THE CORPORATION OF THE TOWN OF MIDLAND

WASTEWATER OPERATIONS

2016 ANNUAL OPERATIONS REPORT

Prepared by:
The Corporation of the Town of Midland
Water and Wastewater Operations Department

OVERVIEW:

This annual report is prepared in accordance with the requirements of **Certificate of Approval Assessment:**

C OF A NUMBERS	DATE	EFFLUENT LIMITS
5708-A72SPG	**JULY 20, 2016**	**Revokes and replaces 5708-7UZK93**
8-5061-95-006	**May 10, 1995**	**Air Approval**
3-0214-80-006	**March 11, 1980**	**Expansion of WPCP**
3-0214-80-006	**March 11, 1980**	**Air-Diesel Generator**
30622-93-006	**September 20, 1993**	**Pump Station #1**
8-3288-93-006	**September 24, 1993**	**Pump Station #1 Generator**

PROJECT DESCRIPTION:

The Midland Wastewater Treatment Centre is a conventional activated sludge plant owned and operated by the Town of Midland. The facility treats a combined industrial and domestic wastewater. Treated effluent is discharged via a gravity outfall into Midland Bay. The Midland Wastewater Treatment Centre was originally built in 1965 as a primary treatment plant. In 1980 the plant was expanded adding secondary treatment. In 1995 the plant was again expanded and upgraded to the present capacity. In 2009 a standby generator was added to run the entire Wastewater Treatment Centre in the event of a power interruption. In 2016 the Certificate of Approval (C of A) was amended to include year round disinfection and de-chlorination.

PLANT FACTS:

Facilities

- Design Capacity – 15,665 m^3 per day.

The Midland WTC consists of the following treatment units:

- SCADA
- fine screening and grit removal in headworks building
- primary clarification
- aeration
- secondary clarification
- chlorination
- de-chlorination
- sludge digestion
- storm equalization
- septage receiving

The influent flow is measured using a partial flume in the headworks building. Effluent flow is measured based on the head behind the chlorine contact overflow weir. Phosphorus precipitation is achieved through alum addition (1,000 L/day dosage) split between the primary clarifiers and the mixed liquor flow from the final aeration basin to the secondary clarifiers. The primary underflow (sludge) is pumped to a two-stage (ESD) egg shaped anaerobic digester. Digested sludge is hauled off-site for land utilization.

SCADA (Supervisory Control and Data Acquisition)
The SCADA is a computerised system of monitoring the performance of the plant. It allows the operators to see changes in operating parameters as they happen instead of after it has happened. This system can also be used to control various areas of the plant and collect plant performance criteria from various instruments.

Headworks
The raw sewage (influent) enters the headworks via a single channel. Once in the headworks, the channel splits into two individual channels separated by a cut-water gate for a combined capacity of 2,460m^3/hour. Under normal/dry weather conditions the influent flows down the primary channel, flowing through a channel monster (grinder), a self-cleaning screen and a grit removal system. In the event of a high flow exceeding 185 L/s, the cut-water gate opens automatically directing the excess flow down the secondary channel through a commutator. Leaving the headworks, flows from both the primary and secondary channels are directed to the primary clarifier influent distribution chamber. Aluminium Sulphate (coagulant) is added to these flows prior to reaching the distribution chamber for the purpose of phosphorus precipitation.

Primary Clarification
Three circular tanks in parallel with the capability of handling a peak flow of 32,580m^3/hour are provided for primary clarification. Waste activated sludge (W.A.S.) is also added to this flow for the purpose of co-thickening the sludge in the primaries. The underflow (sludge) from each primary clarifier is then pumped on a continuous basis to the primary digester using dedicated piston pumps. The effluent from the clarifiers then enters a primary effluent collection chamber.

Aeration
The primary clarifier effluent proceeds directly to the aeration tanks. The aeration tank consists of six cells which can be operated in series or parallel. Currently, the plant is operating in series with six cells in service. Aeration is mechanically provided by 6 - 15 kW motors. Aluminium Sulphate (coagulant) is added to the flow (mixed liquor channel) leaving from the aeration system prior to reaching the secondary clarifiers.

Secondary Clarification
Flow from the aeration system proceeds to a distribution chamber feeding two circular secondary clarifiers. Sludge is removed from the bottom of each clarifier using two variable frequency drive pumps. A portion of the volume of sludge is pumped back to aeration as return activated sludge (R.A.S.) and the remainder is sent to the primary clarifiers as waste activated sludge (W.A.S.); which intern will be wasted to the primary digester.

Chlorination
From the secondary effluent collection chamber, flow proceeds directly to the chlorine contact chamber. Chlorine in the form of Sodium Hypochlorite (approximately 12%) is added year round.

De-chlorination System
From the Chlorine Contact Chamber, flow proceeds to the De-chlorination Chamber. Calcium Thiosulfate (captor) is added to neutralize the chlorine.

Sludge Digestion
The primary clarifier underflow (sludge) is directed to a two-stage anaerobic digester. The first stage consist of 1,000m^3 egg shaped digester (E.S.D.) maintained at approximately 35°C using an external heat exchanger. The heat boiler is operated using digester gas supplemented with natural gas. Mixing in the first stage is accomplished by using a jet pump mixing system. The second stage consists of two conventional shaped digesters, one is fitted with a floating fibreglass cover to hold the gas produced in the system. There is a waste gas flair stack to burn off excess gas.

Storm Equalization
The storm equalization facility consists of a rectangular tank of approximately 1,400m^3 in volume. This tank is controlled by the plant SCADA system. As the flow to the plant increases (290 L/s) in a storm event, a gate at the headworks will open and direct excess flow to this tank in order to stop plant washout in high flow (storm) situations. If the storm is of enough intensity to fill the tank, alum and chlorine are added to the tank before it overflows into a bypass chamber. This gives the storm water primary treatment before it reaches the outfall into Georgian Bay. If a by-pass does occur, the flow is also dechlorinated.

