plant History

The original plant was constructed on the current site, 121 Narcisse Street NW, in 1977 after the proposed site at Minion Field, 2191 30th Street SW. was rejected by the B.C. Agricultural Land Commission and Provincial Pollution Control Board. It was constructed at a cost of $0.9 M and consisted of primary sedimentation, activated sludge, secondary clarification with chlorine disinfection. Solids were aerobically digested and stored in two 1 acre lagoons. Capacity of the plant was 3,000 m^3 per day for a design service population of 6,250.

In 1982, phosphorus removal was added at a cost of $0.1 M and consisted of precipitating phosphorus out of the effluent by the addition of ferrous chloride. Phosphorus was determined to be the limiting nutrient which contributes to the eutrophication and degradation of water quality in Shuswap Lake, particularly, Salmon Arm Bay. Currently the Salmon Arm WPCC contributes less than 4% of the phosphorus loading in the bay.


Aerial Photo Stage IIIB prior to Landscaping

In 1986 the $1.8 M Stage II Upgrade was the first major upgrade to the facility. The liquid process was altered from a common activated sludge process to an experimental trickling filter biological nutrient removal (BNR) system (Fixed Growth Reactor – Suspended Growth Reaction or FGR-SGR. As well, the aerobic digester was upgraded to an Autothermal Thermophilic Aerobic Digester (ATAD). Plant Capacity was increased to 3,500 m^3 per day for a design service population of 8,750.

Improvements were made in 1991 to the solids process at a cost of $0.5 M. The improvements consisted of changing aeration and solids pumping equipment. Rebuilding the ATAD tanks and added waste biological sludge thickening.

The Stage III Upgrade was split into two upgrades with the first part, Stage IIIA completed in 1998 at a cost of $5.2 M. It consisted of improvements to the FGR- SGR process, new secondary clarifier, Supervisory Control and Data Acquisition system, increased ATAD capacity and biosolids dewatering. These improvements led to better control and monitoring, the ability to beneficially recycle biosolids and the decommissioning of the solids storage lagoons. Capacity was increased to 5,000 m^3 per day for a design service population of 12,900.

Stage IIIB was completed in 2005 without the Laboratory/Administration expansion. Of the $7.4 M upgrade, $2.3 M was funded by the Federal and Provincial Governments.

2.2 Wastewater Treatment Plant History (continued)

The upgrade consisted of a complete rebuild of the main lift station at Marine Drive with odor control, added redundancy to critical equipment, stand-by power, effluent filtration, replacement of the chlorination/de-chlorination system with Ultra Violet disinfection, an elaborate odor control system and architectural improvements to the original exterior of the original building. Capacity was increased to 6,700 m^3 per day average flow for a design service population of 15,000. Stage IIIB was completed in 2009 with the $400,000 expansion of the Laboratory/Administration area.

Cost Summary Table 1.1

Project	Cost	Year
Stage I - 6,250 connected population	$0.9 M	1977
Chemical Phosphorus Removal	$0.1 M	1982
Stage II - 8,250 connected population	$1.8 M	1986
Solids Improvements	$0.5 M	1991
Stage IIIA - 12,500 connected population	$5.3 M	1998
Stage IIIB – 15,000 connected population	$7.4 M	2004
Laboratory/Administration Expansion	$0.4 M	2008
Total	**$16.4 M**	
Estimated Insurable/Replacement Value (2005)	$35.0 M	

3.0 Wastewater Collection System

3.1 Overview of Collection System

The Utilities Division, through a schedule of systematic new improvements, upgrades and replacements, strives to maintain and improve the efficient delivery and the high quality of water and sanitary sewer services to the community. This Division plays an integral role in maintaining the health, safety and well being of the community. The Water and Sewer Utilities are self-liquidating funds which must provide for their own revenues through fees, taxes and other charges to support the expenditures required to operate and maintain infrastructure into the future.

3.2 Collection System

The City of Salmon Arm's sanitary sewer collection system consists of 14 sewerage sub areas and 128 km of gravity and force main sanitary sewer pipes covering approximately 1800 hectares. There are approximately 5,350 sewer connections within the system serving close to 9,500 residents. There are eight tributary lift stations that collect and pump sewerage to the Lakeshore Sewer Interceptor located on the foreshore where the main lift station, Wharf Street Pump Station, pumps the sewerage directly to the WPCC (see Map 3.2). The Interceptor provides storage and flow equalization capabilities.

3.3 Lift Stations

All 8 of the tributary Lift stations are inspected once a week by the City of Salmon Arm's Utilities Division. The main Wharf Street Lift Station is inspected and cleaned on a monthly basis. Operators adhere to the **procedural** guidelines and through **regular**, proactive maintenance. The stations are monitored using the Citys SCADA system which enables staff to troubleshoot and trend data on the Cities SCADA system.

