



# Essex-Windsor Regional Landfill Operations Report 2019

Report Date: December 15, 2020



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APPENDIX

- Site Plan Map
- Operations Report Map

This document has been formatted for accessibility and is available in other formats upon request.

# Essex-Windsor Regional Landfill

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## Annual Operations Report for January – December 2019

### 1 Introduction

The Essex-Windsor Regional Landfill Site is located on the south half of Lots 14, 15, and 16, Concession 7 in the Town of Essex (formerly the Township of Colchester North). The Essex-Windsor Solid Waste Authority (EWSWA) operated the landfill during the period covering this report. Staff of EWSWA manages the Site and operates the weigh scale, provides inspection services, contract administration and maintains the associated records for the Site.

#### 1.1 Environmental Compliance Approval

The Essex-Windsor Regional Landfill Site is licensed by the Ontario Ministry of the Environment, Conservation and Parks (MECP) formerly the Ontario Ministry of the Environment and Climate Change (MOECC) under Environmental Compliance Approval (ECA) No. A011101 dated April 3, 2017. The MOECC issued this ECA in order to consolidate the originally issued Certificate of Approval dated September 28, 1995 and all subsequent amendments up to and including Notice No. 22 dated April 7, 2016.

#### 1.2 Purpose

The purpose of this report is to fulfil conditions 15.1 and 15.2 of the ECA.

### 2 Waste Quantities and Types

#### 2.1 Waste Quantities

The Essex-Windsor Regional Landfill site was officially opened to the receipt of waste on July 2<sup>nd</sup>, 1997. The site was originally licensed to accept waste from all generators of non-hazardous solid waste located only in the County of Essex and City of Windsor. In November 2007, the site service area was expanded to include the Province of Ontario.

A total of 351,657 tonnes of waste were received during operations in 2019 compared to 248,040.32 tonnes in 2018. There was a 41.77% increase in total waste being landfilled at the Essex-Windsor Regional Landfill for 2019 compared to 2018. The waste generation sources as determined by landfill

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and transfer station records are as follows: Essex-Windsor 349,260.10 tonnes and Chatham-Kent 2,396.14 tonnes.

The Essex-Windsor Solid Waste Authority has implemented a number of waste bans or restrictions at the site and as a result does not accept tires, old clean corrugated cardboard, white goods, fish offal, brush, grass and leaves for disposal. Most of these items are instead diverted to our on-site recycling depot. The Landfill does accept tires, old clean corrugated cardboard and white goods for recycling and brush, grass and leaves for composting.

The average daily waste quantity delivered to the Site during the 303 days of operation in 2019 was 1161 tonnes per operating day (see Table 1 for monthly amounts).

**Table 1: Waste Quantities by Month for 2018 and 2019**

<b>Month</b>	<b>2018 Tonnes</b>	<b>2018 Average Daily Waste Tonnes</b>	<b>2019 Tonnes</b>	<b>2019 Average Daily Waste Tonnes</b>
January	14,231.56	547	19,679.99	757
February	12,525.38	545	21,104.22	918
March	14,504.34	558	24,804.85	954
April	15,656.79	626	27,017.07	1,081
May	26,583.40	1,022	43,607.19	1,677
June	20,355.50	783	37,401.31	1,496
July	25,231.09	1,009	21,007.59	807
August	21,683.01	834	24,020.39	923
September	17,093.15	712	19,335.92	805
October	20,638.96	794	20,839.74	801
November	30,286.81	1,165	48,380.70	1860
December	29,250.33	1,219	44,458.03	1852
<b>Totals:</b>	<b>248,040.32</b>	<b>818</b>	<b>351,657</b>	<b>1161</b>

### 2.2 Special Wastes

Certain wastes require specific approval or special handling. These are classified as "special wastes", and could include such things as solid waste in barrels, asbestos, dusty waste, or industrial solid waste. The following table

provides a summary of the most common special waste received at the Regional Landfill.

**Table 2: Special Waste Quantities Received**

Special Waste	Loads in 2018	Loads in 2019
Asbestos	105	146
Bleaching Clay	105	91
Municipal Sludge	319	276

### 2.3 Waste Refused

The Authority's Weigh-person is required to question waste haulers about the nature of the wastes being disposed of, and to look for suspicious, unauthorized, or banned materials present in a load. The Authority also employs Waste Inspectors as well as the contracted heavy equipment operators who are located in the active disposal area to inspect loads of waste for unacceptable material such as liquids, suspected hazardous wastes, special waste which have not been approved and/or waste banned from the site by the Authority. As well, wastes are inspected to ensure compliance with waste bans and regulations under the Environmental Protection Act.

If wastes of the aforementioned types are brought to the site by a licensed commercial hauler they are refused from landfilling and returned with the hauler for proper disposal or recycling. The following waste refusals took place in 2019:

**Table 3: Waste Refused**

Waste Type	Quantity in 2019
Tires	63
Major Appliances	13
Propane Tanks	8
Paint, Ballasts & Fluorescent Tubes	2
Small Appliances/Electronics*	89
Car Batteries	3
Metal Items	2
<b>Total</b>	<b>180</b>

Table 3 Notes: \* Small Appliances/Electronics include televisions & miscellaneous small electronic devices

## **2.4 Waste Types**

Municipally delivered wastes hauled directly to the site in 2019 totalled 24,085.13 tonnes. Municipal refuse is also included as part of the refuse from the Authority's two transfer stations. Municipal refuse from the transfer stations for 2019 was 78,366.43 tonnes. Therefore, total municipal residential refuse for 2019 was 102,451.56 tonnes.

Total refuse brought in from Transfer Stations No. 1 & 2 (Windsor and Kingsville respectively) in 2019 represented 105,621.09 tonnes. This refuse represents 30% of the total waste received in 2019. The reader is referred to the annual reports of the Transfer Stations for details on the types of waste included in this total.

IC&I refuse delivered directly to the landfill totalled 28,861.13 tonnes in 2019. IC&I refuse is also included as part of the refuse from the Authority's two transfer stations.

During 2019 a total of 3,063.73 tonnes of sludge was delivered to the site from the Towns of Amherstburg, Kingsville, Leamington and Essex. The sludge is incorporated with the other wastes and co-disposed in the active fill area. The amount of sludge disposed of in 2019 was 0.9% of the total waste stream, which is below the 2% limit stipulated in the Site's ECA. See Table 5 for a full list of waste types.

## **2.5 Waste Diversion Activities including MHSW (Municipal Hazardous and Special Waste) and Recycling Depot**

Conditions 18 and 19 of ECA A011101, as amended April 3, 2017, serve to approve various waste diversion activities which are allowed to be undertaken at the site. Such diversion activities include refrigerant appliances, blue box recyclables, scrap metal, tires, waste electrical & electronic equipment and household chemical and hazardous waste.

The depot is licensed to collect and transfer the following waste classes: 112, 145, 146,147, 148, 212, 213, 221, 242, 243, 252, 261, 263, and 331.

The site was officially open to the receipt of MHSW on September 9<sup>th</sup>, 2013. During 2019 a total of 204 residents from the Essex County area attended the site to drop off an assortment of MHSW, electronics, tires and blue box materials (recyclables). A summary of the MHSW materials and quantities is listed in Table 4A and 4B.

**Table 4A: MHSW Litres**

<b>MHSW Material Type</b>	<b>Litres in 2018</b>	<b>Litres in 2019</b>
Paints & Coatings	5,430	4,214
Adhesives & Flammable Liquid	1,045	1,470
Corrosive Liquid	85	0
Antifreeze (Glycol)	225	70
Aerosols	160	60
Pesticides	540	65
Waste Motor Oil	1,300	2250
<b>Total</b>	<b>8,785</b>	<b>8,129</b>

**Table 4B: MHSW Kilograms**

<b>MHSW Material Type</b>	<b>Kilograms in 2018</b>	<b>Kilograms in 2019</b>
Car Batteries	640	0
Inorganic Oxidizers (fertilizers)	85	0
Dry Cell Batteries	265	360
Waste Oil Filters	65	60
Propane Cylinders	115	120
Propane Tanks	270	0
Fire Extinguishers	55	55
Fluorescents & Misc. Bulbs	105	300
<b>Total</b>	<b>1,600</b>	<b>895</b>

For 2019, there were no spills/upsets or corrective actions taken as a result of the operation of the depot. Daily inspection reports are kept on file at the Regional Landfill Site and available upon request.