Hauled Sewage Receiving
The receiving station consists of 2 square tanks that the sewage haulers (holding tank and septic tank waste) can discharge into. These tanks are equipped with a mixer. As this tank is filled it can be pumped to various areas of the plant to be treated during low flow times.

SAMPLING REQUIREMENTS:

Samples of raw sewage and final effluent for the sewage treatment plant shall be collected at designated locations and analyzed for at least the following parameters at the indicated minimum frequencies:

Raw Sewage		
Parameter	**Type of Sample**	**Minimum Frequency**
BOD^5	Composite	weekly
Total Suspended Solids	Composite	weekly
Total Phosphorus	Composite	weekly
Free Ammonia Nitrogen	Grab	weekly
Total Kjeldhal Nitrogen	Composite	weekly
pH	Grab (on-site test)	weekly

Final Effluent		
Parameter	**Type of Sample**	**Minimum Frequency**
$CBOD^5$	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Phosphorus	Composite	Weekly
Total Ammonia Nitrogen	Composite	Weekly
E. Coli	Grab	Weekly
Temperature	Grab (on-site test)	Weekly
pH	Grab (on-site test)	Weekly
Total Chlorine Residual	Grab (on-site test)	Daily

The sampling and analyses required from the above conditions shall be performed in accordance with the Ministry's Policy No. 08-06.

Final Effluent Parameter Limits:

C. OF A. LIMITS		
PARAMETER	**CONCENTRATION**	**LOADINGS**
Annual Average CBOD^5 (mg/L)	10 mg/L	
Annual Average Suspended Solids	10 mg/L	
T.P* Monthly Average	0.4 mg/L	
Yearly Average	0.3 mg/L	1716 kg *
Monthly Average Ammonia + Am N June 1 to August 31	10 mg/L	n/a
Monthly Average Ammonia + Am N September 1 to May 31	15 mg/L	n/a
Monthly Average Total Cl Residual	0.02 mg/L	n/a

Note 1: The total annual phosphorous loading is based on an annual average daily flow rate of 15,665 cubic meters per day and effluent total phosphorous concentration of 0.3 milligrams per litre.

The above limits indicate the maximum concentrations and loadings that are listed in the new Certificate of Approval No. 5708-A72SPG issued July 20, 2016.

SAMPLING PROCEDURES:

Raw sewage samples are collected daily using an ISCO 3700 automatic sampler, composited over a 24-hour period. Once per week a 24 hr. composite sample is sent out for analysis of CBOD5, Total Suspended Solids, Total Phosphorus and TKN. Once per week a grab sample is collected and sent out for analysis of Free Ammonia Nitrogen (NH_3), while daily composites collected by the ISCO 3700 are tested on site for suspended solids and soluble phosphorus.

Final effluent samples are also collected daily using an ISCO 3700 automatic sampler, composited over a 24-hour period. Once per week a 24 hr. composite sample is sent out for analysis of CBOD5, Total Suspended Solids, Total Phosphorus, and Total Ammonia + Ammonium (NH_3 + NH_4) Nitrogen. Once per week a separate grab sample is collected and sent out for analysis of Escherichia Coli (E. Coli). Grab samples are also collected daily and

tested on-site for pH and Total Chlorine Residual while daily composites are collected by the ISCO 3700 and tested on site for suspended solids and soluble phosphous.

Raw sludge samples (grab) are collected monthly and sent out for analysis of Total Phosphorus, Total Solids, Ammonia Nitrogen, Metals, Potassium, and Ash Lol. Primary digested sludge samples (grab) are collected bi-weekly and monthly and sent out for analysis of Total Phosphorus, Total Solids, Metals, Potassium, Conductivity, Alkalinity, Volatile Acids and Ash Lol.

An anaerobically digested biosolids sample (grab) is collected once per week from the second stage of the digestion process and sent out for analyses of Total Phosphorus, Total Solids, Ammonia Nitrogen, Metals and E. Coli.

Currently, all samples sent out for analysis are sent to Caduceon Environmental Laboratories in the Ottawa District. On-site analysis, other than that mentioned above, is conducted for Total Phosphorus and Suspended Solids as well as other standard operating parameters.

The sampling and analyses noted above are performed in accordance with the Ministry's Policy No. 08-06.

Detailed (daily) analytical data are available on request. Annual and monthly averages are summarized above.

Comments: Daily Flow assessment for the 2016 year indicates that the average design capacity has not been exceeded. (Plant operating capacity is 15,665m^3/day.)

SLUDGE (Biosolids) MANAGEMENT:

Biosolids at the plant are treated anaerobically and onsite storage capacity is limited to a maximum of 1 week.

Town of Midland has an agreement with the Region of Huronia Environmental Services for the supply of all equipment and labour necessary for the transporting and disposal of Liquid Processed Organics (Biosolids) from the Town of Midland Wastewater Treatment Centre.

The Contractor is responsible for the acquisition and preparation of all written materials required by the Ontario Ministry of the Environment and Climate Change (MOECC) and applications of Provincial Certificates of Approval for each Organic Soil Conditioning Site the Contractor intends to use in the execution of the contract.

The Contractor is solely responsible for the operations and maintenance of the Organic Soil Conditioning sites, adhering to the Guidelines and such restrictions as maybe applied to the Provincial Certificates of Approval and any amendments that may come into effect.

BYPASSING AND ABNORMAL CONDITIONS:

- Two hypo chlorite tanks are provided, one of which is lined and heated for year round use.
- The availability of the storm detention/overflow tank provides at the very least sufficient retention for primary treatment of these flows.
- There is provision for chlorination and dechlorination of bypasses due to overflow of the storm equalization tank.

MAINTENANCE AND CALIBRATION ACTIVITIES:

The Town of Midland Wastewater Operations plant shall maintain and operate a sufficient number of flow measuring devices, calibrated at regular intervals not exceeding one year, to ensure their accuracy to within plus or minus 5% of actual rate of flow from 10% to 100% of flow range, in order to measure:

a) The quantity of sewage being conveyed to and through the sewage treatment plant; and

b) The quantity of sewage being by-passed without complete treatment.

