Design and Operations (D&O) Report

Grimsby Anaerobic Digestion Site

ESCARPMENT RENEWABLES

August 26, 2025

The Power of Commitment

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Executive summary

The Design and Operations Report has been prepared in accordance with Table E.1 of Ontario Regulation 359/09. A summary of where information is contained in this report as it relates to these requirements is provided below.

Table E.1 Ontario Regulation 359/09 Compliance Summary

Requirements	Location in Report
Set out a site plan of the project location at which the renewable energy project will be engaged in, including:	
i. One or more maps or diagrams of,	
A. all buildings, structures, roads, utility corridors, rights of way and easements required in respect of the renewable energy generation facility and situated within 300 metres of the facility,	Figure 3
B. any ground water and surface water supplies used at the facility,	Surface water collected in the secondary containment features per Section 3.3.
C. any things from which contaminants are discharged into the air,	Appendix A
D. any works for the collection, transmission, treatment and disposal of sewage,	Not Applicable
E. any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of,	Figure 3
F. the project location in relation to any of the following within 125 metres: the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Conservation Plan, the area of the Niagara Escarpment Plan, the Protected Countryside, the Lake Simcoe watershed, and	Not Applicable
G. any noise receptors or odour receptors that may be negatively affected by the use or operation of the facility,	Appendix B and Appendix C
ii. a description of each item diagrammed under subparagraph i,	
A. all buildings, structures, roads, utility corridors, rights of way and easements required in respect of the renewable energy generation facility and situated within 300 metres of the facility,	Section 2
B. any ground water and surface water supplies used at the facility,	Section 3.3
C. any things from which contaminants are discharged into the air,	Section 3.4
D. any works for the collection, transmission, treatment and disposal of sewage,	Not Applicable
E. any areas where waste, biomass, source separated organics and farm material are stored, handled, processed or disposed of,	Section 2.2, 2.3, 2.4 and 2.5
F. the project location in relation to any of the following within 125 metres: the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Conservation Plan, the area of the Niagara Escarpment Plan, the Protected Countryside, the Lake Simcoe watershed, and	Not Applicable
G. any noise receptors or odour receptors that may be negatively affected by the use or operation of the facility,	Section 3.4 Section 3.5
iii. one or more maps or diagrams of land contours, surface water drainage and any of the following, if they have been identified in complying with this Regulation: properties described in Column 1 of the Table to section 19, heritage resources, archaeological resources, water bodies, significant or provincially significant natural features and any other natural features identified in the Protected Countryside or in the portion of the Oak Ridges Moraine Conservation Plan Area that is subject to the Oak Ridges Moraine Plan,	Not Applicable

iv. a description, map or diagram of the distance between the base of any wind turbines and any public road rights of way or railway rights of way that are within a distance equivalent to the length of any blades of the wind turbine, plus 10 metres,	Not Applicable
v. a description, map or diagram of the distance between the base of any wind turbines and all boundaries of the parcel of land on which the wind turbine is constructed, installed or expanded within a distance equivalent to the height of the wind turbine, excluding the length of any blades, and	Not Applicable
vi. a description, map or diagram of the distance between the base of each wind turbine and the nearest noise receptor.	Not Applicable
2. Set out conceptual plans, specifications and descriptions related to the design of the renewable energy generation facility, including a description of, i. any works for the collection, transmission, treatment and disposal of sewage, including details of any sediment control features and storm water management facilities,	Section 4
ii. any things from which contaminants are discharged into the air,	Section 3.4
iii. any systems, facilities and equipment for receiving, handling, storing and processing any waste, biomass, source separated organics, farm material and biogas, and	Section 2.2, 2.3, 2.4 and 2.5
iv. if the facility includes a transformer substation, the works, facilities and equipment for secondary spill containment.	Section 3.3
3. Set out conceptual plans, specifications and descriptions related to the operation of the renewable energy generation facility, including,	
i. in respect of any water takings,	Section 3.3
A. a description of the time period and duration of water takings expected to be associated with the operation of the facility,	Section 3.3
B. a description of the expected water takings, including rates, amounts and an assessment of the availability of water to meet the expected demand, and	Section 3.3
C. an assessment of and documentation showing the potential for the facility to interfere with existing uses of the water expected to be taken,	Section 3.3
ii. a description of the expected quantity of sewage produced and the expected quality of that sewage at the project location and the manner in which it will be disposed of, including details of any sediment control features and storm water management facilities,	Not Applicable
iii. a description of any expected concentration of air contaminants discharged from the facility,	Section 3.4
iv. in respect of any biomass, source separated organics and farm material at the facility,	
A. the maximum daily quantity that will be accepted,	Section 2.2
B. the estimated annual average quantity that will be accepted,	Section 2.2
C. the estimated average time that it will remain at the facility, and	Section 2.2.3
D. the estimated average rate at which it will be used,	Table 2-2
v. in respect of any waste generated as a result of processes at the project location, the management and disposal of such waste, including,	
A. the expected types of waste to be generated,	Sections 2.2.3 and 2.4
B. the estimated annual average quantity that will be accepted,	Section 2.2.3
C. the estimated average time that it will remain at the facility, and	Section 2.2.3
D. the estimated average rate at which it will be used,	Section 2.2.3
vi. if the facility includes a transformer substation,	
A. a description of the processes in place to prevent spills,	Section 3.3
B. a description of the processes to prevent, eliminate or ameliorate any adverse effects in the event of a spill, and	Section 3.3

C. a description of the processes to restore the natural environment in the event of a spill.	Section 3.3
4. Include an environmental effects monitoring plan in respect of any negative environmental effects that may result from engaging in the renewable energy project, setting out,	
i. performance objectives in respect of the negative environmental effects,	Section 5
ii. mitigation measures to assist in achieving the performance objectives mentioned in subparagraph i, and	Section 5
iii. a program for monitoring negative environmental effects for the duration of the time that the project is engaged in, including a contingency plan to be implemented if any mitigation measures fail.	Section 5.1
5. Include a response plan setting out a description of the actions to be taken while engaging in the renewable energy project to inform the public, aboriginal communities and municipalities, local roads boards and Local Services Boards with respect to the project, including,	
i. measures to provide information regarding the activities occurring at the project location, including emergencies,	Section 5.2
ii. means by which persons responsible for engaging in the project may be contacted, and	Section 5.2
iii. means by which correspondence directed to the persons responsible for engaging in the project will be recorded and addressed.	Section 5.2
6. If the project location is in the Lake Simcoe watershed, a description of whether the project requires alteration of the shore of Lake Simcoe, the shore of a fresh water estuary of a stream connected to Lake Simcoe or other lakes or any permanent or intermittent stream and,	Not Applicable
i. how the project may impact any shoreline, including the ecological functions of the shoreline, and	Not Applicable
ii. how the project will be engaged in to,	Not Applicable
A. maintain the natural contour of the shoreline through the implementation of natural shoreline treatments, such as planting of natural vegetation and bioengineering, and	Not Applicable
B. use a vegetative riparian area, unless the project location is used for agricultural purposes and will continue to be used for such purposes.	Not Applicable
7. If it is determined that the project location is not on a property described in Column 1 of the Table to section 19, provide a summary of the matters addressed in making the determination.	The Site was originally established by the Town of Grimsby. The Ministry of Heritage, Sport, Tourism and Culture Industries was contacted on August 19, 2021 to ensure the original archaeological assessment remained valid for the expansion.
8. If section 20 applies in respect of the project and it is determined that the project location does not meet one of the descriptions set out in subsection 20 (2) or that the project location is not in an area described in subsection 20 (3), provide a summary of the matters addressed in making the determination.	Not Applicable
9. If subsection 21 (3) or 23 (2) applies, provide a summary of the matters addressed in making the determination,	The Ministry of Heritage, Sport, Tourism and Culture Industries was contacted on August 19, 2021 to ensure the original archaeological assessment remained valid for the expansion.
i. under subsection 21 (3) or clause 23 (2) (a), as the case may be, including a copy of the document completed under the applicable provision, and	
ii. under clause 23 (3) (b), if applicable.	

Table E.2 below provides a Site Summary.

Table E.2 Site Summary

Parameter	Units	Value/Description
Annual total days of Receiving	Days	303
Days and Hours of Operation	Hours, Days	Monday to Saturday Shipping and Receiving Hours: 7 AM to 7 PM Operating Hours: 24 hours Digestate Shipping Hours: 5 AM to 9 PM
Seasonal Fluctuations	Yes/No	Yes, for digestate shipping only
Average Daily Amount of Waste Received	Tonnes	525
Maximum Daily Amount of Waste Received	Tonnes	Bulk solid waste – 720 Industrial, Commercial, Institutional (ICI) liquid waste – 330
Maximum Annual Amount of Waste Received	Tonnes	159,000
Maximum Waste Storage Quantity	Tonnes	Bulk solid waste – 1,220 Residual waste – 109 Liquid waste – 1,479
Annual Average Amount of Waste Destined for Final Disposal	Tonnes	24,300
Daily Maximum Amount of Waste Destined for Final Disposal	Tonnes	160
Daily Averaged on an Annual Basis Amount of Waste for Final Disposal	Tonnes	80
Environmental Assessment Act Requirements Fulfilled	Yes/No/NA	NA
Waste types	Type	Agricultural Waste
		Source Separated Organics (SSO) (pre-processed and un-processed) - Incoming
		ICI Solid waste – Incoming
		ICI liquid waste[1] - Incoming
		Solid, non-hazardous waste (residuals from pre-processing and digestate skimming/grit) – for final disposal
		Spent carbon – for further processing or final disposal
Density of Each Waste Type	Kilograms (kg) per cubic metres (m^3)	651 - SSO
	kg/m^3	850 – ICI Solid
	kg/m^3	1,000 – ICI Liquid
	kg/m3	800 – Solid, nonhazardous waste (residuals)
	kg/m^3	2,000 – Spent Activated Carbon
Request for Operational Flexibility	Yes/No	Yes

Notes: [1]Liquid ICI organic waste including but not limited to fats, oils and grease (FOG); dissolved air flotation (DAF) sludge, wastewaters from food or beverage companies and biosolids.

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1. Introduction

1.1 Purpose

This Design and Operations (D&O) Report (D&O Report) is prepared to fulfill the Renewable Energy Approval (REA) requirements as set out in Ontario Regulation 359/09. The project is a Class 3 Anaerobic Digester (AD) with a name plate capacity of 1 MW. The AD facility, owned and operated by Escarpment Renewables, currently operates under REA No. 8541-9HSGG3, as amended. The project has received a Feed-In Tariff (FIT) Contract No. F-000610-BIG-130-302. This D&O Report has been prepared to support an application for amendment to the above -noted REA. Escarpment Renewables intends to complete a site expansion and additional site improvements. This includes acceptance of new waste types and increased waste tonnage, along with building new infrastructure on site to manage additional waste processing requirements. The proposed site expansion will have effects on the AD facility's design, capacity, and processes.

1.2 Project location

The project will be constructed on lands owned by Escarpment Renewables, which owns and operates the Grimsby AD Facility located at 424 Sobye Road, Grimsby, Ontario (Site). The Site is located on the northwestern 4hectares (ha) of a 10.5 ha property located on the south side of Sobye Road approximately 300 m east of Park Road South. The proposed expansion will further develop the 10.5 ha property to utilize a total of approximately 6 ha. The legal description of the property is part of Lots 1 and 2, Concession 6, Former Township of North Grimsby. The Site is located on land that is zoned A(H), Agricultural with a Holding designation, under the Town of Grimsby Zoning By-law No. 14-45. Agricultural zoned properties have setback limits that are minimum 15 metres (m) for front yards, interior and exterior side yards, and rear yards. There are no building height requirements. The Holding designation requires that zone be used only for the uses, buildings and structures that existed at the date of the passing of the by-law. The land is also located in an area of high aquifer vulnerability.

Escarpment Renewables has engaged with the Town of Grimsby to initiate a Minor Variance for the expansion outlined in this proposed amendment, as the existing Site use was legally established but is currently a legal non-conforming use.

In the Town of Grimsby's Official Plan, the land use for the site is rural and it is located in the countryside. The Plan also defines the Site and surrounding areas as a Waste Disposal Assessment Area due to the presence of the adjacent closed landfill as noted in Section 1.3.

The location of the project is shown in Figure 1.

1.3 Surrounding land use

The surrounding area is mostly zoned for agricultural purposes. In the immediate vicinity are a number of poultry and cattle farms. Immediately to the west of the subject property at the southeast corner of Sobye and Park Roads is a closed landfill site owned by the Region of Niagara. This site was closed in 1995. This area is zoned for agricultural use. To the north is a radio transmission tower field. This area is zoned SC(H), Specialty Crop with a Holding designation.

To the east is undeveloped farmland and a poultry farm that is in the agricultural use zone. The lands to the south of the property are classified as Significant woodlands, with some wetlands, and contain a small watercourse. This area is zoned for agricultural use with a Holding designation, and also has an additional permitted use as a riding stable. The lands to the south also contain areas zoned Environmental Conservation (EC) and Hazard which restricts development in these areas.

The Niagara Escarpment Plan Boundary is located 1 kilometre (km) north of the Site.

The nearest receptor to the Site is a farmhouse located on the west side of Park Rd south of Sobye Road. This home is located approximately 400 m from the western property line and is separated from the project site by the closed landfill which is approximately 8 m above grade.

In the Town of Grimsby's Official Plan, the lands to the west and south are considered potential natural heritage corridors.

There are 11 groundwater wells installed in the current monitoring well network on Site. Additionally, based on a review of Ontario Ministry of the Environment, Conservation and Parks (MECP) well record database, there are nearby wells associated with the adjacent Park Road Landfill and potential domestic groundwater users near the Site. The confined bedrock aquifer is used as a source of potable water in the area.

There is also a significant groundwater recharge area located approximately 300 m to the south of the Site. The Site's surrounding area is also an area of high aquifer vulnerability. The surrounding area is depicted on Figure 1.1.

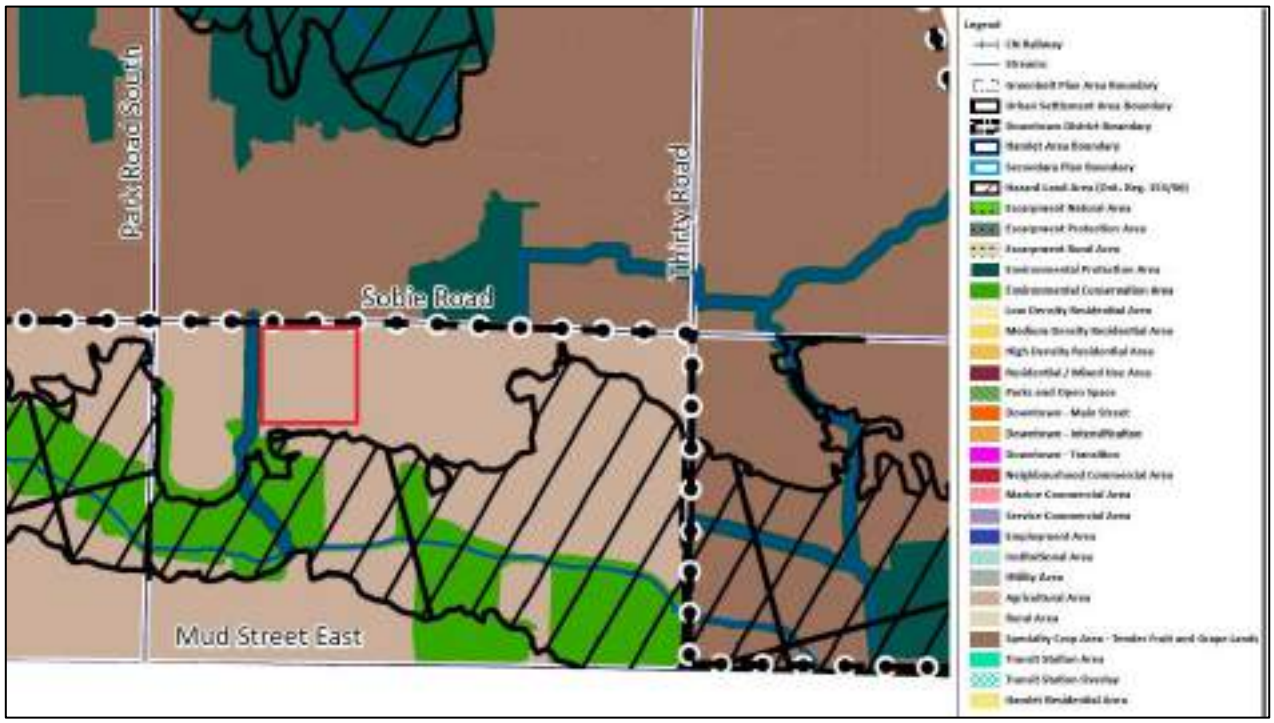


Figure 1.1 Surrounding Land Use from Town of Grimsby Official Plan

1.4 Site description

The Site is flat, sloping gently to the southeast. The Site is developed within the footprint permitted by the current REA. Most development is concentrated in the northwestern area of the Site and consists of staff buildings, AD tanks, digestate storage tanks, and biogas management areas. Most of the Site is gravel and grass covered, with a gravel road running around the perimeter of the AD facility and buildings. To the west of the gravel road is the unused open-air concrete storage bunkers. East of the Site is undeveloped farmland, which will now be partially developed as part of the AD facility. The existing condition for the site is shown on Figure 2, following the text.

2. Facility design

Figure 2 shows the existing site layout. The proposed Site layout for the project is depicted on Figure 3. The conceptual organics pre-processing building layout is shown in Figure 4.

The Site consists of an organic processing facility, which will be capable of receiving and processing up to 159,000 tonnes of organic waste per year by AD. The existing solids storage bunkers will be decommissioned. A new organics pre-processing building will be constructed with the necessary equipment to receive, temporarily store, and process solid organic material for digestion. Liquid receiving tanks are located near the existing pump and pasteurization building and will continue to receive liquid organic material for processing. The AD facility, which is currently operational, will be expanded with additional digester tanks and additional processing equipment. Digestate management currently consists of two storage tanks that will remain. Two additional digestate storage tanks will be constructed.

The existing biogas management area consists of a combined heat and power (CHP) engine, flare, and biogas storage area. The Site will continue to utilize biogas in the existing CHP. The existing temporary biogas storage will be decommissioned in favour of storing biogas in double membrane roof systems on the new digestate storage tanks.

Biogas will also be upgraded to renewable natural gas (RNG) for temporary storage on Site in tube trailers prior to transportation off Site. The existing administration buildings, which consist of an office and staff building will remain but be relocated. Air treatment will be managed by a new air treatment system, managing potentially odour-impacted air generated within the organics pre-processing building. There are also two stormwater management ponds located at the south end of the Site, which will be unchanged. Site access consists of mostly gravel road which will be realigned to make space for additional tanks and equipment.

The process flow diagrams for the facility are shown on the following figures:

– Figure 5 – Waste Receiving and Processing
– Figure 6 – Digestion
– Figure 7 – Digestate and Biogas Management

2.1 Existing conditions

The existing Site layout is shown in Figure 2. When Escarpment Renewables purchased the Site in 2019, several upgrades were constructed to bring the facility into compliance with the REA as well as prepare the site for the potential of a future expansion. These included:

– Addition of three lined and agitated liquid receiving tanks
– Addition of the feed pasteurization system to digesters with two pasteurization lines and room for a third
– Addition of digestate skimming systems to existing digesters
– Construction of the pump and pasteurization building and digestate skimming building
– Grading and stormwater management improvements
– Removal of outdoor waste storage to prevent leachate generation

These upgrades were completed with the pending expansion in mind. As such, the process equipment supplier designed the receiving, pasteurization, conveyance, and digestate management equipment to manage an incoming feedstock capacity higher than the currently approved and processed 23,000 tonnes per year. The existing equipment was sized to manage 33,000 tonnes per year.

The feedstock mix that's currently received at the Site is different than the feedstock mix that was originally proposed in the existing REA. The majority of current feedstock is pre-processed SSO, and various Industrial, Commercial, and Institutional (ICI) liquids, whereas the originally design consisted of more agricultural feedstocks. With over one year of operating the upgraded Site, it has been determined that to achieve 1 MW of electrical output, the Site would need to

receive and process at a higher rate than 23,000 tonnes per year. An updated mass balance for 33,000 tonnes per year can be found in Appendix F, which was prepared by Fitec, who was the equipment supplier for the equipment installed as part of the existing upgrades.

2.2 Waste receiving

2.2.1 Feedstock materials

The proposed waste types for receipt at the Site are:

– Agricultural waste including Swine manure; poultry manure; cattle manure, and paunch manure; grape pomace; corn silage; silage of all types of grasses; dairies and facilities that process dairy products; fruit and vegetable wastes; wastes from cereal and grain processing facilities, oil seed processing facilities, breweries and distillers' grain; glycerin; and herbaceous plant material from greenhouse, nurseries, garden centres and flower shops
– Source -Separated Organics (SSO) (pre-processed and un-processed), received as either a liquid or solid waste
– Packaged ICI organic waste
– Solid and liquid ICI organic waste including but not limited to bakeries; confectionary processing facilities; dairies and facilities that process dairy products; fruit and vegetable processing facilities; fruit and vegetable packing facilities; cereal and grain processing facilities; oil seed processing facilities; food manufacturing facilities; food processing facilities; grocery stores; food distribution companies; beverage manufacturing facilities; breweries and distillers grain; wineries; milling facilities; pet food manufacturing; production of ethanol or biodiesel; greenhouses, nurseries, garden centers and flower shops, limited to herbaceous plant material; biosolids

Table 2.1 provides the maximum annual tonnes of waste received by feedstock. The maximum annual tonnes in feedstock composition are intended to provide the AD facility with the flexibility to change the composition of the total combined feedstock to suit current AD facility operation conditions, changing organic waste market conditions, optimize biogas production and AD facility performance. The annual composition of waste received may consist of any combination of the below waste types up to maximum tonnes indicated and not exceeding a combined maximum of 159,000 tonnes per year.

The expected annual combination of waste tonnes received is estimated to be approximately 109,000 tonnes of SSO and 50,000 tonnes of ICI liquids.

Table 2.1 Feedstock Type and Maximum Annual Tonnage

Waste Type	Maximum (tonnes per year)
Agricultural Waste	7,000
SSO (pre-processed and/or unprocessed)	120,000
ICI Packaged	100,000
ICI Liquid	100,000
Maximum total	159,000

The mass balance for the AD facility feedstock using average expected volumes of each waste type shown above is presented in Table 7 following the text. The mass balance presents the breakdown of waste composition, including contaminants and resulting organics fraction, by waste type.