The Authority contracted with Buckham Transport and EnviroSystems Inc. to manage the majority of MHSW material at its facilities. Aevitas is contracted for Fluorescents & miscellaneous bulbs and SafetyKleen for waste motor oil.

**Table 5: Waste Material Types and Tonnage**

<b>Material Type</b>	<b>2018 Tonnes</b>	<b>2018 Percent</b>	<b>2019 Tonnes</b>	<b>2019 Percent</b>
Municipally delivered Refuse	23,534.36	9.5	24,085.13	6.8
Municipally delivered Clean Up	265.05	0.1	191.57	0.1
Recycling Residual	1,099.52	0.4	2,497.31	0.7
Municipal Construction & Demolition	0.00	0.0	0	0
Pollution Control Grit	1,431.53	0.6	1,241.48	0.4
Municipally delivered Sewage Sludge	3,126.34	1.3	3,063.73	0.9
Residentially delivered Refuse	18.49	0.0	23.50	0.0
Residential Construction & Demolition	9.25	0.0	8.28	0.0
Residential Shingles	0.89	0.0	2.27	0.0
Charitable Organizations	0.00	0.0	58.26	0.0
Contaminated Soil	20,175.58	8.1	116,360.58	33.1
Vines – Greenhouse	55,240.46	22.3	58,472.47	16.6
Greenhouse Waste	8,065.37	3.3	10,418.28	3.0
ICI delivered Refuse	28,014.82	11.3	24,666.01	7.0
ICI Construction and Demolition	3,343.31	1.3	3,918.90	1.1
ICI Shingles	453.06	0.2	276.22	0.1
Asbestos	280.34	0.1	751.92	0.2
Transfer Station Refuse	102,981.95	41.5	105,621.09	30.0
<b>Annual Total</b>	<b>248,040.32</b>	<b>100</b>	<b>351,657.00</b>	<b>100</b>

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**Table 6: Traffic Data for 2019 by Month**

Month	Waste	Leachate	Alternate Daily Cover	Compost	Auto Shredder Fluff	Tires	Glass	PDO	Total for Month
January	1356	121	2	23	115	5	13	6	1,641
February	1290	131	0	21	122	3	14	4	1,585
March	1566	180	0	48	138	7	12	8	1,959
April	1738	308	21	191	101	10	12	9	2,390
May	2594	307	21	210	67	7	10	5	3,221
June	2209	274	31	209	68	3	14	3	2,811
July	1587	297	22	304	66	10	10	5	2,301
August	1794	101	44	238	70	8	12	6	2,273
September	1490	98	107	210	66	0	12	4	1,987
October	1626	122	26	222	72	5	10	3	2,086
November	3083	130	10	252	69	0	12	2	3,558
December	2920	97	13	171	73	2	11	6	3,293
<b>Totals</b>	<b>23,253</b>	<b>2,166</b>	<b>297</b>	<b>2,099</b>	<b>1,027</b>	<b>60</b>	<b>142</b>	<b>61</b>	<b>29,105</b>

Table 6 Notes: PDO = Public Drop Off

### **3 Traffic**

A total of 29,105 vehicles hauling all types of material as shown in Table 6 entered the site in 2019. The daily average volume of traffic hauling waste material only averaged out over the number of working days the site was open during 2019 (303 working days), equalled 77 waste vehicles per day. A total of 5,852 additional vehicles entered the site for other related landfill operations. Accordingly, the total traffic for 2019 was 34,957 vehicles resulting in average vehicles per day of 115.

### **4 Inspections and Complaints**

#### **4.1 Inspections**

The Solid Waste Authority provides a full-time on-site supervisor at the Regional Landfill Site. One of the roles of the supervisor is to undertake a perimeter check of the site on a daily basis to identify problems in any of the following areas: leachate springs, erosion, drainage, litter, daily cover, leachate levels, etc. As well, the supervisor is responsible for ensuring compliance with waste bans, ECA and Regulations under the Environmental Protection Act.

#### **4.2 Complaints**

A formal complaint process is in place at the site. During 2019, there was a total of one complaint reported.

The family of Terri Colenutt reported odour during the four days prior to their complaint notification on November 26, 2019. The odour was present around 6-7AM each morning. The landfill manager contacted the family and invited them to visit the landfill to better identify the odour but they declined.

#### **4.3 Accidents, Fires and Incidents**

There were no accidents or incidents that impacted landfilling operations in 2019.

### **5 Site Development and Maintenance**

#### **5.1 Disposal Operations**

Waste disposal operations at the Site were performed by Canadian Transfer 1869096 Ontario LTD., under contract with the Essex-Windsor Solid Waste

Authority. The work performed includes the placement and compaction of waste; the placement of daily, intermediate and final cover and maintenance of access roads. Staff of the Essex-Windsor Solid Waste Authority carried out litter control, dust control, cleaning of roads and general maintenance.

## 5.2 Disposal Areas

The Essex-Windsor Regional Landfill Site is 123 hectares in size with a waste footprint of 64.5 hectares. The disposal area is divided into five cells and further divided into north and south cells for construction. At this time Cell 4 South, and Cell 5 North and South have not been developed. Cell 3 South was substantially completed in February 2019. Landfilling in block 1 of Cell 3 South began November 21, 2018. The design capacity and area of the waste cells are as follows:

**Table 7: Capacity of Disposal Areas**

Cell	Area (hectares)	Total Volume (cubic metres)	Waste Mass (Tonnes)
1	14.4	1,707,000	784,000
2	11.4	2,834,000	1,360,000
3	10.0	2,675,000	1,284,000
4	10.6	2,969,000	1,427,000
5	11.6	2,615,000	1,245,000
<b>Column Totals:</b>	<b>58.0</b>	<b>12,800,000</b>	<b>6,100,000</b>

Table 7 Notes: (Proctor & Redfern, Vol. 1 – Design Operations Report, October 1993).

1. Total volume is calculated based on measurement from top of the leachate collection system to final contours including 1.0 meter of final cover. Waste 10,167,000 m<sup>3</sup>; Daily & Interim cover 2,036,000 m<sup>3</sup>; Final cover 597,000 m<sup>3</sup> = 12,800,000 m<sup>3</sup>. See ECA Condition 4.5 (3) and (4).
2. Waste density without soil cover is 600 kg/m<sup>3</sup>.
3. Waste to daily and interim cover ratio is 5:1 (by volume).
4. Total volume represents the sum of daily and interim cover volume, final cover volume and waste volume.

**Table 8: Waste Cell Refuse Tonnage**

Year	Cell 1	Cell 2	Cell 3	Cell 4
1997	83,970	0	0	0
1998	180,363	0	0	0
1999	188,298	0	0	0
2000	193,513	0	0	0
2001	226,426	0	0	0
2002	80,859	150,120	0	0
2003	0	272,974	0	0
2004	56,514	221,646	0	0
2005	43,873	152,801	0	0
2006	19,930	168,526	0	0
2007	5,789	180,003	0	0
2008	92,032	103,852	0	0
2009	41,274	117,804	0	0
2010	94,209	104,965	0	0
2011	77,520	147,052	0	0
2012	0	26,908	143,397	0
2013	5,640	60,161	122,203	0
2014	0	34,490	133,757	0
2015	0	160,849	20,553	0
2016	0	152,800	34,195	63,703
2017	0	2,135	1,153	242,151
2018	28,277	45,391	41,695	132,677
2019	0	122,166	227,522	1,969
<b>Total Tonnes</b>	<b>1,418,487</b>	<b>2,224,643</b>	<b>724,475</b>	<b>440,500</b>

Cell 1 of the Essex-Windsor Regional Landfill was opened to the receipt of waste in July 1997 and as of December 31<sup>st</sup>, 2019 had approximately 1,418,487 tonnes of waste in-situ.

During 2019, approximately 122,166 tonnes of additional waste was placed in Cell 2 north as a result of airspace recovery and re-grading activities. This airspace recovery operation was conducted to recover airspace due to consolidation of garbage caused by the stockpiling of clay excavations from the recent construction of Cell 4 North.

