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Leachate Treatment and Disposal

St. Marys Future Solid Waste Disposal Needs Environmental Assessment

Town of St. Marys

Leachate Treatment and Disposal
St. Marys Landfill Site Expansion

Town of St. Marys

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1	October 21, 2019	Revised submission to Town of St. Marys
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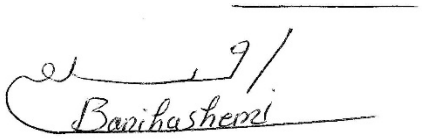
R.J. Burnside & Associates Limited

Report Prepared By:



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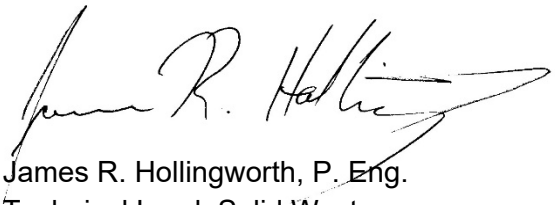

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1.0 Introduction

The Town of St. Marys (Town) is conducting an Individual Environmental Assessment to review alternative means to manage solid waste for a 40-year period. The existing St. Marys landfill site (the Site) is nearing its approved fill capacity. Through the EA process, expansion of the existing landfill was identified as the preferable Alternative to the Undertaking.

1.1 Objective of this Report

This Leachate Treatment and Disposal Report supports the Environmental Assessment Report (EA Report). It considers the quantity and quality of leachate that will be generated by the expansion of the St. Marys Landfill Site as envisioned by the EA Report and how it may impact the Town's wastewater treatment plant.

1.2 Site Description and Study Area

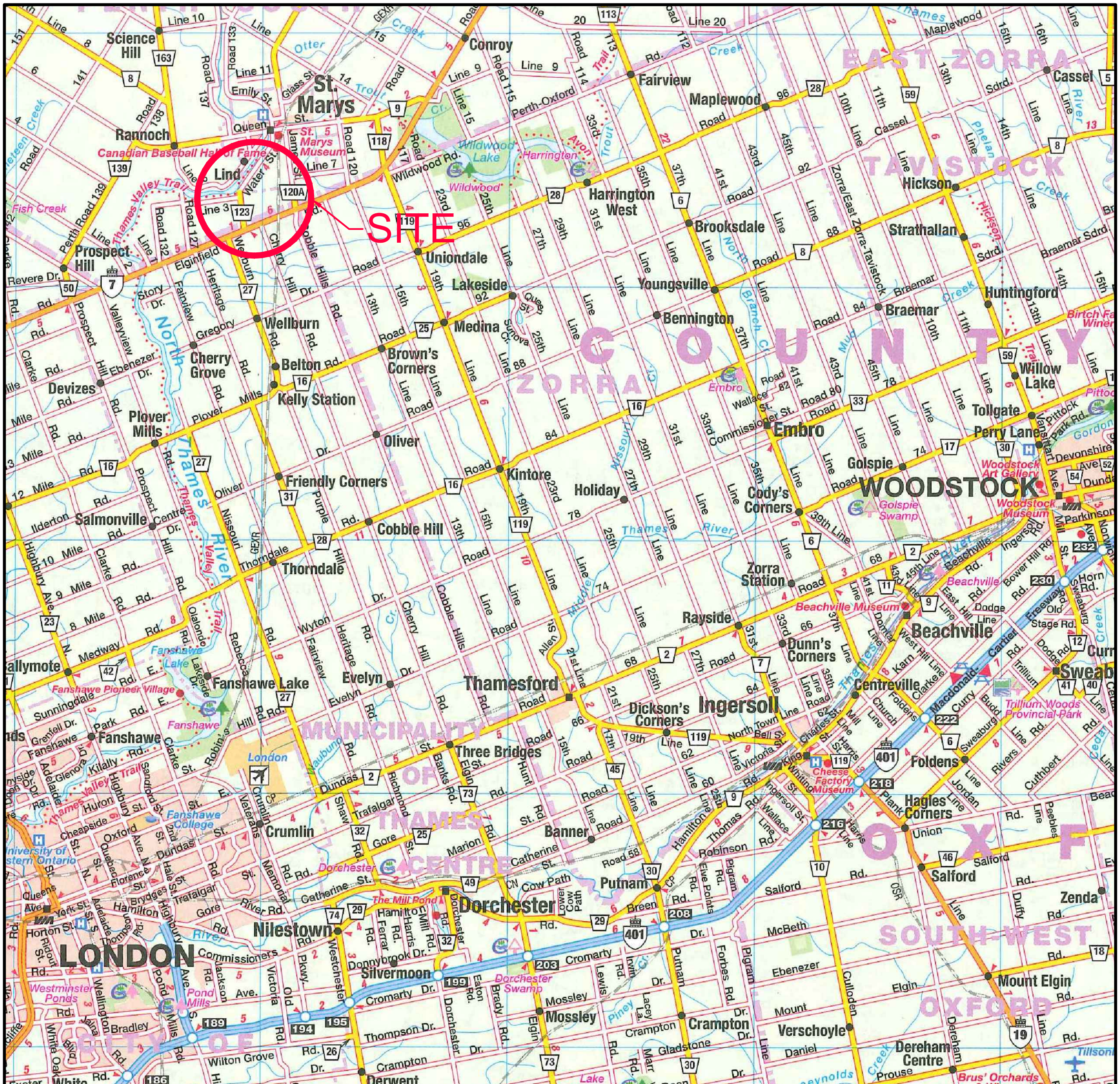
1.2.1 Site Overview

The St. Marys Landfill Site is located at 1221 Water Street South, St. Marys, Ontario. The Site is operated in accordance with Environmental Compliance Approval (ECA) No. A150203, issued June 24, 2010 (with amendments described below). The location is shown on Figure 1 and Figure 2. The Site is situated in the southwest corner of the Town limit, east of Perth County Road 123, on part of Lots 35 and 36 of Thames Concession. The 37 ha site contains the existing 8 ha landfill area.

The ECA for the landfill states that the Site is to be used for the following:

- The final disposal of solid, non-hazardous waste.
- Collection and storage for diversion from final disposal of recyclable waste.
- The acceptance, storage, packaging, bulking and subsequent transfer of Municipal Hazardous or Special Waste (MHSW).
- The composting of leaf and yard waste.

ECA amendment under Notice No. 1 (December 11, 2013) allowed the acceptance of MHSW from the Township of Perth South. Notice No. 2 (November 16, 2015), Notice No. 3 (September 6, 2016), Notice No. 4 (September 5, 2017), Notice No. 5 (September 20, 2018) and Notice No. 6 (October 4, 2019) extended the disposal capacity of the Site to allow completion of the *St. Marys Future Solid Waste Disposal Needs Environmental Assessment*.



Map Reference: Map Art Publishing, Ontario Road Atlas

KEY MAP OF ONTARIO

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THE CORPORATION OF THE TOWN OF ST. MARYS

Figure Title

TOWN OF ST. MARYS
FUTURE SOLID WASTE DISPOSAL NEEDS
ENVIRONMENTAL ASSESSMENT REPORT
SITE LOCATION PLAN

Drawn	Checked	Date	Figure No.
CD	TR	2013/09/24	**1-1**
Scale		Project No.	
N.T.S.		300032339	

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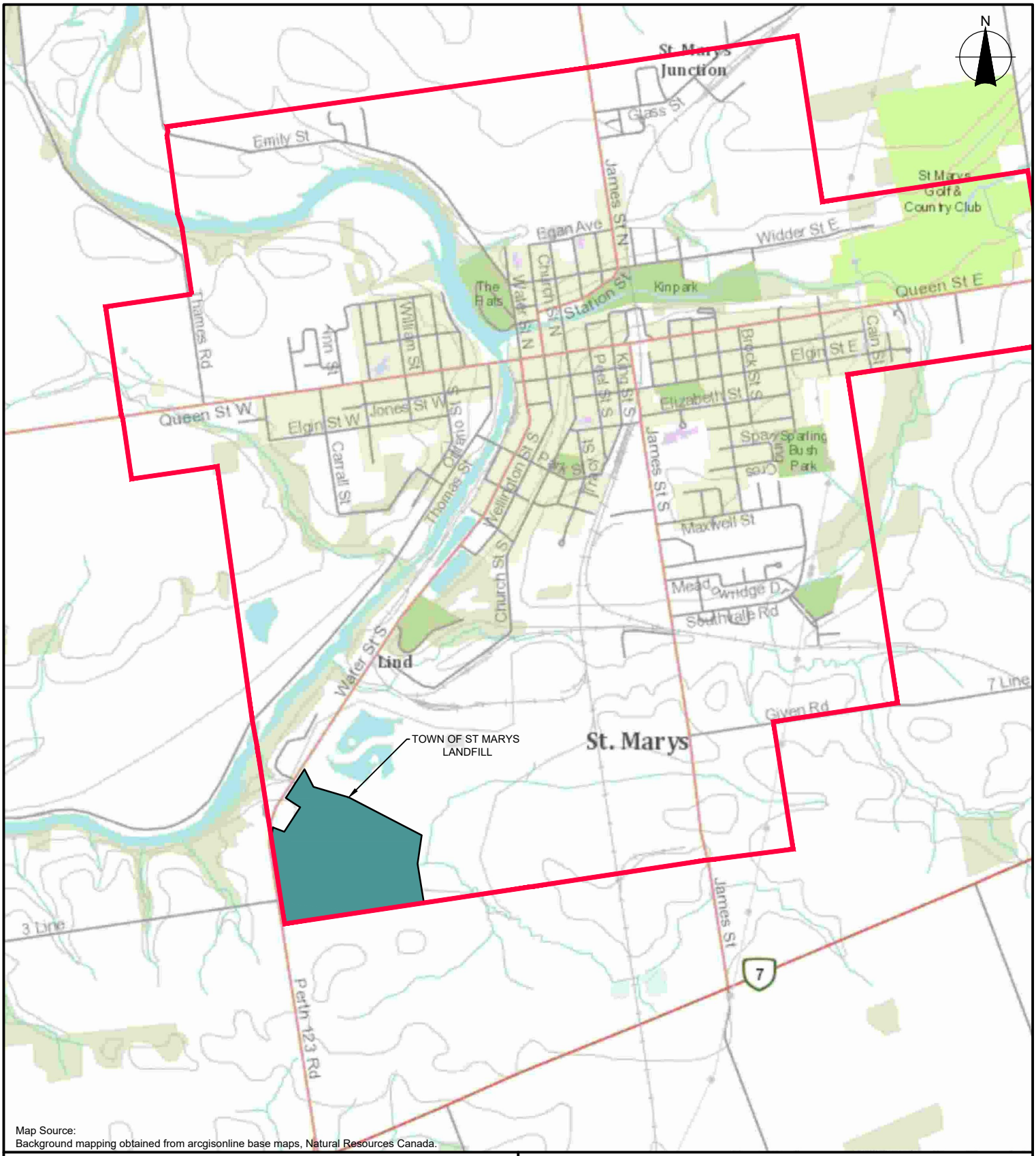

Map Source:
Background mapping obtained from arcgisonline base maps, Natural Resources Canada.

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Figure Title

TOWN OF ST. MARYS
FUTURE SOLID WASTE DISPOSAL NEEDS
ENVIRONMENTAL ASSESSMENT REPORT
TOWN LIMITS AND ST MARYS LANDFILL SITE

Client

THE CORPORATION OF THE TOWN OF ST. MARYS

Drawn	Checked	Date	Figure No.
AE	JRH	16/08/07	**1-2**
Scale		Project No.	
1:25,000		300032339	

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1.2.2 Site Development History

The Site serves the Town of St. Marys and is approved for disposal of solid, non-hazardous wastes. Landfilling at the Site began in December 1984 with the construction of Phase I (see Figure 3). Prior to its use as a waste management facility, St. Marys Cement operated a clay borrow pit on the property. St. Marys Cement personnel indicate that the property was used for this purpose until 1977.

Phase I was filled more quickly than anticipated. According to previous monitoring reports, this was due to excessive daily cover use and several large demolition projects in the Town. Phase I was completed and finished with final cover in the summer of 1993, less than 9 years after it opened. Phase II/III is currently in operation. Phase II/III is divided into 8 stages (or cells), which correspond with the development of the leachate collection system from east to west. Filling has progressed from east to west in stages 1 through 7 and began in stage 8 in September 2013.

The progression of filling has been tracked by annual volumetric surveys. Following the *2014 Annual Operations and Monitoring Report* it was estimated that stage 8 would reach approved capacity by October 2015. On this basis, Burnside prepared an interim fill plan for the Site to allow continued use during completion of the *St. Marys Future Solid Waste Disposal Needs Environmental Assessment*. The Ministry approved the interim filling plan and issued ECA Amendment Notice No. 2. Notice No. 2 provided time limited continued operation within and above the footprint of stages 7 and 8. The disposal capacity of the site was further extended by ECA Amendment Notice No. 3 allowing filling until September 30, 2017, Notice No. 4 allowing filling until September 30, 2018, and Notice No., 5 allowing filling to September 2019. It is anticipated that additional amendments will allow continued filling while the EA is finalized.

1.2.3 Leachate Collection System and Cell Development

The Phase I leachate collection system consists of perforated collector pipes around the perimeter of the landfill footprint. The Phase II/III collection system is an underdrain system that incorporates perimeter collectors as well as lateral collectors beneath the waste. The purpose of these systems is to restrict the lateral off-site migration of the leachate generated within each landfilling area and control the leachate head within the waste.