Waste will be received 6 days per week (Monday through Saturday) for an average of 526 tonnes per day. The peak daily tonnage is based on 2 times the average for a total of 1,050 tonnes per day. The AD facility will accept a maximum of 1,050 tonnes per day which may be comprised of any combination of the above waste types. There will be temporary storage area in the organic pre-processing building for the unprocessed waste to provide buffer to the daily average and daily maximum capacity. The types of material being pre-processed from the storage area (i.e.,

higher moisture content vs. lower moisture content) will be selected to make a desirable consistency of feedstock (12% to 27% TS).

2.2.2 Feedstock receiving

Loaded trucks will enter the Site and be weighed on the scale before discharging their material. Incoming unprocessed ICI and SSO, as well as any agricultural waste that is not unloaded as liquid waste, will be unloaded in the new organics pre-processing building. The incoming trucks will travel south on the site road towards the organics pre-processing building and reverse into the receiving bays to unload material onto the tip floor.

The Organics Receiving Building is operated and maintained at a negative pressure environment (rolling arithmetic average over 30-minute period), such that all potentially process -related odourous air is collected and treated using the fully functional Biofilter. All windows and doors in the Organics Receiving Building are kept closed at all times, except when the doors are used for necessary personnel and/or vehicle entrance and exit. Only one (1) of the three (3) loading/unloading doors (2 bay doors and 1 dock-level bay) in the processing area of the preprocessing building is opened at any one time, and only one (1) of the four (4) loading/unloading doors (4 bay doors) in the receiving area of the preprocessing building are opened at any one time. The opening and closing of the seven (7) loading/unloading doors, the negative pressure differential sensor(s) and the ventilation systems are interlocked, monitored and controlled through the same Supervisory Control and Data Acquisition (SCADA) system to maintain adequate negative air balance and negative air pressure within the Organics Receiving Building. Overhead doors for the pre-processing building will remain closed at all times during off -hours. The tip floor area will be constructed with an estimated height of 14 m to provide required height for unloading of all potential types of trucks. Waste will be tipped, and a front-end loader will move material to the temporary storage area. A steel--plated- push wall will allow the loader to lift material for conveyance to the waste pre-processing unit hoppers.

Certain ICI waste brought to the Site on pallets will be unloaded at a dock -level receiving bay. Trucks will back up to the loading dock and engage with a dock seal. Once engaged, the seal will be visually inspected, and the dock door and truck door may be opened. The seal will help prevent fugitive odour emissions. ICI waste will be unloaded by forklift or similar equipment and brought to the temporary waste storage area on the tip floor.

Pre-processed SSO, ICI liquid feedstock, and liquid agricultural waste will be deposited into the three existing 493 cubic metres (m^3) underground liquid receiving tanks. The liquid receiving tanks are constructed of lined concrete. Each has an installed agitator to allow mixing of the substrate and low-level- and high-level- alarms to manage tank levels. Pumps for the liquid receiving tanks are located in the basement of the pump and pasteurization building. The liquid receiving tanks can pump contents between one another to mix incoming feedstocks prior to digestion. One of the three liquid receiving tanks will be designated for waste requiring pasteurization and the other two liquid receiving tanks will be designated for waste not requiring any pasteurization.

Liquid feedstock trucks will travel around the Site Road to the liquid receiving tanks and reverse into the area located adjacent to the liquid receiving tanks. This area allows trucks to have room to park and unload liquid waste, without blocking the Site's access road. Each liquid receiving tank has room for one waste truck to park directly in front of it. For most liquid loads, a flexible hose with camlock connections will be available if the truck has the connection capability to transfer material this way and the air being exhausted through the activated carbon unit. For all other loads the materials will be discharged into the tank with lid partially or fully open.

The liquid receiving tanks are 10 m in diameter and 6.3 m deep, below grade. The liquid receiving tanks can be heated using a heat exchanger system. The liquid receiving tanks temperature is monitored through the control system. They also contain agitators to prevent solids settling and to ensure a homogenous mixing of the feedstock. The underground liquid receiving tanks are surrounded by an at grade concrete pad that is sloped to a drain, connected to the liquid receiving tanks. This provides spill containment in the liquid waste unloading area. Each liquid receiving tank is also equipped with a grate to prevent large contaminants from damaging internal equipment.

Mixing of feedstock in the existing liquid receiving tanks will include the ability to recirculate digestate, when required, or add water collected in the secondary containment system or stormwater ponds to provide dilution as needed to achieve target solids content.

The expected truck movements are provided in Table 8 following the text. Truck movements are divided into the areas of the Site they are directed to load or unload. Delivery of incoming feedstocks has been split into various types of trucks expected to arrive at the site and divided between weekday and Saturday traffic. Digestate may be transported year-round, however the volume of trucks required to manage annual digestate generation rates has been compressed into an eight-month period to provide a more conservative estimate.

2.2.3 Incoming waste storage

Waste storage for solids feedstock will be limited to the available space on the tip floor area within the organics pre-processing building. On -Site storage will accommodate up to three days' worth of average incoming SSO waste volumes. This results in a maximum 1,220 tonnes(or 1875 m3) of waste stored on the tip floor. This waste may be comprised of SSO, solid ICI organics, and solids Tier 1 and 2 biomass. Solid waste stored on the tip floor will be conveyed via loader to the waste pre-processing operations.

There are three existing underground liquid receiving tanks with a total capacity of 1,479 m^3, which will be used for storage of liquid feedstock. At an average density of 1 tonne per cubic metre, this results in 1,479 tonnes of liquid waste storage. This provides for storage of 8-days' worth of average incoming liquid ICI waste.

2.3 Waste pre-processing

2.3.1 Organics pre-processing building

The organics pre-processing building will be approximately 46 m by 53 m, constructed with a concrete foundation and a pre-engineered, insulated steel structure. Incoming trucks will enter through overhead doors and unload as described in Section 2.2. A manual wheel wash station will be provided to wash outbound truck wheels as necessary. Runoff on the tip floor will be collected in floor trench drains and sumps, with the water directed to the liquid receiving tanks.

Waste from the tip floor will be managed by a front-end loader and stored in the temporary waste storage area. The front-end loader operator will identify any large contaminants within the bulk solid waste and segregate them adjacent to the tip floor for later removal and off-site disposal.

The organics pre-processing building contains the waste pre-processing equipment and residual waste storage areas described below.

Ancillary features provided in the organics pre-processing building include:

– Electrical/control room
– Shop
– Storage
– Heating, ventilation, and air conditioning systems
– Offices, washrooms, change rooms, kitchen/lunchroom

2.3.2 Waste pre-processing units

Solid waste will be pre-processed to prepare the feedstock for anaerobic digestion by removing contaminants that may hinder the digestion process or accumulate within the digesters. From the tip floor/pit, waste will be transported by the front-end loader to angled hoppers that will transport material to the waste pre-processing units by a series of screw and/or belt conveyors.

The waste pre-processing units will consist of two units in parallel designed to separate contaminants from the organic material. The units will be arranged in a staggered layout and will be loaded with material from the tip floor using a front-end loader that will unload waste into a series of hoppers. From the hoppers, waste is conveyed in a contained

auger to a waste pre-processing unit. The waste separation unit is enclosed and uses mechanical means to separate organics from contaminants.

The hopper part of the waste pre-processing unit will be separated from the screening and conveyer section using a concrete wall, with the hopper situated on the tip floor side and the waste screening and conveyor situated in the waste pre-processing room. This will help contain the odorous air that is generated in the tip floor. As the waste pre-processing units are fully contained downstream of the hoppers, they will generate less odourous air in the waste pre-processing room.

The waste processing units will create a light rejects stream (mostly plastics and packaging), which will then be dewatered further through a dewatering press The liquids from the press will be captured and utilized in the process, while the pressed solids will be conveyed into residue trailers for disposal. The hammermill system will create a paste (20% to 32% TS) that will be conveyed into the liquids receiving tanks or one (1) trailer within the Residual Waste Storage via enclosed conveyers for off-site shipping. Each hammermill system can process SSO at a consistent rate of 15 tonnes/hour (2 units = 30 tonnes/hours). The units will be operated based on demand. The hammermill system can accept raw feedstock as is. The residue from hammermills will be conveyed continuously to a dewatering press. This press can process up to 10 tonnes/hour of incoming material.

The waste pre-processing units will also include connections that will allow the addition of liquid from the dewatering unit or from stormwater pond to generate a pumpable organic slurry (12% to 27% TS). The organic slurry from the waste pre-processing units will all be sent to the existing liquid receiving tanks to be combined with other waste prior to feeding the digesters or one (1) trailer within the Residual Waste Storage via enclosed conveyers for off-site shipping.

Paste/slurry will be moved through a sealed conveyance system (i.e., auger, high solids pump). Paste loading into trailers will be relatively infrequent. However, there will be a paste loading system installed to load trailers and controls put in place to ensure proper operation and reduction of the potential for spills. The material in the pre-processing building that is loaded into trailers is either solid (i.e., residues) or semi-solid (i.e., paste/slurry), they will not free flow into a floor drain. In case of a spill, the material would be handled more like a solid (mostly scooped into a bin and then transfer to the trailer) and then the area and equipment would be washed down. Floors will be sloped into the building at a 1-2% grade. The tip floor will have a sump that collects any runoff from the organics and the sump pump will pump liquids directly into the liquids receiving tanks. With the entire floor sloping into the building and the sump, there should not be any liquids that escape out the door from the inside. Waterstops and sealant will be applied to ensure the concrete floor is waterproof.

Residual wastes, such as plastics, glass, packaging, or other inert material will be output from the waste pre-processing units and conveyed to the residual waste storage area within the pre-processing building.

2.3.3 Residual waste

Solid reject materials including grit, plastics and other contaminants will be transported from the pre-processing equipment outlets utilizing an additional series of conveyors to the residual waste storage area. Residual waste from the pre-processing system will include large contaminants mistakenly included in the waste stream (heavies), plastics and other inert such as packaging (lights). Skimmings and grit will be separated out during the digestion process. The quantity of each will be largely dependent on the type and origin of the waste. Initial estimates of residual waste are provided below.

– Heavies – estimated at one percent of total incoming SSO – 1,090 tonnes per year or 3.5 tonnes per operating day stored on the tip floor for direct loading into trucks for off-Site disposal
– Lights – estimated 18% of total incoming SSO and 5% of ICI – 22,120 tonnes per year or up to 73 tonnes per operating day
– Skimmings and Grit – estimated one percent of total incoming waste – 1,090 tonnes per year or 3.5 tonnes per operating day

Estimated total residual waste may therefore amount to 80 tonnes per operating day.

Heavy residuals will be manually removed on an ongoing basis from the material received on the tip floor. These heavies will be put aside on the tip floor and moved to the residue trailer regularly during each operating day. Light residual waste from the waste pre-processing units will be conveyed and dewatered along with residues from grit and skimming building prior loading into trailers. A Komar press (or equivalent) will be used for dewatering, which is a progressive, ultra-high pressure compaction equipment. The press offers high-pressure auger compaction and a proprietary wedge bar separation system for dewatering. The proposed design is that pressed organic liquids will be collected within the equipment and continuously transferred to liquids receiving tanks.

Two trailers will be located in the residual waste storage area (about 120 m^2). One trailer will be used for residual waste and the second trailer for organic paste/slurry, when required. Once full, the residual waste trailer will be removed from the Site and transported to a licensed waste disposal facility. Additional lights and grit will be collected from the digestate and digester feed skimming/grit removal systems as follows:

– Digestate from the existing digesters is skimmed and filtered through a press prior to transfer to digestate storage. The press collects plastics in a storage bin in the adjacent skimming building. The four new digesters will be equipped with skimming and grit removal systems that collect grits and plastics and store them in bin/bunker in the adjacent skimming buildings. Two skimming systems in two buildings will provide the skimming required for the four new digesters. Each skimming system will have a processing capacity of 1080 tonnes-digestate/day
– Once the bin is full, a cover will be placed on the bin, and it will be transferred to the preprocessing building where it is further dewatered and loaded into a trailer to be transported off-site. Alternatively, the material will be collected in bunkers within the skimming and grit buildings and loaders will scoop up the skimmer/grit and put them in a covered bucket inside the skimming building prior to outdoor transport to the pre-processing building.

The following residual waste storage volumes are provided:

– Up to 5 m^3 on the tip floor, included in the total storage volume for waste receipt
– Up to 95 m^3 in two trailers within the organics pre-processing building
– 5 m^3 in a bin in the existing digester skimming building
– 9 m^3 in a bunker in the new digester skimming/grit building 1
– 9 m^3 in a bunker in the new digester skimming/grit building 2

Bins and heavies may be periodically transported to the residual waste storage area in the organics pre-processing building to be combined with residual waste stored in the residual waste trailers for efficient transportation off Site.

The storage volumes above collectively provide approximately 1.2-days of storage for average residual waste. Overall Site waste storage calculations are provided in Table 9 following the text.

2.4 Digestion

2.4.1 Pasteurization system

The existing pasteurization system is located in the pump and pasteurization building adjacent to the liquid receiving tanks. There are two existing pasteurization system trains, each with a capacity of 23,500 tonnes per year, which are connected to the liquid receiving tanks.

Mixed feedstock, requiring pasteurization, from the liquid receiving tanks is pumped to the pasteurization system. Pasteurization is achieved by heating liquid waste to a minimum temperature of 70°C via heat exchangers followed by holding for 1-hour at a minimum temperature of 70°C in the substrate holding tanks. The substrate temperature and pasteurization system glycol temperature are both carefully monitored. Following pasteurization, the substrate is cooled using glycol cooling fans prior to conveying the liquid to the digesters. Each pasteurization holding tank is equipped with level sensors to measure liquid levels, high level alarms to prevent overfill, and one centrally located thermocouple for temperature monitoring. Three tanks are used in each pasteurization train to allow one tank to be filled, one tank to hold the required temperature for 1-hour and the third to be emptied to the digesters. The

pasteurization holding tanks are passively vented through a common pipe which is connect to an activated carbon unit.

The total capacity of the two existing pasteurization trains is 21 m^3 (2 trains x 3 tanks per train x 3.5 m^3 per tank).

In addition to the existing pasteurization system, there will be pasteurization system with sufficient capacity in place to pasteurize the digestate to meet the pathogen levels required by the CFIA. The heat exchangers use recovered heat from the existing CHP. Additional heat will be provided by a new propane or biogas fuelled- boiler located in the second pump and pasteurization building.

The pasteurized feedstock is pumped into the digester tanks automatically and controlled through the AD facility SCADA system.

2.4.2 Digester system

The Site digester systems will consist of:

– Two existing digester tanks each with a capacity of 2,166 m^3 for a total of 4,332 m^3. Each tank is 22 m in diameter and 6 m deep, constructed primarily below grade
– Four new digesters tanks, each with a capacity of 3,435 m^3 for a total of 13,740 m^3. Each tank will be 18 m in diameter and 13.5 m high

The resulting total digester capacity will be 18,072 m^3.

Substrate is pumped from the pasteurization system to the digesters via parallel feeding pipes or from the two liquid receiving tanks containing liquid waste not requiring pasteurization. Design hydraulic retention time (HRT) will be forty-five (45) days during normal operation based on an annual average for the organic waste fed to each anaerobic digester. The HRT needs to be kept at a minimum of twenty-five (25) days at all times. On peak days, the incoming tonnages will be spread over several days to accommodate the minimum HRT (25 days) requirement. Digester operating conditions are based on the type of waste, expected waste characteristics, water balance, and desired biogas consistency.

Each digester is dosed with ferric chloride, or equivalent, from the dosing system daily. Ferric chloride reduces the generation of hydrogen sulphide (H_2S) in biogas. Ferric chloride dosing will be based on monitoring of the H_2S concentrations in the biogas. Stock ferric chloride will be stored in a self-contained double-walled tank located outside on a concrete pad by the digesters.

The design loading conditions are based on the total volume of the average digester feedstock mix and a target 20% dry solids content. The organic loading rate of the digester capacity on Site will be approximately 2.8 kg VS/ m^3day

The headspace of each tank will be connected to the new dual membrane roofed digestate storage tanks utilized for biogas storage and buffer. Additional details of the digestate storage tanks are provided in Section 2.5. These tanks will be designed to meet Canadian Standards Association (CSA) B149.6 – Biogas and Landfill Gas Code.

The new digesters will be self-cleaning digesters outfitted with agitators, in-vessel floor sweepers for grit removal, and skimming systems to skim digestate to remove contaminants and regulate the tank filling level. The self-cleaning feature will continuously clean the digester of fine silting contaminants. The speed setting of the agitators can allow particles to remain in suspension or settle in the bottom of the tank while plastics and other contamination float to the top to be removed. The plastics and other contamination are conveyed to the skimming and grit storage buildings and disposed of offsite.

The existing digesters are outfitted with top mounted skimmers that skim digestate and pump the skimmed digestate to the digestate separation building to filter out contamination. A screw press with a 1.0 mm screen filters the digestate to remove visible plastics and contamination, which are then collected and stored in an adjacent roll-off bin. Two additional screw presses/skimming systems will be installed in phases 1 and 2.

All digesters will be equipped with over/under pressure devices to provide safety pressure relief.

2.4.2.1 Plug flow digesters

The REA permits the operation of two plug flow digesters, which were constructed at the Site, each with a 900 m^3 capacity. Each digester is 30 m long, 6 m wide and 6 m high built entirely of concrete. The Site will utilize wet AD and does not need these digesters to function. Escarpment Renewables will maintain this infrastructure on Site for the purpose of potential future research and development studies with partners that may include industry, research institutes, and government agencies. Proposed studies using these digesters may include, but not be limited to:

– Evaluating the effectiveness of the AD process to breakdown compostable or bio-based plastics
– Investigation into the suitability of the organic fraction from mixed waste processing called facility sorted organics (FSO) as an AD feedstock.

All studies completed in these digesters would consider the materials ability to digest in the AD process (e.g, VS reduction and biogas production) and generation of a beneficial end use product. It would also evaluate possible improvements that would be required to efficiently process these types of feedstocks and the effect of the material on the quality of the AD process end products.

2.5 Digestate management

An estimated average 115,763 tonnes of digestate from the 6 digesters will be produced annually, with between 4 and 7% solids content. Digestate is pumped from the digesters to the digestate storage systems. Digestate storage will be provided by the two existing 4,029 m^3 storage tanks and two 8,000 m^3 tanks, for a total of 24,058 m^3. This will provide approximately 76-days of digestate storage. To provide a minimum storage capacity of 150-days, additional lagoon storage will be secured through contract with local farmers. Digestate will continue to be managed as a fertilizer under the Canadian Food Inspection Agency (CFIA). In the event that the digestate can't be managed as CFIA fertilizer, it will be managed as Non-Agricultural Source Material (NASM) for land application under a NASM plan.

The existing digestate storage tanks are constructed largely below grade. They are concrete with a fixed roof and agitators to keep digestate mixed.

The two new digestate storage tanks will be constructed above grade and include double membrane biogas bladders installed at the top of the tank.

A digestate filling station will be located beside the secondary containment area, where trucks will be filled with digestate through a discharge pump. Digestate filling may occur during extended hours to accommodate agricultural operations. Trucks take digestate to farms and lagoons to be applied to fields as a fertilizer.

2.6 Biogas management

2.6.1 Biogas handling

Biogas will be generated in each of the existing, and new digesters. All digesters will be piped to collect biogas in the new digestate storage tanks with membrane- roofs. The digestate storage tank will be dome style with a diameter of up to 32 m. Each tank will have sufficient capacity to store biogas up to 11-hours at maximum biogas production. The existing biogas storage bladders and building will be decommissioned.

The Site will generate up to 1,883 cubic metres per hour (m^3/hr) of biogas. Biogas will be used either for generation of electricity or RNG, as discussed below.

2.6.2 Electricity

Prior to combustion in the CHP, moisture is removed from the biogas through a gas cooler. Condensate from the moisture removal operation is collected and pumped back to the liquid receiving tank for reuse in the system. Final polishing for H_2S removal is completed by a carbon vessel prior to combustion in the CHP. Electricity generation from the CHP engine produces heat and carbon dioxide (CO_2). Heat is currently used in the digester operation. Electricity is

fed to the grid through the existing FIT contract. The REA Amendment will see the existing CHP engine continue to operate.

2.6.2.1 Engines

The existing CHP engine is a 1-MW cogeneration engine which runs 24-hours per day. This is located in the northernmost portion of the Site beside the staff building and the transformer. Also located near the engines is a 200 kW backup diesel generator that provides backup power for critical operations in the event of a power outage.

2.6.2.2 Heat recovery

The engines produce about 1 MW of thermal energy in the form of heat. The engines are equipped with a heat recovery system located in the heat distribution room, which will be relocated into a new boiler and heat distribution building. Heat from the CHP is used to heat the digester feedstock and for supplying heat to the pasteurization system.

2.6.2.3 Switchgear

The engine room also contains the electrical switchgear that controls the quality of the power exported to the grid. A transformer is located beside the engine container in secondary containment.

2.6.3 RNG

Biogas produced on site will be upgraded to RNG. Biogas generated within the anaerobic digestion process will contain approximately 60% methane (CH_4) with the balance consisting primarily of CO_2 and small amounts of other trace elements. In addition, the biogas will contain H_2S, siloxanes, ammonia, and trace quantities of additional volatile organic compounds (VOCs). In order to produce RNG, the biogas will be upgraded within a treatment process designed to remove impurities, producing a gas consisting primarily of CH_4 that meets the utilization specifications.

2.6.3.1 Biogas pre-treatment

Biogas will be drawn from the digestate/biogas storage into the preliminary biogas treatment stage designed for removal of mainly H_2S and moisture.

An activated carbon system will be used to remove H_2S and VOCs through adsorption. The activated carbon media would require periodic removal once it is spent. Spent activated carbon would be sampled and subjected to TCLP (Toxicity Characteristic Leaching Procedure) prior to off-Site disposal. All spent adsorbents will be dumped into a roll-off bin and landfilled or into a dedicated bin and regenerated offsite.

The biogas pre-treatment system will be implemented to achieve the required inlet quality for the RNG upgrading system. The final configuration of the biogas pre-treatment system will be based on the manufacturer requirements of the RNG upgrading technology described below.

2.6.3.2 Biogas upgrading to renewable natural gas

RNG upgrading will be completed using a packaged system designed by an RNG upgrading technology provider. The RNG upgrading system is used to generate gas with very high CH_4 content suitable for use as RNG. The primary gas to be removed from pre-treated biogas is CO_2.

Two potential technologies may be implemented at the Site; pressure swing adsorption (PSA) or membrane technology.

PSA is an effective method of gas separation, particularly where a complex mixture of gases is generated from feedstock, or where there is high humidity. Under high pressure different gases are attracted to different solid surfaces. The higher the pressure, the more gas is absorbed and when the pressure is reduced, the gas is released or desorbed.

