

2005 Annual Compliance Report

**Operation & Maintenance of the
Paisley Wastewater System
Municipality of Arran-Elderslie**

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1.0 INTRODUCTION

The Paisley Sewage Works System in the Municipality of Arran-Elderslie comprises of three (3) sewage pumping stations and a wastewater treatment plant. The wastewater generated within the collection area of Paisley is collected into the sewer system and pumped to the Wastewater Treatment Plant by way of a 150mm diameter forcemain. The Wastewater Treatment Plant consists of a flow equalization basin, grit chamber, oxidation ditch, clarifiers, phosphorus removal system, two-stage aerobic digester system, an aerated sludge storage tank and a chlorine contact chamber. A 250mm diameter outfall sewer discharges treated effluent to the Saugeen River.

This annual report has been prepared for compliance with the Certificate of Approval # 7098-659N8A dated February 1, 2005 issued by the Ministry of Environment. Refer to **Appendix A** for the current Certificates of Approval. Various sections in this report address the requirements laid out in the Certificate of Approval for an Annual Report that specifies that the Annual Report for the Paisley Sewage works should provide information for the following items:

1. Summary and interpretation of all monitoring data and a comparison to the effluent limits and objectives.
2. Summary of maintenance carried out.
3. Summary of the calibration and maintenance carried out on all effluent monitoring equipment.
4. Description of operating problems encountered and corrective actions taken.
5. Summary of the sludge generated.
6. Summary of any complaints received and any steps taken to address the complaints.
7. Summary of all by-pass, spill or abnormal discharge events.

2.0 DESCRIPTION OF FACILITIES

2.1 SEWAGE PUMPING STATIONS

Ross Street Pumping Station

This main sewage pumping station is located at the southeast corner of Orchard Street and Ross Street equipped with two (2) submersible pumps (one duty and one standby) each rated at 48L/s at a TDH of 12m and a valve chamber that houses all associated valves and by-pass facility. A 150mm diameter forcemain carries the sewage from this pumping station to the Paisley Wastewater Treatment Plant. This pumping station is also equipped with a 35kw diesel fuel generator set complete with a 908 L fuel tank to provide emerging power for the sewage pumps.

Albert Street Pumping Station

This is a subsidiary sewage pumping station located at the southeast corner of Water Street and Albert Street equipped with two (2) submersible sewage pumps each rated at 26L/s at a TDH of 7.5m and a valve chamber that houses all associated valves and by-pass facility. A 150mm forcemain discharges sewage to the Queen Street north sanitary sewer at Water Street. This pumping station is also equipped with one (1) 136m³ capacity flow equalization basin complete with a jet aeration facility for mixing/aeration. There are two (2) submersible sewage transfer pumps, one rated at 26L/s at 7.5m TDH and the other rated at 17L/s at a TDH of 8m.

A 40kw diesel generator set and a 908L fuel tank housed in the generator building is constructed on top of the equalization basin.

Mill Street Pumping Station

This sewage pumping station located South West of the intersection of Mill and Duke Streets consist of a 3m diameter and 9m deep precast concrete manhole with two (2) submersible pumps each rated at 15.5 L/s at 26m TDH. A 100mm diameter forcemain discharges sewage to the manhole (MH4) on Victoria Street for conveyance to the Paisley Wastewater Treatment Plant.

2.2 Wastewater Treatment Plant

The wastewater treatment plant has one (1) 345m³ capacity flow equalization basin with a jet aeration facility for mixing/aeration. A flow restrictor restricts the maximum sewage flow into the grit chamber to approximately 30.3L/s. Two (2) submersible sewage transfer pumps each rated at 15L/s at a TDH of 4.9m transfers the raw sewage into an oxidation ditch that measures 85.3m centerline length and 1.5m water depth with an approximate volume of 412m³. The oxidation ditch is equipped with one (1) rotor aerator. Two (2) sludge transfer pumps each rated at 8.6L/s at 2.0m TDH transfers sludge to the digesters or for return to oxidation ditch.

The Wastewater Treatment Plant includes two (2) clarifiers of 7.3m diameter and 3.05m deep and a two-stage aerobic digestion system equipped with air diffusers and mechanical decanting facilities. The 1 & 2 stage digesters having a capacity of 100m³ and 50m³ respectively are equipped with two (2) sludge pumps each rated at 15.14L/s at 7.0m TDH and one (1) submersible sewage supernatant pump rated at 15.14L/s at 7.0m TDH. One (1) blower having an air flow rate of 91L/s at 41.4kPa and one (1) blower having an air flow rate 91 L/s at 60 kPa, supplies air to both the digesters.