The locations of the Phase I and Phase II/III leachate collection systems are shown on Figure 2. Both systems consist of collector pipes and manholes. Supporting documentation can be found in the November 1992 Design and Operation Report, Phase II/III, St. Marys Landfill (prepared by Conestoga-Rovers & Associates).

Initially. both systems drained to leachate holding tanks. The Phase I tank was near MH1 (PH 1) and the Phase II/III tank was near MH3. In 1997, a gravity sewer connection was installed to drain the leachate to the Town's sanitary sewer system. The Phase I leachate holding tank was decommissioned in 2008. The Phase II/III leachate holding tank was used to connect the Phase II/III leachate collection system to the gravity sewer and contains a valve to shut off leachate flow. This facilitates maintenance of the sewer line. Leachate collected by the system drains by gravity to the municipal sewer system. Under normal operation leachate is not stored on site.

In October and November 2010, Stage 7 of the Phase II/III base was constructed per the development plan. The leachate collection system was expanded to include a leachate collector pipe connected to MH8 and MH13 for Stage 7.

Stage 8 was constructed between July and September 2013 and began receiving waste September 23, 2013. The leachate collection system was completed with the connection of manholes MH9 to MH12. Construction in the late summer of 2013 also included the relocation of the public drop off area for waste metal, electronic waste (e-waste) and MHSW disposal (necessary to accommodate the cell).

1.2.4 Leachate Monitoring Program

The leachate monitoring program consists of:

- Water Levels, measured or qualitative observation, recorded in all leachate collection system manholes.
- Samples collected from MH1 (Phase I) and MH3 (Phase II/III) for BOD, ammonia, COD, chloride, phenols, nitrate, phosphorous, TKN, TSS, alkalinity, sulphate, calcium, magnesium, iron, manganese, aluminum, barium, beryllium, bismuth, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, potassium, silver, sodium, strontium, tungsten, vanadium, zinc, and VOCs

1.3 Expansion Alternatives

The preferred expansion for the site is Alternative Method 3 as identified in Section 6.2 of the EA Report. In this method, the existing waste footprint is expanded vertically and horizontally:

- Vertically – the existing waste peak of 326 to 327 meters above sea level will be extended across a larger area of the waste footprint.
- Horizontally – the waste footprint will go from 8 hectares to approximately 13 hectares.

The vertical expansion portion of Alternative 3 is likely to have a minimal impact on the volume of leachate generated, as it does not increase the drainage area. However, the composition of the leachate is expected to be affected by vertical expansion since the

precipitation will drain through more waste prior to entering the leachate collection system. This differs from cells expanding the horizontal footprint of the landfill, as there will be a significant increase on the leachate generated due to the additional footprint area through which precipitation can drain.
The development (fill) sequence for the preferred alternative method of landfill expansion is described in Section 2.3.

2.0 Leachate Generation

2.1 HELP Model

The Hydrologic Evaluation of Landfill Performance (HELP) model, Version 3.07, was used to generate data for operational considerations of the proposed expansion at the St. Marys Landfill. Specifically, the modelling was used to assist Burnside in the following tasks:

- To evaluate the existing St. Marys landfill and estimate the amount of leachate that is currently being generated and collected.
- To evaluate the proposed St. Marys landfill expansion, considering the Preferred Alternative Method 3.
- To estimate the amount of leachate generated and collected by the preferred alternative.

A potential development (fill) sequence of the preferred Alternative Method 3 was prepared to allow estimates of leachate generation at each stage of the site's development – from existing conditions through expansion to closure. The proposed expansion sequence shown on Figure 3 represents only one potential design for the landfill expansion. The actual design and sequence of filling may change during the *Environmental Protection Act* (EPA) regulated design process. However, the overall HELP model results are expected to be representative of the Site's leachate generation regardless of the final design and development sequence.

CELL 1

CELL 2

CELL 3

CELL 4

CELL 5

CELL 6

CELL 7

CELL 8

0 50 100 150 200

Metres

N

NOTES:

EXPANSION VOLUME IS ATTAINED FROM A 4:1 SIDESLOPE FROM THE EDGE OF THE WASTE TO ELEVATION OF 323m, FOLLOWED BY A 20:1 SLOPE ON THE PEAK. COMBINED WITH A 5 m VERTICAL EXCAVATION (CKD PILE EXCLUDED).

MINIMUM MECP SETBACK FROM PROPERTY BOUNDARY = 30 m, GUIDELINE SETBACK = 100 m

THE PROPOSED EXPANSION SEQUENCE DESCRIBED ON THIS FIGURE REPRESENTS ONLY ONE POTENTIAL DESIGN FOR THE LANDFILL EXPANSION. THE ACTUAL DESIGN AND SEQUENCE OF FILLING MAY CHANGE DURING THE *ENVIRONMENTAL PROTECTION ACT (EPA)* REGULATED DESIGN PROCESS.

LEGEND:

- EXISTING PHASE 2/3 LANDFILL AREA
- EXISTING LANDFILL AREAS
- METHOD 3 PROPOSED CELL BOUNDARY
- LANDFILL BOUNDARY

OBTAINED CAPACITY - 756,000 m³
ABOVE GRADE - 506,000 m³
BELOW GRADE- 250,000 m³

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Figure Title

SOLID WASTE CAPACITY DEVELOPMENT

METHOD 3: PROPOSED CELL SEQUENCING

Drawn	Checked	Date	Figure No.
ZM	JRH	AUGUST 2019	3
Scale		Project No.	
1:2500		300032339	

File: \\nigel\Shared Work Areas\032339 St Marys\Cell Phasing_help_final.dwg Date Plotted: October 21, 2019 - 11:29 AM

2.2 Existing Leachate Quantity

Actual leachate flow or volume is not currently being measured. However, the HELP model was used to estimate the existing leachate flow from Phases I and II/III and the results are summarized in Table 1 below.

Table 1: HELP Model Estimate of the Existing Leachate Flow

Flow	Modeled Existing Leachate Flow (m^3/d)		
	Phase I	Phase II/III	Total
Average Daily Flow	6.7	17.7	24.5
Peak Flow	82	220	302

2.3 Post-expansion Leachate Quantity

HELP modelling results were based on a proposed expansion pattern seen in Figure 3, which is listed below. The site's expansion progresses from existing conditions (Phase I and Phase II/III) at approximately five-year intervals.

- Existing conditions – i.e, Phases I and II/III.
- The first expansion cell, cell 1, is above the Phase II/III footprint (vertical expansion).
- Cell 2 covers Phase I and the valley between Phases I and II/III (vertical expansion over Phase I).
- Cell 3 is a horizontal expansion of the landfill, neighbouring the second cell.
- Cells 4 and 5 are primarily horizontal expansion cells extending out from cell 3 to the east, with some vertical expansion over the extents of Phase II/III.
- Expansion cells 6, 7 and 8 are horizontal expansions to the landfill, eastward from cell 5.

The proposed expansion sequence described above, and in Figure 3, represents only one potential design for the landfill expansion. The actual design and sequence of filling may change during the *Environmental Protection Act* (EPA) regulated design process. Overall, the HELP model attempts to represent the preliminary site design of Alternative Method 3. As would be expected, the development sequence shown in Figure 3 results in peak drainage occurring during the operation of the final Cell (see Table 2).

For this assessment, we have used the HELP model results, summarized in Table 2 below, to represent leachate quantity from the expanded Site, namely:

- Maximum average daily leachate flow = 44.25 m^3/day.
- Single day (peak) leachate flow = 567.8 m^3/day.

These represent the maximum leachate flows that will require treatment at the St. Marys Wastewater Treatment Plant. It should be noted that these are estimates only and the actual volume and loading will vary from the values presented here.

The maximum leachate flows in Table 2 do not account for the potential to delay discharges from the leachate collection system into the sewer, ultimately reaching the WWTP. The landfill itself can act as a temporary storage tank for the leachate; voids in the waste, the granular drainage channels/blanket and leachate collection system pipes provide this capacity. Dependent upon the final design of the landfill, to be determined through the Environmental Protection Act (EPA) design, the design could provide several days of storage capacity without compromising the landfill liner or having leachate seeps[1]. This potential storage capacity has not been considered in this Leachate Treatment and Disposal Report. Rather, it is noted as a contingency should either the sewer or WWTP temporarily require a reduced flow rate from the Site.

Table 2: HELP Model Estimates of Average & Peak Drain (Leachate) Values

Cell	Year		Average Annual Drain (m^3)	Average Drain (m^3/day)	Peak Drain (m^3/day)
	Opened	Closed			
1	2017	2021	9,013	24.69	337
2	2022	2026	8,517	23.33	350
3	2027	2031	10,504	28.78	394
4	2032	2036	12,207	33.44	438
5	2037	2041	13,223	36.23	472
6	2042	2046	14,550	39.86	520
7	2047	2051	15,186	41.61	541
8	2052	2056	15,978	43.78	**568**
Final Closure	2057	-	16,152	**44.25**	562

Drain refers to the volume of leachate that has percolated through the waste layer.

2.4 Historic Leachate Quality

Leachate samples are collected and analyzed for general chemistry parameters and volatile organic compounds (VOC) and metals. The purpose of this monitoring is to:

[1] A seep typically involves leachate that escapes the above grade portion of a landfill, flowing overland and contaminating storm water. Seeps are often caused by a blockage that prevents the downward flow of leachate to the leachate collection system. They can also be caused when the leachate collection system is not operating and the landfill base fills-up, like a bathtub.

- Identify the compounds present in the leachate generated at the Site.
- Assist in the identification of landfill-derived impacts on the surface water and groundwater.
- Assess the strength of the leachate going to the sewage treatment plant.

Leachate samples are collected from MH1 (Phase I) and MH3 (Phase II/III). Prior to 2014, the samples were collected in the fall of each year, in conjunction with the fall monitoring. Beginning in 2014, leachate samples have been collected in the spring and fall of each year in accordance with the ECA. The sampling results are summarized in Table 4 and are compared to the Town of St. Marys' By-Law Limits for Sanitary and Combined Sewer Discharge.

The historical range of typical leachate parameters are listed in Table 3, below.

Table 3: Historical Range of Typical Leachate Parameters

Parameter	Units	Sewer Use By-law	Concentrations in Leachate	
			MH1 (Phase I)	MH3 (Phase II/III)
TSS	mg/L	300	3 – 30,800	20 – 5640
BOD_5	mg/L	300	5 – 250	35 – 4,700
Chloride	mg/L	-	13.5 – 760	320 – 3,050
Conductivity (field)	µS/cm	-	485 – 7,800	1,320 – 15,700
Ammonia	mg/L	-	0.78 – 248	32.0 – 1,132
Total Phosphorous	mg/L	10	0.04 – 16.6	0.45 – 39.9
Iron	mg/L	-	0.51 – 288	0.22 – 290
Manganese	mg/L	-	0.029 – 1.15	0.36 – 5.60

The results show concentrations are generally higher in Phase II/III than in Phase I. Sampling of Phase I did not start until 1991, about two years before the Phase was completed. Phase I was only active for 9 years, while Phase II/III has been active for 23 years, has a greater volume of waste, and the waste is newer[2]. Phase I leachate concentrations have generally been declining (1993-current).

There have been sporadic occurrences of BTEX parameters since 1991. VOC testing in April and September 2017 detected low levels of BTEX parameters in the leachate from both landfill phases. In 2017, the concentrations from Phase I were low (≤ 3 µg/L), while the Phase II/III concentrations were slightly higher (≤ 23 µg/L). These levels are below the sanitary sewer limits.

[2] Contaminants are washed out of the waste over time. The same mass of older waste would not result in the same concentration of contaminants as newer waste.