PSA systems monitor the biogas volume and quality to control the system operation. An adsorbent material is used in PSA gas separation vessels to separate CO_2 and oxygen (O_2) from the product gas, producing a CH_4 rich biomethane or RNG gas. A PSA system would be manufactured to meet the requirements of the latest version of CSA B51, Boiler, Pressure Vessel, and Pressure Piping Code. Typically, PSA systems operate in batches to remove CO_2 and O_2 and collect the CH_4-rich RNG, depressurize and regenerate the adsorptive media and then release the captured CO_2 and O_2.

Membrane technology uses a compressor to pressurize the pre-treated biogas to have it pass through a membrane. Selective membranes are utilized that allow the passage of CO_2 but prevent the passage of CH_4 based on the differences in their molecular size. Typically, multiple tubular membrane modules are arranged in parallel and series. Three stage membrane technology will have a higher recovery rate versus the two-stage membrane technology. The retained CH_4 is often recirculated to achieve high rates of CO_2 removal. The final CH_4 concentration will be determined based on the requirements of RNG injection contracts with the natural gas utility owner.

Both systems involve pre-treatment of the biogas which will consist of coolers, chillers, liquid knock outs, H_2S removal and H_2S polishing (typically using activated carbon). A combination of this pre-treatment equipment will remove H_2S, VOCs and siloxanes from the biogas prior to generation of RNG either PSA or membrane system.

Any condensate generated in the RNG upgrading system will be reused by discharging into the liquids receiving tanks or reused in the upstream processes on Site.

Estimated RNG production based on a 95% uptime and 98.5% recovery rate is estimated to be 1050m^3/hr and 9,200,000 m^3 per year.

PSA and three stage membrane technologies are capable of producing high CH_4 content RNG and minimal CH_4 slip. The off -gas or tail gas from these technologies, which is primarily CO_2, will be vented to atmosphere.

Following upgrading, RNG will be compressed up to 3,600 psi, and stored in portable storage vehicles (i.e., tube trailers) on Site. When filled the trailers will then transport compressed natural gas (CNG) to an injection point on the existing pipeline, “virtual pipeline”, or to another Site for utilization. For direct injection into the pipeline, RNG will be compressed up to 300 psi of injection pressure.

2.6.4 Flare

In the event that surplus or poor -quality gas is produced, an automatic -start flare, capable of combusting biogas is included in the design of the project. Gas is piped from the storage tanks to the flare, RNG upgrading system, and engine. The flare is designed for a capacity of 2,966 m^3/hr at 60% CH_4, providing full redundancy. Additional flaring capacity will be added to account for increased biogas production. The flare will be relocated to the southeast corner of the expanded site near the digestate/biogas storage area.

The flare is designed for operation at 870°C with a 0.7-second retention time and a minimum CH_4 destruction efficiency of 98%. The flare will be connected to the backup generator to keep the flare controls active during power outage. The biogas flare will be directly connected to the digestate/biogas storage and will be activated when the pressure in the digester or digestate/biogas storage reaches above the flare operating pressure setpoint.

In the event of a failure of the RNG upgrading system or the production of upgraded biogas that does not meet the RNG quality requirements, the biogas would be redirected to the flare.

2.7 Air treatment

The organics pre-processing building will generate odours. The waste receiving and temporary storage area will generate the most odour. Other odourous areas include the residual storage area and the waste pre-processing area. Since the waste pre-processing units are enclosed, lower odour is expected in this portion of the building.

A ventilation system will be provided to maintain negative pressure in the organic pre-processing building so that there are no odour complaints at nearby sensitive receptors. To minimize air volumes requiring treatment, air will be

cascaded from areas with lower odour potential to areas with higher odour potential, with air ultimately being drawn from the waste receiving area and into a biofilter. The biofilter will be equipped with either organic or inorganic media.

Table 10 provides the design air changes per hour for each area of the organics pre-processing building, with the final volume to be extracted to the biofilter of 78,306 m^3/hr, or 21.75 cubic metres per second (m^3/s). This represents the air exchanges required under the worst-case scenario corresponding to maximum odour generation. However, the actual air exchanges per hour will vary between 2 to 5 depending on the environmental and operational conditions.

The Company will monitor and record the following physical parameters of the Biofilter, through a combination of sensors, meters and physical probes, at frequencies as recommended by the Equipment suppliers:

a. process air flow through each cell;
b. differential pressure across media bed in each cell;
c. media temperature in each cell;
d. inlet air temperature (after the wet water scrubber);
e. inlet air relative humidity (after the wet water scrubber);
f. water flow through the wet scrubber;
g. water pressure and flow, at irrigation supply to each cell;
h. moisture content of media in each cell; and
i. media pH in each cell.

Electrical, control, and administrative rooms will have separate air handling systems that are not connected to the biofilter. Odourous air will not be generated in these rooms, and they will be maintained under positive pressure.

3. Facility operations

3.1 Process operations

3.1.1 Receiving

The AD facility will receive liquid and solid waste from the sources noted in Section 2.2. Waste will be received as bulk solid waste, containerized solid waste, or liquid waste with the infrastructure outlined in Section 2.2. Trucks will enter the Site and pass over a weigh bridge documenting the quantity of incoming material. A scale house attendant or an automated assistant will direct trucks to the appropriate location for unloading of wastes. Incoming wastes will be received and unloaded under the monitoring of an onsite operator. Operators within the material receiving areas will be responsible for the following primary tasks:

Organics Pre-processing Building:

– Oversight of material receipt including preliminary scanning or visual inspection
– Operation of the truck door permitting access and egress from the building
– Assisting truck drivers backing into the building
– Segregation of rejected waste within the receiving area
– Operation of front-end loader, or forklifts for transfer of material into the waste receiving bunkers
– General housekeeping in the receiving area including floor washing and truck wheel washing prior to exit, as needed

Liquid Receiving Tanks:

– Monitor/supervise the driver in backing up to the liquid receiving tank's lid and stopping the trailer as close to the lid as possible without damaging the tank
– Properly connect hose between truck and liquid receiving tank's lid
– Confirm that there is enough space in the liquid receiving tanks. Records and signal's controlled by the tank's liquid level sensor, provide indication of the liquid receiving tanks liquid levels. The operator will be available to do a visual check to confirm the tank's liquid level as needed.
– Ensure ventilation systems are operational

Anticipated operator staffing and training requirements are presented in Section 3.7.

Records of incoming material are discussed in Section 3.2.

Liquid receiving tanks will require periodic cleaning and removal of grit that accumulates, despite being equipped with agitators. Grit will be collected and disposed of off Site at licensed waste management facilities.

An outbound scale and Site exit will be constructed on the east side of the Site. Trucks will travel around the exterior road and leave by driving over the outbound scale for weighing. This includes trucks bringing waste to the Site, trucks removing residual waste from the Site, and trucks removing digestate from the Site.

All incoming feedstocks will be sampled and tested according to Section 43 of REA number 8541-9HSGG3 dated October 1, 2014.

Reject Waste

If waste is brought to the Site and inspections indicate that the waste is not licensed for acceptance at the Site, the load will be rejected and sent back to the originator (or directed by the originator to a site permitted to receive this material). A record of the reject load will be maintained including:

– Date/time
– Originator
– Transporter
– Material description
– Reason for rejection
– Weight
– Type of material

Site staff will notify the MECP and customer of the reject load within one business day and will maintain the reject load record on Site.

3.1.2 Pre-processing

Waste pre-processing equipment is loaded using a front-end loader or grapple feeding mechanism. The operator will scan or visually inspect material as it is loaded to identify any large contaminants that require segregation.

An operator will be available within the waste pre-processing area for:

– Cleaning
– General equipment maintenance
– Controlling throughput
– Sampling/visual quality control

Pre-processing lines will have a local control and programmable logic controller (PLC) system that is integrated into the Site SCADA system. Waste mixing within the existing liquid receiving tanks can also be controlled from the facility SCADA system. This allows for transfer of feedstock between liquid receiving tanks to blend and generate the desired

mix for digestion. Remote monitoring will be provided through the SCADA system, supplementing the operational oversight of the designated pre-processing operator.

Waste pre-processing will be conducted in two, eight-hour shifts to manage material as it is delivered to the Site. While there is storage capacity adjacent to the tip floor to provide buffer for the pre-processing equipment and to help ensure a continuous supply of feedstock to the digesters, waste will not be stored long-term and waste that has been on the tip floor longest will be prioritized for pre-processing to avoid generation of odours.

Residue management

Residue generated at the Site includes rejected materials, pre-processing residuals, and digestate/digester cleaning residuals. Rejected materials are items incompatible with the waste pre-processing system which are identified in the receiving and storage areas and separated from the waste solids intended for pre-processing. The materials will be temporarily stored in the bulk waste receiving area. Arrangements will be made by the operator to remove these materials from the Site.

Residuals separated from the waste solids during the pre-processing stage will be conveyed along the residuals conveyor to the residual press systems and ultimately stored in indoor trailers until they are full.

Residuals from digestate/digester feed skimming and grit removal systems will be stored in bins or bunkers in the skimmings storage buildings.

Trailers will be backed into the bay within the organics pre-processing building and trailers will be disconnected from the truck. Trucks will typically be coordinated to pick up a nearly filled residual waste trailer when delivering an empty trailer to limit truck traffic associated with residual waste disposal.

Residual wastes will be transported off-Site to a waste disposal facility licensed for receipt of the transported materials.

3.1.3 Digestion

Digestion, digestate management and biogas management systems will be primarily controlled automatically through the SCADA system with remote monitoring of process conditions through the human machine interface (HMI). All systems will be operated 24-hours per day, 7-days per week with remote warnings identifying low- and high-level alarm conditions to standby process operators for determination of manual intervention requirements.

Digester operating pressure will primarily be regulated through the extraction of biogas from the storage tanks. Over/under pressure devices will be equipped on all digesters for safety.

The digestors will be operated at mesophilic temperature range (35° C to 43° C). Temperature will be regulated through the inlet material feed via heating/cooling the feedstock to maintain the mesophilic temperature in the digester. Heating demands are controlled in the heat distribution system that utilizes waste heat from the CHP and supplements with heat from boilers. Each pasteurization/holding tank has a thermocouple to measure the temperature of the substrate to ensure it maintains the desired temperature in the pasteurization/holding tanks. Substrate holding tanks are filled and held for the required duration prior to discharging a batch of feed to the digesters.

Digester feed rate will be set in the HMI and controlled through the SCADA system ensuring appropriate feeding rates and appropriate material retention time.

Routine operational and maintenance requirements will be outlined within the Operation and Maintenance (O&M) Manual prepared during system commissioning.

3.1.4 Biogas management

Biogas is continuously generated in the digesters. The headspace of the digesters are connected together and to the digestate storage tanks. Biogas accumulates within the digestate storage tanks, with storage volumes fluctuating due to the use of two double-membrane roof arrangements, one on each digestate storage tank. Digestate storage tanks will be equipped with pressure sensing devices to monitor the pressure with the tanks.

The double membrane digestate/biogas storage area is connected to the CHP inlet and pre-conditioning systems, the RNG upgrading system, and the flare. The CHP and RNG upgrading systems will automatically allow biogas input based on their available capacity. The CHP engine has a rated capacity of 1MW and gas consumption rate of 450-500 m^3/h. The RNG upgrading system will have a rated capacity as appropriate for the biogas production in the plant. If either system is down for maintenance, biogas will accumulate in the digestate/biogas storage. If digestate/biogas storage pressure is exceeded, then biogas will be sent to the flare for combustion.

The double membrane roof system will have a maximum permeability of 200 cm^3/m^2/day/bar.

3.1.5 Digestate management

Digestate production volumes will be monitored to coordinate tanker truck pickups. An operator will oversee all material shipments from the Site and will ensure correct documentation is coordinated with the weigh scale operator.

Upon completion of Phase2, up to 24,000 m^3 of digestate can be stored on Site to accommodate seasonal variation in use. During seasons when digestate application is more in demand, digestate will be removed from Site more rapidly to free up available storage space. Digestate trucking may also be conducted during extended hours to accommodate agricultural operations.

Digestate will be loaded onto trucks through a digestate loading station that provides for both top and bottom loading options. The digestate filling station will be sloped to the containment area for the existing digesters and storage tanks. This containment volume will be sufficient for the largest digestate loading truck in the facility.

3.1.6 Air treatment

Odourous air generated at the Site will be treated as described within Section 2.7.

3.1.7 Outbound materials

Outbound materials include:

– Digestate
– RNG
– Residual waste
– Reject waste
– Organic paste/slurry, if required

Inbound trucks, including empty trucks to collect material from the Site, will be weighed at the inbound weigh scale. After collecting material from the designated storage areas, trucks will be weighed at the outbound weigh scale prior to leaving the Site. Truck traffic estimates are provided in Table 8 following the text.

3.2 Monitoring, maintenance, and reporting

3.2.1 Process control

The facility will be operated by minimum of two operators per shift. A minimum of one operator is required to load and supervise the waste receiving/pre-processing operations and a second to operate the remaining digester feed, digestate, and biogas operations. Additional operators and staff will be on Site as required.

The plant will be controlled by a SCADA and PLC system. The pre-processing, pasteurization feed, RNG upgrading system, heat distribution, and flare will have a local control/PLC panel and will be connected to the main SCADA system for overall plant control. The control system will be designed in such a way that digesters and biogas management systems can run 24-hours per day/7-days per week without onsite- supervision during nights and weekends. These processes will run highly automated and will have a self controlling-ability. In case of irregularities,

the system will automatically go into safe mode and the operator will be informed via message on their cell phone. The operator can remotely log on via a secured connection to the SCADA system for remote process control if required.

An O&M Manual will be prepared and maintained at the Site based on the equipment installed and will be generated by the suppliers, installers, and contractors during the procurement and construction process.

3.2.2 Safeguard controls

All tanks will be equipped with a low and high-level switch for safety to prevent overflowing or pump dry running.

Tanks which are connected to the air treatment systems will have an open fresh air inlet to prevent damage to the tank by over/under-pressure. Non-atmospheric tanks have mechanical and hydraulic over/under-pressure safety devices. In the current operation, the pressure relief valves in the digesters/storage tanks are set 2-3 mbar above the nominal operating pressure.

In the event, biogas cannot be utilized, a flare system will be used to burn the unused gas and prevent pressure buildup in the system.

The exact operating pressures of the new equipment will be determined during the detailed design phase of the project. The setpoints for the flare will ensure that the flare is turned on at pressures below the max allowable pressure for the system. The flare set point will also be set lower than the overpressure relief valve's set point.

Pumps will be protected against dry running, by application of low level- switches or integrated temperature/pressure switches.

All automatic valves will be equipped with open/close notification and control valves will have feedback of the actual valve position. Some manual valves have open/close notification as well, if this is relevant for process control.

Contingency valves not intended for normal operation will be secured in the desired position during normal operations to prevent use unless necessary.

3.2.3 Monitoring and analyses

As a minimum, the following parameters will be monitored and analyzed:

Table 3.1 Process Monitoring

Process Location	Measurement	Method	Frequency
Inbound/Outbound Materials	Weight	Weigh bridge	Each load
	Waste type	Scale operator logs	Each load
Liquid receiving tanks	Level	Level Sensor	Continuous
	High Level	Level Switch	Continuous
	Temperature	Sensor	Continuous
Pasteurization (each tank and glycol loops)	Temperature	Thermocouple	Continuous
Digesters	Level	Level Sensor	Continuous
	Temperature	Sensor	Continuous
	Solids	Lab Analysis	Weekly
	VS, COD, nutrients	Lab Analysis	Monthly
Digestate	Solids	Lab Analysis	Monthly
	Quality (for end use)	Certified Lab Analysis	Per end-use requirements

Process Location	Measurement	Method	Frequency
Biogas	Flow	Flow Meter	Continuous or as required
	CH_4	Sensor	Continuous or as required
	O_2	Sensor	Continuous or as required
	CO_2	Sensor	Continuous or as required
	H_2S	Sensor	Continuous or as required
	Pressure	Sensor	Continuous or as required
Engine – Heat Distribution	Temperature	Sensors	Continuous
Odour treatment (biofilter)	Flow	Meter	Continuous
	Humidity	Sensor	Continuous
	Odour Units emission at stack	Certified lab	Annual

Additional analytical testing will be completed by operators to inform process adjustments using the on-Site laboratory located in the pump and pasteurization building.

3.2.4 Monitoring and testing

Daily inspections include Site perimeter inspections for the presence of litter, sediment, excessive noise, or odour.

The three liquid receiving tanks constructed prior to 2022 were built with a perimeter tile around the bottoms of the tanks to collect potential leakage. There is a monitoring well to the northwest side of the Liquid Receiving Tank 1. In addition to tank leakage, the weeper collects ground water and transports it to the monitoring well from which it can be sampled by an operator.

The digester and storage tanks constructed prior to 2020 were built with a single perimeter tile to collect potential leaks and transport them to a central sump in the intermediate building. A new perimeter tile will be installed around the 4 new digesters and 2 new storage tanks similar to the existing tanks. This new perimeter tile will be connected to the same central sump as the existing one such that it allows inspection of the incoming water. Additionally, the level of liquid in the digester and storage tanks will be continuously monitored by an instrumentation and control system like the one on the existing tanks to indicate the presence of a leak. The continuous tank level monitoring for the new tanks will be integrated into the existing Site SCADA system.

Samples will be collected daily by operators from the monitoring wells and central sump as part of their regular inspections of the plant and visually inspected for unusual colour and odour. If the samples do show signs of unusual colour and odour, a sample is submitted to an analytical laboratory for pH, COD and optical density testing. If any of these parameters are atypical for historical groundwater conditions on the site, it is a sign that the tanks should be inspected.

Other inspection activities will include equipment inspections to determine maintenance needs and recording and adjusting process conditions per Section 3.2.3.

Routine testing of the incoming organic waste materials and digestate will be conducted to meet the quality criteria. All new incoming waste will be assessed for metal concentrations. In the absence of literature data, laboratory testing will be conducted for metal analysis. The digestate will be analysed for metals, foreign matters, plastics, and pathogens (Faecal coliforms and Salmonella) depending on the intended use and in accordance with the approved schedule by the ministry. Depending on the intended use and pathogen level, the digestate may be pasteurized prior to shipping off site.

Odour and reduced sulphur testing will be conducted in accordance with the approved schedule at the following sources: biofilter exhaust, grit/skimming building, and receiving tanks.

3.2.5 Preventative maintenance

Escarpment Renewables uses a computerised maintenance management software (CMMS) system to track and assign routine monitoring. Site operators are provided with a schedule of inspections and maintenance actions to be performed daily, weekly, and monthly.

Preventative plant maintenance is carried out based on a pre-determined schedule. All moving parts are regularly greased and inspected. CHP Engine maintenance is carried out under contract to the supplier.

Cleaning and first line maintenance will be performed by the staff. Preventive maintenance and corrective maintenance items will be performed by staff, third-party company, or the equipment supplier.

3.2.6 Record keeping and reporting

On-Site records will be maintained of materials received, stored, processed, transferred, and sold, as well as the operational equipment.

Measurements of the following parameters are recorded in the daily log:

– Source, types, and weights of wastes received
– Types, weights, and destinations of all wastes transferred from the Site
– Materials rejected from the Site

Measurements of the following are also recorded and kept:

– Calibration and maintenance of monitoring equipment
– Records produced during any air treatment source testing
– Regulatory reports
– Site laboratory analytical data
– Record of bypass or malfunction of any part or equipment at the Site
– Complaints received and response forms (Complaint Management Reports)
– Emergency situation response

These records will be retained at the Site for at least 2-years and will be made available to the MECP District Manager or Environmental Officer upon request.

Other records that will be recorded and kept on Site include:

– Inspection Reports
– Maintenance Records
– Maintenance Activities
– Monitoring Records

An annual report will be prepared and retained on-Site at the end of March each year.

3.3 Secondary containment

The liquid receiving tanks are constructed below grade and the unloading area is sloped to drains connected to the storage tanks. Should a spill occur during unloading, it will drain to the tanks and be contained.

The existing digesters and storage tanks are constructed below grade. A secondary containment area will be provided for the new digesters and digestate storage tanks, which will be constructed above grade. Secondary containment will include compacted clay base and berms, constructed to achieve a permeability of less than $1x10^{-6}$ cm/s. Alternatively, concrete or asphalt will be used to line the areas if the clay material on Site is not suitable for use as secondary containment. The berms will be a minimum 2.5 m depth, designed in accordance with the Guidelines for

Environmental Protection Measures at Chemical and Waste Storage Facilities. This provides for 100% of the volume of the largest tank in each containment area plus 10% of the aggregate volume of all other tanks and additional runoff for 100-year storm for the expanded site. Secondary containment calculations are provided in Table 11 following the text and show that the containment area provides the minimum required volume 844 m^3.

Precipitation will accumulate in the secondary containment area. Minor flows will be directed to private storm sewers and overland to the new retention area. Major flows will be directed overland to the new retention area. The new retention area is designed for the runoff from rainfall events and the secondary containment. The retention area does not have a direct gravity outlet rather, it will be pumped to the east pond once it has available capacity. Routine visual inspection and continuous tank level monitoring will identify if a spill has occurred. In case of a spill, the material will be contained within the secondary containment area and disposed of according to the spill management & environmental safety protocol. Alternatively, the accumulated water will be used in the digestion process by mixing with incoming feedstock to achieve desired solids content and reduce the need to import water. This will be done on an as -needed basis. The secondary containment will have an area of approximately 4288 m^2. Total annual precipitation from Environment Canada records for the Grimsby Mountain weather station are shown in Table 3.2 below for the past five years. The average annual precipitation is 986 mm. Therefore, approximately 4227 m^3 water will be available within the secondary containment area that could be utilized in the on-site anaerobic digestion process. Realistically, the water demand will be consistent, with precipitation varying seasonally. The feedstock mix will be altered as needed to maintain the desired solids content.

Table 3.2 Average Annual Precipitation

Year	Total Annual Precipitation (mm)
2020	815
2019	1,141
2018	1,051
2017	1,175
2016	748
Average	986

The collection and use of precipitation from this area is not anticipated to impact existing water use, especially given the historical Site use was agricultural crop growth, which utilizes significant volumes of water.

If collected stormwater is determined to be contaminated, it will only be used in the digestion process, treated in a mobile treatment unit (MTU) under its own ECA or collected in tanker trucks to be managed off--Site at a wastewater treatment plant permitted to manage and process the contaminated water.

The 1,500 kilovolt-amp (kVA) transformer which will be employed in this application contains approximately 2,200 litres of oil and is located at the frontage of the property. Secondary containment is provided to contain a spill.

Buildings are constructed with concrete floors graded to contain interior drainage and spills. This will ensure that any spills will remain inside the building and will be collected and recycled into the process or disposed of if necessary.

The following spill response plan will be followed in the event of a spill at the Site and will be updated as necessary prior to commencing operations.