Wastewater Facilities Table 2.1

No.	Wastewater Lift Stations & Facilities	Address
1	Water Pollution Control Centre	121 Narcisse Street NW
2	Mosquito Park Lift Station	4290 Canoe Beach Drive NE
3	Clare's Cove Lift Station	5391-75 Avenue NE
4	Tippy Canoe Lift Station	Pump in MH under road at 50^{th} Street & 75^{th} Avenue NE intersection
5	Captain's Cove Lift Station	2251-73 Avenue NE
6	Canoe Beach Lift Station	7720-36 Street NE
7	Wharf Street Pump Station	1000 Marine Park Drive NE
8	Rotten Row Lift Station	681-10 Avenue SW
9	10 Avenue SW Lift Station	2270-10 Avenue SW [TCH]

3.4 Wharf Street Pump Station

The Wharf Street Lift station is gravity fed by the Lakeshore Interceptor. Three 30 Hp pumps with Variable Speed Drives are used to feed the wastewater facility at rates determined by WPCC operators. The station was upgraded in 2002 with each pump rated at 80 liters/sec flow. The foul air is treated by utilizing UV Radiation which catalyses the breaking of ambient oxygen and water vapor molecules into O^+ and OH^-. These free radicals oxidize the odorous contaminants in the air. This reaction results in a sequential and instantaneous gas breakdown of the contaminants with minimal by-products, such as elemental sulfur, CO_2, water vapor, molecular oxygen and trace ozone. In the event of an extended power outage, there is the capability to connect the City's portable generator to the station to run the pumps.

3.5 Lift Station Repairs and Modifications

Installed to new 20 hp pumps complete with new valves and pipe work at Rotten Row Lift Station ($23,500), replaced volute ($7000) on pump at Mosquito Park, new 2 Hp pump for Tippy Canoe with new flygt bulbs. Rebuild 7.5 Hp pump for Canoe Beach L/S. Purchased Miltronics package to install at Canoe Beach L/S to enable monitoring operations via SCADA in 2009.

3.5 Rehabilitation programs

Sanitary mainline right of way clearing of brush and trees to prevent root infestation. Chemical addition and root cutting to a few service lines to inhibit root development.

3.6 Sanitary Flushing

Approximately 25 km of sanitary mains were flushed in 2008 as part of the maintenance program. Certain areas and services of concern as well as historically troublesome areas are flushed annually.

3.6 Main and Service Interruptions

Two mainline blockages caused by grease build up from adjacent restaurants a third was caused by debris left in a manhole by contractors paving along Trans Canada Highway. There were twenty three (23) service interruptions, these were attributed to grease from homeowners or roots from trees and shrubbery

3.7 Inflow and Infiltration Monitoring Program

The program identifies locations where storm water or ground water enters the sanitary system. Currently the City has an on going contract with Geotivity to provide flow monitoring services to help determine the sources of Inflow and Infiltration (I&I) within the sewer system. Upon completion of the study a rehabilitation program will be initiated in an effort to reduce the amount of rainwater and groundwater entering the sanitary sewer system when it is cost-effective to do so. Reduction of Inflow & Infiltration (I&I) in the system lowers the risk of sanitary sewer overflows and can decrease the costs of conveying and treating wastewater.

3.7 Wastewater Collection Capital Projects

Capital Projects completed in 2008
◆ Canoe Beach Lift Station
◆ Rotten Row Lift Station – replace discharge connections
◆ Tippy Canoe Lift Station Upgrade
◆ Industrial Park collection & treatment system design
Capital projects completed in 2009
◆ 3rd Avenue NE (800 Block) sewer main replacement
◆ Lakeshore sewer main replacement west of 10th Ave. NE
◆ Ongoing SCADA and GIS development

4.0 Wastewater Treatment - Water Pollution Control Centre (WPCC)

The City of Salmon Arm WPCC is located at 121 Narcisse Street N.W. which is located west of the City's Town Centre adjacent to the Shuswap Lake. This section of the report will detail the performance and operational strategies of the plant during the past year.

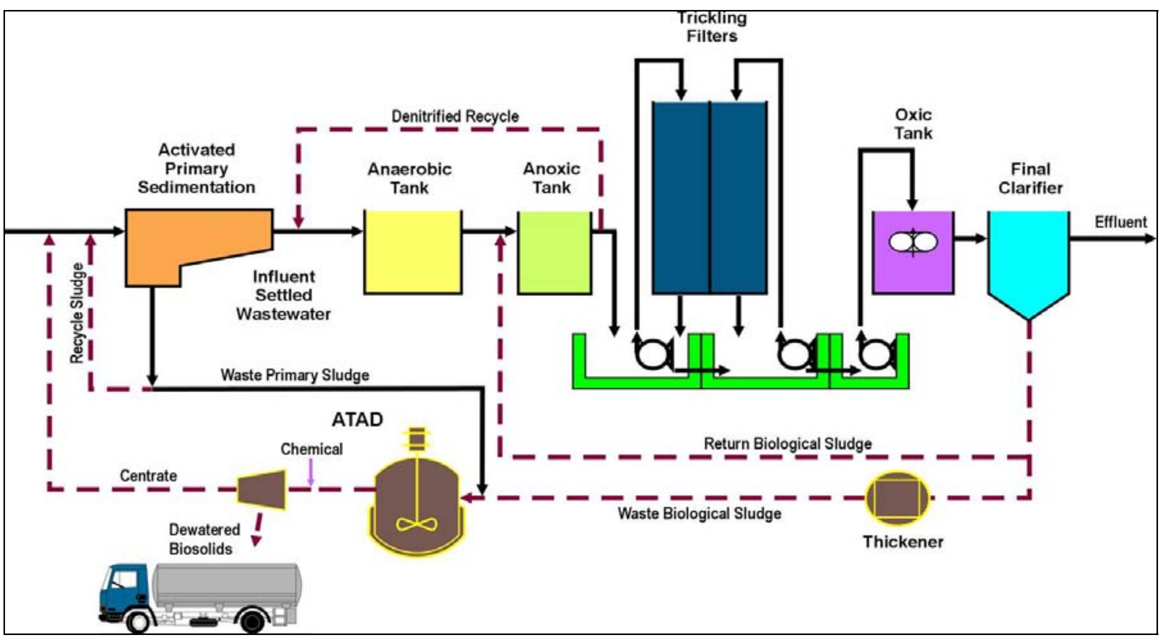
WPCC (after Renovations)