Table 4: Historical Leachate Chemistry – St. Marys Landfill

Location	Phase	Sampling Date	Total Alkalinity	BOD	BOD Soluble	Chloride	COD	COD Soluble	Ammonia	TKN	Nitrate	Nitrite	Fluoride	Phenols	Hardness	TDS	TSS	Sulphate	TOC	DOC	Total Phosphorous	Aluminum	Barium	Beryllium	Bismuth	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Phosphorous	Potassium	Silver	Sodium	Strontium	Titanium	Tungsten	Vanadium	Zinc	Field pH	Field Conductivity	Field Temperature
		Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		µS/cm	°C
Sewer Use By-Law[5]				300			600			50				0.1			300				10					0.7		2.8	5.0	2.0		0.07			5.0	2.0		0.4						2.0	6.0 - 10.5		60
MH-1	I	Nov-87	2706			660			209	250	0.36	<0.10		0.045	837	3716		100		110		0.085 U,F	0.211		<0.04		190		0.013 U,L	0.076	7.92	0.052 U,L	184	0.394		0.031	--	374		557	3.18	0.009		0.008 U,L	0.175	7.1	3860	
MH-1	I	Dec-87	2781	63	41	760	428	371	248	304	0.36	<0.10		0.042	1008	3840	39	79.5	238	109		0.484	0.392		<0.04		263		0.01	0.124	18.9	0.023 U,F	193	0.48		0.027	1.96	384		651	3.22	0.037		0.013	0.105	7.91	2840	
MH-1	I	Jan-88	2484	45	37	573	1017	707	163	185	<0.10	<0.10		0.036	1340	3328	38	75.3																											6.93		
MH-1	I	May-89		28		405			57.2					0.04	1130	2043											225				15		138	1.15													
MH-1	I	Aug-89		88		673	441				<0.1			0.048																																	
MH-1	I	Sep-90		26		684	385		230	232	<0.1			0.065			27				1.37	0.105	0.357				250	0.006	0.009	0.197	18.8	0.073	162	0.334	0.012	0.025	0.865	296		492	3.46	0.018	0.046	0.016	0.079	7.4	4400	
MH-1	I	Sep-91		19		193	61		3.32	60.6	3.84			0.012			214				0.26	1.53	0.32				95.1	0.008		3.03	12.4	0.196	25.7	0.131		0.01		22.1	0.052	121	1.2	0.03		0.007	0.453	7.3	1100	
MH-1	I	Sep-92		101		321	211		67	88.7	2.2			0.007			177				0.37	0.165	0.126	<0.001	<0.04	<0.003	128	<0.005	<0.005	4.57	6.28	0.052	62.4	0.161	0.007	<0.01	0.45	98.3	<0.007	239	2.68	0.004	<0.05	0.006	0.034	7.7	2650	
MH-1	I	Apr-93		24		161	206		101	80	<0.1			0.018			126				1.12	0.539		<0.050	<0.050	0.0007	43.8	<0.010	0.0038	0.053	29	0.005	134	0.837	<0.010	0.013	1.12	89.1	<0.0001	218	1.98	<0.050	<0.050	0.012	0.072	6.9	2900	
MH-1	I	Sep-94		213		605	347		136	196	<0.1			0.016			380				15.8	14.7	18.9			<0.0001	548	0.034	<0.0004	0.05	694	<0.001	225	0.995	0.041	0.073	15.8	225	<0.0001	451	10.1			0.064	0.141	6.5	4300	
MH-1	I	Oct-95		5.9		114	--		3.92	16.7	0.55			<0.002			16				0.19	0.111	0.0881				150			0.005	0.886	0.0064	24.1	0.195		0.0086	0.059	21.9		56.1	0.78	0.0012		0.002	0.0052			
MH-1	I	Sep-96		87.3		13.5	524		147	147	<0.04			<0.002			1400				10.9	0.62	1.54	<0.004	<0.04	<0.004	249	<0.02	<0.008	<0.0084	288	<0.02	129	0.632	<0.024	<0.024	8.52	228	<0.016	449	3.53	0.071	<0.08	<0.016	0.08	6.69	4990	
MH-1	I	Sep-97		119		592	1110		151	197	0.11			<0.001			4200					<0.10	0.176	<0.002		<0.001	351	<0.02	<0.003	<0.02	4.38	<0.01	338	0.98	<0.01	0.112		561	<0.001	1410	2.44				0.206	6.74	5530	
MH-1	I	Sep-98		5.3		190	23		110	110	<0.10			0.005			89.5				0.33	0.19	0.2	<0.001	<0.001	0.0008	250	0.03	0.0066	0.031	4.8	0.004	120	0.54	0.002	0.013		120	<0.0001	220	2.1	0.021	<0.01	<0.001	0.042	7.05	2910	
MH-1	I	Apr-99		5		40.6	29		1.4	2.6	0.7			0.001			3				<0.02	0.2	0.055	<0.0007	<0.0011	<0.0005	100	0.001	<0.0005	0.0072	0.53	<0.0011	19	0.029	0.0018	0.0034		12	<0.0003	38	0.34	0.007	<0.0005	0.0011	0.041	7.69	646	
MH-1	I	Sep-99		39		527	237		195	197	<0.5			0.014			102				2.38	<0.04	0.562	<0.001	<0.023	<0.003	213	<0.005	<0.005	<0.004	39.4	<0.025	186	0.378	<0.006	<0.01	2.43	259	<0.007	424	2.53	0.013	<0.03	<0.003	0.019	7.54 [(1)]	5330	
MH-1	I	Aug-00	2210	21		432	218		3.89	173	0.34J			0.055			82	55.9			1.15		0.203	<0.002	<0.002	<0.001	204	0.007	0.007	0.014J	1.4	<0.002	131	0.37	<0.002	0.01	1.15	370	<0.002	204	2.15	0.006	<0.01	0.003	0.11	9.49	485	
MH-1	I	Nov-01	1330	83		226	98		97.9	139	<0.5			0.025			52	22.4			0.61	0.028	0.228	<0.005	<0.01	<0.01	216	<0.01	<0.005	<0.006	17.6	<0.01	78.7	0.611	<0.01	<0.01	0.61	93.9	<0.005	175	1.82	<0.01		<0.005	0.02	6.39	2910	
MH-1	I	Nov-02	280	5		42	30		0.78	1.6	<2			<0.001			17	<40			0.04	0.06	0.07	<0.001	<0.001	<0.0001	97	<0.001	0.0029	0.005	0.51	0.009	17	0.054	<0.001	0.005	0.04	7.4	<0.0001	24	0.4	<0.002	<0.01	<0.001	0.013	6.94	663	
MH-1	I	Nov-03	1300	20		328	150		77	100	<2			0.005			36	157			1.8	0.6	0.5	<0.01	<0.01	<0.001	240	<0.5	<0.008	<0.01	26.6J	<0.01	116	0.55	<0.01	<0.02	1.8	140	<0.001	267	2.19	0.04	<0.1	<0.01	0.05	7.00	3450	
MH-1	I	Nov-04	1100	11		164	80		69	77	0.4			0.006			79	97			0.73	<0.1	0.2	<0.01	<0.01	<0.001	258	<0.01	<0.008	<0.01	16.6	<0.01	83	0.72	<0.01	<0.02		80	<0.001	140	1.84	<0.02	<0.1	<0.01	0.15	6.18	2680	
MH-1	I	Nov-05	1740	13.0 J		408	167		149	154	<2.0			0.0090			64.0	59.1			1.65	<0.10	0.35	<0.010	<0.010	<0.001	259	<0.010	<0.008	<0.010	29.2	<0.010	121	0.607	<0.010	<0.020		141	<0.001	294	2.47	<0.020	<0.10 UJ	<0.010	<0.030	6.8	4440	
MH-1	I	Nov-06	794	4.3		123	66		43.9	44.1	0.25			0.0030			17.3	37.0			0.39	0.029	0.144	<0.0010	<0.0010	<0.00010	162	0.0015	0.00092	0.0025	8.99	<0.0010	43	0.431	0.0013	<0.0020	0.385	43	<0.0001	99.3	1.09	0.005	<0.010	0.0013	<0.0030	6.4	7800	
MH-1	I	Dec-07	1040	7		122	170		51.9	59.4	<1.0			<0.0010			85	40.3			4.71	0.13	<0.10	<0.010	<0.010	<0.0010	32.8	<0.010	<0.0050	<0.010	0.57	<0.010	11.2	0.244	<0.010	<0.020	4.71	17	<0.001	39.2	0.123	<0.020		<0.010	0.057	7.21	2360	
MH-1	I	Nov-08	1540	4.8		<40	170		107	114	<2.0			<0.01			49	<40			1.19	0.057	0.33	<0.001	<0.001	<0.0001	230	0.00225	0.00473	0.0013	23.1	<0.001	80.4	0.686	<0.001	0.0061	1.19	94	<0.0001	185	2.22	0.0123		0.0022	0.0087	6.42	2894	
MH-1	I	Nov-10	1230	250		268	311		111	186	<1.0			0.015			7400	30.0			79.4	0.006	0.346	<0.001	<0.002	<0.002	210	0.003	0.007	<0.003	53.4	<0.002	78.5	0.547	<0.002	<0.003		82.9	<0.002	176	3.02		<0.010	<0.002	0.007	NA	NA	NA
MH-1	I	May-11	1650	45		261	244		120	236	<1.0			0.007			10500	48.0			1.6	0.012	0.252	<0.001	<0.002	<0.001	188	<0.003	0.004	<0.003	30.7	<0.002	85.0	0.657	<0.002	0.004		110	<0.002	201	2.03		<0.010	<0.002	0.008	6.85	1506	9.81
MH-1	I	Sep-11	1640	51		423	131		142	141	<2.5			0.021			30800	44.2			0.28	0.006	0.307	<0.001	<0.002	<0.001	240	0.003	0.006	<0.003	46.2	<0.002	107	0.356	<0.002	0.01		130	<0.002	262	2.6		<0.010	0.002	<0.005	8.53	3312	12.06
MH-1	I	Apr-12	1350	18		203	121		91	87.3	<1.0			0.017			1630	63.9			16.6	0.005	0.174	<0.001	<0.002	<0.002	227	<0.003	0.003	<0.003	13.8	<0.002	78	0.555	<0.001	<0.003		90.2	<0.002	135	1.69		<0.010	<0.002	<0.005	6.76	2342	6.91
MH-1	I	Oct-12	Ins																																												
MH-1	I	Apr-13	1180	6		145	117		72	68.4	<0.25			0.003			232	50.2			9.7	0.078	0.816	<0.001	<0.002	<0.002	218	<0.003	0.004	<0.003	121	<0.002	65	0.725	0.001	<0.003		64.1	<0.002	106	1.9		<0.010	0.004	0.022	6.80	2087	9.87
MH-3	II/III	May-89		1777		320			43.8					0.256	1442	2847											426				12		91.9	5.60													
MH-3	II/III	Aug-89		1358		322	2235				<0.1			1.11																																	
MH-3	II/III	Sep-90		4695		1126	7348		930	1012	<0.10			1.9			520				13.1	0.709	0.107				367	0.047	0.015	0.808	6.07	0.053	365	2.33		0.064	9.63	456		1040	2.02	0.073	0.043	0.027	0.568	8	8200	
MH-3	II/III	Sep-91		3854		1610	6569		1132	1691	<0.10			0.991			180				5.3	2.25	2.29				531	0.068	0.014	6.89	22.9	0.139	470	3.78		0.1	0.93	664		1440	3.08	0.127	0.06	0.038	1.91	7.4	9300	
MH-3	II/III	Sep-92		2063		1635	2323		466	550	<0.10			0.447			71				0.45	0.543	0.162	<0.001	<0.04	<0.003	234	0.039	0.014	0.741	7.09	0.05	327	1.33	<0.006	0.08	4.91	497	<0.007	1270	2.31	0.078	<0.05	0.021	0.208	7.59	9500	
MH-3	II/III	Apr-93		1349		1294	2645		252	271	<0.10			0.599			80				4.8	1.39		<0.050	<0.050	0.0016	43.9	0.039	0.0188	0.078	22.2	0.012	383	20.0	0.023	0.078	4.8	344	<0.0001	871	5.07	<0.050	<0.050	0.035	1.59	7.3	7000	
MH-3	II/III	Sep-94		297		1580	1080		733	797	<0.1			0.027			131				7.4	0.971	0.208			<0.0001	269	0.032	<0.0004	0.023	2.97	<0.001	408	0.696	0.017	0.128	7.4	494	<0.0001	1030	2.61			0.023	0.142	7.1	9300	
MH-3	II/III	Oct-95		20.7		762			32.0	34.2	1.59			0.008			40				1.76	0.25	0.0914			0.0016	201	0.0109	0.00637	0.0273	2.57	0.0134	162	0.376	0.0072	0.0104	1.27	273	0.002	542	0.751	0.0156	0.003	0.0113	0.0535			
MH-3	II/III	Sep-96		108		13.0	596		187	211	1.79			<0.002			100				8.64	0.697	0.159	<0.004	<0.04	<0.004	222	0.025	<0.008	<0.0084	4.47	<0.02	166	1.26	<0.024	<0.024	4.86	302	<0.016	671	1.35	0.108	<0.08	0.09	0.126	7.5	6250	
MH-3	II/III	Sep-97		120		1910	1030		544	626	0.04			<0.001			24					<0.10	2.32	<0.002		<0.001	274	<0.02	<0.003	<0.02	290	<0.01	177	0.36	<0.01	<0.01		235	<0.001	516	4.23				0.183	7.07	13400	
MH-3	II/III	Sep-98		35		740	80		130	130	<0.5			0.003			45.3				3.2	0.38 J	0.14	<0.001	<0.001	0.011J	350	<0.001	0.011	0.11	5.0 J	0.010J	120	1.10	0.018J	0.053		190	<0.0001	480	1.6	0.042J	<0.01	<0.001	0.19J	7.41	5010	
MH-3	II/III	Sep-98		36		700	90		130	130	<0.5			0.004			44.7				3.2	0.26	0.12	<0.001	<0.001	0.0002	320	<0.001	0.01	0.13	4.0	0.007	110	1.00	0.01	0.047		180	<0.0001	430	1.4	0.024	<0.01	<0.001	0.15			
MH-3	II/III	Apr-99		675		1180	1640		373	407	<1.5			0.04			2190				13	9.3	0.71	0.0007	<0.0011	0.0008	340	0.055	0.033	0.063	100	0.02	260	1.70	0.0076	0.12		320	0.0021	770	1.7	0.2	0.0072	0.019	0.36	7.09	10000	
MH-3	II/III	Sep-99		447		2480	1450		1050	1170	0.6			0.034			20				9	0.3	0.218	<0.001	<0.023	<0.003	146	0.086	0.028	<0.004	1.82	<0.025	335	0.589	<0.006	0.15	9.4	775	<0.007	1720	1.5	0.16	<0.03	0.028	0.165	7.77 (1)	15700	
MH-3	II/III	Aug-00	6110	201		3050	1480		46.0	1140	<0.05UJ			0.271			42	102			5.69		0.195	<0.002	<0.002	<0.001	200	0.098	0.03	0.016	2.5	0.008	300	0.817	0.006	0.155	5.69	1510	0.002	610	1.82	0.145	<0.01	0.042	0.369	10.04	14800	
MH-3	II/III	Nov-01	4580	117		1690	897		744	751	<5.0			0.082			130	95.8			3.43	0.237	0.214	<0.005	<0.01	<0.01	219	0.072	0.026	0.006	3.49	<0.01	244	0.803	<0.01	0.108	3.43	541	<0.005	1300	1.61	0.098		0.027	0.073	7.03	11900	
MH-3	II/III	Nov-02	4690	125		1670	1300		630	1050	<2			0.094			80	58			10	0.2	0.24	<0.01	<0.01	<0.001	330	0.08	0.017	<0.01	1.0	<0.01	270	0.900	<0.01	0.09	10	500	<0.001	1300	1.6	<0.02	<0.01	<0.01	0.25	6.93	13900	
MH-3	II/III	Nov-03	5000	210		1670	1300		720	810	<2			0.068			160	147			7.6	1.1	0.2	<0.01	<0.01	<0.001	281	<3	0.025	0.01	4.1J	<0.01	262	1.19	<0.01	0.1	7.6	530	<0.001	1370	1.76	0.12	<0.1	0.02	0.1	7.64	12300	
MH-3	II/III	Nov-04	2200	921		1010	2200		220	330	<0.5			0.436			21	104			8.4	0.5	0.1	<0.01	<0.01	<0.001	385	0.05	0.011	0.05	6.1	0.02	122	2.60	<0.01	0.06		210	<0.001	670	1.49	0.06	<0.1	0.01	1.03	6.37	6470	
MH-3	II/III	Nov-05	4440	563		1520	2030		541	845	<2.0			0.406			49	<40			10.5	0.58	0.36	<0.010	<0.010	<0.0010	369	0.071	0.032	<0.010	5.78	<0.010	246	1.85	<0.010	0.119		520	<0.001	1400	2.3	0.142	<0.10 UJ	0.026	0.183	7.25	1320	
MH-3	II/III	Nov-06	1710	926		719	1940			182	<0.50			0.13			58.7	435			2.57	0.96	0.25	<0.010	<0.010	<0.0010	342	0.026	0.0119	0.039	6.36	0.012	149	2.27	<0.010	0.064	2.57	153	<0.0010	516	1.83	0.077	<0.10	<0.010	0.608	6.57	5100	
MH-3	II/III	Dec-07	2100	598		547	1500		136	200	<1.0			0.256			68	105			4.76	1.11	0.151	<0.0010	<0.0010	0.00024	303	0.0196	0.0105	0.0183	5.00	0.0069	130	1.70	0.0036	0.0471	4.76	171	<0.00010	399	1.43	0.0662		0.0092	0.54	7.25	5056	
MH-3	II/III	Nov-08	4100	388		71.2	1540		455	479	<2.0			<0.1			80	<40			10.0	1.07	0.3	<0.010	<0.010	<0.00090	381	0.0669	0.0178	0.011	9.10	<0.010	197	2.65	<0.010	0.086	10	350	<0.0010	1040	2.05	0.197		0.03	0.183	6.29	9170	
MH-3	II/III	Jun-10	3220	389		968	770		574	731	<1.0			0.040			5640	146			11.8	0.106	0.154	<0.001	<0.002	<0.002	303	0.031	0.018	<0.003	5.08	<0.002	154	1.44	<0.002	0.049		294	<0.002	688	1.94		<0.010	0.009	0.041	6.95	>3999	16.6
MH-3	II/III	Nov-10	3370	573		1370	729		591	610	<5			0.045			1570	103			15.7	0.120	0.191	<0.001	<0.002	<0.002	303	0.061	0.023	0.005	0.446	<0.002	187	2.08	0.003	0.099		354	<0.002	978	2.65		<0.010	0.018	0.021	7.23	>3999	12.1
MH-3	II/III	May-11	4510	1410		1210	3320		504	1130	<5			0.715			NR	378			39.9	0.118	0.193	<0.001	<0.002	<0.001	548	0.047	0.012	<0.003	0.980	<0.002	256	4.29	<0.002	0.056		389	<0.002	1040	2.33		<0.010	0.017	0.027	6.98	7873	13.10
MH-3	II/III	Sep-11	4940	232		1760	692		414	620	<5			0.072			1050	265			10.4	0.115	0.200	<0.002	<0.004	<0.002	445	0.054	0.020	<0.006	1.060	<0.004	250	2.53	<0.004	0.096		466	<0.004	1140	2.21		<0.020	0.019	0.013	12.95	5923	14.58
MH-3	II/III	Apr-12	4240	1990		1200	4560		458	581	<5			0.505			4780	32			24.2	0.122	0.174	<0.002	<0.004	<0.004	587	0.038	0.008	<0.006	0.219	<0.004	239	4.28	<0.002	0.04		402	<0.004	947	2.16		<0.020	0.009	0.048	7.25	8303	11.45
MH-3	II/III	Oct-12	No results - sample bottles were misplaced by the laboratory																																											
MH-3	II/III	Apr-13	3000	1030		770	2120		326	330	<1.00			0.434			1740	4.7			13.1	1.040	0.271	<0.001	<0.002	<0.002	375	0.037	0.019	0.019	38.7	0.008	158	3.38	0.002	0.05		243	<0.002	600	1.84		<0.010	0.009	0.459	6.93	7094	12.18