Generally, upon discovery, the Escarpment Renewables General Manager will assess the significance of the spill by considering the following factors:

– Location and cause/source of the spill
– Substance spilled and its hazard potential
– Amount of the spill and the extent of spreading
– Potential public or environmental impact

– Immediate actions required to protect on-Site staff
– Immediate actions required to contain the spill
– Notification and reporting requirements

Spills of liquid wastes brought to the Site and spills from tanks within containment areas will be contained quickly through the features discussed above. Spills may occur in other areas. Every reasonable effort will be made to minimize the area affected by the spill. The affected area will be cordoned off to prevent access. The spill will then be reported immediately.

Reportable spills will be reported immediately to the Spills Action Centre at the number provided in the emergency contacts in Section 3.9.

Information on spills must be recorded including names, times, type of spill, investigations and corrective actions taken.

Spill kits will be prepared and provided within the processing buildings.

If a spill is determined to be of such a magnitude that it cannot be safely and effectively controlled by on-Site personnel, then the General Manager shall promptly notify outside emergency response companies to implement control and clean-up.

In the event of a spill, restoration activities may be required if the spill is determined to have had an impact on the soil or groundwater. In this instance, specific plans will be developed to remediate or remove impacted materials and manage in accordance with provincial regulations.

3.4 Air emissions

Locations of potential air emissions are shown on the figure included in Appendix A. An Emissions Summary and Dispersion Modelling (ESDM) Report and Odour Study have also been prepared for the proposed expansion that detail the anticipated emission concentrations, location of sensitive receptors, and resulting point of impingement concentrations. These can be found in Appendix A and Appendix B respectively.

Air emission sources are described in the following subsections.

3.4.1 Trucks

An estimate as to the number of trucks that will be required for incoming feedstock and outgoing material is provided in Table 8. Trucks represent a potential source of dust emissions that is evaluated in the ESDM Report.

3.4.2 Engines/turbines

Air emissions occur from the exhaust stack of the CHP as a result of combustion of biogas. Engine emissions include nitrous oxide, sulphur dioxide, and total reduced sulphur. The emissions are evaluated to confirm compliance with provincial regulations in the ESDM Report.

3.4.3 Flare

The flare will be designed to combust 100% of the biogas produced at the Site in the event of malfunction or required maintenance of the CHP and RNG upgrading system. The flare will start automatically when needed. It is connected to the alarm system and its use is recorded in the computer system. Flare emissions include nitrous oxide, sulphur dioxide, and total reduced sulphur. The emissions are evaluated to confirm compliance with provincial regulations in the ESDM Report.

3.4.4 Over-under pressure valves

The digesters and digestate storage tanks are equipped with over–under pressure relieving valves. These valves will release biogas to atmosphere in the event of an over pressure situation. The valves will only operate in the event the CHP, RNG upgrading system, and the flare are inoperable, which is not anticipated to occur.

3.4.5 Receiving tank displacement air

The liquid/slurry/paste feedstock is delivered to Site in a sealed truck and transferred to the receiving tank via camlock connection or end-dumping. As the tank is filled there will be some air displacement. The primary emission of concern from this source is odour. The odour is evaluated to confirm compliance with provincial regulations in the Odour Study.

3.4.6 Boiler

A supplemental heat boiler is required for digester operation. The boiler is anticipated to be propane-fired and uses glycol to heat digester feedstock. Emissions from the boiler exhaust include nitrous oxides. The emissions are evaluated to confirm compliance with provincial regulations in the ESDM Report.

3.4.7 Biofilter stack

The biofilter will treat air collected from within the organics pre-processing building where bulk solid organic waste is received and processed and residual waste is stored. Exhaust from the biofilter stack may contain ammonia, H_2S, and odour. The emissions are evaluated to confirm compliance with provincial regulations in the ESDM Report. The odour is evaluated to confirm compliance with provincial regulations in the Odour Study.

3.4.8 RNG upgrading system tail gas

The RNG upgrading system separates CH_4 from CO_2 and other contaminants for use as RNG. The remaining gas is primarily CO_2 with a small quantity of CH_4 slip, estimated at 1.5% of total CH_4 from the biogas. The RNG upgrading system tail gas may also contain some VOCs. The emissions are evaluated to confirm compliance with provincial regulations in the ESDM Report.

3.4.9 Digestate loading displacement air

As digestate is loaded into tanker trailers, the air within the trailer that is exposed to the digestate will be exhausted. The primary emission of concern from this source is odour. The odour is evaluated to confirm compliance with provincial regulations in the Odour Study.

3.4.10 Digestate/biogas storage tank membrane leakage

The digestate/biogas storage tanks will have double membrane roof systems. Some biogas will permeate the inner membrane and be exhausted from the interstitial space. The primary emission of concern from this source is odour. The odour is evaluated to confirm compliance with provincial regulations in the Odour Study.

3.4.11 Fugitive emissions from organics pre-processing building

Doors to the organics pre-processing building will remain closed at all times unless personnel are entering/egressing, or a truck is entering/exiting the building. While doors are closed, the building will be maintained under negative pressure to mitigate fugitive emissions from the Organics Receiving Building to any off-site sensitive receptor location. However, during the periodic door opening to allow a truck to enter, there is a potential for fugitive emissions of indoor air. The primary emission of concern from this source is odour. The odour is evaluated to confirm compliance with provincial regulations in the Odour Study.

3.4.12 Emergency generator

The existing diesel emergency generator may occasionally be used if power is lost at the Site. Emissions from the emergency generator exhaust include combustion products. The emissions are evaluated to confirm compliance with provincial regulations in the ESDM Report.

3.5 Noise emissions

Noise emission sources are discussed in the following subsections.

3.5.1 Trucks

An estimate as to the number of trucks that will be required for incoming feedstock and outgoing material is provided in Table 8 following the text. Trucks will travel to various parts of the Site as shown in Table 8. The speed limit noted in Section 3.8 will be enforced. Noise from the trucks is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.2 CHP

The CHP is currently operational in an acoustic enclosure. Noise measurements during operation were collected and included in the AAR. Noise from the CHP is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.3 Flare

The flare will require a blower to operate when the CHP and/or RNG upgrading systems are not operational. Noise from the flare is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.4 Organics pre-processing building

The organics pre-processing building will contain a number of pieces of equipment including:

- Front-end loader
- Forklift
- Pumps
- Organic pre-processing units
- Residual waste compactors
- Conveyors
- Ventilation system fans for intake and exhaust

The construction materials of the doors and walls will mitigate the transmission of noises from within the building. Noise from the organics pre-processing building is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.5 Pump and pasteurization building

The existing pump and pasteurization building contains mixing pumps and piston pumps to manage the transmission of digester feedstock to and from pasteurization. Noise measurements during operation were collected and included in the AAR. Noise from the pump and pasteurization building is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.6 Tank agitators

The liquid receiving tanks, digesters and digestate storage tanks are equipped with multiple agitators to keep the tanks mixed. The new digesters and digestate storage tanks will also have similar agitators. Noise from the agitators is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.7 Digestate skimming buildings

Three digestate skimming buildings will be required to each manage digestate from two digesters. One digestate skimming building exists and noise measurements during operation were collected and included in the AAR. Noise from the digestate skimming buildings is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.8 Backup generator

The backup generator is existing and used in the event of a power outage. Noise measurements during operation were collected and included in the AAR. Noise from the backup generator is assessed in the AAR to confirm noise emissions meet provincial regulations.

3.5.9 RNG upgrading system and compression systems

The RNG upgrading system and tube trailer compression systems will be located on the eastern portion of the site. Noise from the RNG upgrading system and compression systems is assessed in the AAR to confirm noise emissions meet provincial regulations. A berm will be installed along the eastern side of the site to mitigate noise emissions from the site to below the allowable limits as outlined in the AAR.

3.6 Operating hours

The Site will be opened to receive materials:

– Monday – Saturday: 7:00 AM to 7:00 PM

Waste processing/management, Digestion, Odour Treatment, Biogas Management and other such operations, as well as maintenance, will occur 24-hours a day, 7-days a week

Digestate removal will occur:

– Monday to Saturday: 5:00 AM to 9:00 PM

3.7 Staffing and training requirements

The Site will require the following staff:

– Weigh scale attendant(s)/administrators to be present for receiving and monitoring inbound and outbound materials, entering information in Site records, directing traffic, and other administrative duties
– General Manager responsible for overall Site operations and inbound/outbound material contracts
– Facility operator(s) responsible for control of process equipment, adjustment to operating conditions, generation of digester feed mix
– Operation and maintenance personnel responsible for general maintenance of equipment, routine inspections, and cleaning

Staff at the weighbridges and operators will be trained in the identification of approved waste types, hazardous materials, and large contamination. The purpose of the training will be to understand and comply with waste manifestation and tracking requirements, ensure only waste licensed for acceptance at the Site is received, reject and

document waste that is not licensed for acceptance at the Site, and identify and communicate contamination to operators responsible for removal.

Operators, supervisors, managers, and maintenance teams will be trained in the safe use and care of the equipment installed at the Site. An O&M Manual will be prepared and maintained at the Site based on the equipment installed and will be generated by the suppliers, installers, and contractors during the procurement and construction process. Site personnel will be aware of the O&M Manual, its contents, and use.

Operators, supervisors, and managers will be trained in the use of the Site control systems through the HMI and SCADA system.

All staff will be provided with Health and Safety training, including Site-specific training based on the chemicals and materials present at the Site. Training will include what to do in case of emergency for health-related emergencies, fire emergencies, and other catastrophic events. Health and Safety training will be handled by service providers or in-house programs.

Most process related training will be handled through on the job training by experienced operators or staff. Environmental training is process and site specific and will be handled in-house. Environmental training is focused on odour control and spill control.

All staff will be trained in environmental emergency procedures including what to do in case of a spill.

Training requirements will be reviewed annually and new or refresher training provided as required.

3.8 Traffic management

Truck volumes have been estimated based on an average breakdown of material per waste type. The total weekday and Saturday truck traffic estimates when operating at maximum capacity are provided in Table 8 following the text.

Approximately four trucks per hour are anticipated to arrive at the Site. This is a conservative estimate given the inclusion of RNG tube trailer pickups, which are not expected to be conducted on a daily basis. At this rate, minimal queuing is expected and will be limited to peak hours. Trucks coming to the Site will be staggered to the extent possible to maintain traffic routes and avoid queuing. Should any queuing be required, trucks can bypass the scale and circle the perimeter road to queue along the northern portion of the on-Site access road. No trucks will queue on Sobie Road.

On-Site speeds are posted and limited to 15 km/hr.

3.9 Environmental emergency and contingency plans

3.9.1 Emergency contacts

Contacts in case of an emergency are provided in the table below.

Table 3.3 Emergency Contacts

Emergency	Phone Number
Ambulance	911
Fire Department	911
Police (emergency)	911
Police (non-emergency)	905-945-2211
Spills Action Centre	416-325-3000 or 1-800-268-6060

An emergency after hours' number will be posted on the sign at the entrance to the Site.

3.9.2 Emergency response plans

An Emergency Response Plan (ERP) is available for the Site and routinely updated. The ERP covers requirements for fires, accidents, and spills and also includes a Fire Safety Plan. A review of the plan is undertaken annually and updated as required. The current Site ERP and Fire Safety Plan can be found in Appendix G.

The ERP documents the roles and responsibilities of the operating staff and other organizations in responding to various types of on-Site emergencies.

The ERP documents the on-Site equipment and/or materials necessary to be available at the Site to respond to the emergencies.

Communication of the contents of the ERP will be completed during employee training.

3.9.3 Contingency plans

3.9.3.1 Equipment failure

The equipment used on-Site is capable of 24-hour, 365-days-per-year operation.

A preventive maintenance schedule will be in place to minimize the possibility of an equipment failure and documented in the O&M Manual. A procedure will be in place to monitor the causes of failures and to prevent repeat occurrences.

An inventory of spare parts will be maintained on Site.

In the event of a mechanical breakdown at the Site that causes the Site to be temporarily unable to process waste solids, waste solids will be temporarily stored in the receiving areas until the storage capacity is reached. If the storage capacity is fully utilized, waste solids will be redirected to another licensed processing/disposal facility.

If another facility is not available that can handle the material, the waste solids will be disposed of as municipal waste at a licensed facility until normal operations resume.

In the event of a mechanical breakdown at the Site that causes the Site to be temporarily unable to process liquid waste, liquid waste will be temporarily stored in the liquid waste storage tanks until the storage capacity is reached. If the storage capacity is fully utilized, liquid waste will be redirected to another licensed processing facility or shipped back to the supplier.

In the event of a mechanical breakdown or biological upset that causes the anaerobic digestion operation to be temporarily unable to receive feedstock, one digester can be taken out of service while the others continue to operate. If inadequate digester capacity is available at the site, the digester feed tanks will be pumped (using an emergency emptying connection at the tank and a temporary pumping system into tanker trucks for off-Site disposal at licensed facilities and/or used as a feedstock for anaerobic digestion processes if appropriate.

Adequate redundancy has been incorporated into design to tackle mechanical breakdown or system maintenance. If a liquid receiving tank is out of operation (i.e., clean out), the site is still able to properly operate using the other 2 tanks. The liquids receiving tanks are relatively small and easily accessible, a cleanout can typically be done in one day. Pre-processing units will provide redundancy inherently, more shifts can be run on one unit to meet the pre-processing needs. In case the processing rate cannot keep up, temporary storage will be utilized up to the maximum limit and any further material receipt would have to be halted or diverted to other pre-processing site and the pre-processed material can then be returned to the site

Digester feed pumps are plumbed to be able to feed from any tank and to any tank. This will provide considerable redundancy for system reliability and operability. Critical spare parts are kept on site for timely repairs. Multiple digesters will allow flexibility and redundancy for operations; additionally, the new digesters will be self-cleaning greatly reducing the need for cleanout shutdowns.

On completion of Phase 2, there will be up to 4 digestate storage tanks, and any downtime can be scheduled during the Spring-Fall months so that digestate can be directly applied to the farm field without having to be held in the storage tanks for lengthy periods of time or transferring the digestate to additional lagoon storage which will be secured through contract with local farmers. One of the contingencies for any time when the digestion process capacity is decreased would be to ship paste/slurry to other processing sites (e.g., during digester maintenance).

There will also be redundancy in the skimming system by connecting each digester to at least two skimming systems.

3.9.3.2 Electrical outage

The Site's general building systems, including heating, ventilation and air conditioning (HVAC) building management system, as well as the waste pre-processing systems, pasteurization, anaerobic digestion, digestate management, biogas management, and residue management systems are electrically powered.

Loss of electrical power is not an emergency for the Site. All relevant valves and systems will have failsafe operation in case of power outage. The flare will not extinguish unless biogas production ceases, and will not be affected by electricity outages, thereby providing capacity for biogas management in the event of an electrical outage.

A backup diesel generator is available at the Site to maintain critical systems during an electricity outage. This allows the Site to maintain operations during short term outages.

The Site will not receive waste during a prolonged electricity outage where the diesel generator is not able to maintain the Site operations. In this event, material will be diverted back to the supplier or disposed of at a licensed off-Site facility. Normal deliveries will resume when the electricity supply is restored.

During an electricity outage and in event the operation of the organics pre-processing building HVAC system will be interrupted, the building receiving doors will remain closed to minimize fugitive odour release. The backup generator may be used to maintain the HVAC system operation if sufficient power for other critical operations is available as well otherwise, additional portable generators will be used as needed.

3.10 Site inspections and nuisance controls

3.10.1 Dust and litter control

Areas within the Site that have truck traffic are paved and thus are unlikely to create dust. Inspections will be undertaken for dust and litter will be communicated immediately to the General Manager and recorded. Issues with dust will be dealt with immediately by tracing the issue back to the source and dealing with it through appropriate means such as water spraying for dust on roadways. The high moisture content of the feedstock, residual waste, and the digestate materials managed at the Site minimize the potential for dust emissions. All incoming waste is stored and processed indoors.

The primary source of litter at the Site is from material that falls from trucks. Unloading of SSO and ICI material takes place within the receiving bays of the organics pre-processing building with doors closed. Plastic and grit residual is loaded onto tractor trailers located inside the organics pre-processing building and a residual press is used to remove excess liquid from the waste.

Daily perimeter monitoring is conducted per Section 3.2.4 to identify the need for cleaning, which will be conducted by Site personnel.

3.10.2 Noise control

The primary sources of noise expected at the Site include:

– Incoming and outgoing truck traffic
– Mechanical equipment such as pre-processing equipment, pumps, blowers, front end loader, RNG upgrading system

– CHP

Trucks transporting incoming feedstock and outgoing material are on Site for a minimum amount of time where possible, and with a minimum of truck idling and minimal queuing, which limits the impact of excess vehicular noise on the Site. On-Site speed limits will be posted at 15 km/hr.

The majority of the mechanical equipment contained at the Site is enclosed within a building and is not expected to generate significant noise outside of the AD facility. The doors of the receiving bays will remain closed except to admit vehicles, minimizing potential noise from internal operations.

Issues with respect to noise will be communicated immediately to the General Manager and recorded. Issues with noise will be dealt with immediately by tracing the issue back the source and dealing with it through appropriate means such as closing doors or instructing drivers not to idle.

3.10.3 Odour prevention and control

All incoming waste unloading, storage, and pre-processing activities will occur within the organics pre-processing building, or enclosed tanks. The organics pre-processing building will be equipped with air ventilation systems, discharging to air treatment systems. Interlocking bay doors will be installed to ensure desired pressure level can be maintained within the preprocessing building. Refer to Section 2.7 for more information on the air treatment systems.

To reduce the air treatment volume required, air will be cascaded throughout the organics pre-processing building (i.e., air from clean areas will move to areas with more contamination to reduce outside air intake and overall air flow treatment requirements). This building will operate under negative pressure with the exception of the electrical, control, and administrative areas, which will have designated ventilation systems under positive pressure.

Liquid receiving tanks will be enclosed during normal operations to reduce the release of odours from the tanks.

Daily inspections will be conducted of waste receiving operations. This will include all door seals and loading dock seals and other openings to prevent fugitive odour emissions. Daily perimeter inspections for the presence of odour will also be conducted.

Leaks and spills within the organics pre-processing building will be corrected quickly, and floors will be washed down to minimize odour within the building. Spilled materials on the roadways on the Site will be cleaned up and neutralized as necessary.

Odour monitoring will be an integral part of daily Site operations. The goal of odour monitoring will be to identify potential odour sources which enables proactive implementation of odour prevention and control measures. Odour monitoring will include on-Site inspections and off-Site inspections in the event of an odour concern. Current information on wind speed and direction will be obtained from an on-Site weather station in the event of an odour concern. The findings of the odour concern inspections will be recorded in the daily operations log.

The General Manager will review the daily operations logs and records of complaint/incident forms when applicable. If trends of odour sources develop, additional monitoring and strategies will be developed to reduce or eliminate causes.

Potential odour sources and contingency plan

Potential odour sources are identified in Section 3.4.

The following Odour Contingency Plan is proposed for the Site:

– The biofilter will have redundant capacity, capable of operating at a higher volume to surface area loading rate if needed to manage short-term- odour concerns
– In case of an extended power outage, the backup generator (plus any additional portable generators) will maintain building ventilation.
– Space is reserved in the layout for an additional treatment step before or after the biofilter

Refer to the Odour Study for further odour management practices.

3.10.4 Odour complaint response

The odour complaint response procedure is provided in the Odour Study.

3.10.5 Pest control

The Site will maintain good housekeeping procedures to discourage vector and vermin. Potential sources of attraction are with material located within enclosed buildings. The Site will be cleaned on a regular basis to minimize the potential of vermin.

The Site is equipped with rodent traps and bug zappers to prevent pests. If vector or vermin are discovered, the Site will hire a qualified pest control professional to control the nuisances. In general, maintaining the facilities in clean conditions, keeping waste storage indoors, and following guidance of professional pest control specialists should keep the vector and vermin to a minimum at the Site.

3.11 Fencing and security

There is an existing fence surrounding the majority of the Site as shown on Figure 2. The fence will remain or be upgraded as shown in Figure 3 to provide security. In addition, security cameras are installed to provide surveillance. Site access in controlled and monitored through a sign in system which will record all Site personnel and visitors accessing the Site.

4. Stormwater management

The REA requires stormwater management in the form of a sediment basin with a total capacity of 675 m^3. The two existing ponds include a west pond and an east pond that are interconnected by a series of culverts between them. The east pond drains into the west pond. The estimated total volume of the two ponds is approximately 3,000 m^3.

The ponds currently receive runoff from the perimeter ditch and the central area around the existing digesters, servicing the currently -developed portion of the property (approximately 4 ha). The discharge from the west pond is directed along a swale running to the southwest corner of the Site and discharging to existing drainage features consistent with the historical use of the property as an agricultural field. The stormwater runoff from the pre-expansion area will continue to be directed towards the existing ponds.

A secondary containment system will be constructed for the new above -grade tanks, with an area of approximately 0.4 ha. This area will contain stormwater, which will either be used in the AD process, or discharged to the head of the east stormwater management pond if not needed and deemed to not be impacted by site operations. This pumping will be done during periods where the stormwater ponds have capacity to manage the volume of water to be pumped. The total drainage area that the stormwater ponds will be servicing post--expansion is approximately 6 ha, which is higher than the current conditions (approximately 4 ha). The proposed retention area will have the capacity to accommodate entire runoff from the 100-year storm plus the volume requirement for the secondary containment of the new digesters and tanks. Therefore, in spite of increase in direct -flow service area, the combined volume of the existing ponds (approximately 3,000 m^3) and proposed secondary containment (approximately 11,000 m3) are sufficient and larger than that required by the current REA and no changes are proposed to the stormwater management ponds.

Silt fencing is installed and will be maintained along the western property line a minimum 3 m from the edge of an existing drainage area to prevent migration of sediment during construction of the Site. The existing drainage is vegetated, and any vegetation removed as part of the construction will be restored following construction and prior to any silt fence being removed. The stormwater management ponds collect runoff from the Site and provide sedimentation. A silt sock exists in the effluent ditch from the existing stormwater management ponds to further protect the downstream receiving environment from potential sediment migration from the stormwater management ponds.

5. Environmental effects

The existing operation and proposed expansion provide many positive environmental effects including:

– Diverting organic waste from landfill to support the growing demand for organic waste management options needed to meet the goals of the Strategy for a Waste-Free Ontario
– Generates renewable energy in the form of both electricity and RNG
– Recovering nutrients in the form of digestate fertilizer for reuse in agricultural operations in accordance with the Resource Recovery and Circular Economy Act and Food and Organic Waste Policy Statement
– Reducing pathogens to an acceptable level in the digestate

However, the operations have potential environmental effects that are detailed in Table 5.1 along with mitigating features and procedures to be implemented.