Cell 2 of the Essex-Windsor Regional Landfill was constructed in two phases, Cell 2 North was constructed in 2002 and landfilling began in that portion of the cell in June 2002. Cell 2 South was constructed in 2004/2005 and landfilling began in that portion of the cell in early 2005. As of December 31, 2019, Cell 2 had approximately 2,224,643 tonnes of waste in-situ. Cell 2 was originally designed to accommodate the disposal of 1,360,000 tonnes of waste.

Cell 3 north of the Regional Landfill was open to the receipt of waste in 2012 and as of December 31<sup>st</sup>, 2019 had approximately 724,475 tonnes of waste in-situ.

Cell 4 north of the Regional Landfill was developed in 2015 and was open to the receipt of waste on April 6, 2016. As of December 31<sup>st</sup>, 2019 approximately 440,500 tonnes of waste has been placed in Cell 4 north.

Construction of Cell 3 south at the Regional Landfill began in 2018. It was substantially complete in February 2019, however it was opened to the receipt of waste November 21, 2018.

### **5.3 Waste Disposal Methods**

The ramp method of landfilling was employed at the Regional Landfill Site during operations in 2019. Wastes were deposited at the bottom or top of the ramp and pushed upwards or downwards in a lift over the operating face. The landfill contract with the heavy equipment operators specifies that the lift shall be a maximum height of 3 metres, that the ramp slope is to be 5:1, and that the layer of waste, prior to compaction should not exceed 0.45 metres. The Contractor was noted as generally complying with these requirements during the year. The waste is spread using a Caterpillar D8T bulldozer and is then compacted using a Caterpillar 836K Landfill compactor.

At the end of each working day, or more frequently if needed, the tipping area is covered completely with a layer of soil or other approved equal (daily cover). The primary function of daily cover is to reduce odours, nuisance, vectors, fires, litter and unsightliness of the landfill site. Several forms of alternative daily cover are combined with clay to accomplish this. They include street sweepings, auto shredder fluff, and tarps. For 2018 and 2019 the following quantities of cover was combined with clay and tarps for application to the active tipping area at the end of each working day.

**Table 9: Daily Cover**

<b>Material Type</b>	<b>2018 Tonnes</b>	<b>2019 Tonnes</b>
Alternative Daily Cover	5,093.80	6,119.36
Auto Shredder Fluff	42,052.03	37,911.72
Clay	0.00	0.00

As per ECA No. A011101, samples of Shredder Fluff were taken on a monthly basis and submitted for analysis of Ontario Regulation 558 Schedule IV Inorganics and PCBs. In every case the Auto Shredder Fluff samples conformed to the specifications of a non-hazardous waste under Ontario Regulation 558. Detailed sample records are available for review at the offices of the Essex-Windsor Solid Waste Authority.

#### **5.4 Site Maintenance**

EWSWA Staff carried out the day to day maintenance of the site. This included, but was not limited to, the cleaning and scraping of roads, litter control, dust control and the maintenance of the leachate collection system.

There are 15 litter control units stationed at the Site. The portable litter control units are used in conjunction with the permanent litter control fence surrounding the active tipping area to control the movement of litter on the site. The units are 10 metres long by 5 metres high with a wire mesh type fence attached to them. The units are mounted on skids that permit easy relocation by the heavy equipment at the site. The units are moved frequently to coincide with wind direction and have assisted greatly in controlling the movement of litter away from the disposal area.

The removal and control of mud from the road is accomplished by the application of several pieces of equipment. A water truck combined with a

front end loader (F.E.L.) and a truck wheel wash are used in various combinations and have all but eliminated the tracking of mud off the site.

Dust control for 2019 was accomplished by using a 3,800 imperial gallon water truck equipped with spray bars. During the dry periods, water was applied to the tipping face area and roads to control dust.

### **5.5 Vegetation and Cover**

In order to promote a thicker and healthier growth of grass on top of the waste cells, several major grass cuts were completed in 2019. By cutting the grass more often weed patches do not get a chance to germinate and the grass is allowed to re-establish itself in poor growth areas. A healthy, thick grass growth reduces erosion, surface water infiltration and cell cap desiccation. Annual inspection results suggest that the regular cutting of the grass has resulted in much thicker healthier growth of grass.

### **5.6 Roads**

A water truck and a front-end loader, owned by EWSWA, were utilized as required to clean the County road and internal access road at the Regional Site. The Authority carried out daily and monthly road patrols on access routes to the Site, and local municipal roads that surround the Site, for illegally dumped waste and waste that may have fallen off of trucks on the way to the Site.

The roads patrolled include County Road 18 from County Road 23 to Coulter Sideroad, County Road 23 from Highway 3 to County Road 18, Ferris Sideroad from Concession Road 8 to County Road 18, McCormick Sideroad from County Road 18 to Concession Road 6, Coulter Sideroad from Concession Road 8 to Concession Road 6, Concession Road 8 between the Coulter and Ferris Sideroads and Concession Road 6 between the Coulter and McCormick Sideroads. Material picked up from the road patrols was brought to the landfill for proper disposal and the wood and brush was placed on the compost pad for chipping. For 2019 the illegal dumping of waste around the site continued to be minimal.

### 5.7 Erosion Control/Drainage

Washouts were repaired as required and a number of areas which experienced minor erosion during the year were repaired in 2019. All landfill surface water ditches were cleaned out and re-graded as required.

### 5.8 Volume Analysis and Compaction

Monthly compaction surveys of the Site were carried out in 2019 to provide for accurate volume analysis. The results are included in Table 10. The compaction surveys were completed by EWSWA staff. The average compaction of waste for the Regional Landfill for 2019 was 0.789 tonnes/m<sup>3</sup>, which is 31.5% greater than the minimum acceptable compaction criterion of 0.600 tonnes/m<sup>3</sup>.

**Table 10: Compaction by Month for 2018 and 2019**

Month	2018 Compaction (tonnes per cubic metre)	2018 Criteria (% based on 0.600 tonnes per cubic metres)	2019 Compaction (tonnes per cubic metre)	2019 Criteria (% based on 0.600 tonnes per cubic metres)
January	0.800	33.3	0.765	27.5
February	0.778	29.6	0.802	33.6
March	0.806	34.3	0.825	37.5
April	0.804	34.0	N/A	N/A
May	0.795	32.5	0.804	34.0
June	0.761	26.8	0.819	36.4
July	0.814	35.7	0.776	29.4
August	0.786	31.1	0.806	34.4
September	0.678	13.0	0.759	26.6
October	0.684	14.0	0.759	26.6
November	0.860	43.4	0.791	31.9
December	0.867	44.4	0.773	28.9
<b>Average</b>	<b>0.786</b>	<b>31.01</b>	<b>0.789</b>	<b>31.5</b>

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Based on the 2019 average compaction ratio of 0.789 tonnes/m<sup>3</sup> and based on the 351,657 tonnes of waste received during operations in 2019, the approximate volume of airspace consumed in 2019 as a result of landfilling activities was 445,670 m<sup>3</sup>. At the end of 2019, the approximate capacity of airspace remaining for the Essex-Windsor Regional Landfill was estimated to be 6,005,252 m<sup>3</sup>. The remaining capacity of the Landfill is shown in Table 11.