2.5 Post-expansion Leachate Quality

It is difficult at best to accurately predict concentrations of various organic and inorganic constituents in leachate that will be generated by the proposed landfill expansion; there are uncertainties around accurately predicting the chemistry in the leachate that will be generated by the proposed landfill expansion. For the EA study, leachate chemistry from six southern Ontario landfills were studied and summarized together with the data collected from the existing St. Marys Landfill leachate (range) to provide a reasonable estimate of the range for the conventional pollutant parameters anticipated following expansion. This information is provided in Table 5. The actual leachate from the expanded landfill may differ from these estimates. Representative concentrations for the expanded St. Marys Landfill Site were estimated based on the flows discussed in Section 2.3.

It should be noted that the minimum and maximum levels shown are based on the available data set in Table 5. The Estimated Representative Level is not an average calculation. This value was estimated by reviewing the data set, using knowledge of the landfills in question and selecting a value for each parameter that is likely representative of what is expected for the St. Marys expansion. It should also be noted that the leachate characteristics will be dependent upon the wastes that accumulate in the new footprint. Over time the characteristics will change as different wastes accumulate and previous wastes age.

The St. Marys Landfill is approved to receive domestic, commercial, and industrial non-hazardous solid waste. Therefore, it is expected that only low levels of MECP “priority pollutants” will be found in the leachate. These contaminants are not anticipated to have a detrimental effect on the treatment system option selected. Many treatment facilities handle similar Ontario landfill leachate. This aspect will be verified through sampling and analysis of the actual leachate produced on an ongoing basis.

Table 5: Leachate Quality: St. Marys Landfill, 6 Other Southern Ontario Landfills and Future Estimate

Leachate Source		Town of St. Marys Sanitary Sewer By-Law	St. Marys Landfill	Oxford Landfill	Peterborough Landfill	Sarnia Landfill	Keel Valley Landfill	Laidlaws Durham Landfill	Walker Bros. Landfill	Estimated Leachate Quality, St. Marys Landfill		
Parameter	Unit									Min	Max	Estimated Representative Levels
pH	pH	6-10.5		7.5 - 8.17	6.27 - 7.31	6.2 - 7.5	6.2 - 6.8	6.8 - 7.4	7.4 - 9	6.00	9.00	7.20
Chloride (Cl)	mg/L		100 – 3,000	750 – 1,800	284 - 922	120 – 1,600	453 – 1,050	300 - 428	196 – 2,830	100	3,000	
Total Suspended Solids (TSS)	mg/L	300	20 – 7,900 (Ave.=993)	25 - 184 (Ave. = 74)	14 - 42 (Ave. = 21)	12 - 685			45 - 792	12	7,900	995.00
Chemical Oxygen Demand (COD)	mg/L	600	80 – 7,400 (Ave.=1970)	730 – 2,020 (Ave. = 1200)	159 - 617 (Ave. = 467)	281 – 2,800	1,410 – 6,400	1,280 – 4,560	1,009 – 3,300	80	7,400	2,240.00
Biochemical Oxygen Demand (BOD)	mg/L	300	20 – 4,700 (Ave.=900)	64 – 1,600 (Ave. = 555)	20.6 - 829 (Ave. = 382)	60 - 2540	2,330 – 4,820	900 – 1,600	810 – 4,934	20	4,900	1,800.00
Carbonaceous BOD (CBOD)	mg/L		-		16.7 - 658 (Ave. = 358)					17	660	1,320.00
Total Kjeldahl Nitrogen (TKN)	mg/L	50	30 – 1,700 (Ave.=630)	86 - 761 (Ave. = 447)	82 – 358 (Ave. = 195)	150 - 810		26.3 - 44.3		26	1,700	630.00
Total Ammonia Nitrogen	mg/L		30 - 1100							30	1,100	466
Fluoride (F)	mg/L			0.32 - 0.71						0.2	0.7	
Sulphate (SO_4)	mg/L		5 - 440	<2 - 350		<1 - 90	27 - 78	0.34 - 5.5	131 – 10,800	<1.0	10,800	
Total Phosphorus (TP)	mg/L	10	0.5 - 40 (Ave. = 9.5)	2.63-6.86 (Ave. = 4.4)	0.34 - 2.42 (Ave. = 0.95)	ND - 5.35	0.32 - 0.9			0.3	40	9.5
Solvent Extractable Matter of mineral or synthetic origin	mg/L	15			<0.5 - 9					<0.5	9	
Solvent Extractable Matter of animal or vegetable origin (grease and oil)	mg/L	150			<0.5					<0.5	0.5	
Phenolic Compounds	mg/L	0.1	0.003 – 2 (Ave=0.3)	0.007 - 0.33	16 - 92	230 - 2300	1.1 - 4.45	1.1 - 1.5	0.97 - 1.4	0.003	2300	0.31
Aluminum (Al)	mg/L		0.1 - 9	0.19 - 5.97	0.03 - 1	0.4-0.5	0.11 - 1.18		1.6 - 3	0.03	6	
Iron (Fe)	mg/L		0.2 - 290	2.14 - 9.57	3.04 - 28.9	1.5 - 77	65 - 220	8.0 - 138	1.25 - 18.5	0.2	290	
Antimony (Sb)	mg/L			<0.02 - 0.06	<0.02					0.006	0.06	

Leachate Source		Town of St. Marys Sanitary Sewer By-Law	St. Marys Landfill	Oxford Landfill	Peterborough Landfill	Sarnia Landfill	Keel Valley Landfill	Laidlaws Durham Landfill	Walker Bros. Landfill	Estimated Leachate Quality, St. Marys Landfill		
Parameter	Unit									Min	Max	Estimated Representative Levels
Bismuth (Bi)	mg/L			<0.05	<0.05 - 0.3					<0.01	0.3	
Cobalt (Co)	mg/L	5	0.006 - 0.03	0.01 - 0.043	0.002 - 0.01	0.01 - 0.03	0.015 - 0.025			0.002	0.03	
Arsenic (As)	mg/L	1		<0.01 -0.02	<0.01	<0.001	<0.001 - 0.003			<0.001	0.02	
Barium (Ba)	mg/L		0.09 - 2	0.5 - 1.39	0.47 - 0.71	0.094 - 0.1	0.16 - 1.14			0.09	2.5	
Cadmium (Cd)	mg/L	0.7	0.0002 - 0.0016	<0.001 - 0.002	0.0007 - 0.002	<0.005 - 0.01	<0.001 - 0.002			<0.0001	0.01	
Chromium (Cr)	mg/L	2.8	0.01 - 0.1	0.032 - 0.13	0.005 - 0.055	0.01 - 0.3	0.009 - 0.04		0.04 - 0.14	0.005	0.3	
Copper (Cu)	mg/L	2	0.005 – 7 (Ave=0.3)	0.007 - 0.33	<0.005	<0.03 - 0.11	0.014 - 0.044		0.01 - 0.1	<0.001	7	0.33
Manganese (Mn)	mg/L		0.4 - 20	0.493 - 1.63	0.23 - 0.76	0.02 - 0.24	2.75 - 8.31	3.63 - 4.21	0.11 - 4	0.09	20	
Lead (Pb)	mg/L	0.07	0.002 - 0.14 (Ave=0.02)	<0.007 - 0.013	0.007 - 0.02	<0.005 - 0.23	0.001 - 0.043			<0.0025	0.23	0.017
Selenium (Se)	mg/L	0.8		<0.01 - 0.02	<0.002	<0.001 - 0.003	<0.001 - 0.004			<0.001	0.02	
Zinc (Zn)	mg/L	2	0.01 - 1.9	0.02 - 0.7	0.01 - 0.16	0.091 - 0.66	1.31 - 2.44		0.1 - 0.68	<0.005	2.4	
Molybdenum (Mo)	mg/L	5	0.002 - 0.023	<0.01	<0.005	<0.005 - 0.065				<0.0005	0.065	
Silver (Ag)	mg/L	0.4	0.002	<0.08	<0.01		<0.005 - 0.11			<0.001	0.11	
Tin (Sn)	mg/L			<0.02 - 0.03	<0.02					<0.01	0.03	
Titanium (Ti)	mg/L		0.016 - 0.2	0.053 - 0.41	0.02 - 0.06					0.006	0.4	
Vanadium (V)	mg/L		0.01 - 0.1	0.01 - 0.04	0.004 - 0.01	<0.02 - 0.03				0.003	0.1	
Nickel (Ni)	mg/L	2	0.01 - 0.16	0.06-0.16	0.029 - 0.055	<0.05 - 0.1	0.043 - 0.159		0.12	0.01	0.16	
Sulphide (S)	mg/L	1		<0.02 - 0.75						<0.02	0.75	
Cyanide (HCN)	mg/L	1.2		<0.01 - 0.02	0.005 - 0.23	<0.001 - <0.002	<0.1 - 1.1			0.005	0.23	
Mercury (Hg)	mg/L	0.01		<0.00001 - 0.00009	<0.1					<0.00001	0.1	