Table 5.1 Potential Environmental Effects

Environmental Effect	Performance Objective	Mitigation
Noise Emissions	Meet Provincial Standard	The organics pre-processing building will have noise ratings for the pre-engineered steel structure established to provide a minimum standard to ensure noise mitigation for sources within the building. The CHP and backup generator have acoustic enclosures. A berm will be constructed on the eastern portion of the Site to mitigate noise mainly from the RNG Facility. Truck traffic noise will be mitigated through the implementation of on-site speed limits and a no idling policy.
Odour	Meet Provincial standard	Liquid receiving tanks are closed to minimize the possibility of fugitive odour emissions. The Organics Pre-processing Building is fully enclosed and maintained under negative pressure with doors closed at all times unless personnel or trucks are entering/exiting. Digestate is fully contained. Digestate/biogas storage permeability requirements are met. Also see the Odour Study Report.
Air Emissions	Meet Provincial standard	The CHP, backup generator, RNG upgrading system, boiler and flare emissions will be designed to meet Provincial standards. Also see the ESDM report.
Spills/Leaks	None	The potential for spills at the Site is minimized by the design of the facilities including the use of a perimeter road and secondary containment to prevent contact between tanks and vehicles. The liquid receiving tanks are lined to reduce potential for leaks. All waste is stored and processed indoors with concrete foundations and sumps to minimize potential for leaks. Cam lock connections and grading around liquid receiving tanks ensure that the possibility of spillage is minimized and contained. All above -grade tanks are contained in a secondary containment system designed in accordance with the Guidelines for Environmental Protection Measures at Chemical and Waste Storage Facilities.

Environmental Effect	Performance Objective	Mitigation
Siltation Control	None	Silt fencing will be installed at the western perimeter of the Site and in construction areas. After construction is complete, the disturbed area is to be seeded to prevent erosion from occurring. The stormwater ponds are existing and contain additional erosion and sedimentation protection through the use of silt socks.
Natural Heritage Impacts	None	Potential natural heritage impacts were identified during the initial development of the Site and remain the same for the expansion. These included: Noise impacts (identified above) Siltation impacts (identified above) Potential for winter deer congregation Lighting Consistent with the mitigation measures proposed for the Site development, 3.2-m high fence will be considered to prevent deer entering the Site and new lighting will be installed downward facing to prevent adverse effects to the surrounding natural environment.

Neither the construction of the project nor its long-term operation will have an adverse effect on the surrounding environment. The woodland to the south will remain untouched. There are no archaeological or heritage resources identified in the area.

5.1 Groundwater monitoring

The entire Site is visually checked daily by the operator and any issues are documented and repaired as required. Inspection and record keeping procedures are described in Section 3.2. The facility operator is also provided with a cell phone that is directly connected to the facility alarm system. As a result, the plant is monitored 24-hours a day, 7-days a week and any repairs required can usually be completed by telephone or internet connection.

Before proceeding with Phase 1 the monitoring wells will be monitored in accordance with the Hydrogeological Assessment Report for the potential presence of groundwater impacts from the operations. Baseline groundwater quality will be established by monitoring the wells over a period of 4-years. Should potential impacts be identified, they will continue to be monitored to evaluate the potential for off-Site impacts. All potential contaminants of concern and their relevant trigger level, and contingency plan will be developed and submitted to the director for approval. Following the baseline period, groundwater monitoring will be annually. Mitigation and contingency measures will be developed on a case-by-case basis but could include the removal of liquid from underground tanks to isolate and complete repairs due to leaks. Such incidents will be recorded and notified to the MECP District Manager.

5.2 Communications

As part of the expansion, Escarpment Renewables will complete engagement activities with the public, including provision of notification through newspaper advertising and publishing documentation on their website. A public consultation meeting will also be held to provide the public with details of the proposed expansion. A Consultation Report will be prepared to document any public comments and responses.

A sign will be posted on site with the name and contact information for concerns or complaints. In addition, key emergency information such as fire, police, ambulance and the MECP spills action centre will be on the sign. Emergency procedures are maintained within the ERP.

All correspondence to the owner received from the public or agency will be recorded by Escarpment Renewables and a response provided. Spills will be reported to the MECP Spills Action Centre.

6. Operational flexibility

Table 6.1 outlines the areas of operational flexibility for the Site. The design presented in this D&O report is the base case. The potential modifications outlined below will not result in additional adverse impacts on the environment outside of regulatory limits. Should the base case be modified Escarpment Renewables will provide the local district office with a letter outlining the modification and any revised technical reports requiring updates to demonstrate that the modification has not resulted in additional adverse impacts to the environment outside of regulatory limits.

Table 6.1 Operational Flexibility Options

Design	Base Case	Potential Modification
Organics pre-processing	Two pre-processing units within the organics pre-processing building.	Flexibility to install additional pre-processing units with similar or different technologies, providing that the overall pre-processing throughput remains the same.
New digesters	Four new self-cleaning digesters with a volume of 3,435m^3 each.	Flexibility to install two to six new digesters providing the minimum HRT and organic loading rate remains in the same range.
New digestate/biogas storage tanks	Two new digester/biogas storage tanks with a liquid volume of 8,000m^3 each.	Flexibility to install a pad-mounted biogas bladder instead of the second digestate/biogas storage tank. This will serve as additional biogas storage only, if required.
Digester technology	A digester technology which contains a skimmer and floor sweeper to remove light and heavy fractions from the digesters.	Flexibility to utilize additional pre-processing equipment to remove light and heavy fractions instead of utilizing skimmer and floor sweeper technology.
Feedstock receiving area within the organics pre-processing building	It is currently proposed to utilize a front-end loader on the tipping floor to manage the incoming solid feedstock in the organics pre-processing building.	Flexibility to use a pit and grapple system given that the storage volumes remain the same.
Odour management technology	Biofilter for odour management within the organics pre-processing building.	– Flexibility to select a different media (organic or inorganic).
RNG Injection or transportation	RNG is currently planned to be compressed into tube trailers prior to transportation off Site.	Flexibility to inject RNG directly into an onsite natural gas pipeline.

The Site will be developed in phases to allow for progressive expansion as waste receiving volumes are realized. Table 6.2 provides the number of units of infrastructure that will be installed during each Phase. Phase 0 represents the existing Site conditions.

Table 6.2 Operational Envelope

Equipment	Phase 0 (Existing)	Phase 1	Phase 2
Inbound Scale	1		
Outbound Scale		1	
Office Building	1		
Staff Building	1		
CHP	1		
Organics Pre-processing Building		1	

Equipment	Phase 0 (Existing)	Phase 1	Phase 2
Waste Pre-processing Unit		1	1
Pasteurization Lines	2		
Boiler	1	1	
Liquid Receiving Tanks	3		
Plug Flow Digesters	2		
Existing Digesters	2		
New Digesters		2	2
Existing Digestate Storage Tanks	2		
Biogas Storage Bladder	1		
Digestate Storage Tanks with Biogas Storage		1	1
Secondary Containment Area		1	
Digestate Skimming Systems/Buildings	1	1	1
RNG Upgrading System		1	1
Flare	1	1 (replace existing)	
Stormwater Ponds	2		
Biofilter		1	

The existing infrastructure in Phase 0 was sized to receive up to 33,000 tonnes per year of incoming material. Prior to construction and commissioning of the expansion the Site will receive up to 33,000 tonnes per year of incoming material as outlined in Table 6.3 which provides the annual waste limits for each Phase.

Table 6.3 Annual Tonnage Limits by Implementation Phase

Waste Type	Annual Tonnes		
	Phase 0 (Existing)	Phase 1	Phase 2
Agricultural Waste	7,000	7,000	7,000
SSO (pre-processed and/or unprocessed)	33,000[(1)]	75,000	120,000
ICI Packaged	0	25,000	100,000
ICI Liquid	10,000	38,000	100,000
Maximum total	33,000	120,000	159,000

Notes:
[(1)] pre-processed only

The maximum annual tonnes in feedstock composition are intended to provide the AD facility with the flexibility to change the composition of the total combined feedstock to suit current AD facility operation conditions, changing organic waste market conditions, optimize biogas production and AD facility performance. The annual composition of waste received may consist of any combination of the above waste types and not exceeding a combined maximum of tonnes per year per phase.

A change log is provided in Appendix E, providing details of revisions made to the Site under operational flexibility.

7. Financial assurance

In accordance with MECP Guideline F-15, Financial Assurance (FA) is normally required for all private waste processing sites. FA for the Site has been calculated in accordance with this Guideline and is included in Appendix E.

Tables

Table 7

Mass Balance
Design and Operational Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

Incoming Waste	Amount	Amount	Amount	Units
	Phase 0	**Phase 1**	**Phase 2**	
Total processed waste volume	33,000	89,920	142,342	Tonnes
Processed waste solids	18%	18%	19%	Percent
Contaminants, Avg (SSO)	0%	13%	13%	Percent
Contaminants, Avg (ICI)	0%	5%	5%	Percent
Proportion Solids	70%	64%	68%	Percent
Proportion Liquids	30%	37%	32%	Percent
Raw Waste, Solids	23,100	63,500	108,850	Tonnes
Raw Waste, Liquids	10,000	37,000	50,000	Tonnes
Raw Waste, Total	33,000	100,000	159,000	Tonnes
Average daily solid waste receipt*	76	189	319	Tonnes
Average daily liquid waste receipt	33	121	166	Tonnes
Average feedstock volatile solids	85%	82%	82%	Percent
* Average daily solid waste receipt represents the raw SSO waste before de-packaging as well as the preprocessed SSO and slurry				

Table 7

Mass Balance
Design and Operational Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

Waste Processing	Amount	Amount	Amount	Units
	Phase 0	**Phase 1**	**Phase 2**	
SSO incoming, avg	23,000	64,000	109,000	Tonnes
ICI Liquids incoming, avg	10,000	36,000	50,000	Tonnes
SSO, processed	23,000	55,936	95,266	Tonnes
ICI, processed	10,000	34,200	47,500	Tonnes
SSO solids	0%	27%	27%	Percent
ICI Liquids Solids	5%	5%	5%	Percent
Total solids of average mix	4,140	16,813	28,097	Tonnes
Solids of average mix	18%	18%	19%	Percent
Target solids to digester	20%	20%	20%	Percent
Liquids from dewatering press		2,700	5,400	Tonnes
Total mix to digester	33,000	92,836	148,166	Tonnes
Residual Waste, avg		6,300	12,600	Tonnes

Table 7

Mass Balance
Design and Operational Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

Digestion	Amount	Amount	Amount	Units
	Phase 0	**Phase 1**	**Phase 2**	
Total digester capacity	4332	11,202	18,072	m^3
Existing Digester (2,166 m^3) loading rate	45	50	48	m^3/day
Existing Digester (2,166 m^3) organic loading rate	3.5	3.3	3.3	kg VS/m^3d
New Digester (3,435 m^3) loading rate		79	76	m^3/day
New Digester (3,435 m^3) organic loading rate		3.3	3.3	kg VS/m^3d
Retention time	48	44	45	days
Inerts	10%	10%	10%	Percent
VS conversion	80%	80%	80%	Percent
Solids not converted	1,448	3,971	6,276	Tonnes
Digestate	25,773	65,700	115,763	Tonnes
Digestate Solids content	<3%	<3%	<3%	%

Table 7

Mass Balance
Design and Operational Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

Biogas Management	Amount	Amount	Amount	Units
	Phase 0	**Phase 1**	**Phase 2**	
Biogas Yield	123	106	104	m^3/Tonnes
Biogas Flow	462	1,210	1,883	m^3/hr
Utilized in CHP	462	500	500	m^3/hr
Biogas Flow for RNG		710	1,383	m^3/hr
Biogas Methane Content	60%	60%	60%	%
Methane Recovery		98.5%	98.5%	Percent
RNG Flow		420	817	m^3/hr
Uptime		95%	95%	Percent
Annual Flow		3,491,377	6,802,511	m^3/yr
HHV RNG		37.67	37.67	MJ/m^3
HHV		131,520	256,251	GJ/yr
Methane density at 38C, 14.5 psi		0.621	0.621	kg/m^3
Methane, assumed 100% RNG for simplicity		2,168,145	4,224,360	kg/yr
Methane moles per kg		62.3346	62.3346	moles/kg
Methane Mole (n)		135,150,408	263,323,677	moles/yr
Gas Constant, R		8.3144626	8.3144626	m^3*Pa/mol*K
Compressed pressure		3,600	3,600	psi
Compressed pressure		24,821,136	24,821,136	Pa
Temperature		311.15	311.15	K
V (Compressed)		14,086	27,446	m^3/yr

Table 8

Truck Traffic Estimate
Design and Operations Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

WEEKDAYS - Max Daily Truck Count [1]

Incoming	Volumes (tonnes/year)	Volumes (m3/year)	Transfer Trailer (small)	Transfer Trailer (large)	Collection Trucks	Walking Floor Trailers (small)	Tube Trailers (small)	Tube Trailers (large)	Tanker Trucks (medium)	Tanker Trucks (large)	Roll-Off Trucks (large)	Notes
SSO 1	80,353	123,620		4							8	Remaining SSO Divided equally amongst large transfer trailer, and large roll-off trucks
SSO 2 (local)	9,941	15,293			6							Maximum 12,000 tpy curbside collection
ICI Liquid	41,419	41,419							5	3		Total ICI Liquid divided equally between medium and large tankers
TOTAL	**131,713**		-	**4**	**6**	-			**5**	**3**	**8**	
Outgoing												
Total Residuals	18,324	22,905	2	1								Total residuals divided equally between small and large transfer trailers
RNG		25,349					1	1				Converted RNG volume assuming 100% methane at 14.5 psi and 38C to volume at 3600 psi 38C and divided equally amongst small and large tube trailers
Digestate	102,403	102,403								16		Total digestate concentrated to 8 months of the year and spread over longer daily operating hours
TOTAL	**120,726**		**2**	**1**	-	-	**1**	**1**	-	**16**	-	

Noise Source ID				
T1	**Daily total for Processing Area Trucks**	**18**	**per hour**	**1.50**
T2	**Daily total for Liquid Loading Trucks**	**8**	**per hour**	**0.67**
T3	**Daily total for Residuals Area Trucks**	**3**	**per hour**	**0.25**
T4	**Daily total for RNG Area Trucks**	**2**	**per hour**	**0.17**
T5	**Daily total for Digestate Trucks**	**16**	**per hour**	**1.00**
			TOTAL	**3.58**

SATURDAYS - Max Daily Truck Count [1]

Incoming	Volumes (tonnes)	Volumes (m3/year)	Transfer Trailer (small)	Transfer Trailer (large)	Collection Trucks	Walking Floor Trailers (small)	Tube Trailers (small)	Tube Trailers (large)	Tanker Trucks (medium)	Tanker Trucks (large)	Roll-Off Trucks (large)	Notes
SSO 1	16,647	25,611		4							8	Remaining SSO Divided equally amongst large transfer trailer, and large roll-off trucks
SSO 2 (local)	2,059	3,168			6							Maximum 12,000 tpy curbside collection
ICI Liquid	8,581	8,581							5	3		Total ICI Liquid divided equally between medium and large tankers
TOTAL	**27,287**		-	**4**	**6**	-			**5**	**3**	**8**	
Outgoing												
Total Residuals	3,796	4,745	2	1								Total residuals divided equally between small and large transfer trailers
RNG		5,252					1	1				Converted RNG volume assuming 100% methane at 14.5 psi and 38C to volume at 3600 psi 38C and divided equally amongst small and large tube trailers
Digestate	21,215	21,215								16		Total digestate concentrated to 8 months of the year and spread over longer daily operating hours
TOTAL	**25,011**		**2**	**1**	-	-	**1**	**1**	-	**16**	-	

Noise Source ID				
T1	**Daily total for Processing Area Trucks**	**18**	**per hour**	**1.50**
T2	**Daily total for Liquid Loading Trucks**	**8**	**per hour**	**0.67**
T3	**Daily total for Residuals Area Trucks**	**3**	**per hour**	**0.25**
T4	**Daily total for RNG Area Trucks**	**2**	**per hour**	**0.17**
T5	**Daily total for Digestate Trucks**	**16**	**per hour**	**1.00**
			TOTAL	**3.58**

Notes
1 - Calculations round up to nearest truck, providing a worst case scenario

Truck Traffic Estimate
Design and Operations Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

ASSUMPTIONS

Incoming		Daily hours	
Weekday (Hours)	60		12
Saturday (hours)	12		12
Outgoing			
Weekday (Hours)	60		12
Saturday (hours)	12		12
Digestate	16		16
Working weekdays/year	251		
Working Saturdays/year	52		
Working Digestate Weekdays/Year	168		
Working Digestate Saturdays/Year	35		

Waste Volumes

Incoming	Gross Volume	Net Volume	Residual Waste Volumes	Volume for Collection Trucks	Volume for Remaining Trucks
SSO	109,000	89,380	19,620	12,000	97,000
SSO/ICI Liquid	50,000	47,500	2,500		
Outgoing		-			
Residual SSO	19,620	19,620			
Residual ICI	2,500	2,500			
Total Residuals	22,120	22,120			
RNG (compressed)	30,601	30,601			
Digestate	123,618	123,618			

Truck Types	**Typical Truck Capacities**	**Assumed Truck Capacities (m^3)**	**Notes**
Transfer Trailers	13.6 - 22.6 tonnes (15-25 tons)	31	Small
	76 cubic metres (100 cubic yards)	76	Large - 76 m3 capacity
Collection Trucks	5-7 tonnes (6-7.5 tons)	11	
Walking Floor Trailers	10 -31 cubic metres (14-40 cubic yards)	31	Small - 31 m3 capacity
	25 tonnes	38	Large
Tanker Trucks (ICI Liquid)	5000 litres (1,320 gallons)	5	Small - 5000 L capacity
	20000 litres	20	Medium - 20000 L capacity
	1500-40,000 litres	40	capacity
Roll-Off Trucks	2-7 tonnes (2-8 tons)	9	Small
	15 - 31 cubic metres (20-40 cubic yard)	31	Large - 31 m3 capacity
Compressed Gas Tube Trailers	5,000 m3 in 20 ft trailer	5000	
	12,000 m3 in 40 ft trailer	12000	

Waste Density

Organic Waste (t/m3)	0.65
ICI Liquid (t/m3)	1
Residual Waste (t/m3)	0.8
Digestate	1

Table 9

Waste Storage Calculations
Design and Operations Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

Storage Area	Quantity (m^3)	Quantity (Tonnes)
Tip Floor	1,271	1,080
Existing Receiving Tank 1	493	493
Existing Receiving Tank 2	493	493
Existing Receiving Tank 3	493	493
Existing Digester 1	2,166	2,166
Existing Digester 2	2,166	2,166
New Digester 1	3,435	3,435
New Digester 2	3,435	3,435
New Digester 3	3,435	3,435
New Digester 4	3,435	3,435
Existing Digestate Storage Tank 1	4,029	4,029
Existing Digestate Storage Tank 2	4,029	4,029
New Digestate Storage Tank 3	8,000	8,000
New Digestate Storage Tank 4	8,000	8,000
Residual Waste Trailers	95	76
Existing Grit/Skimmings 1	5	4
Grit/Skimmings 2	9	7
Grit/Skimmings 3	9	7

Waste Processing Building Air Changes
Design and Operations Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

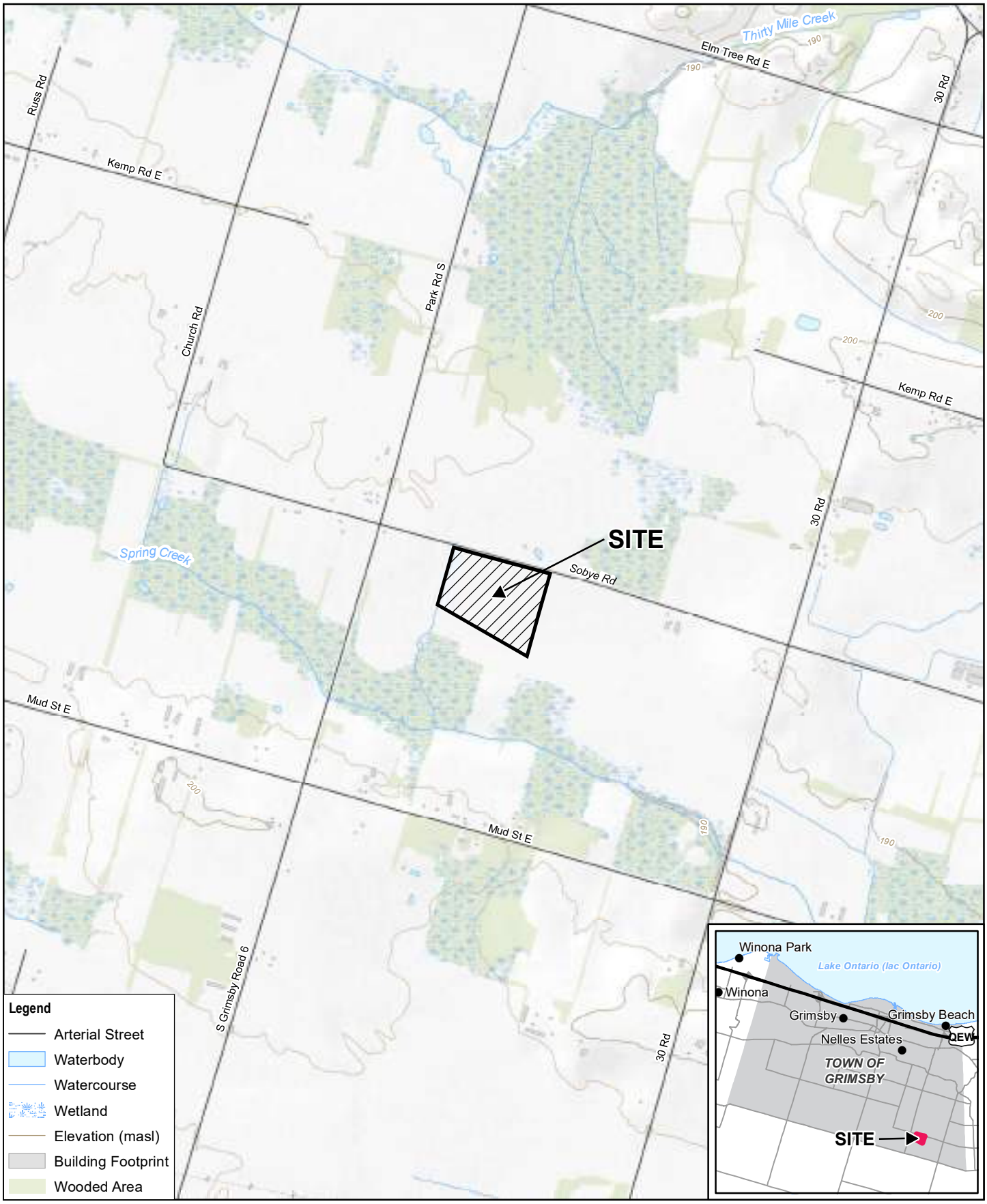
Room	Area (m^2)	Height (m)	Volume (m^3)	Target ACH	Total Air Extracted (m^3/hr)	Volume from Previous (m^3/hr)	Additional Air Intake Required (m^3/hr)
Shop/Storage	285	8	2,282	2	4,564	0	4,564
Processing and Residuals Area	977	8	7,816	5	39,082	4,564	34,518
Waste Receiving Area	1,119	14	15,661	5	78,306	39,082	39,224
Total							78,306