Location of Wharf Street Pump Station

This section of the report will detail the performance and operational strategies of the plant during the past year.

4.1 Process Overview

The process of wastewater treatment can be separated into two flow streams – liquid and solids also referred to as the liquid train and solids train.



4.1 Process Overview

Initially the wastewater flows into the plant from a sewage lift station located at Marine Park Drive. The influent then passes through several mechanical devices to remove large particles including rocks, rags, plastics and grit. This is done in the headworks of the facility and prevents damage to downstream equipment.

Headworks

Primary Sedimentation Tanks

The flow then enters the Primary Sedimentation Tanks where heavier organic and inorganic solids are settled out of the liquid stream. These particles are then pumped to the ATAD for stabilization. The liquid, on the other hand, then enters the tertiary BNR and SGR-FGR part of the facility for further treatment.

SGR's

FGR

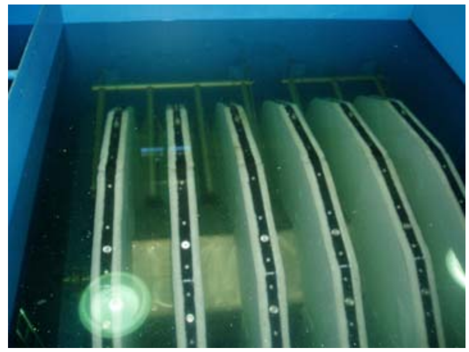
The tertiary treatment involves the use of bacteria to convert degradable organic matter into bacterial cells. These cells are then separated from the liquid in the secondary clarifiers.

The growth portion of the bacteria is removed from the process by thickening and pumped to the ATAD while the remainder is recycled back to the incoming wastewater. This maintains a balance of food (wastewater organics) to micro organisms.

4.1 Process Overview (continued)

The secondary effluent then passes through the Aqua Aerobics disk filtration system which provides 10 micron filtration, the effluent is then disinfected using a Wedico Ideal Horizons Ultra Violet Light (UV) disinfection system prior to it being discharged into the Salmon Arm Bay in the Shuwap Lake.

Secondary Clarifiers



Cloth Disk Filters

UV Treatment System

UV Bulbs

Solids are digested to form biosolids in the high temperature ATAD. This process uses high temperature bacteria (60 to 70 degrees Celsius) to stabilize and pasteurize the biosolids. Following processing, the biosolids are thickened with the use of high speed centrifuges and the biosolids are then incorporated with soil to produce a high quality top soil.

Centrifuge

Train B Odour Scrubber

4.1 Process Overview (continued)

Odor control is another major component of the plant operation. The odor control has been separated into two trains based on the concentration of odor generating compounds. One train deals with a large air volume of low odor concentration while the second train deals with a low air volume with a high concentration of odor compounds. The latter system uses a multi treatment system – biofilter, ozone contact, four (4) stage chemical scrubber and dilution while the other system uses a single stage chemical scrubber.