1. Summarized leachate chemistry from six (6) southern Ontario landfills, data collected from the existing St. Marys Landfill leachate (range) and estimate of the anticipated range for the conventional pollutant parameters

2.6 Treatment and Disposal

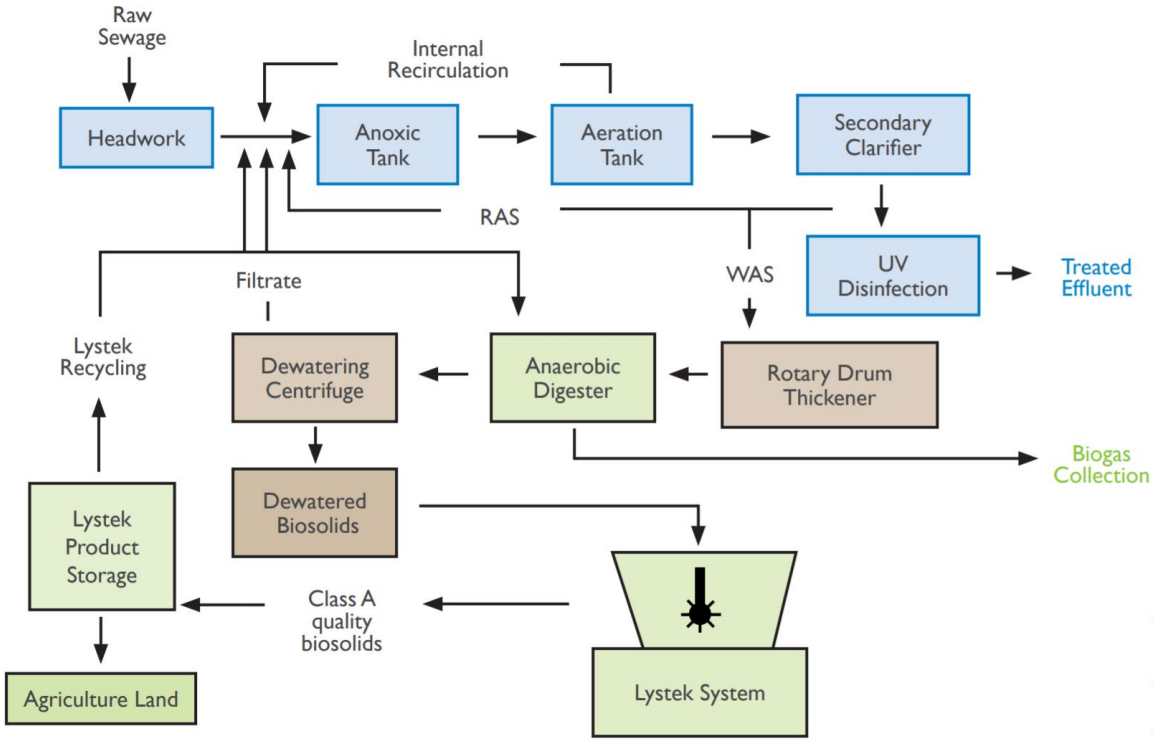
2.6.1 St. Marys Wastewater Treatment Plant

Currently, leachate is collected and flows, via gravity sewer, directly into the municipal sewer leading to the St. Marys Wastewater Treatment Plant (WWTP).

The existing St. Marys WWTP, serving the Separated Town of St. Marys in the County of Perth, is located at 309 Thomas St. and discharges the final effluent into the North Thames River. The WWTP, according to the amended ECA # 4934-AH9S98 (February 24, 2017) is designed for a Rated Capacity of 5,560 m^3/day; and Peak Flow Rate of 14,250 m^3/d.

The St. Marys WWTP biological nutrient removal (BNR) system was upgraded in 2009, and the digestors were converted to intermediate storage in 2015. The upgrade included conversion of the existing extended aeration activated sludge type system to a biological nutrient removal system with integrated sludge management. Sludge is stabilized and processed using Lystek technology.

Figure 4: St. Marys Wastewater Treatment Plan Process Map



2.6.2 Historic Wastewater Influent Flow and Quality

The flow and leachate quality from the WWTP Annual Reports are summarized in Table 5 and Table 6 below.

The flow information over the past five years shows an increasing trend on both average and maximum daily flows. If the current rate of increasing flow continues, Burnside's opinion is that with the observed trend the ADF will reach the rated capacity in approximately 10 years. The MDF, will be expected to consistently exceed the plant's design MDF in approximately 5-10 years.

According to the 2018 Wastewater Annual Summary Report, there are future plant alterations planned which are being governed by a long-term capital needs projection covering a 20-year planning period. These alternations are noted to include an "*environmental assessment for capacity expansion as required*". The Town updates its D-5-1 reserve capacity assessment on an annual basis and is anticipating a WWTP hydraulic capacity expansion in the near future. The Town indicated that the planning processes have been identified in future capital projects and will be implemented when required.

Table 6: Historic Wastewater Influent Flow

Flow (m^3/day)	Year				
	2014	**2015**	**2016**	**2017**	**2018**
Average Daily Flow	4,337	3,817	3,995	4,228	4,374
Maximum Daily Flow	11,678	9,102	10,812	13,055	18,094[3]

Table 7: Historic Wastewater Influent Quality

Parameter	Average Concentration (mg/L)				
	2014	**2015**	**2016**	**2017**	**2018**
BOD_5	395	348	334	312	254
TSS	205	205	231	216	212.1
TP	4.5	4.5	3.9	4.1	3.7

[3] Per the 2018 Wastewater Annual Summary Report, "The peak flow rate of 14,250 m^3 was exceeded on February 20 and 21, 2018 during extreme flooding conditions."

2.6.3 Effluent Limits

The plant's ECA limits the effluent mass loadings and effluent concentrations to the following levels:

Table 8: ECA Effluent Concentrations Limit Levels and Effluent Mass Loadings

Parameter	Limit (mg/L)		Objective (mg/L)	Average Concentration (mg/L)				
	Monthly Average	Daily		2014	2015	2016	2017	2018
$CBOD_5$*	15	25	10.0	2.5	2.5	2.9	3.4	4.7
TSS*	15	25	10.0	5.5	5.5	5.7	6.5	10.2
TP*	1.0	1.0	0.7	0.14	0.4	0.24	0.37	0.34
Total Ammonia Nitrogen*	6.0	8.0	2.5	0.27	0.3	0.32	0.13	2.0
Dissolved Oxygen*	-	-	4.0 (Minimum concentration objective)	-	9.8	12.9	12.8	8.8
*E. Coli***	<200 organisms/ 100 mL	-	100 counts/100 mL 200 counts/100 mL	4	4	10	9	43
pH	6-9.5		6-8.5	-	-	7.4	7.3	7.2

* May 01 to November 30
** May 01 to November 30, December 01 to April 30

2.6.4 Impact of Landfill Expansion on Plant Operations

St. Marys WWTP currently receives the leachate from the Site and is located approximately 1.3 km from the St. Marys Landfill.

The plant currently receives an average wastewater flow of 4,374 m^3/day (2018 data) or 79% of its rated capacity. The additional flow from the proposed landfill expansion does not represent a significant impact to the influent flow quantity. The estimated current and future leachate volume generated by the St. Marys Landfill represents only 1.0% of the Average Daily Flow currently processed by the WWTP, and an even smaller percentage of the approved rated capacity. It is understood that the effluent discharged from the St. Marys WWTP meets its regulated discharge requirements (See Table 8), and as such the WWTP performance is not adversely affected by acceptance of St. Marys Landfill leachate.

Based on the expected effluent concentration of leachate parameters (see Table 5), the treatment processes at the plant, and the dilution ratio at the WWTP (less than 1.0

percent of total inflow), it is not expected that the additional leachate flow would adversely affect the ability of the St. Marys WWTP to meet it's effluent requirements.

As noted in Section 2.6.3, future capacity increase upgrades are being considered. This is part of the long-term capital needs projection covering a 20-year planning period. The St. Marys landfill leachate, representing less than 1% of the plant's current daily flow, is insignificant. Further, following expansion of the St. Marys landfill, leachate will remain an insignificant component of inflow to the WWTP.

2.6.5 Impact on Sludge Production, Handling and Disposal

Increased loading from the additional leachate will increase the sludge production of the WWTP. The analysis assumes that essentially all the sludge generated as a result of leachate treatment will be biological sludge. The estimated increase in average daily sludge production at the plant over the landfill life can be estimated assuming that the activated sludge production (TSS, kg/d) is approximately 85% of the removed BOD_5 (kg/d) and assuming 99% BOD_5 removal. Therefore, assuming the Rated Capacity Flow of 5,560 m^3/d having an average BOD_5 (average 2014-2018) level of 329 mg/L, and estimated Average Leachate Daily Flow of 44 m^3/d having an estimated BOD_5 = 1800 mg/L (see Table 4), the combined BOD_5 would be 341 mg/L which translates to % Activated Sludge Production Increase of 4.5% (mass prior to sludge processing).

Since Lystek systems are typically operated on a batch basis, it is assumed that a 4.5% increase in sludge production can be absorbed by increasing the hours of operation for the Lystek equipment.

To evaluate the additional sludge hydraulic loading due to receiving the leachate, it was assumed that the sludge processing system will receive approximately 0.8% of the influent. Therefore, at the conservative scenario of maximum leachate flow and the plant's maximum daily receiving flow (1% increase in receiving flow), the leachate will only cause an increase inflow to the sludge processing system by 0.8%.

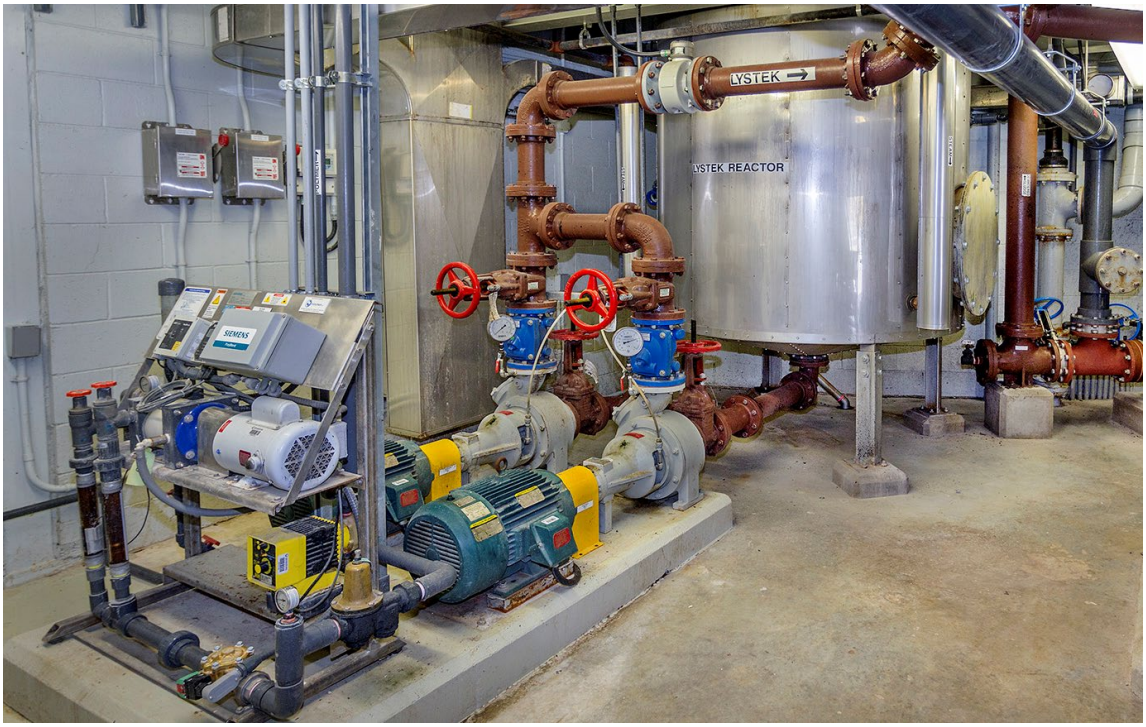
A WWTP Optimization Study completed on 2016 provided an updated evaluation assuming a BOD_5 level of 340 mg/L. The assessment results summary provided in Table 9 below, supports the evaluations above and supports the capability of the WWTP to handle the impacts of the additional leachate on the produced sludge quality and quantity.

Table 9: St. Marys WWTP Capacity Assessment Results Summary (2016)

Treatment Unit	Capacity Assessment		
	Average Day Flow	Max Day Flow	Peak Flow
Headworks	-	-	14,250 m^3/d
Bioreactors	6,405 m^3/d	-	-
Secondary Clarifiers		18,529 m^3/d	23,500 m^3/d
RAS Pumping	8,840 m^3/d	-	-
Oxygenation	83,300 m^3/d	-	-
Disinfection		-	14,250 m^3/d
WAS Thickening	7,861 m^3/d	-	-
Biosolids Dewatering	5,560 m^3/d	-	-
Lystek Process	25,000 m^3/d	-	-
Biosolids Storage	n/a	-	-
Overall Capacity	**5,560 m^3/d**	**18,529 m^3/d**	**23,500 m^3/d**

Figure 5: Lystek System at the St. Marys Wastewater Treatment Plant

2.6.6 Phenolic Compounds and Heavy Metals



The phenolic compounds and metals levels in the St. Marys Landfill leachate were estimated based on data from the 6 southern Ontario Landfills and sampling data from

the St. Marys Landfill (Table 5). The ranges of these levels, including copper, lead, and phenolic compounds, from the landfill data fall above the Town of St. Marys Sanitary Sewer By-Law levels. Therefore, the actual levels of the metals and phenolic compounds should be carefully monitored through sampling during the operation of the landfill expansion to determine the future potentials impacts on the produced fertilizer management process.