Table 11

Secondary Containment Calculations
Design and Operations Report
Escarpment Renewables, Grimsby Anaerobic Digestion Facility

Parameter	Amount		Units
Digesters			
Diameter	18		m
Height	13.5		m
Embedded depth	1.8		m
Area *[example - pi*R(18/2)^2]*	254		m^2
Volume *[example - Area (254)*Height (13.5-1.8)]*		2972	m^3
Number of units	4		
Total Volume *[example - Volume(3,435)*No.(4)]*	11,887		m^3
Digestate Storage			
Diameter	32		m
Height	10		m
Embedded depth	1.8		m
Area	804		m^2
Volume	6,593		m^3
Number of units	2		
Total Volume	13,186		m^3
Containment Volume Required			
[example - Digestate Storage volume + 10%(Digestate Storage volume+total digester volume)*	8441		m^3
Containment Height	2.5		m
Net Containment Area Required	3376		m^2
Area Provided (secondary containment+100-year storm)	4288		m^2
Containment Volume Provided	10,720		m^3

Figures



Paper Size ANSI B

0 200 400 600 800

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

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GHD

ESCARPMENT RENEWABLES
442 SOBYE ROAD, TOWN OF GRIMSBY, ONTARIO

Project No. **11226032**
Date **Jun 9, 2021**

SITE LOCATION MAP

FIGURE 1

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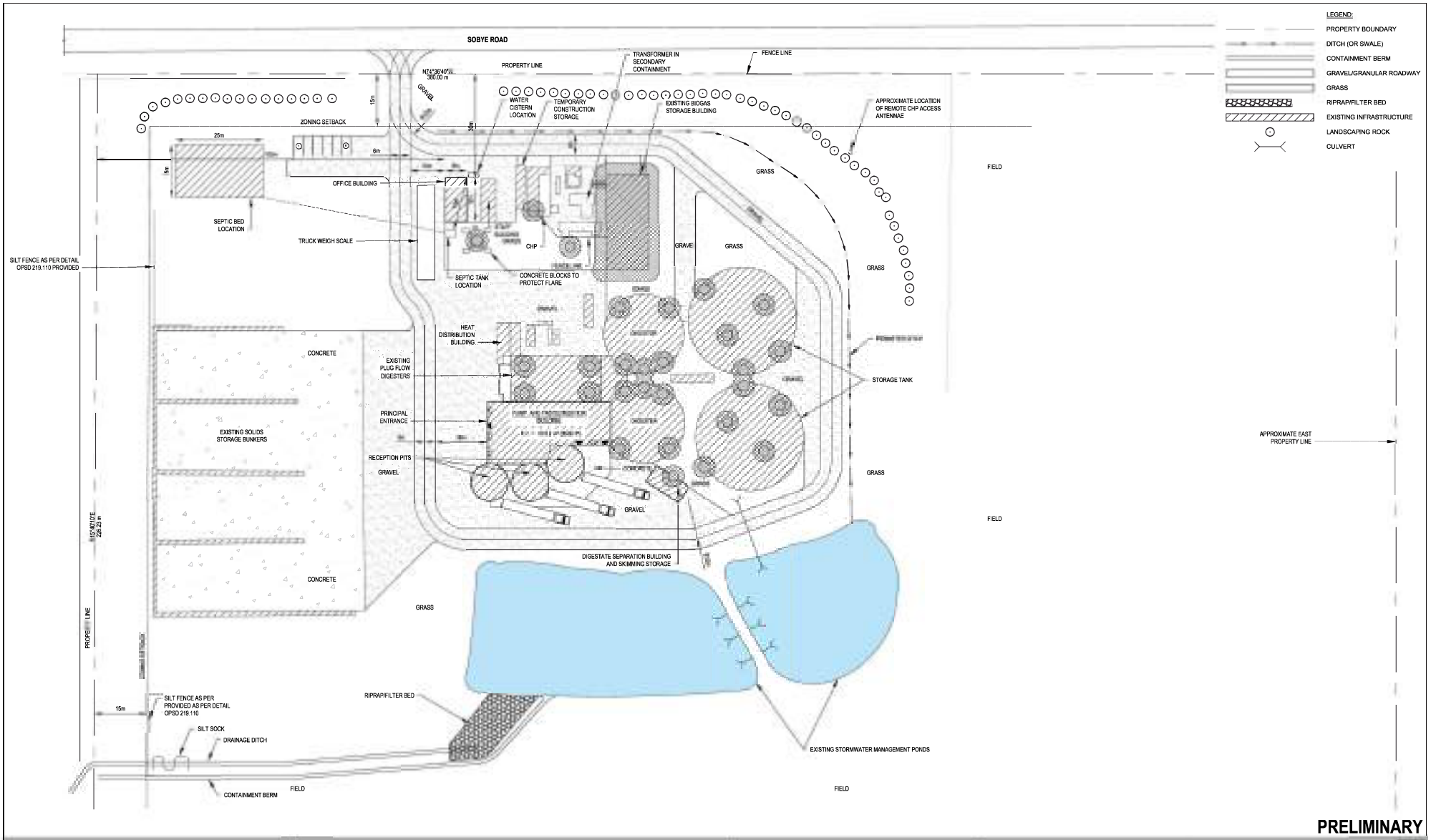
Print date: 09 Jun 2021 - 15:17



PRELIMINARY

No.	Issue	Checked	Approved	Date
				2022-01-17

Author: SPENCER H | Drafting Check: KALANDER D | Project Manager: JASON W
Designer: JASON W | Design Check: RYAN L | Project Director: VICTORIA S

0 5 10 15
1:500

Bar is 25mm on original size sheet
0 25mm

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Client: **ESCARPMENT RENEWABLES**

Project: **ESCARPMENT RENEWABLE ENERGY APPROVAL AMENDMENT**

Project No.: **11226032** | Date: **2022-01-17** | Scale: **1:500**

Title: **EXISTING CONDITIONS**

Size: ANSI D

FIGURE 2

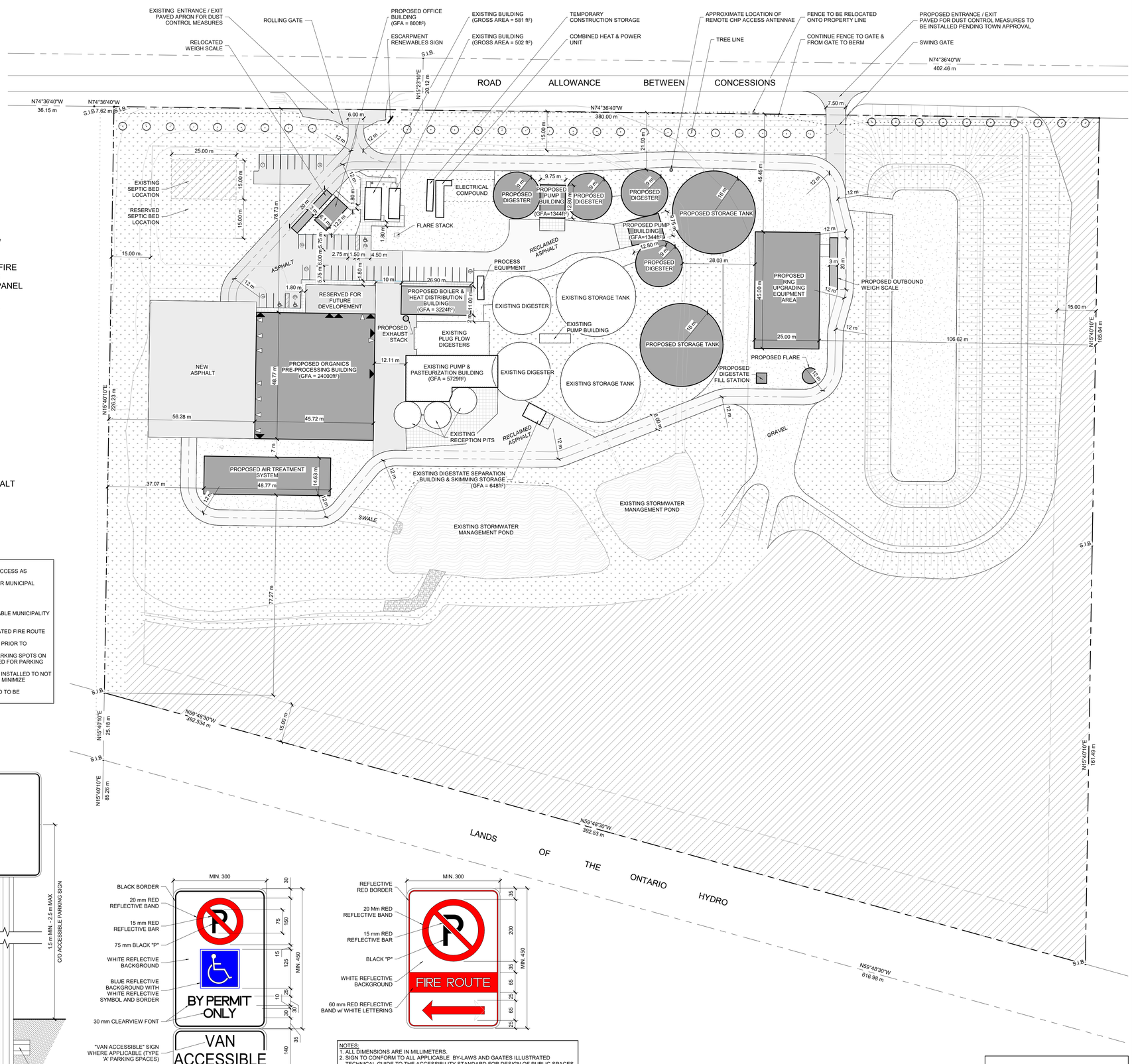
Plot Date: 21 January 2022 - 12:37 PM | Plotted By: Bhavish Mungroo

Path and Filename: \\ghdnet\ghd\CA\Waterloo\Projects\66\11226032\Digital_Design\ACAD\Figures\11226032-DD-WA0001-C01-REV 1-11-2022.dwg

KEY MAP N.T.S.

SITE LEGEND

- PARKING SPACE TAGS (25)
- BARRIER FREE PARKING SPACE (EX_25)
- TREE / PLANTING
- PROPERTY LINE
- ZONING SETBACKS
- GRAVEL
- EXISTING BUILDING
- PROPOSED BUILDING
- RIP-RAP
- SWM POND
- EXTERIOR DOOR / B.F. ENTRANCE (B.F.)
- UNOBSTRUCTED FIRE FIGHTER ACCESS DOOR/WINDOW/ PANEL
- OVERHEAD DOOR
- TRUCK ROUTE
- FENCE LINE
- SOD / GRASS
- CONCRETE
- ASPHALT
- RECLAIMED ASPHALT
- FARM FIELD



ZONING:
A - AGRICULTURAL ZONE *(REFER TO ZONING INFO TABLE FOR DETAILS)*

OFF-STREET PARKING: *(AS PER ZBL SECTION 5.1)*

EXISTING:

PUMP AND PAST. BUILDING	= 532m² x 1 SPACE / 90m²	= 6 SPACES
SEPARATION BUILDING	= 60m² x 1 SPACE / 90m²	= 1 SPACES
EXISTING BUILDINGS	= 101m² x 1 SPACE / 28m²	= 4 SPACES
TOTAL FOR EXISTING		= 11 SPACES

PROPOSED:

OFFICE	= 74m² x 1 SPACE / 28m²	= 3 SPACES
PRE-PROCESS BUILDING	= 2 230m² x 1 SPACE / 90m²	= 26 SPACES
BOILER & HEAT BUILDING	= 300m² x 1 SPACE / 90m²	= 4 SPACES
PUMP BUILDING x2	= 250m² x 1 SPACE / 90m²	= 3 SPACES
TOTAL PROPOSED REQUIRED		= 35 SPACES
TOTAL PROPOSED PROVIDED		= 46 SPACES

BARRIER FREE (AS PER ZBL SECTION 5.13):

TOTAL REQUIRED PARKING SPACES (1 PER 20 SPACES)	
(11 EXISTING + 36 PROPOSED) x 1 SPACE / 20 SPACES	= 3 SPACES
THEREFORE, REQ'D No. OF BARRIER FREE SPACES	= 3 SPACES
OVERALL TOTAL PROVIDED ON SITE - INCLUDING BARRIER FREE	= 46 SPACES

OFF-STREET LOADING SPACES:

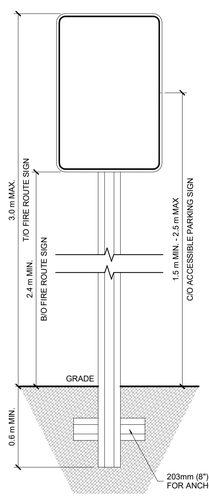
REQUIRED LOADING SPACES *(AS PER ZBL SECTION 5.15)*

GROSS FLOOR AREA *(2 351m² to 7 500m²)*	
TOTAL REQUIRED	= 2 SPACE
TOTAL PROPOSED:	= 2 SPACE

SITE PLAN NOTES:
1. FIRE ROUTE ACCESS REQUIRES FIRE PERSONNEL ACCESS AS REQUIRED BY OBC.
2. FIRE ROUTE TO BE POSTED AND DESIGNATED UNDER MUNICIPAL BYLAW DESIGN REQUIREMENTS AS FOLLOWS:
   - MIN. 6m WIDE
   - 12m CENTRE LINE TURNING RADIUS
   - MAX. 8% SLOPE
3. FIRE ROUTE SIGNS MUST BE STANDARD OF APPLICABLE MUNICIPALITY AND ARE TO BE PLACED AS FOLLOWS:
   - INTERVALS OF NOT LESS THAN 15.2m (50')
   - NOT MORE THAN 45.7m (150') ALONG THE DESIGNATED FIRE ROUTE
   - AT A HEIGHT OF NOT LESS THAN 1.8m (6')
4. ANY SITE FENCING TO BE CONFIRMED WITH OWNER PRIOR TO CONSTRUCTION.
5. STANDARD BUMP BLOCKS TO BE INSTALLED FOR PARKING SPOTS ON GRAVEL SURFACES. PAINTED LINES TO BE INSTALLED FOR PARKING SPOTS ON PAVED SURFACES.
6. YARD LIGHTING LOCATION AND ORIENTATION TO BE INSTALLED TO NOT INTERFERE WITH TRAFFIC ON COUNTY ROADS PLUS MINIMIZE INTERFERENCE ON NEIGHBORING PROPERTIES.
7. PROPERTY LINES ARE APPROXIMATE AND MAY NEED TO BE CONFIRMED BY AN OLS.

ZONING BY-LAW INFORMATION TABLE

	ZONING BY-LAW	EXISTING	PROPOSED
LOT AREA (MIN.)	400 000 m²	105 026 m²	105 026 m²
LOT FRONTAGE (MIN.)	183 m	380 m	380 m
FRONT YARD SETBACK	15 m	30 m	22.3 m
EAST SIDE YARD SETBACK	15 m	175.4 m	106.2 m
WEST SIDE YARD SETBACK	15 m	97.7 m	37.1 m
REAR YARD SETBACK	15 m	102 m	77.3 m
LOT DEPTH (MIN.)	NO PROVISIONS	226.3 m	226.3 m
BUILDING FLOOR AREA	NO PROVISIONS	N/A	3 546 m²
GROSS FLOOR AREA	NO PROVISIONS	N/A	3 546 m²
LOT COVERAGE (ALL BLDGs)	20% (MAX.)	N/A	3.4%
LOT COVERAGE (ACCESSORY)	NO PROVISIONS	0%	7.1%
BUILDING HEIGHT (MAX.)	NO PROVISIONS	N/A	14 m
NUMBER OF PARKING SPACES	44	8	47
BARRIER FREE SPACES	3	0	3
NUMBER OF LOADING SPACES	1	3	4
LANDSCAPED AREA	NO PROVISIONS	N/A	74 396 m²
GRANULAR AREA	NO PROVISIONS	N/A	8 336 m²
PAVED AREA	NO PROVISIONS	N/A	11 271 m²



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. SIGN TO CONFORM TO ALL APPLICABLE BY-LAWS AND GAATES ILLUSTRATED TECHNICAL GUIDE TO THE ACCESSIBILITY STANDARD FOR DESIGN OF PUBLIC SPACES. EXACT SIZE TO BE CONFIRMED BY GC / SUPPLIER.
3. OPTIONAL MOUNTING ON BUILDING OR POLE.

BRANDON WARTMAN, TOWN OF GRIMSBY

NOTES:

PLEASE READ NOTE PAGE AT BEGINNING OF DRAWING SET FOR ALL NOTES REGARDING THIS PROJECT

NO.	DATE:	DESCRIPTION:

NOTES:
1. OWNER: ESCARPMENT RENEWABLES
2. LEGAL DESCRIPTION:
   PART OF LOT 1
   CONCESSION 6
   GEOGRAPHIC TOWNSHIP OF GRIMSBY
   TOWN OF GRIMSBY
   COUNTY OF LINCOLN
3. SITE GRADING, SERVICING AND EROSION & SEDIMENT CONTROL PLAN PROVIDED BY GRIT ENGINEERING INC. REFER TO PROJECT No. GE22-0178-1 DRAWING No. C300 & C500

PROJECT NORTH / TRUE NORTH

PROFESSIONAL ENGINEER'S SEAL

STONECREST ENGINEERING INC. EST. 1995
440 Wright Blvd Unit #2, Stratford, ON, N4Z 1H3
519-625-8025 -- info@stonecrestengineering.com

CONTRACTOR TO CHECK ALL DIMENSIONS AND ELEVATIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK

DO NOT SCALE THE DRAWINGS

CLIENT: ESCARPMENT RENEWABLES

LOCATION: 424 SOBYE ROAD, BEAMSVILLE, ON

PROJECT NAME: PRE-PROCESS BUILDING

PROJECT STATUS AND VERSION: CONCEPT DRAWINGS

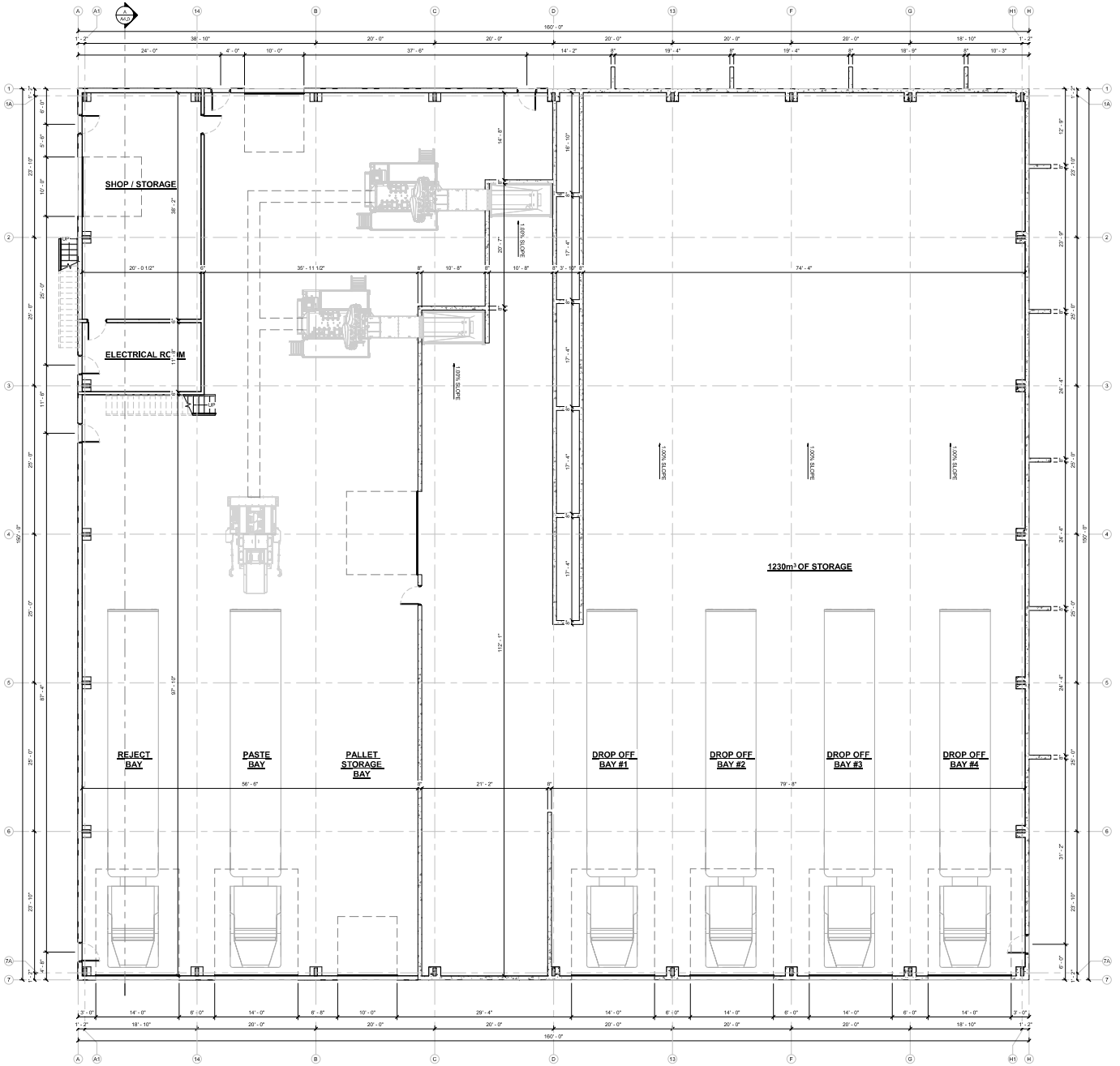
DESIGNED BY:	PRINT DATE:
T.L. / M.W.	2024.02.01

PAGE DESCRIPTION: SITE LAYOUT

SCALE: AS NOTED

FILE: 8016-1

PAGE NUMBER: A1.1



1 MAIN FLOOR PLAN
A2.0 SCALE: 1/8" = 1'-0"

NOTES:
PLEASE READ NOTE PAGE AT BEGINNING OF DRAWING SET FOR ALL NOTES REGARDING THIS PROJECT

NO.	DATE	DESCRIPTION
1	10/2022	ISSUED FOR CLIENT REVIEW

LEGEND:
- SPOT ELEVATION
- D01 DOOR IDENTIFICATION TAG
- W1 WALL IDENTIFICATION TAG
- WN1 WINDOW IDENTIFICATION TAG
- C1 PIER / COLUMN IDENTIFICATION TAG
- F1 FOOTING / LINTEL IDENTIFICATION TAG
- FIRE SEPARATION RATED WALL (FS)
- FIRE RESISTANCE RATED WALL (FRR)