The Paisley Wastewater Plant further includes one (1) sludge storage tank with a storage capacity of 492m³ and is equipped with two (2) mechanical submersible mixers and a mechanical decanting facility. Two (2) blowers each have an airflow rate of 91L/s at 60kPa supplies air to the sludge storage tank.

The Wastewater Plant also includes a phosphorus removal system and a seasonal chlorine disinfection system. A 18kg/d capacity chlorinator with a weigh scale, injector and other appurtenances, injects chlorine into the chlorine contact chamber for disinfection of the treatment effluent before it is discharged to the Saugeen River by a 200mm diameter outfall sewer.

3.0 SUMMARY OF WASTEWATER FLOWS

A summary of wastewater flows received at the sewage treatment plant is provided in **Table 1**. The rated design capacity of the treatment plant is 705 m³/day. In 2005, the average daily flow did not exceed the rated capacity. The maximum day flow was 1,367 m³/day which occurred in January 2005. In 2005, the Paisley Waste Treatment Plant operated at 54 % of the design capacity (average day flow). The flow meter was calibrated on July 19, 2005, by R&R Instrumentation Services Inc.. Refer to **Appendix B** for the calibration report.

TABLE 1

**Summary of Wastewater Flow: 2005
 Paisley Sewage Works
 Municipality of Arran-Elderslie**

Month	Total Flow (m³)	Average Daily Flow (m³/day)	Maximum Daily Flow (m³/day)
January	16,785	541	1,367
February	11,472	410	601
March	13,144	424	808
April	14,785	493	979
May	11,641	376	563
June	9,979	333	406
July	9,708	313	418
August	8,894	287	381
September	8,558	285	512
October	8,630	278	378
November	11,425	381	917
December	13,025	420	788
Total	138,046		
Average		378	
Maximum			1,367

4.0 SUMMARY OF EFFLUENT MONITORING AND RAW SEWAGE MONITORING

The Amended Certificate of Approval (CofA) issued on February 1, 2005 specifies that the raw sewage be tested for CBOD5, Total Suspended Solids, Total Kjeldahl Nitrogen (TKN) and Total Phosphorus once every month. **Table 2** shows the summary of raw sewage monitoring data.

The Certificate of Approval further specifies that an 8 hr composite samples of treated effluent shall be collected bi-weekly and tested for CBOD5, Total Suspended Solids, Total Phosphorus and Total Ammonia Nitrogen. The Certificate of Approval also requires that a grab sample of treated effluent shall be collected weekly and tested for E. Coli, pH, Temperature and a daily grab sample be collected and tested for Total Chlorine Residual during chlorination season. **Table 3** shows the Summary of Effluent Monitoring data. No exceedances occurred in 2005.

Composite samples were collected and tested for CBOD5, Total Suspended Solids, Total Phosphorus and Total Ammonia Nitrogen, bi-weekly. Refer to Appendix F for the monthly Utility Monitoring Reports that were electronically submitted to the MOE.

With respect to E. Coli, the Certificate of Approval (CofA) requires that the Geometric Mean Density of E. Coli does not exceed 200 organisms per 100ml of effluent discharged for the weekly samples between May 1st and October 31st. No monthly samples exceeded this limit during the target months.

Considering the cost required to perform the sampling, as per the frequency set out in the Certificate of Approval, on March 1, 2005 Oweson Water Services (*a Division of Oweson Ltd.*) requested the Ministry of the Environment Area office that the effluent monitoring frequency of composite samples for CBOD5, Total Suspended Solids, Total Phosphorus and Total Ammonium Nitrogen shall be changed from weekly to bi-weekly or twice a month and grab samples for pH and Temperature be changed from bi-weekly to weekly. A copy of the letter is enclosed in the **Appendix C**.

5.0 SUMMARY OF MAINTENANCE

Major and routine maintenance carried out in Paisley Sewage Works is as follows:

- ! weekly greasing of clarifier gear reducers
- ! weekly greasing on rotor
- ! weekly general inspection and oil level checks on blowers
- ! alum pump weekly inspection and flow rate check
- ! monthly flushing of alum lines
- ! monthly check on diesel generator sets
- ! daily inspection of pumping stations
- ! daily cleaning of bar and screens at the WWTP
- ! new idler tracks on both Final Clarifiers
- ! new submersible sewage transfer pump at the WWTP
- ! flushing of the sewage collection system

6.0 SEWAGE BY-PASS

In the year 2005, no sewage by-pass from the pumping stations occurred.