**Table 11: Historical Compaction Results**

Year	Waste Landfilled (Tonnes)	Annual Average Compaction (Tonnes per Cubic Metre)	Volume Consumed (Cubic Metres)	Remaining Volume (Cubic Metres)
				12,200,000*
1997	83,970.78	0.650	129,186	12,070,815
1998	180,363.45	0.757	238,261	11,832,555
1999	188,298.61	0.882	213,490	11,619,065
2000	193,513.28	0.791	244,643	11,374,422
2001	226,426.47	0.778	291,037	11,083,386
2002	230,979.74	0.779	296,508	10,786,878
2003	272,974.15	0.761	358,704	10,428,174
2004	278,159.99	0.737	377,422	10,050,752
2005	196,674.46	0.713	275,841	9,774,911
2006	188,456.38	0.757	248,952	9,525,959
2007	185,793.91	0.780	238,197	9,287,762
2008	195,885.12	0.833	235,156	9,052,606
2009	159,078.74	0.685	232,230	8,820,376
2010	199,175.61	0.759	262,417	8,557,959
2011	224,572.04	0.814	275,887	8,282,072
2012	170,305.06	0.774	220,032	8,062,040
2013	188,004.02	0.789	238,281	7,823,759
2014	168,247.68	0.774	217,374	7,606,385
2015	181,401.74	0.806	225,064	7,381,321
2016	250,698.66	0.804	311,814	7,069,507
2017	245,440.17	0.810	303,012	6,766,495
2018	248,040.32	0.786	315,573	6,450,922
2019	351,657.00	0.789	445,670	6,005,252
<b>Totals:</b>	<b>4,808,117.38</b>	<b>0.774</b>	<b>6,194,751</b>	<b>6,005,252**</b>

\* Source – ECA Condition 4.5 (3) & (4). Waste 10,167,000 m<sup>3</sup>; Daily & Interim cover 2,036,000 m<sup>3</sup> = 12,200,000 m<sup>3</sup>

\*\* Difference due to rounding

## **5.9 Composting**

The Essex-Windsor Regional Landfill Compost Pad is located on the same property as the Regional landfill. As part of Cell 3 South construction in 2018 a new compost pad was constructed at the north-east corner of the property, north of the storm water pond. The compost operation is licensed under ECA No. A011105, which allows for the operation of an onsite composting operation. In 2019 an amount of 10,301 tonnes of yard waste was brought directly to the Regional Landfill Composting site by generators of yard waste or their haulers. An additional 16,775.95 tonnes was transferred to the site from the Authority's Windsor Public Drop-off Depot for a total of 27,077.23 tonnes of yard waste. For additional detailed information regarding the composting operation please refer to the Essex-Windsor Regional Landfill Composting Operations Report, 2019.

## **5.10 Cell Development**

Cell 3 North development was completed in 2012. Waste was disposed in Cell 2 and Cell 3 for 2015. During 2015 the construction of Cell 4 North was completed. On April 6, 2016 Cell 4 North began to have waste placed in it. Construction of Cell 3 South began in May 2018 and continued throughout the balance of the year. As part of Cell 3 South construction in 2018, the MSHW pad was relocated to an adjacent location to accommodate the installation of a leachate collection manhole. The MSHW pad continues to function in the same manner as the old pad.

## **6 Gas Management**

The Essex-Windsor Regional Landfill gas management system consists of a number of wells established throughout the Landfill site designed to reduce landfill gas emissions.

### **6.1 Vacuum Flare**

In January 2009 the vacuum flare was decommissioned and replaced by a landfill gas collection system that the Authority contracted with Integrated Gas Recovery Services Inc. to construct.

The original agreement with Integrated Gas Recovery Services Inc. (IGRS) was terminated at the end of 2015. As of 2016 to present the Authority has contracted with IGRS to maintain and operate the vacuum flare. The Greenhouse Gas (GHG) and National Pollutant Release Inventory (NPRI) is

## Regional Landfill Site Annual Operations Report 2019

completed and reported by IGRS annually. This reporting is submitted separate from this report by EWSWA. The results are summarized in Table 12 of this report.

Typical maintenance of the gas collection system was complete by (IGRS) staff throughout the year including additional maintenance as typically required during winter months to remove ice and improve drainage in the Big "O" collection pipes. Other improvements included replacing access road crossings with solid wall HDPE piping to improve drainage and reinforce connections.

**Table 12: Landfill Monthly Flare Data for 2019**

Month	Average Flow (SCFM)	Average Percent Methane	Operation Time (Hours)	Operation Time (percent of Month)	Volume of Gas (SCF)	Volume CH4 (SCF)
January	206	45.8	481	64.6	6,327,395	2,897,947
February	192	47.7	546	81.2	6,595,062	3,145,845
March	223	46.4	559	75.2	7,940,258	3,684,280
April	212	48.3	600	83.3	7,677,633	3,708,297
May	213	51.0	586	78.8	7,302,449	3,724,249
June	205	49.3	542	75.3	6,654,361	3,280,600
July	202	47.5	513	69.0	6,228,728	2,958,646
August	227	43.2	569	76.5	8,009,226	3,459,986
September	240	43.8	415	57.6	6,307,302	2,762,598
October	235	43.4	506	68.0	7,719,549	3,350,284
November	263	50.3	672	93.3	10,700,974	5,382,590
December	279	50.9	593	79.7	10,165,208	5,174,091
<b>Totals:</b>	225	47.5	6,582	77.4	91,628,145	43,529,413

Table 12 Notes: SCFM=Standard Cubic Feet per Minute; SCF=Standard Cubic Feet, CH4=Methane

## 7 Leachate System Maintenance

### 7.1 Leachate System General History

A perimeter leachate collection system and a leachate underdrain system is in place at the Site. The system was constructed in a number of phases.

Phase I, which surrounds the east cell of the former Landfill Site No. 1 (now Cell 1 of the Regional Landfill), was installed beginning in August 1990 and became functional in October 1990, although it was not completed until March 1991. The leachate catchment area for Phase I was originally 13.8 hectares.

The catchment area was reduced to 12.76 ha in 1997 with the development of the Regional Landfill and further reduced to 9.76 ha as a result of the 1998 Landfill Mining project.

Phase II, which surrounded the former west cell of Landfill Site No.1, was installed between January and March 1993. This phase of the collection system became operational in April 1993. The leachate catchment area for Phase II is 5.76 hectares.

In 1997 the development of Cell 1 of the Essex-Windsor Regional Landfill led to the expansion of the former Area 1 (Phase III). The southern section of Cell 1 was excavated down to a depth of 10 metres below the existing site grade and extended approximately 100 metres to the south. A leachate collection underdrain system, consisting of a series of parallel perforated pipes, was installed at the base of the new landfill cell. A new pump station was installed in order to permit the leachate to be pumped out of the cell for treatment. This phase of the leachate underdrain system became functional in September 1998.

Later in September of 1998, the southern section of Cell 1 was expanded further when an additional 3 hectare area just north of the original Cell 1 excavation was developed (Phase IV). This area was also excavated down to a depth of 10 metres below existing grade and extended approximately 100 metres to the north. This portion of the leachate underdrain system was activated in 1999. The Cell 1 Leachate Underdrain System has a total catchment area of approximately 6 hectares.

Phase V of the leachate collection system was installed during the construction of Cell 2 North in the winter of 2002 and became operational on June 6<sup>th</sup>, 2002. Phase V consists of 4.95 hectares of leachate underdrain system, only 2.70 ha of which was activated during 2002. In 2003 the remaining 2.25 ha area was activated so that landfilling activities could be carried out in this section of Cell 2. This section of the Landfill, like all the newly constructed areas of the Landfill was also excavated down to a depth

of 10 meters below existing grade and consists of a series of parallel perforated pipes designed to collect and convey the leachate.

Phase VI of the leachate collection system was installed during the construction of Cell 2 South in 2004. Phase VI consists of 5.45 hectares of leachate underdrain system, 4.13 ha of which was activated during 2005. The remaining 1.32 ha was activated in mid-December 2006.

Phase VII of the leachate collection system was installed during the construction of Cell 3 north which started in July of 2011. This phase consists of 4.9 hectares of leachate underdrain system, 2.1 ha of which was activated during 2012. In 2013 an additional 1.4 ha became operational. The remaining 1.4 ha will become operational in 2014. As was the case for all the previous leachate collection systems, the collection pipes were installed at a depth of approximately 10 metres below existing grade and consist of a series of parallel perforated pipes designed to collect and convey the leachate to a pump station.

In 2015, the construction of Cell 4N resulted in the further expansion of the Essex-Windsor Regional Landfill Leachate Collection System (Phase VIII). The northern section of Cell 4N encompasses an area of 5.7 hectares which was excavated down to a depth of 10 meters below the existing site grade. As per the landfill design specifications a leachate collection underdrain system, consisting of a series of parallel perforated pipes was installed at the base of the new landfill cell. A new pump station was also installed in order to permit the leachate to be pumped out of the cell for treatment.