PROJECT NORTH | TRUE NORTH

DRAFT - NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER'S SEAL

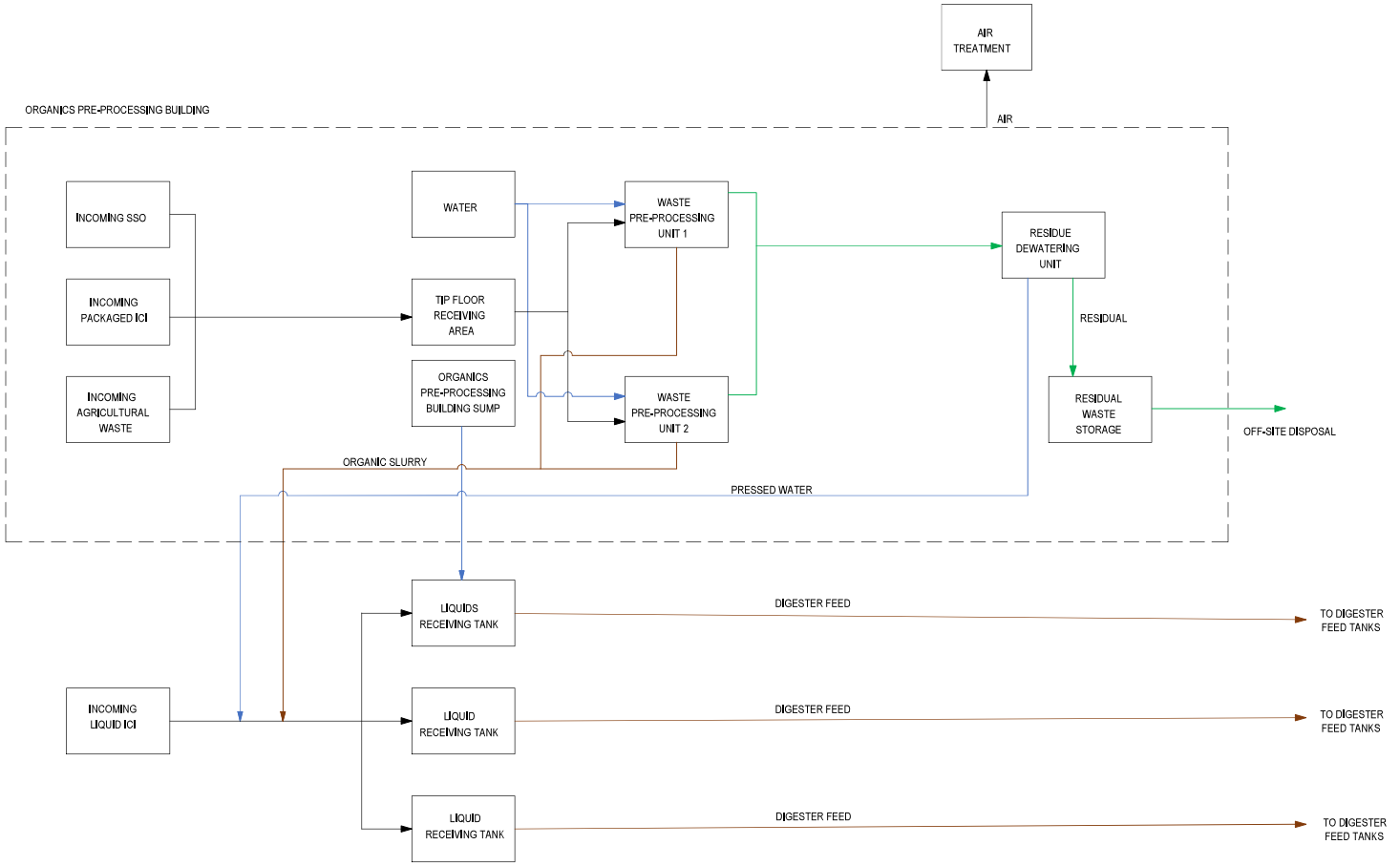
SHAKESPEARE, ONTARIO, CANADA
PH: (519)-625-8025
FX: (519)-625-8966

CONTRACTOR TO CHECK ALL DIMENSIONS AND ELEVATIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

DO NOT SCALE THE DRAWINGS

CLIENT: MILLAR WASTE SYSTEMS
LOCATION: 424 SOBIE ROAD, BEAMSVILLE, ON
PROJECT TYPE: PRE-PROCESSING BUILDING
PROJECT STATUS AND VERSION: PRELIMINARY DRAWINGS

DRAWN BY: TRAVIS L.
PRINT DATE: 2022-
PAGE DESCRIPTION: FLOOR PLAN
SCALE: AS NOTED
FILE: _2016 - PRE-PROCESS - 1
PAGE NUMBER: A2.0



PRELIMINARY

No.	Issue	Checked	Approved	Date
				2023-12-04

Author SPENCER H | Drafting Check KALJINDER D | Project Manager JASON W
Designer JASON W | Design Check RYAN L | Project Director VICTORIA S

Bar is 25mm on original size sheet
0 25mm

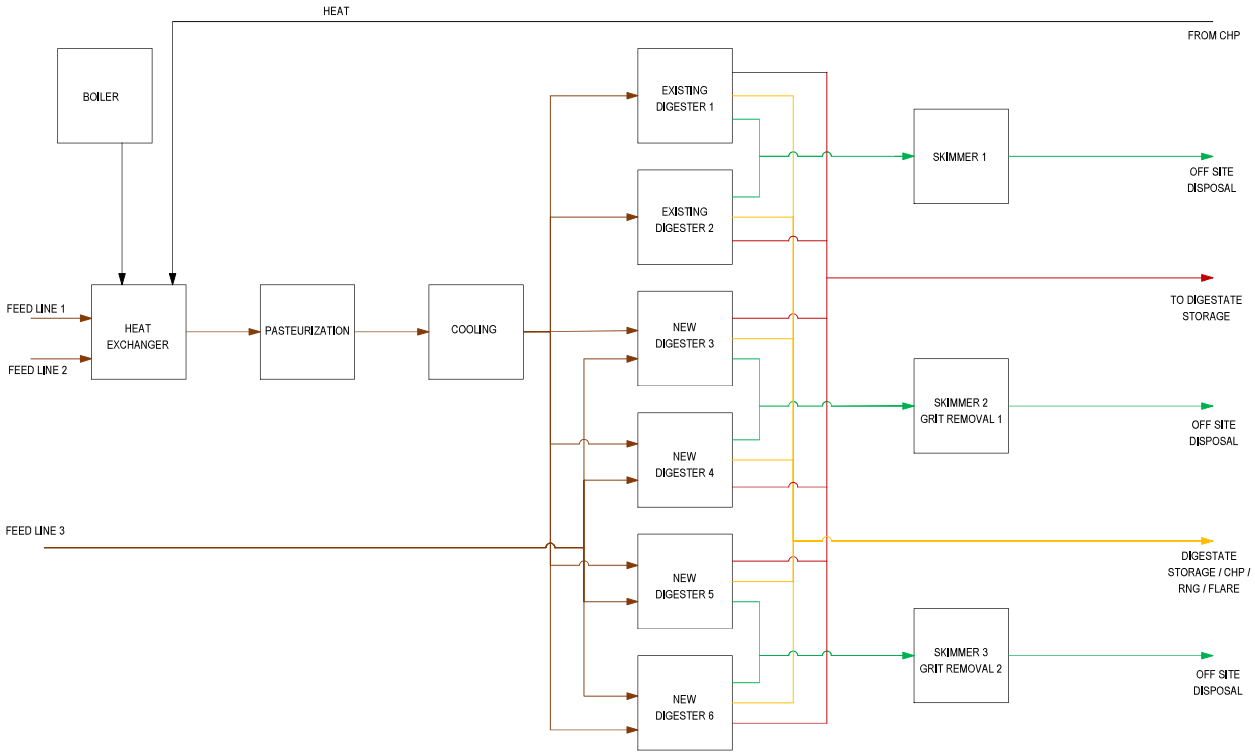
GHD
www.ghd.com

Client ESCARPMENT RENEWABLES
Project ESCARPMENT RENEWABLE ENERGY APPROVAL AMENDMENT
Project No. 11226032 | Date 2023-12-04 | Scale N.T.S.

Title
PROCESS FLOW DIAGRAM WASTE RECEIVING AND PROCESSING ESCARPMENT RENEWABLES

Size ANSI D
Sheet No. FIGURE 5

Plot Date: 4 December 2023 - 4:29 PM | Plotted By: Kamal Aguby | Path and Filename: N:\CA\Waterloo\Projects\60\21122603\2Digital_Design\ACAD\Figures\11226032-SD-WA0001-C03.dwg



PRELIMINARY

No.	Issue	Checked	Approved	Date
				2023-12-04

Author SPENCER H | Drafting Check KALJINDER D | Project Manager JASON W
Designer JASON W | Design Check RYAN L | Project Director VICTORIA S

Bar is 25mm on original size sheet
0 25mm

GHD
www.ghd.com

Client: ESCARPMENT RENEWABLES

Project: ESCARPMENT RENEWABLE ENERGY APPROVAL AMENDMENT

Project No.: 11226032 | Date: 2023-12-04 | Scale: N.T.S.

Title: PROCESS FLOW DIAGRAM DIGESTION ESCARPMENT RENEWABLES

Size: ANSI D

Sheet No.: FIGURE 6

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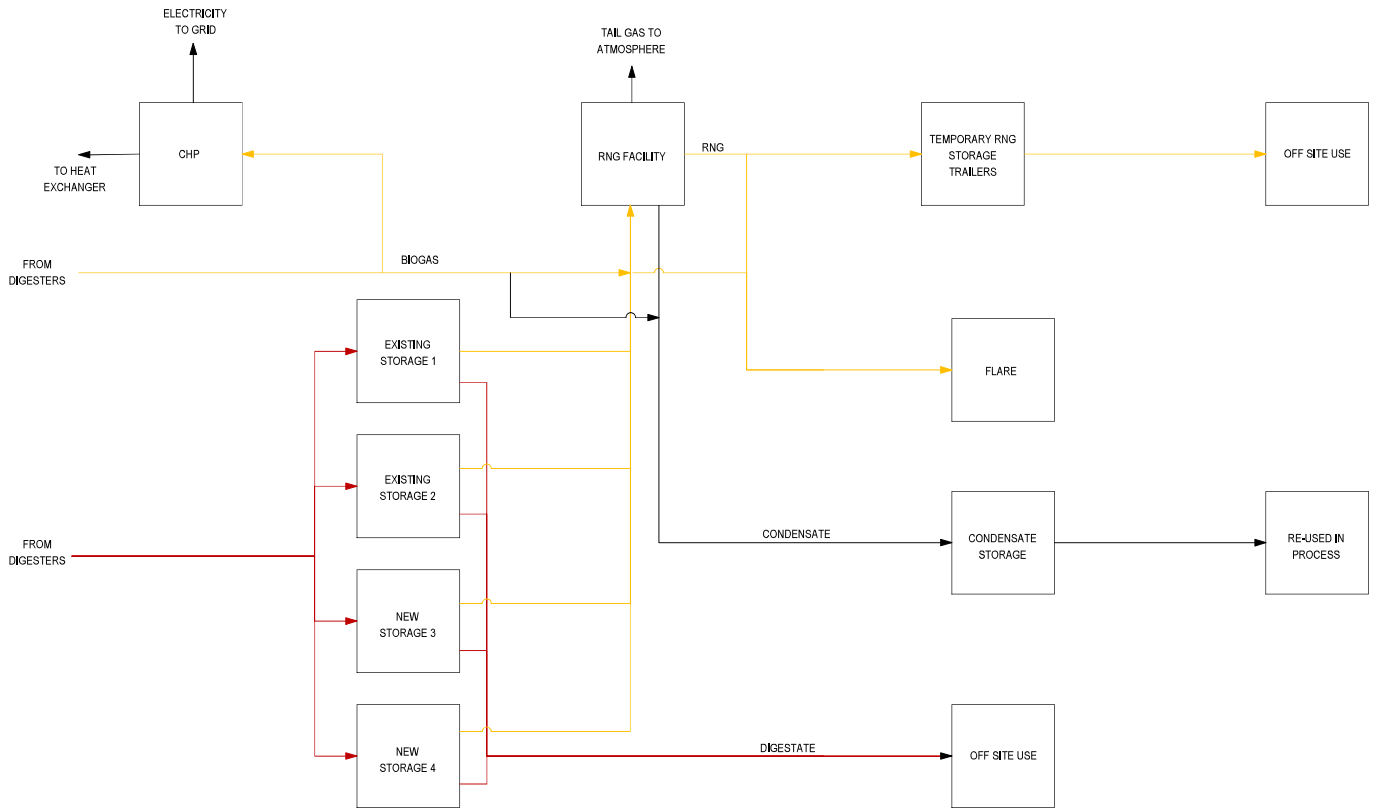

PRELIMINARY

No.	Issue	Checked	Approved	Date
				2023-12-04

Author SPENCER H | Drafting Check KALJINDER D | Project Manager JASON W
Designer JASON W | Design Check RYAN L | Project Director VICTORIA S

Bar is 25mm on original size sheet
0 25mm

GHD
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Client ESCARPMENT RENEWABLES

Project ESCARPMENT RENEWABLE ENERGY APPROVAL AMENDMENT

Project No. 11226032 | Date 2023-12-04 | Scale N.T.S.

Title PROCESS FLOW DIAGRAM
DIGESTATE AND BIOGAS
MANAGEMENT
ESCARPMENT RENEWABLES

Size ANSI D

Sheet No. FIGURE 7

Plot Date: 4 December 2023 - 5:01 PM | Plotted By: Kamal Ajeby
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Appendices

Appendix A

Emissions Summary and Dispersion Modelling Report

Emission Summary and Dispersion Modelling Report

424 Sobye Road, Grimsby, Ontario

Escarpment Renewables

July 29, 2024

GHD
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Waterloo, Ontario N2L 3X2, Canada
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Last saved date	July 26, 2024
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Author	Punith Nallathamby
Project manager	Jason Wilson
Client name	Escarpment Renewables
Project name	Escarpment Renewables
Document title	Emission Summary and Dispersion Modelling Report | 424 Sobye Road, Grimsby, Ontario
Revision version	Rev 02
Project number	11226032-RPT-4-Rev1

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	00	Punith Nallathamby	Matthew Griffin		Victoria Shortreed		Jan.26/22
S4	01	Punith Nallathamby	Matthew Griffin		Victoria Shortreed		July29, 2024

Version Control

Revision	Date	Revised Description	Reviewer Initials
	October 1, 2014	Original Renewable Energy Approval (REA) Application – REA No. 8541-9HSGG3	
	October 31, 2018	Amendment to REA No. 8541-9HSGG3	
	July 26, 2019	Amendment to REA No. 8541-9HSGG3	
1.0	November 2021	ESDM update for REA Application for Facility updates	MG

Executive summary

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared to support an application for an Amendment for Renewable Energy Approval (REA) (Air & Noise) No. 8541-9HSGG3. The ESDM Report was prepared in accordance with s.26 of Ontario Regulation (O. Reg.) 419/05 to support the REA amendment application. In addition, guidance in the ministry publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) was followed, as appropriate.

Escarpment Renewables operates an anaerobic digester to produce renewable energy from digester biogas on their property, located at 424 Sobye Road in Grimsby, Ontario (Facility). The Facility is in an area zoned ‘Agricultural’.

This application and supporting documentation were prepared in accordance with all applicable regulatory and Ministry requirements that were in effect at the time of application.

The primary North American Industrial Classification System (NAICS) Code that applies to the Facility is 562210 – "Waste Treatment and Disposal". Compliance has been assessed using the AERMOD dispersion model and the standards listed in Schedule 3 of O. Reg. 419/05, in the document entitled "Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants”, version 2.0, dated April 2018 (ACB List).

The Facility is expected to emit odour, volatile organic compounds (VOCs) and products of combustion. Some of the sources and contaminants were considered negligible in accordance with s.8 of O. Reg. 419/05.

The maximum point of impingement (POI) concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s. 11 of O. Reg. 419/05 and the data quality assessment follows the process outlined in the requirements of the ESDM Procedure Document.

A POI concentration for each significant contaminant emitted from the Facility was calculated based on the calculated emission rates and the output from the approved dispersion model; the results are present in the following Emission Summary Table in accordance with s.26 of O. Reg. 419/05.

The POI concentrations listed in the Emission Summary Tables were compared against criteria in the ACB List. All of the predicted POI concentrations for contaminants listed in the Emission Summary Table that are included in the ACB List, are below the corresponding limits.

Contents

Figure index

Table index

Appendices

1. Introduction and Facility Description

This section provides a description of the facility as required by sub paragraph 1 of s.26 (1) of Ontario Regulation 419/05 (O. Reg. 419/05). Escarpment Renewables operates an anaerobic digester (AD) facility at 424 Sobye Road in Grimsby, Ontario (Facility). The location of the Facility is presented on Figure 1 and the land use designation of the site and surrounding area is presented on Figure 2. The property line along with the location of the discharges from each of the sources is presented on Figure 3. The location of each of the sources is specified with the source reference number.

The primary North American Industrial Classification System (NAICS) that applies to the Facility is 562210 – "Waste Treatment and Disposal". This NAICS Code is listed in Schedule 5 of O. Reg. 419/05. The assessment of compliance was performed using the AERMOD dispersion model and the standards listed in Schedule 3 of O. Reg. 419/05, in the document entitled "Air Contaminants Benchmarks (ACB) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants", version 2.0, dated April 2018 (ACB List).

1.1 Purpose and Scope of ESDM Report

The ESDM report was prepared in accordance with s.26 of O. Reg. 419/05 and guidance in the Ontario Ministry of the Environment, Conservation and Parks (MECP) publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) PIBS 3614e04.1.

This ESDM Report has been prepared as part of an Amendment Application for a Renewable Energy Approval (REA) (Air & Noise). The Facility currently operates under REA (Air & Noise) No. 8541-9HSGG3 that was originally dated February 16, 2012 and was most recently amended April 22, 2020. The current REA is provided in Appendix A. The Facility is planning an expansion and has prepared an up-to-date ESDM, incorporating all proposed modifications to be made to the Facility.

For ease of review and to promote clarity, this ESDM Report is structured to correspond to each of the items listed in the Ministry publication "Emission Summary and Dispersion Modelling Check-List", March 2017, PIBS 5357E.

1.2 Description of Processes and NAICS Codes

Escarpment Renewables operates a renewable energy generation facility with an anaerobic biodigester. The raw materials include solid and liquid wastes that are brought to the facility for the anaerobic digesting process. The digestates are then shipped off site for beneficial use while the biogas is used to generate electricity, renewable natural gas (RNG) or combusted.

The NAICS Code that applies to this Facility is 562210 – "Waste Treatment and Disposal".

1.3 Description of Products and Raw Materials

The processes at the Facility include material receiving, heating, digesting, electricity and RNG generation and waste disposal.

Product usages and process information are provided in greater detail in Appendix B – Supporting Calculations. Refer to Table 1 - Sources and Contaminants Identification Table, which tabulates the individual sources of emissions at the Facility.

1.4 Process Flow Diagram

Refer to Figure 4A, Figure 4B, and Figure 4C – Process Flow Diagram for a graphical representation of the manufacturing processes at the Facility.

1.5 Operating Schedule

The Facility can operate up to 24 hours per day, 365 days per year.

1.6 Feedstock and Site Changes

A summary of the changes to:

– Feedstock waste types and quantities can be found in Section 2.2 of the Design & Operation (D&O) Report. In summary Escarpment Renewables is currently approved to process a maximum of 23,000 tonnes of biomass per year which will be increased to 159,000 tonnes per year and include the following waste types and maximum tonnages:
  - Agricultural waste (up to 7,000 tonnes per year)
  - Source-Separated Organics (SSO) (up to 120,000 tonnes per year)
  - Industrial, Commercial, and Institutional (ICI) packaged waste (up to 100,000 tonnes per year)
  - ICI Liquid waste (up to 100,000 tonnes per year)
  - Combined maximum 159,000 tonnes per year

The annual composition of waste received may consist of any combination of the above waste types up to the maximum tonnes indicated and not exceeding a combined maximum of 159,000 tonnes per year.

– Changes to the Site (equipment, process and layout) can be found in Section 2 of the D&O Report. In summary these will include:
  - Increased digester capacity
  - Expanded Site footprint
  - Operating Hours
  - Waste Storage Improvements
  - New organics pre-processing building
  - New air treatment
  - New digestate/biogas storage tanks
  - New RNG Upgrading System
  - New Flare

2. Initial Identification of Sources and Contaminants

This section provides an initial identification of all of the sources and contaminants emitted at the Facility, as required by subparagraphs 2 to 4 of s.26 (1) of O. Reg. 419/05.

There may be general ventilation from the Facility that only discharges uncontaminated air from the workspaces or air from the workspace that may include contaminants that come from commercial office supplies, building maintenance

products or supplies and activities; these types of ventilation sources are considered to be negligible and were not identified as sources at the Facility.

General ventilation located in the process area that does not vent process emissions is also considered negligible.

2.1 Sources and Contaminants Identification Table

Table 1 – Sources and Contaminants Identification Table tabulates all the emission sources at the Facility. Table 1 provides the information required for sub paragraphs 2 to 4 of s.26 (1) of O. Reg. 419/05.

The expected contaminants emitted from each source are also identified in Table 1. Each of the identified sources has been assigned a source reference number.

The site plan, including the property line is presented along with the location of the discharges from each of the sources is presented on Figure 3. The location of each of the sources is specified with the source reference number.

3. Assessment of Significance of Sources and Contaminants

This section provides an explanation for each source and contaminant identified as negligible in Table 1, as required by subparagraph 5 of s.26(1) of O. Reg. 419/05.

In Accordance with s.8 of O. Reg. 419/05, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

3.1 Identification of Negligible Contaminants and Sources

Each negligible source is identified in Table 1 – Sources and Contaminants Identification Table. The remaining sources are significant. These sources will be included in the dispersion modelling for the Facility.

3.2 Rationale for Assessment

For each source in Table 1 that has been identified as being negligible there is an accompanying documented rationale. The technical information required to substantiate the argument that each of the identified sources is negligible is presented in Appendix C – Supporting Information for Assessment of Negligibility.

4. Operating Conditions, Emissions Estimating and Data Quality

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the facility as required by sub paragraphs 6 and 7 of s.26 (1) of O. Reg. 419/05. In accordance with s.8 of O. Reg. 419/05, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

4.1 Description of Operating Conditions

Section 10 of O. Reg. 419/05 states that an acceptable operating condition is a scenario that assumes operating conditions for the Facility that would result, for the relevant contaminant, in the highest concentration of the contaminant at POI that the Facility is capable of, the operating condition described in this ESDM Report meets this requirement.