In October 2015, the Lystek product generated at the St. Marys WWTP, called LysteGro™, was registered as a biofertilizer under the Canadian Food Inspection Agency (CFIA). Registration as a fertilizer under the CFIA is site-specific and includes a detailed review and evaluation of the product over a period of a year or longer.

As a registered fertilizer, the LysteGro product is not considered a sewage sludge waste product and therefore is not subject to the same restrictions as biosolids with respect to land application and storage. Consequently, LysteGro may be land applied year-round, and may be stored with no specific storage or permitting requirements. The removal of restrictions with respect to storage of the biofertilizer produced at the St. Marys WWTP eliminates the impact of biosolids storage limitations on the capacity of the plant.

If the LysteGro does not meet the required CFIA standards for maximum acceptable 45-year cumulative metal additions to soil[4], it may impact the LysteGro™, registration as a biofertilizer under the CFIA. In most cases, however, the metal levels in the LysteGro are significantly below requirements for land application.

2.7 Leachate Conveyance

The HELP Model predicts a peak (maximum) leachate flow of 568 m^3 to occur during a single day of the model's 100-year projection period. This is 6.6 L/s or 38% of the sewer's capacity (assuming no other sources).

The Sanitary Sewer design sheet from 1997 (Table 10), shows that the utilized capacity of the end collection system (2A to 3A and 2A to 1A) would be 87.7% at the Peak Design Flow.

Considering this, parts of the sewer collection system might require capacity upgrades after Cell 1 and Cell 2 have been filled and closed; this is when increased leachate flow is expected to begin. The Town has indicated that the conveyance system (sewer) will be reviewed and evaluated downstream of the landfill prior to the Site's expansion. This will be a requirement for the EPA design of the Site's expansion. Sewer upgrades would thus be considered and implemented with the development sequence of the Site expansion.

[4] Appendix 3 of Guide to Submitting Applications for Registration under the Fertilizers Act, Canadian Food Inspection Agency

3.0 Conclusions and Recommendations

Based on the above discussions, the leachate management solution is for St. Marys WWTP to continue receiving the leachate from the Site. Parts of the sewer collection system might require capacity upgrades after Cell 1 and Cell 2 are filled and closed which is where the leachate flow increase is expected to begin.

It is noted however that the St. Marys landfill may also be used to temporarily store leachate within the prepared base of the landfill. Several days of leachate volume could be stored in this manner without compromising the landfill liner or having leachate seeps. With proper design and operating plans developed during the EPA approval stage, temporary storage in the landfill base could be used during periods of particularly high flows to reduce the quantity of leachate being sent to the St. Marys WWTP. In turn, this would provide the sewer or the WWTP some time to alleviate a temporary over capacity condition.

The Town of St, Marys owns and operates both the landfill and the WWTP. This provides them with an ongoing understanding of both facilities, as well as knowledge of planned upgrades or overall needs. With this knowledge, it is expected that the Town will make improvements to the WWTP as may be required to allow future landfill leachate flows (quality or quantity).

Although unexpected, should the St. Marys WWTP prove incapable of handling the landfill leachate, it will be necessary to handle the wastewater using another approach. In that case, the following procedure would be followed:

- MECP would be notified that, under the unanticipated circumstances, the St. Marys WWTP is not able to handle the Landfill leachate.
- Other options would be considered, including the on-Site wastewater treatment and discharge, trucking the leachate to other neighboring wastewater treatment plants that might be suitable, such as London, Mitchell and Stratford, and any possible additional options available at that time would be identified and evaluated.
- An ECA application would be filed for the updated approach, as required.

Table 10: Sanitary Sewer Design Sheet

SANITARY SEWER DESIGN SHEET (metric)

SANITARY SEWER DESIGN SHEET
LANDFILL INFRASTRUCTURE - WATER ST. SOUTH SANITARY SEWER
TOWN OF ST. MARYS

CRA Consulting Engineers
Conestoga-Rovers & Associates Ltd
651 Colby Dr. Waterloo, Ont. N2V 1C2

MUNICIPALITY:
ST. MARYS, ONTARIO

I:\PAYCERT\5761\645SAN.XLS

PROJECT: LANDFILL INFRASTRUCTURE
WATER ST. SOUTH SANITARY SEWER

Qavg = 400 L/cap/day
Qextran 0.16704 l/sec/ha n=0.013

REFERENCE No. 5761

DATE: 06-Jun-97

CHECKED BY: M.C.G.

LOCATION				INDIVIDUAL	CUMULATIVE							PIPE					
SEWER LINK From	To	CATCHMENT Area	DENSITY per/ha	AREA (ha)	AREA (ha)	POP	HARMON PEAKING FACTOR	AVG FLOW (l/sec)	EXTRAN. FLOW (l/sec)	PEAK DESIGN FLOW (l/sec)	LENGTH (m)	SIZE (mm dia)	TYPE	SLOPE (%)	MAX. CAPACITY (l/sec)	UTILIZED CAPACITY (%)	FULL FLOW VELOCITY (m/sec)
Phase II/III to MH 14A estimated leachate flow fro				4.90	4.90		4.00	0.08	0.82	1.12	97.16	200		0.48%	23.0	4.9%	3.56
Phase I to MH 16A			0	2.10	2.10	0	4.00	0.08	0.35	0.65	10.00	200		0.53%	24.2	2.7%	2.07
16A	15A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	90.00	200		0.50%	23.5	7.5%	0.56
15A	14A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	90.00	200		1.80%	44.6	4.0%	5.64
14A	13A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	49.91	200		0.50%	23.5	7.5%	0.56
13A	12A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	113.10	200		1.42%	39.6	4.5%	5.64
12A	11A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	120.03	200		0.80%	29.7	6.0%	0.56
11A	10A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	120.00	200		1.50%	40.7	4.4%	5.64
10A	9A		0	0.00	7.00	0	4.00	0.15	1.17	1.77	68.14	200		0.50%	23.5	7.5%	0.56
9A	8A		12	35.00	42.00	420	4.01	2.09	7.02	15.42	97.79	200		1.00%	33.2	46.4%	1.14
8A	7A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	90.00	200		0.62%	26.2	58.9%	0.98
7A	6A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	90.00	200		0.59%	25.5	60.4%	0.86
6A	5A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	90.00	200		0.63%	26.4	58.5%	0.98
5A	4A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	90.00	200		0.63%	26.4	58.5%	0.98
4A	3A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	90.00	200		0.63%	26.4	58.5%	0.98
3A	2A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	58.91	200		0.28%	17.6	87.7%	0.69
2A	1A		0	0.00	42.00	420	4.01	2.09	7.02	15.42	116.05	200		0.28%	17.6	87.7%	0.69

Conversions
1 hectare=2.47 acres
1 cfs/acre=69.3 l/sec/ha
1 cfs=28.1 l/sec

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

St. Marys WWTP ECA

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 4934-AH9S98
Issue Date: February 24, 2017

The Corporation of the Separated Town of St. Marys
408 James St S
Post Office Box, No. 998
St. Marys, Ontario
N4X 1B6

Site Location: St. Marys Wastewater Treatment Plant
309 Thomas St
Separated Town of St. Marys , County of Perth
N4X 1B6

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

Existing St. Marys Wastewater Treatment Plant for the collection, transmission, treatment and disposal of domestic sewage, serving the Separated Town of St. Marys in the County of Perth, located at the above site location and discharging the final effluent into the North Thames River, consisting of the following Works:

- Rated Capacity of 5,560 m 3 /day; and
- Peak Flow Rate of 14,250 m 3 /d,

Raw Sewage Pumping Station

- One (1) automatically cleaned bar screen (12.7 mm bar size, 50.8 mm clear spacing);
- Three (3) raw sewage pumps rated at 48 L/s at 9.1 m Total Dynamic Head (TDH);
- Two (2) ventilation fans each designed for six (6) air changes per hour or 515 L/s (1100 cfm); and
- Approximately 27 m of 350 mm forcemain to inlet works.

Inlet Works

- One (1) 13.9 m3 round bottom detritor with scraper arm;
- One (1) new manually cleaned bar screens (63 mm clear spacing) to serve as a back up in case the mechanically cleaned bar screens are out of service.
- One (1) grit conveyor;
- One (1) 5 hp comminutor; and
- One (1) 600 mm diameter sewer from the headworks to the converted anoxic tanks.

Anoxic Tanks

- Two (2) 10.973 m diameter anoxic tanks with a sidewater depth (SWD) of 3.8 m, each equipped with one (1) 4 hp submersible mixer;
- One (1) 600 mm diameter pipe from the anoxic tanks to the aeration tanks;
- One (1) 400 mm diameter internal recirculation pipe from the aeration tanks to the anoxic tanks;

and
- Two (2) internal recirculation pumps (one standby), each rated at 20 hp and 278 L/s at 3.66 m TDH to recycle wastewater from the aeration tanks to the anoxic tanks.

Equalization Tanks

- Two (2) 9.144 m diameter waste activated sludge (WAS) equalization tanks with a sidewater depth of 3.5 m, each equipped with one (1) 4 hp submersible mixer and aeration system.

Aeration Tanks

- An inlet chamber 1.5 m wide by 7.0 m long by 2.0 m SWD equipped with flow splitting weirs to three (3) distribution chambers 1.5 m wide by 1.5 m long by 2.0 m SWD to feed aeration basins; and
- Three (3) aeration basins operating in parallel with each basin measuring 6.17 m wide by 30.48 m long by 4.57 m SWD and each equipped with fine bubble diffused aeration system.

Secondary Clarifiers

- A flow splitting mechanism in the existing secondary feed chamber splitting flows to the four (4) secondary clarifiers;
- A splitter box for adjustment of return and waste activated sludge wasting rates with capability to transfer waste activated sludge either to aeration tanks or primary clarifiers;
- Two (2) 15.24 m diameter x 4.4 m SWD secondary clarifiers, with centre feed and peripheral weir and launder; and
- Two (2) 10.668 m diameter x 3.0 m SWD secondary clarifiers with centre feed and peripheral weir and launder.

Disinfection

Chlorination

A backup chlorination system consisting of :

- One (1) chlorine contact chamber with total capacity of 86 m3;
- One (1) chlorinator with chlorine injectors; and
- One (1) backup sodium hypochlorite system located in the UV Building.

UV Disinfection

- An ultraviolet (UV) disinfection system consisting of two (2) lamp arrays having a total of nine (9) lamp modules in each array and eight (8) bulbs per module giving a total of one hundred and forty-four (144) bulbs with an ultraviolet output at 70% of rated lamp output of 28,600 microwatts/cm2.

Blower, Sludge and Chemical Feed Building

- A 7.00 m wide by 20.00 m long building to accommodate blowers, sludge piping, chemical storage and chemical feed systems including the following;
- Three (3) centrifugal blowers (three duty, one standby), each designed at a rated capacity of 7,851 L/s at 58.6 kPa;
- One (1) 150 hp turbo blower designed to provide minimum 2,506 cubic meters of air per hour and maximum 5,792 cubic meters of air per hour along with Dissolved Oxygen (DO) control system.
- Two (2) rotary lobe type primary sludge pumps (one duty, one standby), each rated at 15.2 L/s at 12.2 m TDH;

- Three (3) centrifugal return activated sludge pumps (two duty one standby), each rated at 34.11 L/s at 20.0 m TDH;
- One (1) constant speed 2.6 KW open impeller centrifugal pump rated at 19.01 L/s at 7.0 m TDH for pumping out aeration basins to aeration basin effluent chamber;
- Two (2) alum chemical feed pumps (1 duty and one standby); and
- Adjustable dissolved oxygen probes in each aeration basin for control of blowers by dissolved oxygen levels.

Effluent Outfall

- Approximately 3 m of 600 mm diameter sewer outfall discharging to Thames River.

Flow Metering

One (1) 300 mm Parshall flume with 22,690 m 3 /day hydraulic capacity in inlet works;

One (1) velocity-area flow meter with a transducer in the effluent outfall pipe; and

One (1) ultrasonic level sensor to measure bypass flow over the weir in the primary effluent chamber.

Temporary Sludge Holding Tank

One (1) concrete chamber and splitter box with adjustable weir to provide capability to return supernatant to the existing anoxic tanks inlet distribution chamber and/or to the aeration inlet distribution chamber;

One (1) 817 m 3 capacity measuring 12.192 m diameter by 7.0 m SWD conical bottom primary anaerobic digester used as temporary sludge holding tank;

One (1) 925 m 3 capacity, measuring 12.192 m diameter by 7.224 m SWD conical bottom secondary anaerobic digester used as temporary sludge holding tank;

Waste Activated Sludge (WAS) Thickening

- One (1) 2 hp rotary drum thickener (3.3 m x 0.75 m) capable of thickening waste activated sludge at a rate of 3.9 L/s;
- One (1) 0.33 hp flocculator with a volume of 0.13 m3;
- One (1) 4.6 m3 working capacity thickened WAS storage/transfer tank; and
- Two (2) thickened WAS pumps, each rated at 3 hp and 1.6 L/s at 6.7 m TDH.