This phase of the leachate collection system was not activated in 2015 as no waste was placed in the cell and was activated in 2016. In 2017 the collection system operated as designed with only minor repairs required to control panels, mostly due to power fluctuations.

## **7.2 Leachate System Maintenance during 2019**

The entire leachate collection system is drained/pumped to one of three leachate collection ponds on the west side of the Site. The leachate is collected by tanker truck from the ponds and taken to the Lou Romano Pollution Control Plant in the City of Windsor for treatment or land applied/re-circulated on site, depending on the time of year and the annual quantity of leachate produced.

### 7.3 Leachate Quantities

The leachate management system in place at the Regional Landfill Site does not permit the calculation of precipitation-based leachate generation rates, as has been the practice since 1991 at the former Landfill Site No. 1. At the former Landfill Site No. 1 there was minimal leachate storage capacity, so leachate had to be removed as it was generated. This provided accurate generation statistics.

The leachate collection system at the Essex-Windsor Regional Landfill Site is operated to remove leachate from the system to prevent leachate mounding in the waste. It also prevents ground water contamination; however, leachate is now stored on site, in lined leachate ponds, in order to maximize the utilization of leachate land application and recirculation systems described in Sections 7.5 through 7.8 and to provide for hydraulic and organic equalization of the leachate.

As of the end of 1999 there was a combined storage capacity of 23,400 m<sup>3</sup> in three ponds, the south, east and west ponds. Two 5-HP aerators are installed in the south pond and one 5-HP aerator was installed in each of the west and east ponds. The aerators help control odours while at the same time reducing BOD (Biochemical Oxygen Demand) levels in the leachate.

During November 2005 the south pond was drained and the sumps were vacuumed out of any sediment build up.

Leachate generated at the Essex-Windsor Regional Landfill is managed or treated via a number of different leachate treatment technologies. These include hauling leachate off site to an approved sewage treatment facility, re-circulating leachate into existing landfilled waste or land applying leachate to a vegetative ecosystem.

In 2019, the various leachate management systems both on and off the site managed 95,072.74 m<sup>3</sup> of leachate, an increase compared with the 67,375.50 m<sup>3</sup> in 2018. The quantities of leachate in 2019 are shown in Table 13.

**Table 13: Leachate Management in 2019**

Month	Trucked off Site	LLTS (spray)	LLTS (Trickle)	West Cell Land Treatment	Total (cubic metres)
January	5,106.85	0.00	0.00	0.00	5,106.85
February	5,580.50	0.00	0.00	0.00	5,580.50
March	7,765.15	0.00	0.00	0.00	7,765.15
April	13,392.17	0.00	0.00	0.00	13,392.17
May	13,302.16	0.00	0.00	0.00	13,302.16
June	11,761.97	0.00	0.00	0.00	11,761.97
July	12,823.34	0.00	0.00	474.00	13,297.34
August	4,166.76	0.00	0.00	1,443.00	5,609.76
September	3,975.95	0.00	0.00	518.00	4,493.95
October	5,290.67	0.00	0.00	97.00	5,387.67
November	5,704.75	0.00	0.00	0.00	5,704.75
December	3,670.47	0.00	0.00	0.00	3,670.47
<b>Totals:</b>	<b>92,540.74</b>	<b>0</b>	<b>0</b>	<b>2,532</b>	<b>95,072.74</b>

Table 13 Notes: LLTS = Leachate Land Treatment System

#### 7.4 Leachate Quality

Leachate is produced primarily from the percolation of incident precipitation into the refuse. Processes within the refuse degrade the quality of the percolating water, creating the leachate. The chemical characteristics of the leachate can vary within the refuse, depending on various factors, such as refuse composition and age refuse hydraulic conductivity, leachate residence time, and the leachate flow regime.

Samples of the leachate are collected for analysis of a range of general chemistry and metal compounds from two locations within the leachate collection system as part of the groundwater monitoring program detailed in

Section 8.2 and the environmental monitoring programs for the various leachate land treatment systems detailed in Section 7.9. The samples collected from Pump Station 1 (PS1) reflect the leachate generated by waste in Cell 1, Cell 2 and Cell 3N of the Regional Landfill. Samples collected from PS3 reflect the leachate from the West Cell of the former Essex County Landfill Site No. 1. Samples collected from PS2 which was installed in 2015, reflect the leachate from Cell 4N.

During 2019 leachate samples were collected as part of the Regional Landfill Leachate Management Program. The leachate samples were analyzed in the field for pH, conductivity, temperature and turbidity. Samples were submitted to Exova Accutest Laboratories Limited and analyzed for general chemical parameters, volatile organic compounds (EPA Method 624) and semi-volatile compounds (EPA Method 625).

The general chemical results for the collected leachate samples in 2019 were comparable to the historical findings for the leachate collector systems with minor historical exceedances.

### **7.5 Leachate System Maintenance**

Condition 9.4 of the ECA No. A011101 for the Site requires that the leachate collection system be flushed and cleaned at least once every two years. Heaton Sanitation was contracted to carry out the work in 2018, but due to surcharging of the collection system in January, February, and March and again in mid-October, November and December this work was delayed until 2019. Other than surcharging due to persistent precipitation, there were no significant problems detected with the system. A plan to implement additional leachate haul trucks was initiated in December 2018. The system is scheduled to be flushed and cleaned out again in the year 2021.

Pump station repairs and preventative maintenance was carried out as required during 2019. This included but was not limited to the following:

- Regular inspection and adjustments of the pumps as required,
- The removal and power washing of pumps,
- The painting of electrical panels,

### **7.6 Leachate Springs and Stains**

A leachate stain is defined as a discolouration of the soil that extends no more than 1 metre from its source. A leachate spring is defined as an active movement of leachate that extends beyond 1 metre from its source. During 2019, there were no springs or stains.

### **7.7 Leachate Land Treatment System**

In 1992 the Ministry of the Environment approved a four-year experimental program for the land treatment of leachate at Landfill Site No. 1. In September of 1995 an amendment to the ECA was received from the Ministry of the Environment lifting the four-year experimental requirement. This allowed for the continuation of the system until such time that the land's ability to treat the leachate has been exhausted or when the land is required for other uses.

The current delivery system network configuration consists of 99 impact sprinklers, which apply leachate across 1.0 ha, and 72 subsurface drip irrigation laterals, which apply leachate to 0.8 ha.

In 2019 the Leachate Land Treatment System (LLTS) spray system and trickle system were not started in 2<sup>nd</sup> quarter as usual due to saturated ground conditions.

The vegetation in the Land Treatment Area is comprised mainly of reed canary grass, which is cut and maintained as required. Vegetation is cut and baled and then removed for composting.

The ECA issued by the Ministry of the Environment for operation of the Land Treatment System permits continued operation until environmental monitoring indicates that the treatment capacity of the site has been exhausted.

### **7.8 West Cell Land Treatment and Recirculation System**

Condition 9 of ECA No. A011101 dated April 3, 2017 authorizes operation of the West Cell Leachate Land Treatment and Recirculation System (LTRS). Condition 9.1 (h) allows for the continued operation of the LTRS until such time as environmental monitoring indicates that the treatment capacity of the system has been exhausted. The LTRS integrates leachate land treatment technology with leachate recirculation to dispose of leachate and accelerate the rate of landfill stabilization. Recirculation of leachate into the

West Cell occurs by way of drip irrigation laterals that distribute leachate through 20 sand-filled trench reservoirs constructed into the waste below the cap. The land treatment delivery network is comprised of twelve distribution laterals supplying leachate to 120 impact sprinklers.

Both the land treatment component and recirculation system of the LTRS was not operated during 2012 or 2013 as the area was sprayed for a total kill off of invasive plants. Leachate land application resumed on May 4<sup>th</sup>, 2015 but the recirculation component was not operated.

The West Cell land application system was started on July 25, 2019 and closed and winterized on October 22, 2019. During this period 2,532.00 m<sup>3</sup> of leachate was applied over approximately 30 days.

### **7.9 Cell 1 Land Treatment System**

Condition 9 also authorizes operation of the Cell 1 Leachate Treatment System (C1-LTS). The Cell 1 leachate treatment area was added in 2000. The area is slightly less than a hectare in surface area and is situated on the landfill area designated as Cell 1 (immediately north of the fill area). The C1-LTS employs the same spray technology as the other leachate and treatment systems located on site. It is comprised of one block containing 8 laterals supplying leachate to a total of 60 impact sprinklers.