The waste gas burner was replaced (January 2013), meeting T.S.S.A. standards.

DISCUSSION:

The Midland Wastewater Treatment Centre produced excellent quality effluent in 2016. No major operational problems were encountered and the Town of Midland has met all parameters laid out in Environmental Compliance Approval with the exception of winter chlorination and de-chlorination for the month of December as approved by the Ministry of the Environment and Climate Change.
We modified our chlorination and de-chlorination process by removing the existing Oxidation Reduction Potential (ORP) unit and replaced it with Wallace and Tiernan Micro 2000 Total Chlorine Analyzer (0-0.1 mg/L). This analyzer will then determine the presence of total chlorine should the proper level of de-chlorination not occur.

Appendix – A. Plant Flows - 2016
B. Raw Sewage Annual Results - 2016
C. Final Effluent Annual Results - 2016
D. By-Pass Information - 2016
E. Anaerobically Digested Biosolids Summary - 2016
F. Sludge Haulage - 2016
G. Septage Received - 2016
H. RV Waste Received - 2016

APPENDIX A

TOWN OF MIDLAND WASTEWATER TREATMENT PLANT FLOWS

2016	AVERAGE DAILY FLOW (m^3/d)	MAX. DAILY FLOW (m3/d)	MIN. DAILY FLOW (m3/d)	TOTAL FLOW (m^3)	MAX. PEAK DAILY FLOW (L/s)
JANUARY	9521	14083	8197	295163	14082
FEBRUARY	10132	17709	5465	293820	17709
MARCH	12872	26080	8269	399031	26080
APRIL	12111	25136	8718	363327	25136
MAY	8134	10522	5410	252154	10522
JUNE	7254	8429	6107	217616	8429
JULY	7469	8235	6757	231542	8235
AUGUST	8273	15070	7032	256469	15070
SEPTEMBER	7609	10653	6243	228259	10653
OCTOBER	7852	10336	6654	243427	10336
NOVEMBER	7886	9868	7134	236576	9868
DECEMBER	8450	10008	7257	261952	10008
TOTAL				3279336	
AVERAGE	9083.8			273278	
MINIMUM				217616	
MAXIMUM				399031	

Notes:

Monthly Average Daily Flow - means the cumulative total sewage flow to the sewage works during a calendar month divided by the number of days during which sewage was flowing to the sewage works that month.

Maximum Daily Flow - means the maximum rate of flow to the sewage works that occurred on one given day that month.

Minimum Daily Flow - means the minimum rate of flow to the sewage works that occurred that month.

Total Flow - means the total sewage flow to the sewage works that occurred during a calendar month.

Maximum Peak Flow - means the maximum rate of sewage flow to the sewage works which occurred at a specific moment in time.

APPENDIX B

TOWN OF MIDLAND WASTEWATER TREATMENT PLANT RAW SEWAGE MONTHLY CONCENTRATIONS

YEAR 2016	RAW INFLUENT BOD_5 (mg/L)	RAW INFLUENT T.P. (mg/L)	RAW INFLUENT S.S. (mg/L)	RAW INFLUENT T.K.N. (mg/L)	UN-IONIZED AMMONIA (mg/L)	RAW INFLUENT pH (mg/L)
JANUARY	100	3.0	166	21.45	0.68	7.6
FEBRUARY	138	2.8	164	23.08	0.32	7.5
MARCH	85	3.2	137	16.48	0.18	7.5
APRIL	90	3.0	148	22.03	0.28	7.6
MAY	189	3.5	213	25.94	1.02	8.0
JUNE	166	4.0	271	29.06	4.84	8.1
JULY	153	3.7	181	28.18	1.51	7.9
AUGUST	131	3.8	188	25.48	1.36	8.1
SEPTEMBER	136	3.7	189	25.60	3.27	8.2
OCTOBER	163	4.1	190	30.50	2.57	8.3
NOVEMBER	149	4.2	213	36.08	1.95	8.2
DECEMBER	134	3.5	194	26.33	1.53	8.1
YEARLY AVG.	136	3.54	187.67	25.84	1.67	7.9

Notes:

Monthly Average Concentration - means the arithmetic mean of all daily or weekly concentrations of a contaminant in the raw influent sampled or measured, during a calendar month.

Raw Influent - means raw (untreated) wastewater flowing into the treatment plant.

BOD5 - means five day biochemical oxygen demand measured in an unfiltered sample.

Raw Influent T.P. - means the total phosphorus concentration.

Raw Influent S.S. - refers to the concentration of solids that either float on the surface or are suspended in the raw wastewater entering the sewage works.

Raw Influent T.K.N. - refers to the concentration of total Kjeldahl nitrogen in the raw influent sample.

Raw Influent T.A.N. - refers to the concentration of total ammonia and ammonium nitrogen in the raw influent sample.

Un-ionized ammonia - also called free ammonia, refers to the neutral form of ammonia-nitrogen in water.

Raw Influent pH - refers to the intensity of the basic or acidic condition of a liquid; measures the hydrogen ion concentration.