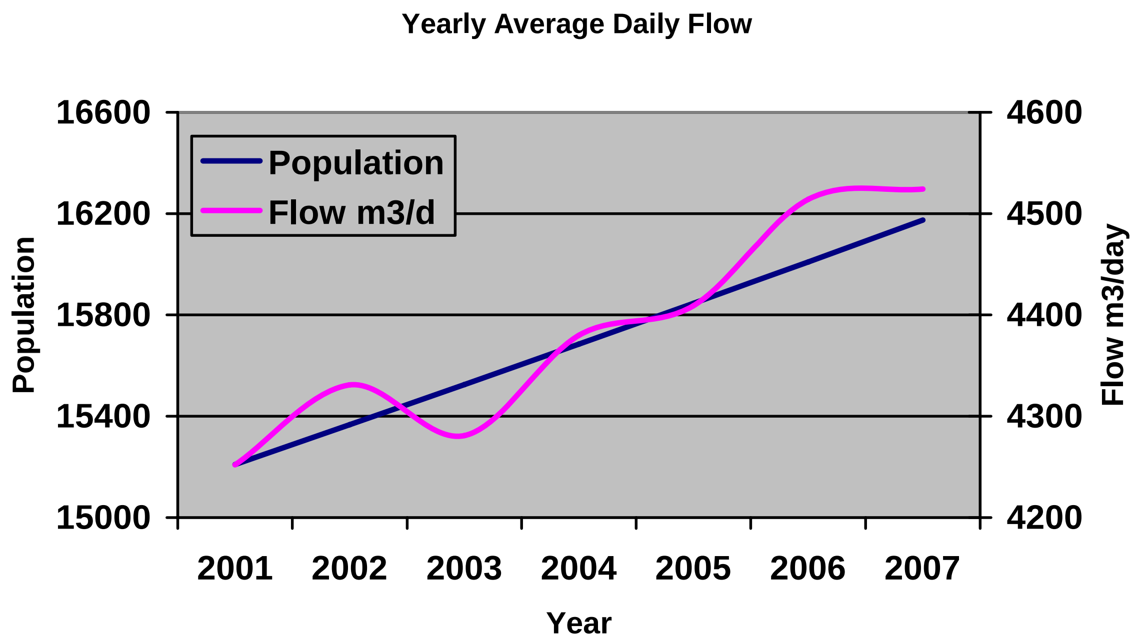
Single Stage Chemical Scrubber

ATAD & Piping

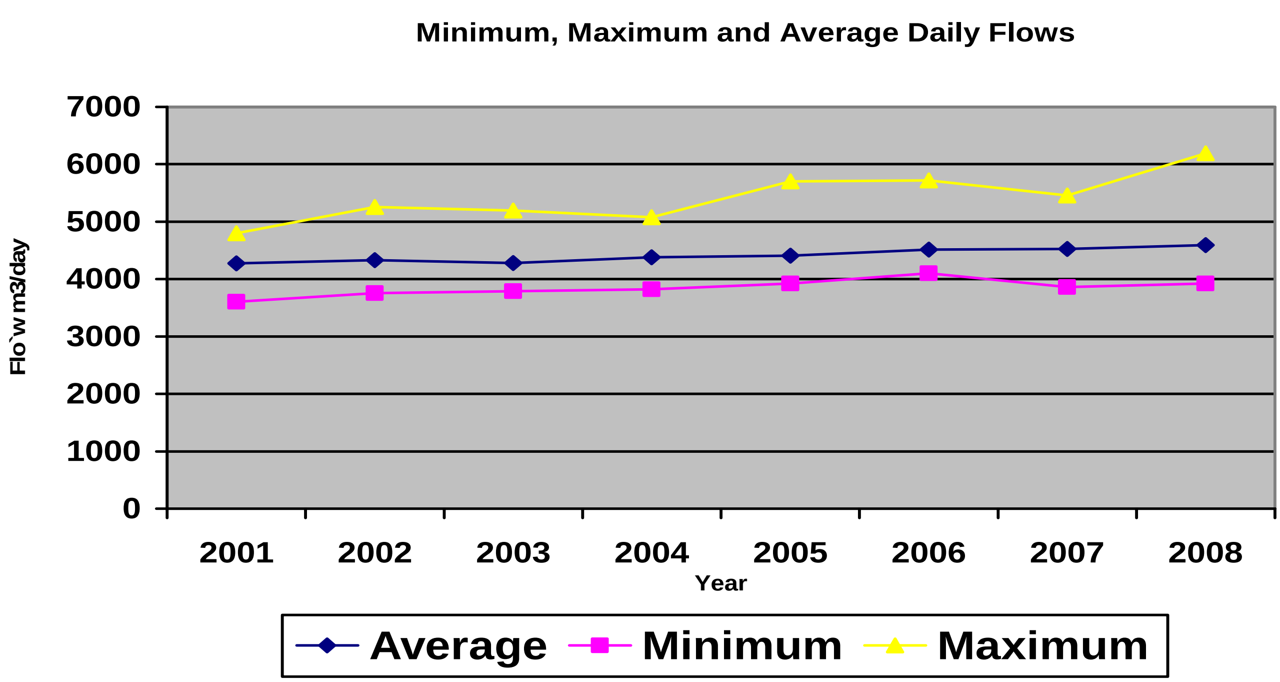
Generator Set, Train B
– Odor Control and Filtration Building

4.2 Flows

Plant flows averaged 4, 595 m^3 per day for the year. The highest flow was recorded on May 6 when 31.2 mm of rainfall increased the 24-hour total influent flow to 6,194 m^3. This compares to the 2007 average flow of 4524 m^3 with a peak of 5,456 m^3 on March 5, 2007 when 4.3 mm of rain fell and combined with normal snowmelt. Currently, the City Engineering Department is in the 4th year of the sanitary sewer inflow – infiltration study. There were no bypasses of the treatment process during the year. The outfall was visually inspected on January 30, 2008 and on January 22, 2009 with no evidence of any failures.