The C1-LTS was decommissioned on June 16<sup>th</sup>, 2008 to recover air space for landfilling.

### **7.10 Cell 1 Bio-Reactor**

ECA No. A011101 was amended again on October 31<sup>st</sup>, 2000 to authorize operation of the Cell 1 Bio-Reactor. This five-year, full scale, pilot project was constructed in the southern portion of Cell 1 and commenced operation in March of 2001. The system was a multilevel leachate recirculation network with each level comprised of horizontal infiltration trenches constructed within the refuse to provide equitable leachate distribution for the purpose of enhancing waste biodegradation.

The Cell 1 Bio-Reactor was decommissioned in 2006.

### **7.11 Environmental Monitoring of Leachate Land Treatment Systems**

As required by the Ministry of the Environment and Climate Control, a detailed environmental monitoring and data collection program was conducted for the LLTS and West Cell for 2019.

Groundwater and surface water monitoring and sampling were completed around the landfill site perimeter, including areas downgradient of the on-site leachate treatment areas. Detailed findings will be included in the 2019/2020 Biennial Monitoring Program Report for the Regional Landfill Site prepared by WSP.

In summary, groundwater and surface water quality showed no detectable effects from the current operations of the leachate land treatment areas at the landfill site. For additional detailed information regarding the Leachate Land Treatment Systems, please refer to the 2019 Annual Monitoring Report, Leachate Management Program Essex-Windsor Regional Landfill Site prepared by WSP.

## **8 Monitoring Programs**

The ECA requires that a number of additional monitoring programs be carried out at the Essex-Windsor Regional Landfill. These include monitoring of the ground and surface water, precipitation, sediment sampling, dust monitoring, gas and woodlot monitoring. In September 2003, ECA No. A011101 was amended to reflect the recommended monitoring changes submitted by WSP, for the Essex-Windsor Regional Landfill in their annual monitoring reports dated 1999, 2000, 2001 and 2002.

The most significant changes were that Monthly Operations Reports was amended from monthly to annual submissions. Each of the programs carried out in 2019 is described in more detail in the following sections.

### **8.1 Surface Water and Sediment Monitoring**

The 2019 surface water and sediment sampling programs consisted of the following as noted in WSP's Annual Summary:

- Collection and analysis of Storm Water Management pond water samples on a monthly basis.

- Collection of samples from 5 surface water monitoring locations (SW2, SW3, SW8, SW9 & SW12) was taken following a "precipitation" event. A

precipitation event is when 30 mm or more of precipitation is received within a contiguous 24-hour period.

Collection of sediment samples from 5 surface water monitoring locations (SW2, SW3, SW8, SW9 & SW12) once per year.

The 2019 monitoring services for the Leachate Monitoring Program (LMP) and related annual reporting activities were completed at the site. In summary, groundwater and surface water quality showed no detectable effects from the current operations of the leachate land treatment areas at the landfill site.

## **8.2 Ground Water Monitoring**

All routine ground water monitoring in 2019 was carried out by WSP and consisted of the following activities:

- Measurement of ground water levels at 85 monitoring locations.
- Collection of samples twice per year from 25 ground water monitors in the Shallow Ground Water System and 5 ground water monitors in the Upper Sand Ground Water System.
- Annual ground water monitoring from 21 monitors in the Middle Aquitard, 10 in the Lower Sand Ground Water System, 3 in the lower Aquitard, 24 from the Upper Aquitard and 8 from the Bedrock Aquifer.
- Select monitors were also sampled and analysed for BTEX compounds during the spring and fall sampling events.

Generally, groundwater elevations during 2019 are consistent with the historical database. Groundwater chemical results during 2019 are generally consistent with historical results and continue to document naturally poor groundwater quality at the site.

In summary, groundwater and surface water quality showed no detectable effects from the current operations of the leachate land treatment areas at the landfill site.

## **8.3 Weather Monitoring**

A complete weather station is located at the Regional Landfill. It collects wind speed and direction, temperature and precipitation measurements.

## Regional Landfill Site Annual Operations Report 2019

The wind information is used to direct litter control operations and to assist in investigating odour complaints.

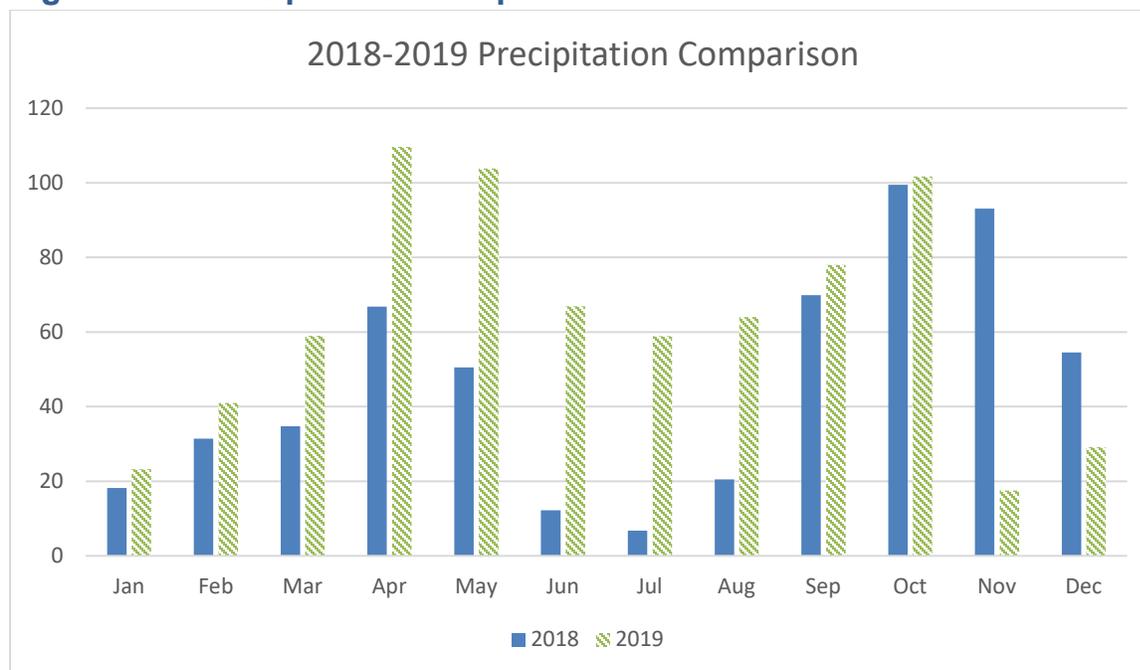
The information obtained through precipitation measuring is also used to facilitate the surface water sampling program carried out at the Site, and to calculate the appropriate application rate for the leachate land application/recirculation systems.

The total amount of precipitation received at the Landfill in 2019 was 752.7 mm. The total amount received in 2018 was 558.1 mm; this is an increase of approximately 35% compared to 2018. The monthly precipitation rates are shown in Table 14 and Figure 1.

**Table 14: Precipitation by Month in 2019**

<b>Month</b>	<b>Millimetres of Precipitation</b>
January	23.2
February	41
March	59
April	109.6
May	103.8
June	66.9
July	58.9
August	64
September	78
October	101.7
November	17.5
December	29.1
<b>2019 Total:</b>	<b>752.7</b>

**Figure 1: Precipitation Comparison 2018 and 2019**



#### 8.4 Leachate Level Monitoring

Monthly leachate level monitoring was conducted throughout the year on all maintenance holes and the pump stations on the perimeter leachate collector system and all refuse monitors. The leachate collector system is typically operated with either off-site leachate haulage or on-site land treatment/recirculation to maintain gravity drainage of the collector system. Leachate elevations within the perimeter collector system are typically maintained below the surrounding shallow groundwater elevations to maintain groundwater movement toward the Landfill. The leachate level monitoring results for 2019 indicated that in general the collector system was typically operated as designed.