APPENDIX C

TOWN OF MIDLAND WASTEWATER TREATMENT PLANT FINAL EFFLUENT MONTHLY CONCENTRATIONS

YEAR 2016	FINAL EFF. $CBOD_5$ (mg/L)	FINAL EFF. T.P. (mg/L)	FINAL EFF. S.S. (mg/L)	FINAL EFF. T.A.N. (mg/L)	FINAL EFF. Ph (mg/L)	FINAL EFF. E. coli (org/100mL)	FINAL EFF. TOT. NAOCl RES. (mg/L)	CONDUCTIVITY (mg/L)	AVG. O.R.P READING (mV)	MAX. O.R.P. READING (mV)	MIN. O.R.P. READING (mV)
JANUARY	6.0	0.15	3.9	0.205	7.2	743.5		940.2			
FEBRUARY	8.0	0.12	3.5	3.54	7.2	1037.7		937.8			
MARCH	5.3	0.16	4.0	1.04	7.1	441.6		906.8			
APRIL	3.0	0.12	2.5	1.58	7.1	220.4		838.5			
MAY	3.4	0.11	3.4	6.17	7.5	44.5	0.54	942.9	123.7	1000.0	0
JUNE	3.0	0.14	3.3	0.106	7.5	21.7	0.58	1033.7	74.2	1000.0	0
JULY	3.0	0.13	2.0	0.07	7.4	26.0	0.63	1046.6	141.6	241.2	0
AUGUST	3.8	0.18	2.4	0.21	7.5	6.3	0.65	1041.0	122.3	1000.0	0
SEPTEMBER	3.0	0.09	1.8	0.067	7.6	9.2	0.6	1036.0	130.6	200.9	0
OCTOBER	3.0	0.08	2.4	0.11	7.6	13.63	0.58	951.8	119.42	159.2	0
NOVEMBER	3.8	0.11	2.6	0.056	7.4	19.7	0.58	967.1	134.7	1000.0	0
DECEMBER	3.0	0.15	4.7	4.825	7.4	1012.9	*0.019	905.8	OFF LINE	OFF LINE	OFF LINE
TOTAL											
AVERAGE	4.0	0.13	3.0	1.59	7.4	299.8	0.59	962.35	120.9		
ANNUAL AVG. LOADING (Kg/Yr.)		426.31									

*CHLORINATED 2 DAYS IN DECEMBER.

Notes:

Monthly Average Concentration - means the arithmetic mean of all daily or weekly concentrations of a contaminant in the final effluent sampled or measured during a calendar month.

Final Effluent - refers to the treated wastewater discharging from the treatment plant.

CBOD5 - means five day biochemical oxygen demand measured in an unfiltered sample. Both the BOD and COD tests are a measure of the relative oxygen-depletion effect of a waste contaminant.

Final Effluent T.P. - means the total phosphorus concentration in a given sample.

Final Effluent S.S. - refers to the concentration of solids that either float on the surface or are suspended in the final effluent discharging the wastewater plant.

Final Effluent T.A.N. - refers to the concentration of total ammonia and ammonium nitrogen in the final effluent sample.

Final Effluent pH - refers to the intensity of the basic or acidic condition of a liquid; measures the hydrogen ion concentration.

Final Effluent E. Coli - Escherichia coli, indicator organisms to test environmental samples for fecal contamination.

Final Effluent Total NaOCl Residual - refers to the remaining concentrations of oxidizing hypochlorous acid and hypochlorite ions to estimate effectiveness of disinfection or to demonstrate safety for discharge to aquatic ecosystems.

O.R.P. Reading - Oxidation reduction potential is a measure of the tendency of a chemical species to acquire electrons and thereby be reduced. Reduction potential is measured in millivolts (mV). It is used as an indicator of dechlorination.

Monthly Average O.R.P. Reading - means the arithmetic mean of all daily measured readings in the final effluent sample during a calendar month.

Maximum O.R.P. Reading - refers to the maximum measured value in a given calendar month.

Minimum O.R.P. Reading - refers to the minimum measured value in a given calendar month.

Final Effluent Parameter Limits:

C. OF A. LIMITS		
PARAMETER	**CONCENTRATION**	**LOADINGS**
Annual Average $CBOD^5$ (mg/L)	10 mg/L	
Annual Average Suspended Solids	10 mg/L	
T.P* Monthly Average	0.4 mg/L	
Yearly Average	0.3 mg/L	1716 kg*
Monthly Average Ammonia + Am N June 1 to August 31	10 mg/L	n/a
Monthly Average Ammonia + Am N September 1 to May 31	15 mg/L	n/a
Monthly Average Total Cl Residual	0.02 mg/L	n/a

Notes:

*Note 1: The total annual phosphorous loading is based on an annual average daily flow rate of 15,665 cubic meters per day and effluent total phosphorous concentration of 0.3 milligrams per litre.

APPENDIX D

BY-PASS REPORT - 2016

Month	Location	Type	Volume (m3)	Duration (min)	# Events	Rainfall (mm)
January						
February						
March 28	**Storm Tank**	Plant Bypass	4082.2	12 hours	3	44.5
March 31	**Storm Tank**	Plant Bypass	4729.9	14.43 hrs	6	54.0
March 31	**Chamber A**	Plant Bypass	24.5	0.23 hr	1	54.0
April						
May						
June						
July 8	**Chamber A**	Plant Bypass	25.0	0.3 hr	1	21.5
August 16	**Storm Tank**	Plant Bypass	645.8	1.7 hr	2	73.0
	Chamber A	Plant Bypass	28.4	0.17 hr	2	73.0
September 17	Chamber A	Plant Bypass	43.0	.25 hr	1	45.0
October 17	**Chamber A**	Plant Bypass	116.5	0.3 hr	1	39.0
November						
December						

NOTES:

Plant By-pass - means any discharge from a pump station or chamber that does not undergo any treatment before it was discharged to the environment.

Secondary By-pass - means any discharge from within the wastewater treatment plant that received partial treatment before it was discharged to the environment.