Sludge Storage

One (1) 1,270 m 3 storage capacity sludge storage facilities consisting of:

- One (1) valve chamber 2.1 m wide and 2.1 m long;
- Two (2) cells 6.7 m wide, 14.0 m long and 4.5 m deep;
- One (1) cell 6.0 m wide, 13.5 m long and 4.5 m deep;
- One (1) cell 2.1 m wide, 6.0 m long and 4.5 m deep;
- One (1) sludge loading dock;
- An exhaust ventilation and activated carbon odour control system;
- One (1) submersible mixer; and
- One (1) sump pump.

Lystek Technology

Lystek sludge treatment system consisting of:

- One (1) 3 hp in-line grinder rated at 60 m3/hr;
- One (1) 30 hp centrifuge (3.5 m x 0.9 m) equipped with 7.5 hp backdrive capable of dewatering digested sludge at a rate of 3.3 L/s;
- One (1) 4 m3 working capacity dewatered sludge storage/transfer tank;
- One (1) 25 hp progressive cavity pump rated at 6.1L/s at 58 m TDH with one (1) 7.5 hp bridge breaker;
- One (1) 4 m3 working capacity Lystek reactor equipped with one (1) 50 hp high speed mixer and three (3) direct steam injection ports;
- One (1) electric steam boiler rated at 100 kW;
- One (1) 11.3 m3 capacity chemical storage tank;
- Two (2) chemical feed pumps (one standby), each rated at 115 L/hr; and

Phosphorus Removal System

One (1) phosphorous removal system capable of processing internal recycle streams consisting of:

- One (1) polymerized ferric chloride feed system;
- One (1) 2.134 m diameter clarifier; and
- One (1) 40 m 3 working capacity phosphorous sludge storage tank located in existing sludge storage tank.

Odour Control System

One (1) activated carbon adsorption odour control system capable of treating air flows between 19.3 to 38.5 m 3 /min (680 to 1360 cfm).

Standby Power

- One (1) standby diesel generator set equipped with fuel storage and spill protection.

Miscellaneous

An administration building with an extension of an electrical/storage building; and

Addition to the existing administration building approximately 3.0 m wide by 8.2 m long adjacent to existing garage to be used as maintenance shop and parts storage.

and other controls, piping, valves, drains, and appurtenances essential for the proper operation of the aforementioned sewage works,

all in accordance with supporting documents listed in **Schedule B** .

For the purpose of this environmental compliance approval, the following definitions apply:

"Approval" means this entire document including the application and any supporting documents listed in any schedules in this Approval;

"Annual Average Daily Flow" means the cumulative total sewage flow to the sewage works during a

calendar year divided by the number of days during which sewage was flowing to the sewage works that year;

"Bypass" means diversion of sewage around one or more unit processes within the Sewage Treatment Plant with the diverted sewage flows being returned to the Sewage Treatment Plant treatment train upstream of the Final Effluent sampling point, and discharging to the environment through the Sewage Treatment Plant outfall;

"BOD5" (also known as TBOD 5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"CBOD 5 " means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"Director" means a person appointed by the Minister pursuant to section 5 of the *Environmental Protection Act* for the purposes of Part II.1 of the *Environmental Protection Act* ;

"EPA" means the Environmental Protection Act , R.S.O 1990, c.E.19, as amended;

"Equivalent equipment" means a substituted equipment or like-for-like equipment that meets the required quality and performance standards of a named equipment;

"Event" means an action or occurrence, at a given location within the Sewage Treatment Plant that causes a Plant Bypass or Overflow. An Event ends when there is no recurrence of a Bypass or Overflow in the 12-hour period following the last Bypass or Overflow. Two Events are separated by at least 12 hours during which there has been no recurrence of a Bypass or Overflow. An Overflow Event and a Bypass Event are two separate reportable events even when they occur concurrently;

"Final Effluent" means effluent that are discharged to the environment through the approved Final Effluent outfall, including bypasses, that are required to comply with the compliance limits stipulated in the Approval for the Sewage Treatment Plant, pertaining specifically to the Final Effluent sampling point.

" *E. Coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"Influent" means flows to the Sewage Treatment Plant through the collection system, excluding all process return flows;

"Geometric Mean Density" is the nth root of the product of multiplication of the results of n number of samples over the period specified;

"Limited Operational Flexibility" (LOF) means the minor modifications that the Owner is pre-approved to make to the Works under this Approval;

"Ministry" means the Ontario Ministry of the Environment and Climate Change;

"Monthly Average Concentration" means the arithmetic mean of all Single Sample Concentrations of a contaminant in the Final Effluent sampled or measured, or both, during a calendar month;

"Notice of Modifications" means the form entitled "Notice of Modifications to Sewage Works";

"Overflow" means a discharge to the environment from the Sewage Treatment Plant at a location other than the plant outfall or into the plant outfall downstream of the Final Effluent sampling location;

"Owner" means The Corporation of the Separated Town of St. Marys and its successors and assignees;

"Peak Flow Rate" means the Peak Instantaneous Flow Rate, Peak Hourly Flow Rate or Peak Daily Flow Rate of sewage for which the sewage treatment plant or treatment process unit or equipment is designed to handle as appropriate;

"Rated Capacity" means the Annual Average Daily Flow for which the Works are approved to handle;

"Sewage Treatment Plant" means the entire sewage treatment and effluent outfall facility;

"Single Sample Concentration" means the concentration of a contaminant in the effluent discharged over any single day, as measured by a composite or grab sample, whichever is required;

"Substantial Completion" has the same meaning as “substantial performance” in the *Construction Lien Act* ;

"Water Supervisor" means the Water Compliance Supervisor for the Safe Drinking Water Branch (SDWB) for the London office of the Ministry; and

"Works" means the sewage works described in the Owner's application, and this Approval, and includes Proposed Works, Previous Works, and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with the description given in this Approval, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Approval.

(3) Where there is a conflict between a provision of any submitted document referred to in this Approval and the Conditions of this Approval, the Conditions in this Approval shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this Approval are severable. If any requirement of this Approval, or the

application of any requirement of this Approval to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this approval shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this Approval will cease to apply to those parts of the Works which have not been constructed within five (5) years of the date of this Approval.

3. CHANGE OF OWNER

(1) The Owner shall notify the Water Supervisor and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

(a) change of Owner;

(b) change of address of the Owner;

(c) change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act* , R.S.O. 1990, c.B17 shall be included in the notification to the Water Supervisor; and

(d) change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act* , R.S.O. 1990, c. C39 shall be included in the notification to the Water Supervisor.

(2) In the event of any change in ownership of the Works, other than a change to a successor municipality, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the Water Supervisor and the Director.

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Upon the Substantial Completion of the Works, the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this Approval, and upon request, shall make the written statement available for inspection by Ministry personnel.

(2) Within six (6) months of the Substantial Completion of the Works, a set of as-built drawings showing the Works “as constructed” shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works for the operational life of the Works.

5. BYPASS

(1) Any Bypass is prohibited, except:

(a) in an emergency situation when a structural, mechanical or electrical failure that causes a temporary reduction in the capacity of the Sewage Treatment Plant or in unexpected and/or unavoidable circumstance(s) that are likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset;

(b) where the Bypass is a direct and unavoidable result of a planned maintenance procedure or other circumstance(s), the Owner having notified the Water Supervisor at least fifteen (15) days prior to the occurrence of Bypass and the Water Supervisor has given written consent of the Bypass;

(2) For any Bypass Event, the Owner shall forthwith notify the Spills Action Centre (SAC), and the local Medical Officer of Health all Bypass(es). This notice shall include, at a minimum, the following information for each Event:

(a) the date(s), time(s) of the Bypass(es);

(b) the treatment process(es) Bypassed and the status of the disinfection;

(c) the reason(s) for the Bypass(es).

(3) After any Bypass Event, the Owner shall collect and record the following information:

(a) the duration of the Bypass Event;

(b) the measured or the estimated volume of Bypass(es) for each Event.

(4) For any Bypass Event, the owner shall collect sample(s) of the Final Effluent, representative of the Event, at the Final Effluent Compliance Sampling Point, and analyze for all effluent parameters outlined in Effluent Objectives condition. These samples shall be in addition to the regular samples required in the Monitoring and Recording condition and shall follow the same Protocols specified in the Monitoring and Recording condition.

(5) The Owner shall submit a summary report of the Bypass Event(s) to the Water Supervisor on a quarterly basis, only if a bypass event happens within the period considered, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary reports shall be in an electronic format, which shall contain, at a minimum, the types of information set out in Subsections (2), (3) and (4) for Bypass(es). The Water Supervisor may modify the reporting frequency at any time in writing.

6. OVERFLOW

(1) Any Overflow is prohibited, except:

(a) in an emergency situation when a structural, mechanical or electrical failure that causes a temporary reduction in the capacity of the Sewage Treatment Plant or in an unexpected and/or unavoidable circumstance(s) that are likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset;

(b) where the Overflow is a direct and unavoidable result of a planned maintenance procedure or other circumstance(s), the Owner having notified the Water Supervisor at least fifteen (15) days prior to the occurrence of the Overflow and the Water Supervisor has given written consent of the Overflow.

(2) For any Overflow Event, the Owner shall forthwith notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information for each Event:

(a) the date(s), time(s) of the Overflow(s);

(b) the location(s) of the Overflow(s) and the receiver;

(c) the reason(s) for the Overflow(s); and

(d) the level of treatment the Overflow(s) has received and disinfection status of same.

(3) After any Overflow Event, the Owner shall collect and record the following information:

(a) the duration of the Overflow Event;

(b) the monitored or estimated volume of the Overflow(s); and

(c) the impact of Overflow(s) on the receiver.

(4) For any Overflow Event, the Owner shall collect samples, representative of the Event, consisting of a minimum of two (2) grab samples of the Overflow, one at the beginning of the Event and one approximately near the end of the Event, and every 4 hours for the duration of the Event, and have them analyzed for effluent parameters outlined in Effluent Objectives condition. For raw sewage and primary treatment system Overflow, BOD5 shall be monitored instead of CBOD5.

(5) The Owner shall submit a summary report of the Overflow(s) Event(s) to the Water Supervisor on a quarterly basis, only if an overflow event happens within the period considered, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary report shall be in an electronic format, which shall contain, at a minimum; the types of information set out in Subsections (2), (3) and (4) for Overflow(s). The Water Supervisor may modify the reporting frequency at any time in writing.

7. DESIGN OBJECTIVES

(1) The Owner shall use best efforts to design, construct and operate the Works with the design objectives of the materials named in Table 1 as effluent parameters are achieved in the Final Effluent from the Works.

Table 1 - Design Objectives	
Effluent Parameter	**Concentration Objective** (milligrams per litre unless otherwise indicated)
Column 1	Column 2
CBOD5	10.0
Total Suspended Solids	10.0
Total Phosphorus	0.7
Total Ammonia Nitrogen (Ammonia Nitrogen + Ammonium Nitrogen)	2.5
Dissolved Oxygen	4.0 1
E. coli May 01 to November 30 December 01 to April 30	100 counts/100 mL 200 counts/100 mL (Geometric Mean Density)

1 Minimum concentration objective.

(2) The Owner shall use best efforts to:

(a) maintain the pH of the effluent from the Works within the range of 6.0 to 8.5 at all times;

(b) operate the works within the Rated Capacity of the Works; and

(c) ensure that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

(3) The Owner shall include in all reports submitted in accordance with Condition 11 a summary of the efforts made and results achieved under this Condition.

8. COMPLIANCE LIMITS

(1) The Owner shall operate and maintain the Works such that the compliance limits of the materials named below as effluent parameters are not exceeded in the effluent from the Works.

Table 2 - Compliance Limits		
Effluent Parameter	**Monthly Average Concentration 1** (milligrams per litre unless otherwise indicated)	**Daily Concentration** (milligrams per litre unless otherwise indicated)
Column 1	Column 2	Column 3

CBOD5	15	25
Total Suspended Solids	15	25
Total Phosphorus	1.0	1.0
Total Ammonia Nitrogen (Ammonia Nitrogen + Ammonium Nitrogen)	6.0	8.0
*E. coli***2**	200 counts/100 mL (Geometric Mean Density)	-

1 Except *E. coli* , which is monthly *Geometric Mean Density* ; **2** Effluent limits are applicable between May 01 and November 30, each year.

(2) For the purposes of determining compliance with and enforcing subsection (1):

(a) The Monthly Average Concentration of CBOD 5 , total suspended solids, total phosphorus and total ammonia nitrogen as named in Column 1 of Table 2 of subsection (1) shall not exceed the corresponding monthly average concentration set out in Column 2 of Table 2 of subsection (1).

(b) In addition to compliance with 2(a) above, the Daily Concentration of CBOD 5 , total suspended solids, total phosphorus and total ammonia nitrogen as named in Column 1 of Table 2 of subsection (1) shall not exceed the corresponding daily concentration set out in Column 3 of Table 2 of subsection (1).

(c) The monthly Geometric Mean Density of E. coli as named in Column 1 of Table 2 of subsection (1) shall not exceed the corresponding density set out in Column 2 of Table 2 of subsection (1).

(3) The pH of the effluent from the works shall be maintained between 6.0 to 9.5, inclusive, at all times

(4) Paragraphs (a) to (c) of subsection (2) and subsection (3) shall apply upon the date of issuance of this Approval.

(5) Only those monitoring results collected during the corresponding time period shall be used in calculating the Monthly Average Concentration, monthly Geometric Mean Density and Daily Concentration for this Approval.

9. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval - are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval - and the Act and Regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the

Works.

(2) The Owner shall prepare or update an operations manual within six (6) months of the date of issuance of this Approval, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the Water Supervisor ; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall provide for the overall operation of the Works with an operator who holds a licence that is applicable to that type of facility and that is of the same class as or higher than the class of the facility in accordance with Ontario Regulation 129/04.