#### 8.5 Gas Monitoring

The gas monitoring program was expanded through 2017 to incorporate additional shallow flow/upper sand monitors to delineate potential gas migration at the perimeter of all existing refuse areas on site (21S-III, 95-I, 95-III, 96-I, 96-III, 97-I, 97-III, 102-I, 102-III, 103-I, 103-III, 104-I, and 104-III).

Combustible gas was detected within the waste at Monitors 35A-II, 36-I, 38, 42, 64, 69, and 70 at concentrations that represent a potential health and

safety concern. Access to the waste footprint (closed and open) should be restricted to adequately trained site personnel. Concentrations adjacent to the waste footprint do not present an immediate health and safety concern to onsite structures.

Based on typical combustible concentrations less than 0%, reported for Monitors 14A-I/II/III/IV and in consideration of the acceptable groundwater chemical concentrations reported to date, the monitors appear to remain in good condition. Routine monitoring and maintenance was conducted by Comcor Environmental Limited under contract.

### **8.6 Dust Monitoring**

The dust monitoring field program was conducted by EWSWA's staff in accordance with the Off-Site Dust Monitoring Program that was attached to the letter from EWSWA to the MOECC, dated May 28, 1997. The ECA conditions pertaining to dust are Conditions 4.22 through 4.26.

A series of three dust fall jars were placed by EWSWA to capture representative sample areas. Three locations were selected to consist of background, active fill or work face area, and down wind or potential impact area. Dust samples were collected monthly.

A total of 12 samples were collected by EWSWA from the three selected locations at the end of each month (or representative month-long period). The samples were submitted to Maxxam Analytics for laboratory analysis. The samples were analyzed for insoluble and soluble particulate. Based on the analytical results, the reported concentrations were below the acceptable level for dust fall ambient air quality of 7.0 g/m<sup>2</sup>/month over 30 days or 4.6 g/m<sup>2</sup> over one year. Consequently, no additional dust control measures or corrective measures were warranted during the monitored periods.

### **8.7 Other Monitoring Programs**

As per the recently amended Waste ECA (Condition 8.10), an air monitoring program was implemented at the Regional Landfill site in 2017. Air samples were collected at five perimeter sampling locations once monthly in July through October 2017. In addition, air samples were required to be collected at four source sampling locations during the first month of sampling. Based on the reported analytical results, no exceedances of the target list of compounds were reported, and the majority of reported parameters were

below the laboratory detection limits, with the exception of o-Xylene and m&p-Xylene concentrations for perimeter samples AQ8 and AQ9 in August 2017. Sample location AQ8 is northeast of Cell 4N and AQ9 is in the southeast corner of the landfill. O-Xylene and m&p-Xylene concentrations for samples AQ8 and AQ9 both exceeded the MOECC JSL of 100 µg/m<sup>3</sup> for these parameters. However, the total xylenes concentration met the MOECC Standard for samples AQ8 and AQ9. In addition, the total xylene concentrations for all five samples during the August monitoring event were well below the Upper Risk Threshold of 7,300 µg/m<sup>3</sup> for total xylene. No further exceedances of the target list of compounds were reported during the subsequent September and October air monitoring events. As such, no further action is recommended at this time. This air monitoring program will be performed every five years as required by the current ECA.

### **8.8 Woodlot Monitoring**

In November 2008, the Landfill Liaison Committee concurred with staff recommendation that the formal woodlot monitoring program for the Essex-Windsor Regional Landfill be concluded and further, that the woodlots be visually examined on an annual basis and if unjustifiable stress and decline of the woodlot trees is observed, then an independent evaluation will be sought to determine if a monitoring program be re-established.

A tour of the woodlots conducted during 2019 indicated that the health of the woodlots appeared to be consistent with previous inspections.

### **8.9 Aquatic Biology Monitoring**

In February 2004, the Landfill Liaison Committee concurred with the staff recommendation that the Aquatic Biology Monitoring program be discontinued until either an onsite leachate treatment facility is constructed and discharges treated leachate to the storm water management pond or the monthly pond chemistry results indicate the pond is being adversely affected as a result of landfill operations.

Regional Landfill Site Annual Operations Report 2019

Tom Marentette

Manager, Waste Disposal

A handwritten signature in black ink, appearing to read 'Tom Marentette', with a large, stylized loop at the end.

Eli Maodus

General Manager

A handwritten signature in black ink, appearing to read 'Eli Maodus', written in a cursive style.

Report prepared by:

**Dee Blais**, Administrative Assistant

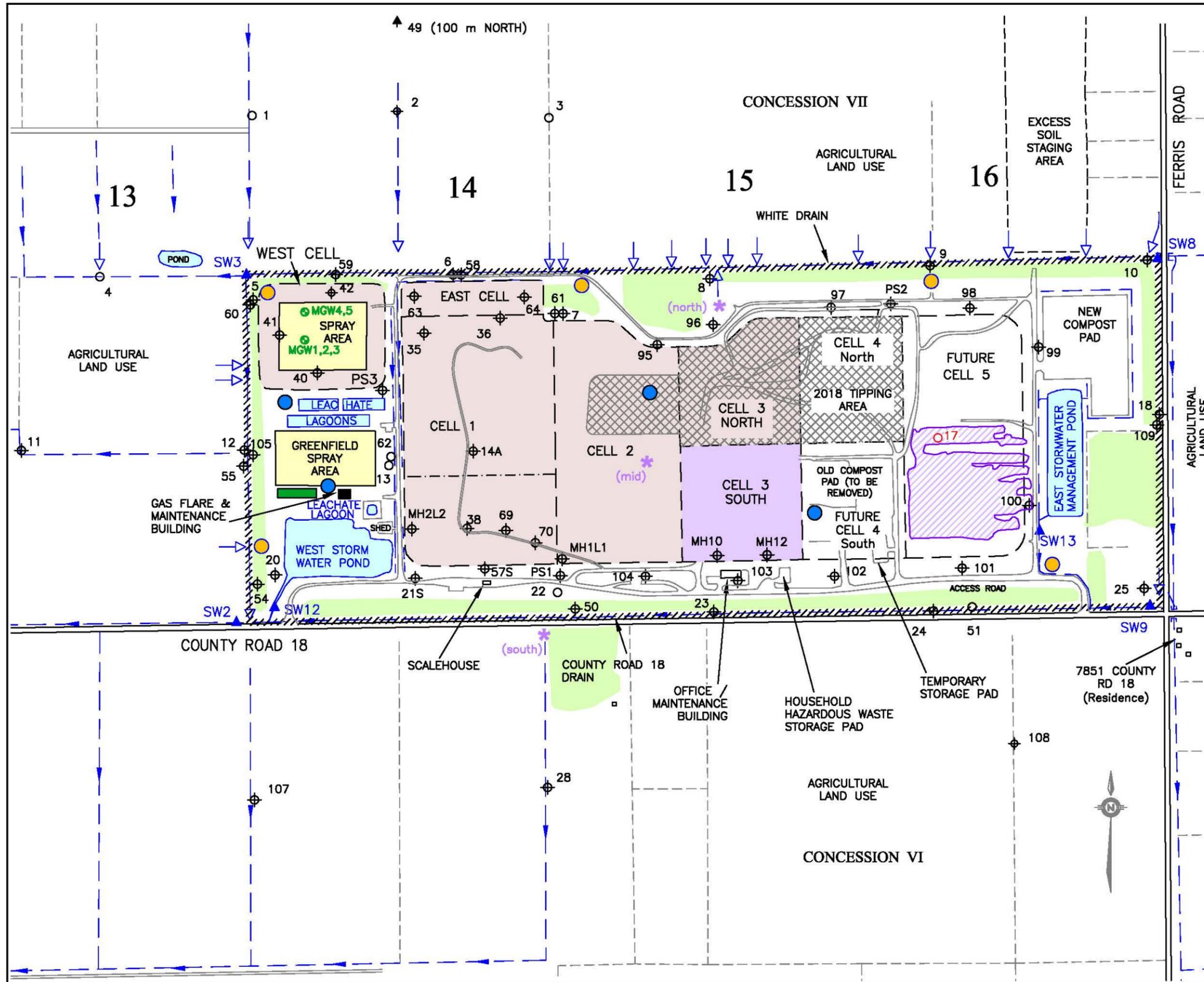


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# Appendix

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- Site Plan Map
- Operations Report Map