APPENDIX E

2016 Sludge Quality Analysis Summary

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Average
Ammonia	mg/l	902	869	838	924	890	896	957	1093	898	854	894	980	916
Phosphorus	mg/l	593	641	810	886	755	854	772	979	745	666	773	749	768
Nitrate	mg/l													
Ammonia + Nitrate	mg/l	902	869	838	924	890	896	957	1093	898	850	894	980	916
TS	mg/l	22025	25725	29980	37450	28950	28560	24700	26575	25040	28275	27580	27700	27713
Potassium	mg/l	67	65	60	64	69	68	63	2025	65	69	66	64	229
Metal Concentrations		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Average**
Copper	mg/l	8.53	11.09	12.32	14.63	12.01	13.19	11.46	11.83	11.13	12.75	11.47	11.68	11.84
Nickel	mg/l	2.95	4.56	4.33	4.26	3.40	3.38	2.86	3.70	5.26	8.95	9.92	13.85	5.62
Lead	mg/l	0.43	0.53	0.68	0.98	0.88	0.68	0.53	0.50	0.58	0.68	1.60	1.28	0.78
Zinc	mg/l	22.50	28.38	28.22	32.65	29.38	33.20	27.68	29.65	38.54	47.28	69.70	83.25	39.20
Arsenic	mg/l	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.08	0.10	0.10	0.10	0.10	0.10
Cadmium	mg/l	0.03	0.03	0.03	0.03	0.02	0.03	0.23	0.03	0.03	0.03	0.03	0.03	0.05
Cobalt	mg/l	0.85	1.06	0.90	0.76	0.71	1.18	0.83	0.88	1.48	2.00	3.10	3.33	1.42
Chromium	mg/l	11.97	16.21	16.40	16.50	12.95	15.12	10.68	9.30	10.52	13.75	20.06	23.30	14.73
Mercury	mg/l	0.02	0.02	0.02	0.03	0.02	0.01	0.01	0.03	0.02	0.02	0.02	0.02	0.02
Molybdenum	mg/l	0.22	0.34	0.33	0.33	0.25	0.24	0.20	0.19	0.25	0.38	0.44	0.47	0.30
Selenium	mg/l	0.10	9.63	0.16	0.23	0.18	0.16	0.13	0.10	0.10	0.15	0.10	0.13	0.93
Ammonia/Metal Ratios		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Average**
Copper	**10**	106	78	68	63	74	68	84	92	81	67	78	84	79
Nickel	**40**	305	190	194	217	262	265	335	295	171	95	90	71	208
Lead	**15**	2121	1655	1233	948	1017	1317	1823	2185	1548	1259	559	768	1369
Zinc	**4**	40	31	30	28	30	27	35	37	23	18	13	12	27
Arsenic	**100**	9015	8688	8382	9243	8900	8958	9573	14097	8978	8500	8938	9795	9422
Cadmium	**500**	30050	28958	27940	30808	38280	29860	4117	36417	29927	28333	29793	30138	28718
Cobalt	**50**	1064	822	927	1213	1262	758	1153	1245	606	426	288	294	838
Chromium	**6**	75	54	51	56	69	59	90	118	85	62	45	42	67
Mercury	**1500**	52261	47603	39914	27590	40920	69984	64898	39727	40809	34694	36934	61219	46379
Molybdenium	**180**	4098	2555	2540	2780	3633	3702	4847	5905	3650	2222	2013	2073	3335
Selenium	**500**	9015	90	5239	4108	5086	5599	7658	10925	8978	5667	8938	7836	6595

2016 First Quarter Sludge Quality Analysis

		January						February						March					
		6	13	19	27		Avg.	3	10	17	24		Avg.	2	9	16	23	30	Avg.
Ammonia	mg/l	870	959	891	886		901.50	956	871	856	792		868.75	778	849	844	838	882	838.2
Phosphorus	mg/l	850	488	499	533		592.50	391	929	713	530		640.75	875	824	730	698	922	809.8
Nitrate	mg/l																		
Ammonia + Nitrate	mg/l	870	959	891	886		901.50	956	871	856	792		868.75	778	849	844	838	882	838.2
TS	mg/l	30700	17200	20300	19900		22025	15700	33000	30500	23700		25725	31900	31900	21700	29600	34800	29980
Potassium	mg/l	75.4	52	64.2	77.2		67.20	57.8	75.9	62.8	62.4		64.73	72.1	54.9	61.3	54.6	58.8	60.34
Ecoli		17000	24000	16000	17000		18500	35000	14000		31000		26667						#DIV/0!
Metal Concentrations																			
Copper	mg/l	12.3	5.89	7.45	8.49		8.53	5.26	13.9	14.6	10.6		11.09	15.9	12.4	7.8	10.6	14.9	12.32
Nickel	mg/l	4.37	2.05	2.6	2.79		2.95	2.11	5.97	6	4.17		4.56	6.48	4.91	2.68	3.27	4.31	4.33
Lead	mg/l	0.7	0.3	0.4	0.3		0.43	0.2	0.7	0.6	0.6		0.53	0.7	0.6	0.5	0.6	1	0.68
Zinc	mg/l	31.6	16.8	19.7	21.9		22.50	15	38.2	36.8	23.5		28.38	35.5	30.9	17.8	23.5	33.4	28.22
Arsenic	mg/l	0.1	0.1	0.1	0.1		0.10	0.1	0.1	0.1	0.1		0.10	0.1	0.1	0.1	0.1	0.1	0.1
Cadmium	mg/l	0.03	0.03	0.03	0.03		0.03	0.03	0.03	0.03	0.03		0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cobalt	mg/l	1.23	0.54	0.74	0.88		0.85	0.59	1.47	1.34	0.83		1.06	1.24	0.98	0.56	0.72	1.02	0.904
Chromium	mg/l	17.7	7.99	10.1	12.1		11.97	8.33	21.5	21.3	13.7		16.21	22.7	17.4	10.3	13.1	18.5	16.4
Mercury	mg/l	0.032	0.011	0.015	0.011		0.02	0.006	0.02	0.028	0.019		0.02	0.018	0.024	0.016	0.024	0.023	0.02
Molybdenum	mg/l	0.29	0.16	0.2	0.23		0.22	0.23	0.39	0.46	0.28		0.34	0.45	0.35	0.2	0.28	0.37	0.33
Selenium	mg/l	0.1	0.1	0.1	0.1		0.10	0.1	38.2	0.1	0.1		9.63	0.2	0.2	0.1	0.1	0.2	0.16