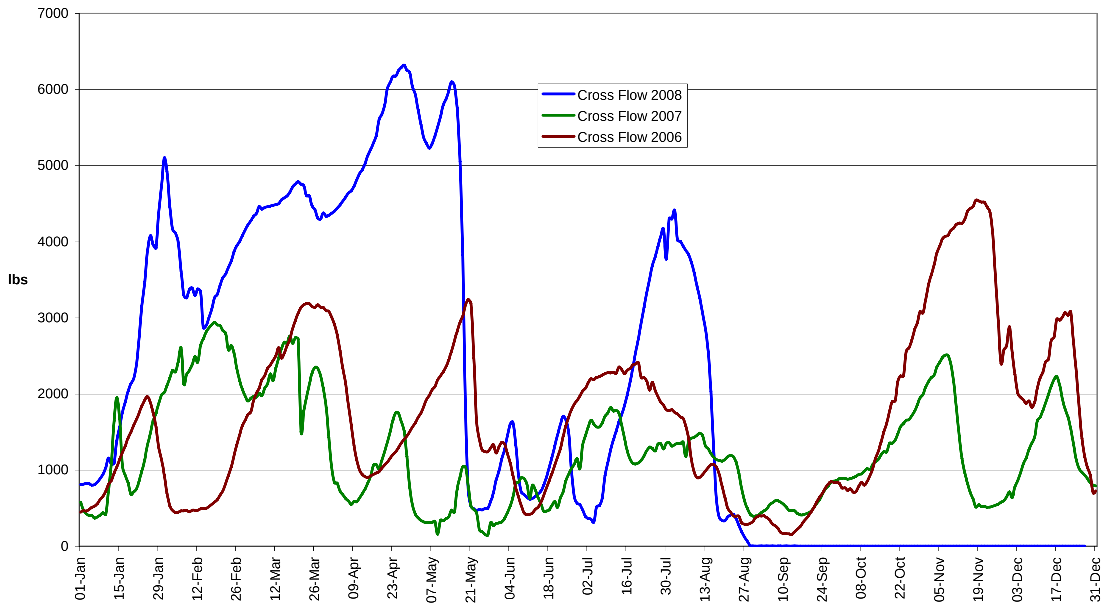


* Population based on the 2001 and 2006 census, a linear growth rate was assumed to complete the chart.



4.3 Process Alterations

Biomass stability in the FGR and SGR's is the key parameter to constant quality effluent. and this continues to be the challenge for plant operations.



FGR Pilot Weight

In January of 2008, the MLSS dropped again to unacceptable levels while the FGR Pilot indicated high accumulation of biomass. This is similar to the situation in January 2007. In May the MLSS was adequate, however the Pilot FGR indicated a massive accumulation of biomass. This situation was unique in that the Bio-P system was not performing well despite the sufficient MLSS. The FGR started to slough on May 14 and the inactive FGR quadrant was put online on May 15 to buffer the slough and increase process contact time.

Oxic MLSS *mg/l*	2001	2002	2003	2004	2005	2006	2007	2008
Average	3100	3500	3200	4700	5100	4400	4100	4500
Maximum	5300	6600	4900	7100	7500	7000	7500	8500
Minimum	400	1400	1100	2200	2100	2200	100	1200

Oxic SGR MLSS Concentration   Note: 2007 Oxic MLSS of 100 occurred in January

4.4 Nutrient Removal

Plant nutrient removal did deteriorate in 2008 mainly due to the fluctuating MLSS and biomass accumulations in the FGR. Staff is investigating replacing the media with the recommended straight media (see 2007 annual report) in 2009.

	2001	2002	2003	2004	2005	2006	2007	2008	Permit
Flow m^3	**4252**	**4331**	**4281**	**4380**	**4409**	**4514**	**4524**	**4595**	**8200**
Total Phosphorus *mg/l*	**0.94**	**1.22**	**0.82**	**0.46**	**0.41**	**0.38**	**0.45**	**0.64**	**1.0**
P per Day	**4.0**	**5.28**	**3.51**	**2.01**	**1.81**	**1.72**	**2.04**	**2.94**	**8.2**
Kg P per Year	**1460**	**1927**	**1281**	**736**	**660**	**626**	**745**	**1073**	**2993**

Parameter (*mg/l*)	2001	2002	2003	2004	2005	2006	2007	2008	Permit Limit
Suspended Solids	**20.9**	**19.4**	**13.4**	**7.4**	**6.4**	**5.1**	**8.7**	**7.9**	**40**
BOD_5	**18.1**	**17.1**	**13.5**	**9.4**	**9.0**	**7.7**	**7.3**	**7.7**	**30**
Total Phosphorus	**0.94**	**1.22**	**0.82**	**0.46**	**0.41**	**0.38**	**0.45**	**0.64**	**1.0**
Ortho Phosphorus	**0.19**	**0.36**	**0.26**	**0.09**	**0.09**	**0.09**	**0.11**	**0.21**	**N/A**
Ammonia	**10.2**	**12.3**	**9.7**	**7.5**	**8.2**	**7.8**	**13.2**	**20.8**	**N/A**
Nitrate & Nitrite	**3.5**	**3.7**	**6.2**	**8.0**	**4.4**	**8.8**	**6.5**	**4.4**	**N/A**
NH_4 NO_3 NO_2	**13.7**	**16.0**	**15.9**	**15.5**	**12.6**	**16.6**	**19.6**	**25.1**	**N/A**