10. MONITORING AND RECORDING

The Owner shall, upon commencement of operation of the Works, carry out the following monitoring program:

(1) All samples and measurements taken for the purposes of this Approval are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) For the purposes of this condition, "daily" means once every day and "weekly" means once every week.

(3) Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Influent Sampling Point (Sampling point at the raw sewage pumping station or at the inlet chamber of the *Works*)

Parameter	Sample Type	Minimum Frequency
Column 1	Column 2	Column 3
BOD5	24-hour composite	Weekly
Total Suspended Solids	24-hour composite	Weekly
Total Phosphorus	24-hour composite	Weekly
Total Kjeldahl Nitrogen	24-hour composite	Weekly
Total Ammonia Nitrogen (Ammonia Nitrogen + Ammonium Nitrogen)	24-hour composite	Weekly
Alkalinity	24-hour composite	Weekly

Table 4 - Final Effluent Sampling Point
(Sampling point at the outlet of the disinfection unit or at the outfall sewer)

Parameter	Sample Type	Minimum Frequency
Column 1	Column 2	Column 3
CBOD5	24-hour composite	Weekly
Total Suspended Solids	24-hour composite	Weekly
Total Phosphorus	24-hour composite	Weekly
Total Ammonia Nitrogen (Ammonia Nitrogen + Ammonium Nitrogen)	24-hour composite	Weekly
E. coli	Grab	Weekly
Dissolved Oxygen	Grab	Daily
Alkalinity	24-hour composite	Weekly
Total Chlorine Residual1	Grab	Daily
pH	Grab/probe	Daily
Temperature	Grab/probe	Daily

1 During the time when chlorination is used for disinfection.

Note: Definitions for grab and composite samples are included in one or more documents below. 24-hour composite sample means a time-composite sample and constitutes of an integrated sample made up of blending 24 hourly aliquots taken by refrigerated autosampler, which are obtained at an hourly frequency having same sample volume.

(4) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (21 st edition), as amended from time to time by more recently published editions.

(5) The temperature and pH of the effluent from the Works shall be determined in the field at the time of sampling for Total Ammonia Nitrogen. The concentration of unionized ammonia shall be calculated using the total ammonia concentration, pH and temperature using the methodology stipulated in "Ontario's Provincial Water Quality Objectives" dated July 1994, as amended, for ammonia (unionized).

(6) 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 within the range of 10% to 100% of the full scale reading of the measuring devices, shall be installed, maintained and operated in order to measure and record the flow at a daily frequency.

(7) The Owner shall retain for a minimum of three (3) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

11. REPORTING

(1) Fifteen (15) days prior to the date of a planned bypass being conducted pursuant to Condition 5, the Owner shall notify the Water Supervisor (in writing) of the pending start date, in addition to an assessment of the potential adverse effects on the environment and the duration of the bypass.

(2) The Owner shall report to the Water Supervisor or designate, any exceedence of any parameter specified in Condition 8 orally, as soon as reasonably possible, and in writing within seven (7) days after all laboratory results of the exceedence have been received and tabulated.

(3) In addition to the obligations under Part X of the *Environmental Protection Act* , the Owner shall, within ten (10) working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by product, intermediate product, oils, solvents, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the Water Supervisor describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(4) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(5) The Owner shall prepare and submit to the Water Supervisor a Monthly Compliance Summary

report on monthly basis, within thirty (30) days following the end of the month being reported upon or within a period as the Water Supervisor may agree in writing.

(6) The Owner shall prepare and submit to the Water Supervisor a performance report, on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a summary and interpretation of all monitoring data and a comparison to the compliance limits outlined in compliance limits condition, including an overview of the success and adequacy of the Works;

(b) a description of any operating problems encountered and corrective actions taken;

(c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) a description of efforts made and results achieved in meeting the design objectives condition;

(g) a tabulation of the volume of sludge generated in the reporting period, an outline of anticipated volumes to be generated in the next reporting period and an outline of the proposed sludge handling methods;

(h) a summary of any complaints received during the reporting period and any steps taken to address the complaints;

(i) a summary of all Bypass, spill or abnormal discharge events;

(j) a copy of all Notice of Modifications submitted to the Water Supervisor, with a status report on the implementation of Limited Operational Flexibility;

(k) a report of all modifications arising under section 3 of **Schedule A** ; and;

(l) any other information the Water Supervisor requires from time to time.

(8) The Owner shall, within thirty (30) calendar days of issuance of this Approval, submit a Municipal and Local Services Board Wastewater System Profile Information Form, and shall resubmit the updated document every time a notification is provided to the Water Supervisor in compliance with requirements of change of ownership under this Approval.

12. LIMITED OPERATIONAL FLEXIBILITY

(1) The Owner may make modifications to the Works in accordance with the Terms and Conditions of this Approval and subject to the Ministry's "Limited Operational Flexibility Criteria for Modifications to Sewage Works ", included under **Schedule A** of this Approval, as amended.

(2) Sewage works proposed under Limited Operational Flexibility shall adhere to the design guidelines contained within the Ministry's publication "Design Guidelines for Sewage Works 2008", as amended.

(3) The Owner shall ensure at all times, that the Works, related equipment and appurtenances which are installed or used to achieve compliance are operated in accordance with all Terms and Conditions of this Approval.

(4) For greater certainty, the following are not permitted as part of Limited Operational Flexibility:

(a) Modifications to the Works that result in an increase of the Rated Capacity of the Works;

(b) Modifications to the Works that may adversely affect the approved effluent quality criteria or the location of the discharge/outfall;

(c) Modifications to the treatment process technology of the Works, or modifications that involve construction of new reactors (tanks) or alter the treatment train process design;

(d) Modifications to the Works approved under s.9 of the EPA, and

(e) Modifications to the Works pursuant to an order issued by the Ministry.

(5) Implementation of Limited Operational Flexibility is not intended to be used for piecemeal measures that result in major alterations or expansions.

(6) If the implementation of Limited Operational Flexibility requires changes to be made to the Emergency Response, Spill Reporting and Contingency Plan, the Owner shall, as deemed necessary in consultation with the Water Supervisor, provide a revised copy of this plan for approval to the local fire services authority prior to implementing Limited Operational Flexibility.

(7) For greater certainty, any modification made under the Limited Operational Flexibility may only be carried out after other legal obligations have been complied with, including those arising from the *Environmental Protection Act* , *Niagara Escarpment Planning and Development Act* , *Oak Ridges Moraine Conservation Act* , *Lake Simcoe Protection Act* and *Greenbelt Act* .

(8) Prior to implementing Limited Operational Flexibility, the Owner shall complete a Notice of Modifications describing any proposed modifications to the Works and submit it to the Water Supervisor.

Schedule A

Limited Operational Flexibility Criteria for Modifications to Municipal Sewage Works

1. The modifications to sewage works approved under an Environmental Compliance Approval (Approval) that are permitted under the Limited Operational Flexibility (LOF), are outlined below and are subject to the LOF conditions in the Approval, and require the submission of the Notice of Modifications. If there is a conflict between the sewage works listed below and the Terms and Conditions in the Approval, the Terms and Conditions in the Approval shall take precedence.

1.1 Sewage Pumping Stations

a. Adding or replacing equipment where new equipment is located within an existing sewage treatment plant site or an existing sewage pumping station site, provided that the facility Rated Capacity is not exceeded and the existing flow process and/or treatment train are maintained, as applicable.

1.2 Sewage Treatment Process

a. Installing additional chemical dosage equipment including replacing with alternative chemicals for pH adjustment or coagulants (non-toxic polymers) provided that there are no modifications of treatment processes or other modifications that may alter the intent of operations and may have negative impacts on the effluent quantity and quality.

b. Expanding the buffer zone between a sanitary sewage lagoon facility or land treatment area and adjacent uses provided that the buffer zone is entirely on the proponent's land.

c. Optimizing existing sanitary sewage lagoons with the purpose to increase efficiency of treatment operations provided that existing sewage treatment plant rated capacity is not exceeded and where no land acquisition is required.

d. Optimizing existing sewage treatment plant equipment with the purpose to increase the efficiency of the existing treatment operations, provided that there are no modifications to the works that result in an increase of the Rated Capacity, and may have adverse effects to the effluent quality or location of the discharge.

e. Replacement, refurbishment of previously approved equipment in whole or in part with Equivalent Equipment, like-for-like of different make and model, provided that the firm capacity, reliability, performance standard, level of quality and redundancy of the group of equipment is kept the same. For clarity proposes, the following equipment can be considered under this provision: screens, grit separators, blowers, aeration equipment, sludge thickeners, dewatering equipment, UV systems, chlorine contact equipment, bio-disks, and sludge digester systems.

1.3 Sewage Treatment Plant Outfall

a. Replacement of discharge pipe with similar pipe size provided that the outfall location is not changed.

1.4 Sanitary Sewers

a. Pipe relining and replacement with similar pipe size within the Sewage Treatment Plant site, where the nominal diameter is not greater than 1,200 mm.

1.5 Pilot Systems

a. Installation of pilot systems for new or existing technologies provided that:

i. any effluent from the pilot system is discharged to the inlet of the sewage treatment plant or hauled off-site for proper disposal,
ii. any effluent from the pilot system discharged to the inlet of the sewage treatment plant or sewage conveyance system does not significantly alter the composition/concentration of the influent sewage to be treated in the downstream process; and that it does not add any inhibiting substances to the downstream process, and
iii. the pilot system's duration does not exceed a maximum of two years; and a report with results is submitted to the Director and Water Supervisor three months after completion of the pilot project.

2. Sewage works that are exempt from section 53 of the OWRA by O. Reg. 525/98 continue to be exempt and are not required to follow the notification process under this Limited Operational Flexibility.

3. Normal or emergency operational modifications, such as repairs, reconstructions, or other improvements that are part of maintenance activities, including cleaning, renovations to existing approved sewage works equipment, provided that the modification is made with Equivalent Equipment, are considered pre-approved.

4. The modifications noted in section (3) above are not required to follow the notification protocols under Limited Operational Flexibility, provided that the number of pieces and description of the equipment as described in the Approval does not change.

Schedule B

Environmental Compliance Approval (ECA) supporting documents:

1. Applications for the Approval of Sewage Works submitted by Town of St. Marys dated September 14, 1987 and September 15, 1989, including final plans and specifications prepared by Conestoga-

Rovers and Associates Ltd.;

2. Application for Approval of Municipal and Private Sewage Works submitted by The Corporation of the Separated Town of St. Marys dated February 15, 2002 and design specifications prepared by Ontario Clean Water Agency;

3. Application for Approval of Municipal and Private Sewage Works submitted by the The Corporation of the Separated Town of St. Marys dated July 10, 2007 along with supporting attachments including Technical Design Brief and electronic report of Pilot Plant Study on a compact disc both prepared by Conestoga-Rovers and Associates;

4. Application for Approval of Municipal and Private Sewage Works submitted by The Corporation of the Separated Town of St. Marys dated March 4, 2010 along with supporting attachments including Design Report and a set of Engineering Drawings prepared by Conestoga-Rovers and Associates (CRA);

5. Environmental Compliance Approval Application for Sewage Works dated January 15, 2015 signed by Dave Black, C.E.T of the Corporation of the Separated Town of St. Mary's, and cover letter submitted by Hank Andress, P.Eng., P.Eng., of Ontario Clean Water Agency, dated January 16, 2015;

6. Document entitled "ECA – Limited Operational Flexibility for St. Mar's WWTP Aeration Blowers Upgrade and Lystek By-Pass Line", dated January 16, 2015;

7. Environmental Compliance Approval Application for Sewage Works dated October 26, 2016 signed by Dave Blake, with supporting documentation; and

8. Email dated January 3, 2017 from Ryan P. DeVries, P.Eng of B.M. Ross and Associates Limited, Consulting Engineers to Youssouf Kalogo, P.Eng of the Ontario Ministry of the Environment and Climate Change.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this Approval the existence of this Approval.

2. Condition 2 is included to ensure that, when the Works are constructed, the Works will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the Ministry records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

4. Condition 4 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works “as constructed” are maintained for future references.

5. Condition 5 is included to indicate that Bypass is prohibited, except in circumstances where the failure to Bypass could result in greater injury to the public interest than the Bypass itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Bypass Events.

6. Condition 6 is included to indicate that Overflow of untreated or partially treated sewage to the receiver is prohibited, except in circumstances where the failure to Overflow could result in greater injury to the public interest than the Overflow itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Overflow Events.

7. Condition 7 is imposed to establish non-enforceable design objectives of the treated effluent which the Owner is obligated to use best efforts to strive towards on an ongoing basis. These objectives are to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs and before the compliance limits are exceeded.

8. Condition 8 is imposed to ensure that the effluent discharged from the Works to the Thames River meets the Ministry's compliance limits thus minimizing environmental impact on the receiver and to protect water quality, fish and other aquatic life in the receiving water body.

9. Condition 9 is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works.

10. Condition 10 is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives and compliance limits specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.

11. Condition 11 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

12. Condition 12 is included to ensure that the Works are operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider. These Conditions are also included to ensure that a Professional Engineer has reviewed the proposed modifications and attests that the modifications are in line with that of Limited Operational Flexibility, and provide assurance that the proposed modifications comply with the Ministry's requirements stipulated in the Terms and Conditions of this Approval, MOECC policies, guidelines, and industry engineering standards and best management practices.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7828-9VLLLP issued on April 22, 2015

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of February, 2017

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

YK/
c: DWMD Supervisor, MOECC London - District
Ryan DeVries, B.M. Ross and Associates