2016 Second Quarter Quality Analysis

		April						May						June					
		6	13	20	27		Avg.	4	11	19	25		Avg.	1	8	15	22	29	Avg.
Ammonia	mg/l	935	935	998	829		924.25	886	895	912	867		890.00	923	857	909	916	874	895.80
Phosphorus	mg/l	1250	830	777	687		886	885	945	570	619		754.75	915	638	879	989	847	853.60
Nitrate	mg/l																		
Ammonia + Nitrate	mg/l	935	935	998	829		924.25	886	895	912	867		890.00	923	857	909	916	874	895.80
TS	mg/l	39300	38600	39400	32500		37450	34200	34000	22800	24800		28950	35400	21200	29300	29600	27300	28560
Potassium	mg/l	56.5	70.4	55.9	73		63.95	69.5	63.9	66.2	75		68.65	67.6	70.6	65.3	65.2	72.2	68.18
Ecoli							#DIV/0!						#DIV/0!						#DIV/0!
Metal Concentrations																			
Copper	mg/l	21.1	14.5	11.6	11.3		14.625	14.2	11.4	8.95	13.5		12.01	15.1	9.26	14.8	11.2	15.6	13.19
Nickel	mg/l	6.02	4.27	3.28	3.45		4.26	4.27	3.23	2.63	3.46		3.40	4.14	2.34	3.62	3.01	3.77	3.38
Lead	mg/l	1.4	1	0.8	0.7		0.975	1.1	1.1	0.6	0.7		0.88	0.9	0.4	1	0.5	0.6	0.68
Zinc	mg/l	46.2	34.4	24.6	25.4		32.65	34	32	22.6	28.9		29.38	35.9	20.8	33.7	33.4	42.2	33.20
Arsenic	mg/l	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	0.1		0.10	0.1	0.1	0.1	0.1	0.1	0.10
Cadmium	mg/l	0.03	0.03	0.03	0.03		0.03	0.003	0.03	0.03	0.03		0.02	0.03	0.03	0.03	0.03	0.03	0.03
Cobalt	mg/l	1.41	0.88	0.69	0.069		0.76225	0.84	0.66	0.55	0.77		0.71	0.93	0.66	1.15	1.33	1.84	1.18
Chromium	mg/l	25.6	15.8	11.9	12.7		16.50	15.7	11.9	10.1	14.1		12.95	16.7	10.1	16.5	13.8	18.5	15.12
Mercury	mg/l	0.036	0.025	0.025	0.048		0.03	0.034	0.028	0.015	0.01		0.02	0.014	0.01	0.012	0.012	0.016	0.01
Molybdenum	mg/l	0.51	0.33	0.24	0.25		0.33	0.29	0.24	0.2	0.25		0.25	0.3	0.18	0.24	0.21	0.28	0.24
Selenium	mg/l	0.3	0.2	0.2	0.2		0.225	0.2	0.2	0.1	0.2		0.18	0.2	0.1	0.2	0.1	0.2	0.16

2016 Third Quarter Quality Analysis

		July						August						September					
		7	13	20	27		Avg.	3	10	17	24		Avg.	1	7	14	21	28	Avg.
Ammonia	mg/l	828	881	1030	1090		957.25	1030	1040	1040	1260		1092.50	934	861	884	929	881	897.80
Phosphorus	mg/l	805	827	669	786		771.75	970	788	948	1210		979.00	705	707	750	722	840	744.80
Nitrate	mg/l																		
Ammonia + Nitrate	mg/l	828	881	1030	1090		957.25	1030	1040	1040	1260		1092.50	934	861	884	929	881	897.80
TS	mg/l	26200	27800	19800	25000		24700	27500	21700	27500	29600		26575	23200	25100	27800	21600	27500	25040
Potassium	mg/l	66.5	69	54.8	62.1		63.10	63.8	67.2	7905	65.1		2025.28	58.3	73.8	61.7		64.6	64.60
Ecoli							#DIV/0!						#DIV/0!						#DIV/0!
Metal Concentrations																			
Copper	mg/l	11.8	13.2	9.33	11.5		11.46	9.73	9.49	14	14.1		11.83	11.3	12.6	12.1	9.83	9.81	11.13
Nickel	mg/l	2.98	2.88	2.32	3.25		2.86	3.08	2.79	5.12	3.82		3.70	3.52	3.86	6.08	5.75	7.1	5.26
Lead	mg/l	0.6	0.5	0.4	0.6		0.53	0.4	0.4	0.6	0.6		0.50	0.6	0.8	0.7	0.3	0.5	0.58
Zinc	mg/l	30.8	32.1	22.3	25.5		27.68	25.8	23.9	33.8	35.1		29.65	32.6	43.9	49.2	32.3	34.7	38.54
Arsenic	mg/l	0.1	0.1	0.1	0.1		0.10	0.0	0.1	0.1	0.1		0.08	0.1	0.1	0.1	0.1	0.1	0.10
Cadmium	mg/l	0.03	0.03	0.03	0.84		0.23	0.03	0.03	0.03	0.03		0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cobalt	mg/l	1.26	1.19	0.84	0.03		0.83	0.77	0.71	0.97	1.06		0.88	1.04	1.53	2.01	1.43	1.4	1.48
Chromium	mg/l	13.2	12.2	8.3	9.02		10.68	8.57	7.61	10.4	10.6		9.30	9.47	11.7	12.3	9.35	9.79	10.52
Mercury	mg/l	0.017	0.018	0.009	0.015		0.01	0.014	0.01	0.015	0.071		0.03	0.009	0.015	0.025	0.046	0.015	0.02
Molybdenum	mg/l	0.23	0.21	0.16	0.19		0.20	0.08	0.17	0.23	0.26		0.19	0.19	0.27	0.3	0.22	0.25	0.25
Selenium	mg/l	0.2	0.1	0.1	0.1		0.13	0.1	0.1	0.1	0.1		0.10	0.1	0.1	0.1	0.1	0.1	0.10