Note: Final Effluent Filtration commenced in 2004

Effluent Quality Table

Test Data	S.S.	BOD	Ortho P	Total P	NH4	NOx	Oxic MLSS
	mg/l	mg/l	Mg/l	mg/l	mg/l	mg/l	mg/l
January 3, 2008	5.7	4.6	0.04	0.24	12.0	7.9	5390
January 10, 2008	2.7	5.1	0.05	0.21	14.2	5.1	4375
January 16, 2008	4.5	8.2	0.07	0.28	28.8	2.3	1699
January 23, 2008	6.1	12.6	1.86	2.30	27.7	1.6	1450
January 31, 2008	7.2	10.3	0.29	0.64	29.7	0.2	3714
February 7, 2008	3.1	8.2	0.09	N/A	22.8	0.3	5341
February 14, 2008	5.4	7.8	0.08	0.39	19.1	1.4	5960
February 21, 2008	3.9	9.6	0.27	0.53	27.2	0.6	4958
February 28, 2008	2.9	7.4	0.20	0.51	24.9	0.0	4339
March 6, 2008	4.6	11.7	0.15	0.51	26.0	0.7	4182
March 13, 2008	6.3	10.8	0.10	0.43	21.8	0.0	4594
March 20, 2008	6.7	9.6	0.19	0.63	16.7	0.0	5581
March 27, 2008	9.5	12.1	0.25	0.77	20.8	2.3	5620
April 3, 2008	10.3	9.9	0.10	0.49	21.8	2.9	4814
April 10, 2008	11.1	7.6	0.09	0.43	24.9	1.6	4712
April 17, 2008	6.6	10.2	0.30	0.60	31.1	1.0	4867
April 24, 2008	5.0	6.9	0.20	0.62	32.5	0.7	5050
May 1, 2008	6.6	6.6	0.10	0.48	27.2	0.0	6660
May 8, 2008	10	4.8	0.06	0.30	18.4	2.2	4447
May 15, 2008	12.5	5.4	0.61	1.50	31.1	0.1	5641
May 22, 2008	12.8	8.7	0.42	0.86	19.1	9.6	7312
May 29, 2008	8.2	N/A	0.05	0.31	14.6	7.4	4630
June 5, 2008	N/A	N/A	N/A	0.36	N/A	N/A	5447
June 12, 2008	10.6	3.5	0.01	0.29	6.6	18.1	5828
June 19, 2008	2.5	N/A	0.01	0.28	16.0	7.5	3887
June 26, 2008	6.4	14.0	0.03	0.46	10.7	7.5	4984
July 3, 2008	5.4	7.5	0.02	0.38	9.0	10.0	5635
July 10, 2008	5.8	7.7	0.04	0.34	19.9	6.2	4702
July 17, 2008	4.3	12.4	0.04	0.29	31.1	2.4	4246
July 24, 2008	N/A	3.9	0.03	0.29	17.4	4.4	1895
July 31, 2008	5.7	5.7	1.06	1.85	31.1	0.9	2069
August 7, 2008	5.4	7.1	0.24	0.76	19.9	0.0	3549
August 14, 2008	11.9	8.2	0.92	1.64	23.0	0.0	5268
August 21, 2008	8.5	8.1	0.18	0.56	28.4	0.4	5144
September 1, 2008	11.2	7.6	0.66	1.31	6.9	5.8	5439
September 4, 2008	12.3	9.2	0.43	1.19	7.8	7.1	5497
September 11, 2008	7.4	5.9	0.03	0.39	11.7	7.1	4689
September 18, 2008	8.7	3.8	0.03	0.38	7.2	7.7	3885
September 25, 2008	6.6	6.4	0.01	0.30	15.9	9.2	4106
October 2, 2008	8.5	6.0	0.02	0.26	12.2	9.1	4153
October 9, 2008	6.8	6.1	0.01	0.39	10.7	11.0	4430
October 16, 2008	8.4	5.1	0.01	0.38	11.2	9.5	3910
October 23, 2008	7.1	3.5	0.01	0.36	12.8	10.9	4622
October 30, 2008	6.6	4.5	0.04	0.45	14.6	8.8	3696
November 7, 2008	5.4	6	0.02	0.37	22.8	5.2	4138
November 13, 2008	6.7	8.8	0.04	0.37	26.0	2.7	4377
November 20, 2008	7.4	3.5	0.03	0.43	26.0	4.6	4135
November 29, 2008	15.2	5.1	0.19	1.06	29.7	2.8	4188
December 6, 2008	15.6	10.3	0.65	1.68	27.2	2.7	4277
December 11, 2008	20.8	13.8	0.31	1.62	29.7	4.2	4886
December 18, 2008	19.6	10.9	0.13	0.99	34.0	4.7	4876
December 31, 2008	3.1	2.7	0.05	0.43	27.2	3.7	4625
Average	**7.9**	**7.7**	**0.21**	**0.64**	**20.8**	**4.4**	**4575**
Maximum	**20.8**	**14**	**1.86**	**2.3**	**34.0**	**18.1**	**7312**
Minimum	**2.5**	**2.7**	**0.01**	**0.21**	**6.6**	**0.0**	**1450**