7.0 LAND APPLICATION OF DIGESTED SLUDGE

The MOE issued a provisional Certificate of Approval (CofA) #S-2724-34 dated October 1, 2002 that permits the application of digested sludge from the Paisley Wastewater Treatment Plant on lands located at Lots 33, 34 and 35, Concession A in the Township of Arran-Elderslie (formerly Elderslie Township) County of Bruce. A copy of the CofA is enclosed in **Appendix D**. Attached **Figure 1** in **Appendix E** shows the location of the digested sludge spreading site. In 2005, 26 loads at 17.3 m³ of digested sludge, equalling 449.8 m³, was hauled to the sludge spreading site, Gord Cottril's site #S-2724-34, in July. Eight (8) loads were incorporated on site M2 and eighteen (18) loads on site M6. The sludge was incorporated into the soil after surface broadcast.

On July 12 & 13, 2005, a hauled sludge sample was collected and submitted to Caduceon Environmental Laboratories. Results of the heavy metal sludge analysis in terms of mg/kg are provided in **Table 4**. Concentrations for all parameters were less than the maximum allowable metal content for aerobic solids as per column four (4) of **Table 1** from the guidelines for utilization for bio-solids and other wastes on agricultural lands (copy attached in **Appendix D**).

TABLE 4
Paisley Wastewater Treatment Plant
Comparison of Sludge Analysis Results with MOE Aerobic Biosolids Land Application Criteria
Samples Taken July 12 & 13, 2005
Municipality of Arran-Elderslie

Parameter	Average Concentration (Samples 1, 2, and 3) Results (mg/kg)	Criteria (mg/kg)	Met? (Y/N)
Arsenic	0.20	170	y
Cadmium	0.05	34	y
Chromium	4.95	2,800	y
Cobalt	0.11	340	y
Copper	19.20	1,700	y
Lead	1.40	1,100	y
Mercury	0.069	11	y
Molybdenum	0.69	94	y
Nickel	0.56	420	y
Selenium	0.10	34	y
Zinc	21.60	4,200	y

8.0 MINISTRY OF THE ENVIRONMENT INSPECTION

The Ministry of the Environment staff inspected the Paisley Sewage Treatment Plant on September 20, 2004. Refer to **Appendix E** for Ministry of Environment Inspection Report. Though the report did not identify any specific issue related to compliance but expressed concerns regarding chlorine and ammonia concentration in the final effluent prior to our involvement in operating this facility.

Upon Oweson Water Services becoming the Operating Authority, we made several process changes that improved (reduced) the ammonia concentration in the final effluent. These included:

- the wasting procedure
- the operational depth of the oxidation ditch
- the alum addition at the sewage plant was changed from batch to continuous dosing
- the return rate procedure was altered ie. amount and pump cycles

9.0 COMRIF APPLICATION FOR SEWAGE SYSTEM IMPROVEMENTS

In January 2005, on behalf of the Municipality, Henderson Paddon & Associates submitted a grant application to the Canada Ontario Municipal Rural Infrastructure Fund (COMRIF) for sanitary sewer system extension into these parts of the Paisley Urban area which are currently serviced by water but not sewage, in accordance with "full servicing" Official Plan Policy and Provincial Policy.

10.0 CONCLUSIONS

1. Based on the information presented in this annual report, it is concluded that the Paisley Wastewater Treatment Plant and the sewage pumping stations were generally operated and maintained in accordance with the Certificate of Approval in 2005.
2. On July 19, 2005, the raw sewage flow meter was calibrated and the percentage error was found to be acceptable.
3. The Paisley Sewage Works was operated at 54% of the design capacity (average day).
4. Routine maintenance was carried out at the sewage works.
5. 449.8 m³ of sludge was removed and incorporated into approved agricultural land.
6. Several process changes in the operation of the plant have reduced the ammonia concentration in the final effluent.

11.0 RECOMMENDATIONS

1. Continue to operate in accordance with the Certificate of Approval and Regulations.
2. Sampling of raw sewage, and treated effluent should be done for all the parameters at the required frequency as stipulated in the Amended Certificate of Approval issued on February 1, 2005.
3. A standard recording form for responding to complaints should be used for recording any complaints relating to the Paisley Sewage Works System.
4. The flow meter calibration should be done before July 19, 2006.
5. Sludge must be hauled from the plant on an as-needed basis in 2006.
6. Chlorine should be flow paced.

Respectfully submitted:

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Appendix A

Certificate of Approval (Sewage)

Appendix B

Flow Meter Calibration Report

Appendix C

Letter to the Ministry of Environment

Appendix E

Ministry of Environment Inspection Report

Appendix F

Utility Monitoring Reports

Appendix G

Ministry of Environment Inspection Report

Appendix D

Certificate of Approval (Utilization of Digested Sewage Sludge)

Appendix H

Effluent Sewage Monitoring Summaries