2016 Fourth Quarter Sludge Quality Analysis

		October						November						December				
		5	12	19	26		Avg.	2	9	16	23	30	Avg.	8	15	20	28	Avg.
Ammonia	mg/l	822	847	881	865		853.75	858	879	870	941	921	893.80	875	936	917	1190	979.5
Phosphorus	mg/l	774	539	688	664		666.25	793	418	881	909	865	773.20	913	820	519	745	749.25
Nitrate	mg/l				865													
Ammonia + Nitrate	mg/l	822	847	881			850.00	858	879	870	941	921	893.80	875	936	917	1190	979.5
TS	mg/l	29400	28400	24000	31300		28275	24700	16000	32600	31600	33000	27580	29200	29600	22500	29500	27700
Potassium	mg/l	65.3	60.3	69.7	79		68.58	59.7	61.2	85	67.2	56.3	65.88	56.9	62.2	70.2	64.9	63.55
Ecoli							#DIV/0!						#DIV/0!					#DIV/0!
Metal Concentrations																		
Copper	mg/l	14.1	12.4	11.4	13.1		12.75	9.85	6.21	15.6	13.7	12	11.47	9.64	14.4	8.97	13.7	11.6775
Nickel	mg/l	9.2	9.67	8.02	8.91		8.95	6.82	4.67	11	13.5	13.6	9.92	13.3	17	11	14.1	13.85
Lead	mg/l	1	0.6	0.5	0.6		0.68	0.6	0.9	2.5	2.3	1.7	1.60	1.2	1.8	0.9	1.2	1.275
Zinc	mg/l	45	48.6	42.9	52.6		47.28	43.2	31.1	82.3	97.9	94	69.70	80.6	106	64.3	82.1	83.25
Arsenic	mg/l	0.1	0.1	0.1	0.1		0.10	0.1	0.1	0.1	0.1	0.1	0.10	0.1	0.1	0.1	0.1	0.1
Cadmium	mg/l	0.03	0.03	0.03	0.03		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.0325
Cobalt	mg/l	1.79	1.98	1.82	2.4		2.00	1.87	1.46	3.8	4.42	3.96	3.10	3.38	4.26	2.55	3.12	3.3275
Chromium	mg/l	12.8	13.7	12.5	16		13.75	12.8	9.71	25	27.4	25.4	20.06	21.6	28.3	18.6	24.7	23.3
Mercury	mg/l	0.013	0.023	0.015	0.047		0.02	0.027	0.007	0.022	0.044	0.021	0.02	0.014	0.014	0.01	0.026	0.016
Molybdenum	mg/l	0.37	0.39	0.34	0.43		0.38	0.34	0.25	0.6	0.56	0.47	0.44	0.4	0.55	0.4	0.54	0.4725
Selenium	mg/l	0.1	0.2	0.1	0.2		0.15	0.1	0.1	0.1	0.1	0.1	0.10	0.1	0.1	0.1	0.2	0.125

DIGESTED BIOSOLIDS PARAMETER LIMITS:

PARAMETER	CONCENTRATION
Antimony	1 ug/g
Arsenic	11 ug/g
Barium	210 ug/g
Beryllium	2.5 ug/g
Boron	36 ug/g
Boron (HWS)	NA
Cadmium	1 ug/g
Chromium	67 ug/g
Chromium (VI)	0.66 ug/g
Cobalt	19 ug/g
Copper	62 ug/g
Lead	45 ug/g
Mercury	0.16 ug/g
Molybdenum	2 ug/g
Nickel	37 ug/g
Selenium	1.2 ug/g
Silver	0.5 ug/g
Thallium	1 ug/g
Uranium	1.9 ug/g
Vanadium	86 ug/g
Zinc	290 ug/g

APPENDIX F

2016 HAULED BIOSOLIDS

DATE:	NUMBER OF LOADS	VOLUME HAULED M3
JANUARY	26	1,092
FEBRUARY	32	1,344
MARCH	19	798
APRIL	23	966
MAY	30	1,260
JUNE	26	1,092
JULY	22	924
AUGUST	25	1,048
SEPTEMBER	30	1,261
OCTOBER	26	1,095
NOVEMBER	23	966
DECEMBER	31	1,280
TOTAL	**313**	**13,126**

APPENDIX G

TOWN OF MIDLAND WATER & WASTEWATER OPERATIONS

HAULED SEWAGE DISPOSAL BREAKDOWN - 2016

GEORGIAN BAY SANITATION

MONTH	DOMESTIC SEPTIC TANK	DOMESTIC HOLDING TANK	COM./IND. SEPTIC TANK	COM/IND. HOLDING TANK	PORTABLE TOILETS	MARINE WASTE	GREASE TRAPS
JANUARY	1000	27200		2000	1000		
FEBRUARY		24200					
MARCH	1600	24600			2000		
APRIL	1000	53400			1000		
MAY		6600		12000	1000	2000	
JUNE		8000		5000	9000	4000	
JULY	800	10600		8000	9000	7000	
AUGUST		13800	2000	5000	7000	13000	
SEPTEMBER		9200		4000	5600	2000	
OCTOBER		12000			3000	2000	
NOVEMBER	4000	22700		4000	4000	2000	
DECEMBER	800	18200			1000		
TOTALS:	**9200**	**230500**	**2000**	**40000**	**43600**	**32000**	**0**

MONTHLY UPDATED TOTAL

570700

HAULED FROM MUNICIPALITY # OF TIMES	
TINY	82
TAY	20
PENETANG	12
CRAIGHURST	
SPRINGWATER	1
ORR LAKE	
OTHER	3
MIDLAND	49
TOTAL	167