4.5 Fecal Coliform

Staff initiated a review of the Ultra Violet disinfection system. A technician from the manufacture was brought in to ensure the system was functioning as designed and concluded the system was performing as per manufacturer specifications. Subsequently a detailed collimated beam test on the final effluent was conducted to analyze the ability of UV light to disinfect the final effluent. One bank of UV bulbs was replaced in February while the second bank was replaced in December of 2008 as part of the normal maintenance.

4.6 Toxicity

The annual toxicity test was completed on January 09, 2008 by Cantest Ltd. and once again there were no mortalities.

4.7 Biosolids

The City of Salmon Arm are utilizing the Class A biosolids to produce biosolids growing medium (topsoil) in accordance with Organic Matter Recycling Regulation (OMRR). CARO Environmental Services conducted tests on the biosolids for nutrients and metals on February 12 2009. Fecal coliform tests on the Auto Thermophilic Aerobic Digester (ATAD) biosolids were also conducted on this date and once again the fecal coliform levels were well below OMRR limits.

4.8 Operating Certificate

The Municipal Liquid Waste Management Plan was completed in 2004 and received Ministerial Approval in early 2005 and a new Operation Certificate for effluent discharge is in the progress of being updated.

4.9 Wastewater Collection System upgrading

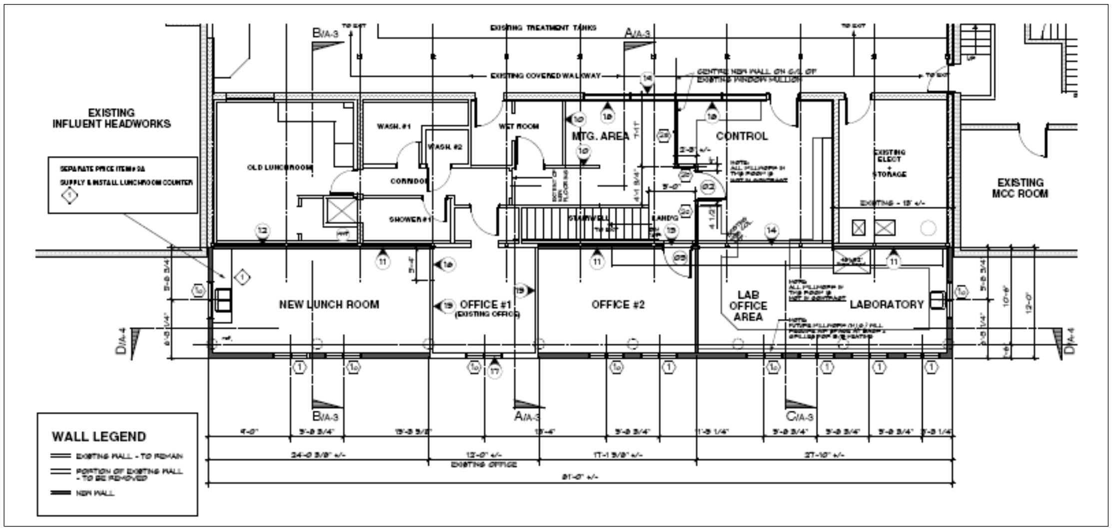
4.9.1 WPCC Capital Projects - 2008

Projects completed in 2008 include:

- Stage IIIB was completed in 2008 with landscaping, architectural building aesthetics and laboratory and administration expansion Laboratory with new Fume Hood, Ovens and Spectrophotometer

- Administration Expansion with Plant Siding Painted to match Stage IIB Upgrade.

4.9.1 WPCC Capital Projects – 2008 (continued)



Administration Addition

Control Room

Laboratory

- The study to analyze the odor constituents produced by the ATAD at various temperatures and retention times was the Masters Thesis of UBC Engineering student, Bonita Parsons and was completed in early 2008.

- The research project, in conjunction with process engineers Dayton & Knight Ltd, UBC Department of Environmental Engineers and Ostara Nutrient Recovery Technologies Inc., to determine the economic viability of phosphorus recovery/recycling was completed in 2008. Although the project was successful, the economic viability was deemed to be risky.

- Collimated Beam test to assess the disinfection properties of the plant's final effluent completed by UBC Department of Chemical and Biological Engineering. This analysis will be used in future upgrades to the UV disinfection system.

4.9.2 WPCC Staff Initiated Projects Completed in 2008

- Completion of hand railing installation Biofilter Tower. This allows operators to safely clean and maintain the misting system in the Biofilter for improved odour treatment

- In conjunction with the Laboratory upgrade, new laboratory equipment was installed.