- LEGEND**
- REGIONAL LANDFILL PROPERTY BOUNDARY
  - WASTE (AS OF END OF 2018)
  - CELL 3 SOUTH EXCAVATION
  - LAND TREATMENT AREA
  - WOODLOT AND/OR VISUAL MITIGATION BERM
  - PONDS
  - DIRECTION OF SURFACE WATER FLOW
  - SURFACE WATER DITCH/DRAIN DISCHARGE POINT
  - 18 MONITORING LOCATION AND DESIGNATION
  - PS1 PUMP STATION AND DESIGNATION
  - 51 INACTIVE MONITORING LOCATION AND DESIGNATION
  - 71 INACTIVE MONITOR NEST TO BE DECOMMISSIONED
  - SW9 SURFACE WATER MONITORING LOCATION AND DESIGNATION
  - MGW4,5 GAS MONITORING WELL LOCATION AND DESIGNATION
  - ENVIRONMENTAL CONTROL AREA
  - DUST MONITORING STATIONS
  - APPROXIMATE TIPPING AREA
  - APPROXIMATE LOCATION OF FORMER SLUDGE PITS
  - AIR SAMPLING LOCATION - SOURCE
  - AIR SAMPLING LOCATION - PERIMETER

- NOTES:**
1. SITE CONDITIONS BASED ON DECEMBER, 2018 OBSERVATIONS.
  2. SIZE AND LOCATION OF TIPPING AREA WILL VARY WITH TIME.
  3. "- - -" INDICATES DEMARCATION BETWEEN CELL 1 NORTHERN AND SOUTHERN SECTIONS. CELL 1 SOUTHERN SECTION ENGINEERED/RECONSTRUCTED WITH LEACHATE COLLECTOR SYSTEM SIMILAR TO CELL 2, 3N, AND 4N.
  4. WELL NESTS 98 AND 101 INSTALLED FEBRUARY 2019.



## SITE PLAN

2017 / 2018 BIENNIAL MONITORING PROGRAM  
 ESSEX-WINDSOR REGIONAL LANDFILL SITE  
 For Essex-Windsor Solid Waste Authority

DATE: MAY 2019	SCALE: 1:750
PROJECT: 111-53107-02 100	FILE NO.: 111-53107-04 100-7 F1 BMR

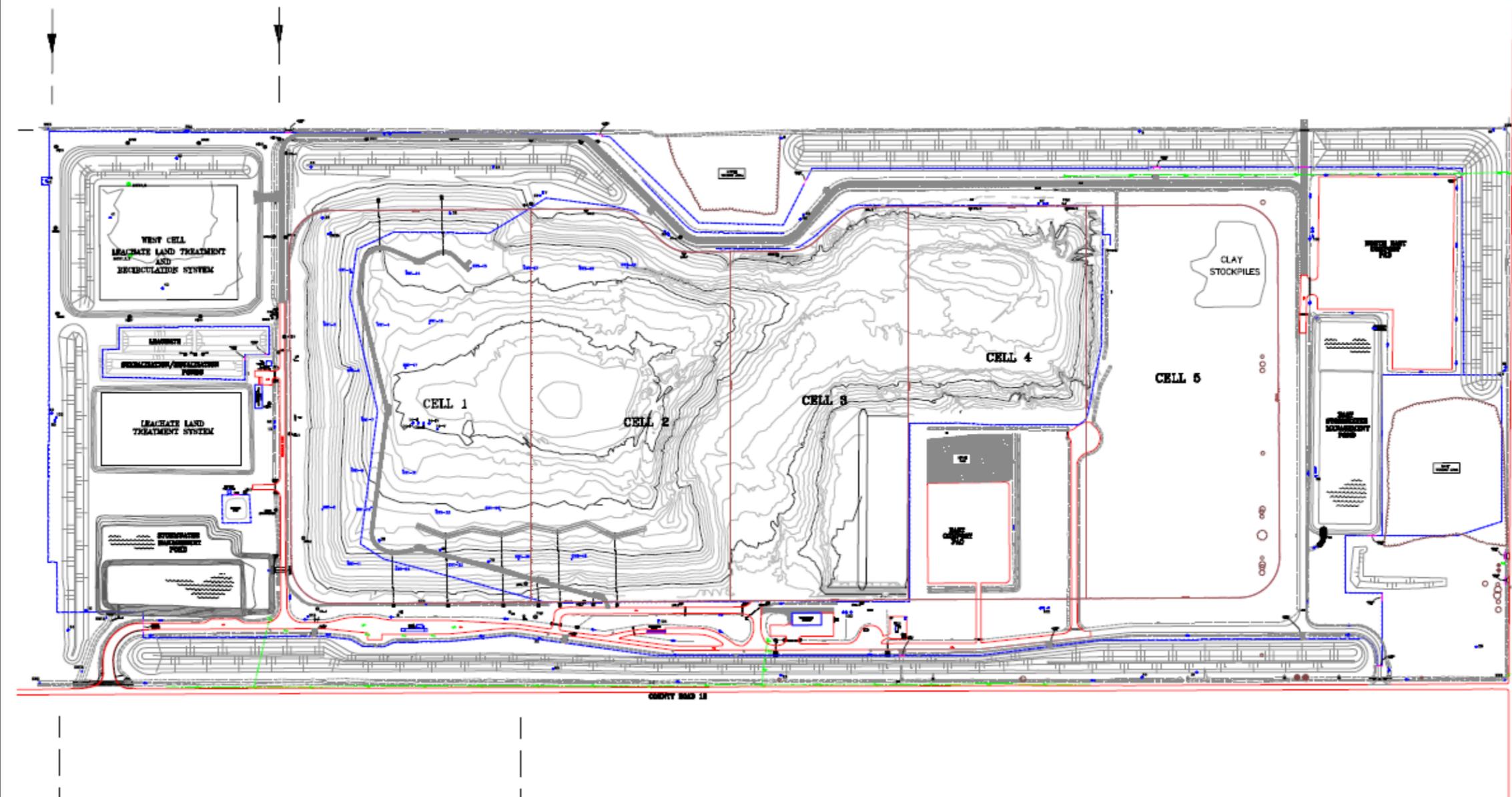


FIGURE  
**1**





ESSEX-WINDSOR SOLID WASTE AUTHORITY  
 880 FAIRVIEW AVE. W., ESSEX, ONTARIO, M3K 1Y9  
 (513) 978-6441 1-800-865-8977 FAX: (513) 978-8378



KEY:	Leachate Collection System	Stormwater	Notes	Gas Collection System
<ul style="list-style-type: none"> <li>Proposed</li> <li>Existing</li> <li>Gravel</li> <li>Open</li> <li>Under</li> <li>Flow</li> </ul>	<ul style="list-style-type: none"> <li>Shutoff Valve</li> <li>LCS Inlet/Outlet Hole</li> <li>LCS Pump Station</li> <li>Service Maintenance Hole</li> <li>LCS Underdrain System</li> <li>Gasport</li> </ul>	<ul style="list-style-type: none"> <li>Slope</li> <li>Marker post</li> <li>Warning Hole</li> </ul>	<ul style="list-style-type: none"> <li>Hydro pole</li> <li>Light standard</li> <li>Traffic light</li> </ul>	<ul style="list-style-type: none"> <li>Positive flow</li> <li>Vacuum flow</li> <li>Gas well</li> </ul>
<ul style="list-style-type: none"> <li>Contours</li> <li>Woodlot</li> <li>Access Gate</li> <li>Access Road</li> <li>Building</li> <li>Off-bottom Drain</li> </ul>	<ul style="list-style-type: none"> <li>Access Gate</li> <li>Access Road</li> <li>Off-bottom Drain</li> </ul>			

ESSEX - WINDSOR  
 SOLID WASTE AUTHORITY  
 REGIONAL LANDFILL  
 2019 SITE PLAN

AUTOCAD FILE:  
 RLF\_2019-site plan.dwg  
 CIVIL 3D 2012

DRAWN BY:  
 A.E.B.B. ①  
 DATE:  
 DEC. 31, 2019  
 SCALE: AS SHOWN  
 50 0 50 100