HAULED SEWAGE TOTAL IN GALLONS **357300**

TOWN OF MIDLAND WATER & WASTEWATER OPERATIONS

HAULED SEWAGE DISPOSAL BREAKDOWN - 2016

REGIONAL SANITATION

MONTH	DOMESTIC SEPTIC TANK	DOMESTIC HOLDING TANK	COM./IND. SEPTIC TANK	COM/IND. HOLDING TANK	PORTABLE TOILETS	MARINE WASTE	GREASE TRAPS
JANUARY		20000					
FEBRUARY		18000					
MARCH		27000					
APRIL		8000					
MAY		3000					
JUNE						9000	
JULY						18000	
AUGUST						15000	
SEPTEMBER						17000	
OCTOBER						6000	
NOVEMBER		5500				3000	
DECEMBER		9600					
TOTALS:	**0**	**91100**	**0**	**0**	**0**	**68000**	**0**

HAULED FROM MUNICIPALITY	# OF TIMES
TINY	40
TAY	5
PENETANG	12
CRAIGHURST	
SPRINGWATER	
ORR LAKE	
OTHER	
MIDLAND	2
TOTAL	59

HAULED SEWAGE TOTAL IN GALLONS **159100**

TOWN OF MIDLAND WATER & WASTEWATER OPERATIONS

HAULED SEWAGE DISPOSAL BREAKDOWN - 2016

RITCHIE SEPTIC TANK PUMPING

MONTH	DOMESTIC SEPTIC TANK	DOMESTIC HOLDING TANK	COM./IND. SEPTIC TANK	COM/IND. HOLDING TANK	PORTABLE TOILETS	MARINE WASTE	GREASE TRAPS
JANUARY		3800					
FEBRUARY		7000		2000			
MARCH		7500		7000			
APRIL		6000		2000			
MAY							
JUNE							
JULY							
AUGUST							
SEPTEMBER							
OCTOBER							
NOVEMBER							
DECEMBER							
TOTALS:	0	24300	0	11000	0	0	0

HAULED FROM MUNICIPALITY	# OF TIMES
TINY	3
TAY	2
PENETANG	
ELMVALE/SW	12
COLDWATER	
ORR LAKE	2
OTHER	
MIDLAND	
TOTAL	19

HAULED SEWAGE TOTAL IN GALLONS **35300**

TOWN OF MIDLAND WATER & WASTEWATER OPERATIONS

HAULED SEWAGE DISPOSAL BREAKDOWN - 2016

PEPI SEWAGE DISPOSAL

MONTH	DOMESTIC SEPTIC TANK	DOMESTIC HOLDING TANK	COM./IND. SEPTIC TANK	COM/IND. HOLDING TANK	PORTABLE TOILETS	MARINE WASTE	GREASE TRAPS
JANUARY		2600					
FEBRUARY		3400		2000			
MARCH		5000		2000			
APRIL				2000			
MAY							
JUNE							
JULY							
AUGUST							
SEPTEMBER							
OCTOBER							
NOVEMBER							
DECEMBER		2000					
TOTALS:	0	13000	0	6000	0	0	0

HAULED FROM MUNICIPALITY	# OF TIMES
TINY	
TAY	5
HONEY HARBOUR	
MUSKOKA	
SEVERN TOWN	4
COLDWATER	
G-BAY	2
MIDLAND	
TOTAL	11

HAULED SEWAGE TOTAL IN GALLONS 19000

	DS	DH	CII-S	CII-H	PT	MW	GT		YR END TOTALS
Gallon Total	9200	358900	2000	57000	43600	100000	0		570700
m3	41.86	1632.995	9.1	259.35	198.38	455	0		2596.685
%	1.6	62.9	0.4	10.0	7.6	17.5	0.0		100.0
					MUNICIPALITIES TOTAL				256

APPENDIX H

RV Waste Disposal 2016		
ISPOSAL	***Municipality TOWN***	***VOLUME in gallons***
13-Apr-16	MIDLAND	20
9-May-16	PENETANG	15
27-May-16	MIDLAND	10
6-Jun-16	MIDLAND	10
8-Jun-16	MIDLAND	10
10-Jun-16	MIDLAND	5
13-Jun-16	MIDLAND	40
17-Jun-16	PENETANG	10
20-Jun-16	MIDLAND	20
20-Jun-16	MIDLAND	20
23-Jun-16	WYEBRIDGE	10
23-Jun-16	MIDLAND	10
7-Jul-16	TINY	10
25-Jul-16	MIDLAND	5
25-Jul-16	MIDLAND	5
25-Jul-16	MIDLAND	5
26-Jul-16	PENETANG	5
2-Aug-16	WAUBAUSHENE	5
3-Aug-16	MIDLAND	10
4-Aug-16	TINY	5
9-Aug-16	MIDLAND	5
11-Aug-16	PENETANG	60
18-Aug-16	WYEBRIDGE	5
19-Aug-16	WAUBAUSHENE	10
29-Aug-16	**ALABAMA**	20
30-Aug-16	MIDLAND	50
30-Aug-16	SPRINGWATER	20
6-Sep-16	MIDLAND	35
8-Sep-16	TAY	20
13-Sep-16	QUEENS	10
DISPOSAL B	MIDLAND	35
22-Sep-16	WAUBAUSHENE	20
27-Sep-16	PENETANG	80
27-Sep-16	TAY	20
29-Sep-16	PENETANG	20
13-Oct-16	MIDLAND	10
14-Oct-16	BARRIE	10
14-Oct-16	WAUBAUSHENE	10
14-Oct-16	MIDLAND	10
18-Oct-16	SEVERN SOUND	10
18-Oct-16	MIDLAND	10
18-Oct-16	PENETANG	5
19-Oct-16	MIDLAND	20
24-Oct-16	PENETANG	15
26-Oct-16	MIDLAND	15
28-Oct-16	PENETANG	5
28-Oct-16	TINY	5
1-Nov-16	TINY	10
2-Nov-16	MIDLAND	10
2-Nov-16	MIDLAND	20
2-Nov-16	MIDLAND	30
4-Oct-16	TINY	**20**
16-Oct-16	WAUBAUSHENE	20
14-Nov-16	MIDLAND	20
14-Nov-16	PORT SEVERN	20
Total		**915**