Image of protozoa Carchesium using the new microscope

- Replacement of Hypochlorite Metering Pumps with positive displacement pumps to insure proper dosing of hypochlorite and therefore treatment in the odour scrubbers.

- Implementation of the Computer Maintenance Software Program to ensure and track maintenance to the over 500 pieces of equipment at the facility.

4.9.3 WPCC Capital Projects Scheduled for 2009

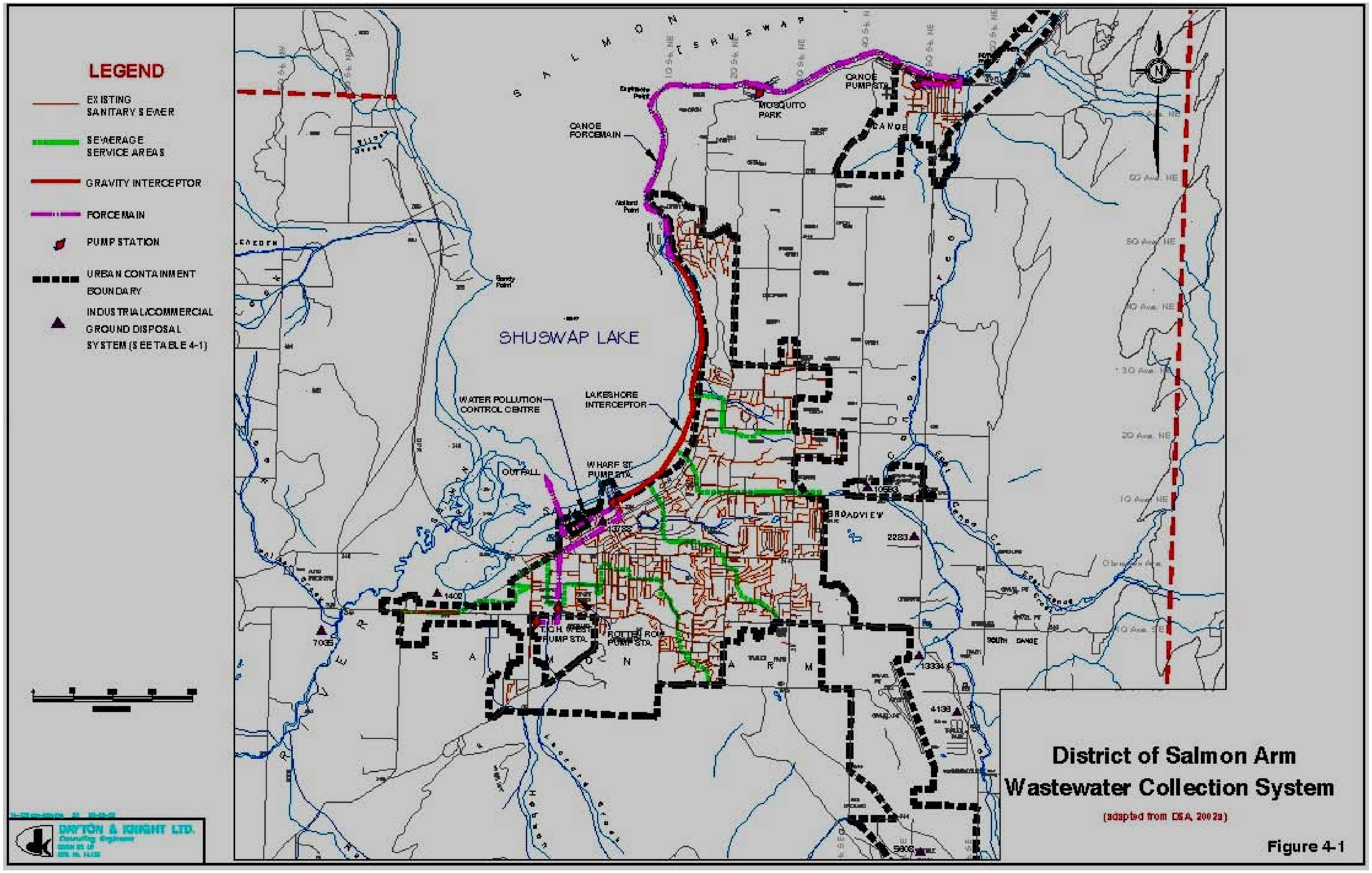
- A water reclamation facility for effluent water recycling to be used for some in-house services at the plant as well as irrigation of lands in the treatment plant compound was to be completed in 2008; however the only tender received was over budget. City staff will be completing this project in 2009.

- Replacement of inefficient lighting utilizing BC Hydro's Power Smart Product Incentive Program was to be completed in 2008 but this project has been rescheduled for 2009.

- Upgrade the computer hardware and software for the Supervisory Control and Data Acquisition system.

- Replacement of FGR crossflow media with straight flow media.

APPENDIX



District of Salmon Arm Wastewater Collection System

(adapted from DSA, 2002a)

Figure 4-1