The operating conditions that would result in the highest concentration of the contaminants were used for this assessment. The individual maximum rates of production for each significant source of emissions are explicitly described in Appendix B.

4.2 Explanation of the Methods Used to Calculate Emission Rates

The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with requirements of the ESDM Procedure Document.

The emission rate for each significant contaminant emitted from a significant source was estimated and the methodology for the calculation is documented in Table 2A and Table 2B.

4.3 Sample Calculations

The technical rationale, including sample calculations, required to substantiate the emission rates presented in Table 2A and Table 2B is documented in Appendix B.

4.4 Assessment of Data Quality

This section provides a description of the assessment of the data quality of the emission estimates for each significant contaminant from the facility.

The assessment of the data quality of the emission rate estimates for each significant contaminant emitted from the significant sources was performed in accordance with the requirements of subparagraph 7iii of s.26 (1) of O. Reg. 419/05.

For each contaminant, the emission rate was estimated and the data quality of the estimate is documented in Table 2A and Table 2B. The assessment of data quality for each source listed in Table 2A and Table 2B is documented in Appendix B.

All the emission rates listed in Table 2A and Table 2B correspond to the operating scenario where all significant sources are operating simultaneously at their individual maximum rates of production. Therefore, emission rate estimates listed in Table 2A and Table 2B are not likely to be an underestimate of the actual emission rates and use of these emission rates will result in a calculated concentration at POI greater than the actual concentrations.

5. Source Summary Table and Site Plan

This section provides the table required by subparagraph 8 and the site plan required by subparagraph 9 of s.26 (1) of O. Reg. 419/05.

5.1 Source Summary Table

For each source of significant contaminants, the following parameters are referenced:

– Contaminant
– Chemical Abstract Society (CAS) reference number
– Source reference number
– Source description
– Stack parameters (flow rate, exhaust temperature, diameter, height above grade, height above roof)
– Location referenced to a Universal Transverse Mercator (UTM) coordinate system presented in Figure 3A
– Maximum emission rate
– Averaging period
– Emission estimating technique
– Estimation data quality
– Percentage of overall emission

5.2 Site Plan

The locations of the emission sources listed in Table 2A and Table 2B are presented on Figure 3; the location of each of the sources is specified with the source reference number. The location of the property-line is indicated on Figure 3, with the end points of each section of the property-line clearly referenced in a Cartesian coordinate system. The location of each source is referenced to this coordinate system under a column in Table 2A and Table 2B.

The heights of the structures that are part of the Facility are labeled on Figure 3.

6. Dispersion Modelling

This section provides a description of how the dispersion modelling was conducted at the Facility to calculate the maximum concentration at a POI.

The dispersion modelling was conducted in accordance with the ministry publication "Air Dispersion Modelling Guideline for Ontario" PIBS 5165e03 (ADMGO). A general description of the input data used in the dispersion model is provided below and summarized in Table 3.

The Schedule 3 standards have been applied to Escarpment Renewables in this ESDM for the February 1, 2020 implementation date.

The emission rates used in the dispersion model meet the requirements of Section 11(1) 1 of O. Reg. 419/05, which requires that the emission rate used in the dispersion model is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant. These emission rates are further described in Appendix B.

The AERMOD modelling system has been identified by the MECP as one of the approved dispersion models under O. Reg. 419/05, and currently includes the Plume Rise Model Enhancements (PRIME) algorithms for assessing the effects of buildings on air dispersion.

The AERMOD modelling system is made up of the AERMOD dispersion model, the AERMET meteorological pre-processor and the AERMAP terrain pre-processor. The following approved dispersion model and pre-processors were used in the assessment:

– AERMOD dispersion model (v. 19191)

– AERMAP surface pre-processor (v. 18081)
– BPIP building downwash pre-processor (v. 04274)

A summary of the AERMOD source input parameters is provided in Appendix D.

AERMET was not used in this assessment, as a pre-processed MECP meteorological dataset was used.

The emission rates used in the dispersion model meet the requirements of Section 11(1) 1 of O. Reg. 419/05, which requires that the emission rate used in the dispersion model is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant. These emission rates are further described in Appendix B.

There is no childcare facility, health care facility, senior's residence, long-term care facility, or an education facility located at the Facility. Furthermore, the nearest POI is located greater than 5 metres (m) from the building on which the point of emissions are located. As such, same structure contamination was not considered.

6.1 Co-ordinate System

The UTM coordinate system, as per Section 5.2.2 of the ADMGO, was used to specify model object sources, buildings and receptors. All coordinates were defined in the North American Datum of 1983 (NAD83).

All sources, building, and the property line coordinates are provided on Figure 3.

6.2 Meteorology and Land Use Zoning Plan

Subparagraph 10 of s.26 (1) of O. Reg. 419/05 requires a description of the local land use conditions if meteorological data described in paragraph 2 of s.13 (1) of O. Reg. 419/05 was used. Site specific meteorological data was obtained from the MECP.

A land use zoning plan is provided on Figure 2. Figure 2 also illustrates the extents of the Facility property boundary and provides the zoning of adjacent land uses. The Facility is located in an area zoned 'Agricultural'. The land use surrounding the Facility is zoned ‘Agricultural’ as well.

6.3 Terrain

AERMOD captures the essential physics of dispersion in complex terrain though the use of a separate height scale factor for each receptor (United States Environmental Protection Agency [USEPA], 1998 – AERMAP UG). The highest scale factor represents the terrain that would dominate flow in the vicinity of the receptor.

The height scale factor that is used by AERMOD is generated by the AERMAP terrain pre-processor. AERMAP utilizes terrain data, or Digital Elevation Model (DEM) data in conjunction with a layout of receptors and sources to height scale factors that can be directly used in AERMOD. Terrain data used in this assessment was obtained from MECP (7.5-minute format).

6.4 Receptors

Receptors were chosen based on recommendations provided in Section 7.1 of the ADMGO, which is in accordance with s.14 of O. Reg. 419/05. A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

– 20-m spacing within 200 m of the edge of the bounding box
– 50-m spacing from 200 to 500 m
– 100-m spacing from 500 to 1,000 m

– 200-m spacing from 1,000 to 2,000 m
– 500-m spacing from 2,000 to 5,000 m

A property line ground level receptor grid with 10-m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Facility's property line.

6.5 Building Downwash

The Facility buildings were entered into the model using the USEPA Building Profile Input Program (BPIP-PRIME). The inputs into this pre-processor include the co-ordinates and heights of the buildings and stacks. The BPIP program was executed to evaluate any building cavity downwash effects. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions. The on-site buildings and structures were modelled with their respective average roof heights.

The PRIME plume rise algorithms include vertical wind shear calculations (important for buoyant releases from short stacks (i.e., stacks at release heights within the recirculation zones of the buildings). The PRIME algorithm also allows for the wind speed deficit factors to improve the accuracy of predicted concentrations within building wake zones that form in the lee of buildings. The BPIP input file is provided in Appendix D.

6.6 Deposition

AERMOD has the ability to account for wet and dry deposition of substances that would reduce ground level concentrations at POIs. However, the deposition algorithm has not been implemented in this assessment and therefore, the predicted POI concentrations are considered to be more conservative.

6.7 Averaging Time and Conversions

The shortest time scale that AERMOD predicts is a 1-hour average value. Schedule 3 standards were used to assess compliance at this Facility. Many of these standards are based on 1-hour and 24-hour averaging times, which are averaging times that are easily provided by AERMOD. In cases where a standard has an averaging period less than 1 hour (e.g., 10-minute), a conversion to the appropriate averaging period was completed using the MECP recommended conversion factors, as documented in the ADMGO.

6.8 Dispersion Modelling Options

The options used in the AERMOD dispersion model are summarized in the table below.

Modelling Parameter	Description	Used in the Assessment?
DFAULT	Specifies that regulatory default options will be used	Yes
ADJ_U*	Specifies that AERMET is pre-processed to adjust friction velocity for low wind speed conditions	Yes
CONC	Specifies that concentration values will be calculated	Yes
DDPLETE	Specifies that dry deposition will be calculated	No
WDPLETE	Specifies that wet deposition will be calculated	No
FLAT	Specifies that the non-default option of assuming flat terrain will be used	No, the model will use elevated terrain as detailed in the AERMAP output
NOSTD	Specifies that the non-default option of no stack-tip downwash will be used	No

Modelling Parameter	Description	Used in the Assessment?
AVERTIME	Time averaging periods calculated	1-hour, 24-hour, Annual
URBANOPT	Allows model to incorporate the effects of increased surface heating from an urban area on pollutant dispersion under stable atmospheric conditions	No
FLAGPOLE	Specifies that receptor heights above local ground level are allowed on the receptors	No

6.9 Dispersion Modelling Input and Output Files

The information input into the approved dispersion model is recorded in Appendix D. Appendix D also includes the input and output files from the AERMOD model in electronic form.

Table 3 provides a detailed description of the source input parameters.

7. Emission Summary Table and Conclusions

This section provides the table required by subparagraph 14 of s.26 (1) of O. Reg. 419/05 and provides an interpretation of the results as required by the ESDM Procedure Report.

7.1 Emission Summary Table

A POI concentration for each significant contaminant emitted from the Facility was calculated based on the emission rates listed in Table 2A and Table 2B and the output from the approved dispersion model presented in Appendix D. The results are presented in Table 4. This table follows the format provided in the ESDM Procedure Document. For each source of significant contaminants, the following parameters are referenced:

– Contaminant name
– CAS number
– Total facility emission rate
– Approved dispersion model used
– Maximum POI concentration
– Averaging period for the dispersion modelling
– MECP POI limit
– Indication of limiting effect
– Schedule in O. Reg. 419/05
– The percentage of standard

The POI concentrations listed in Table 4 were compared against Schedule 3 criteria in the ACB List.

7.2 Conclusions

This ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. In addition, guidance in the ESDM Procedure Document was followed as appropriate.

The emission rate estimates for each source of significant contaminants are documented in Table 2A and Table 2B. All the emission rates listed in Table 2A and Table 2B correspond to the operating scenario where all significant

sources are operating simultaneously at their individual maximum rates of production. Therefore, these emission rate estimates listed in Table 2A and Table 2B are not likely to be an underestimate of the actual emission rates.

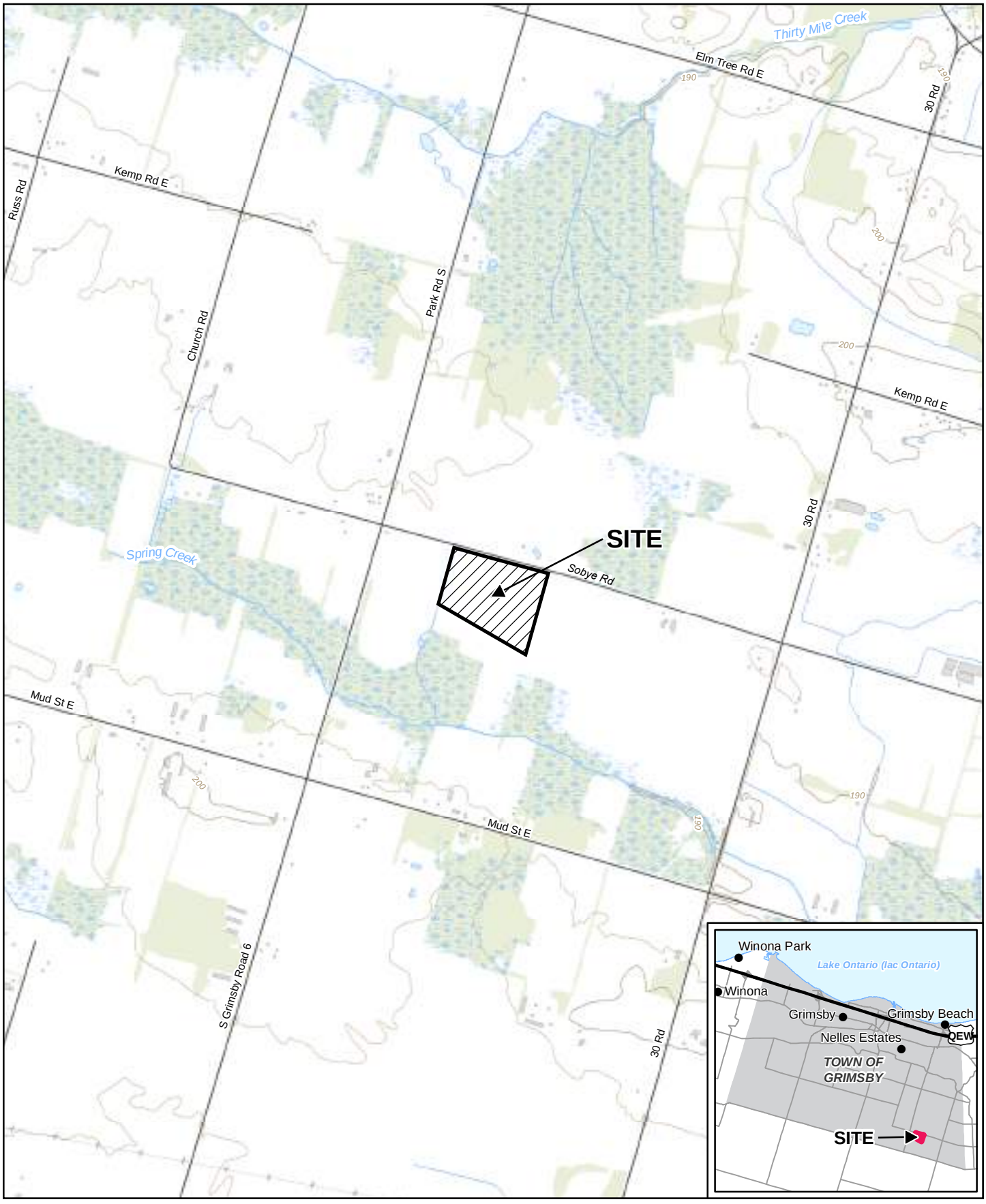
A POI concentration for each significant contaminant emitted from the Facility was calculated based on the calculated emission rates and the output from the AERMOD dispersion model with the results presented in Table 4.

The POI concentrations listed in Table 4 were compared against criteria listed in the Ministry publication, "Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants", version 2.0, dated April 2018.

All the contaminants that have limits in the ACB list are below their corresponding MECP POI Limit.

This ESDM Report demonstrates that the Facility can operate in compliance with O. Reg. 419/05 using the proposed operating scenarios.

Figures



Paper Size ANSI B

0 200 400 600 800

Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

ESCARPMENT RENEWABLES
424 SOBYE ROAD, GRIMSBY, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Project No. **11226032**
Date **Oct 26, 2021**

SITE LOCATION MAP

FIGURE 1

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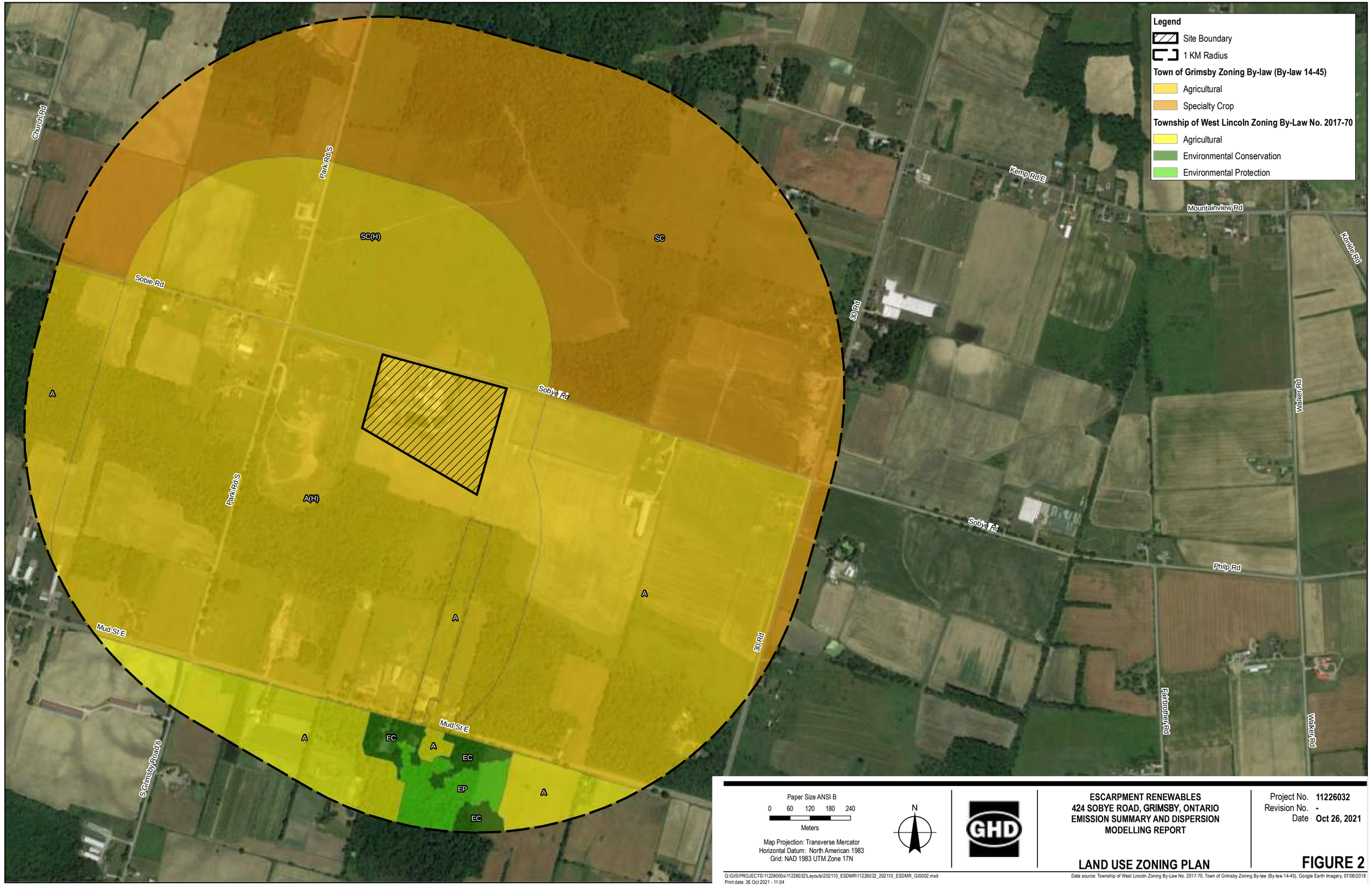
Print date: 26 Oct 2021 - 10:20



Paper Size ANSI B

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

ESCARPMENT RENEWABLES
424 SOBYE ROAD, GRIMSBY, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Project No. **11226032**
Revision No. **-**
Date **Oct 26, 2021**

LAND USE ZONING PLAN

FIGURE 2

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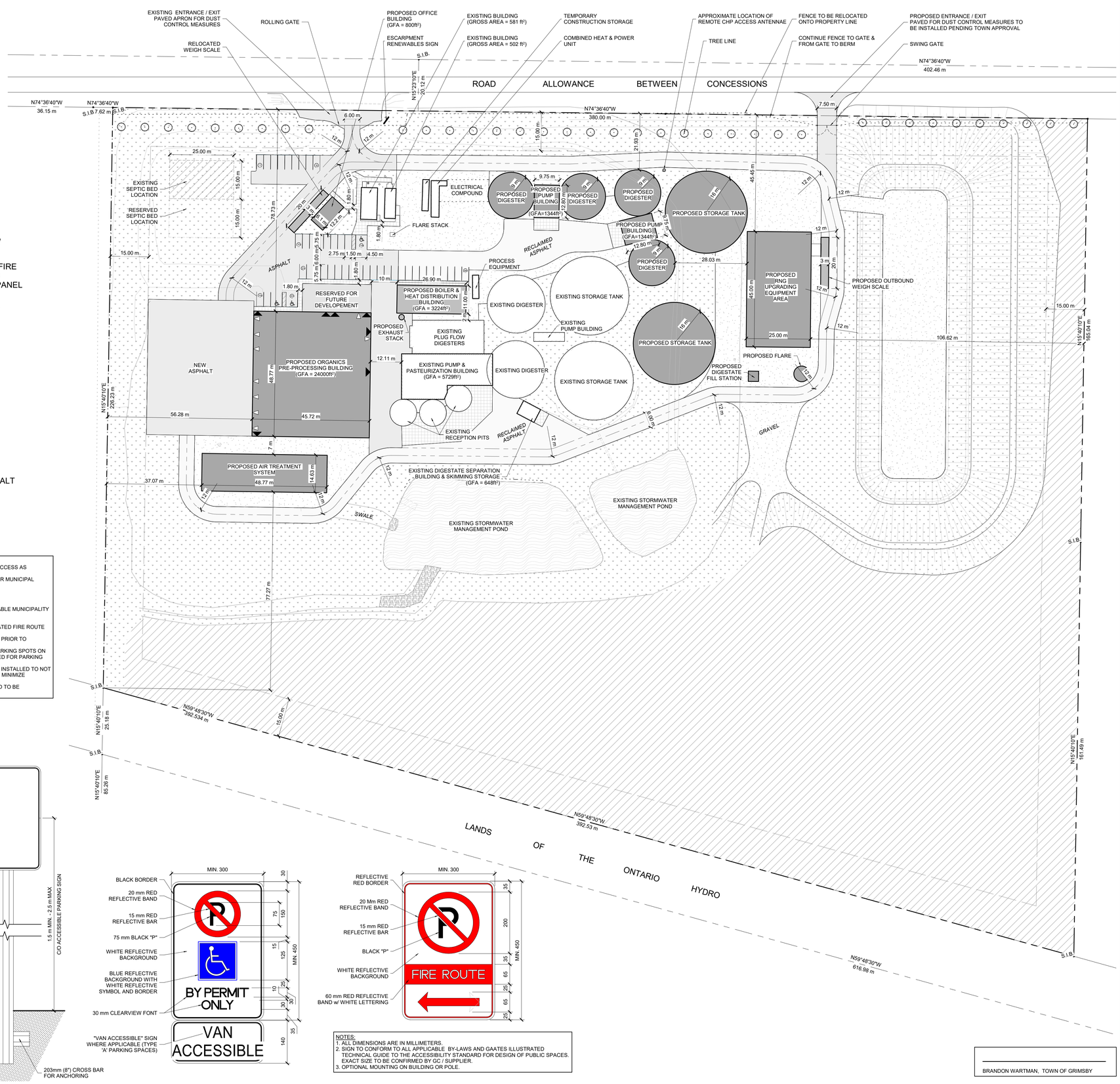
Print date: 26 Oct 2021 - 11:04

Data source: Township of West Lincoln Zoning By-Law No. 2017-70, Town of Grimsby Zoning By-law (By-law 14-45), Google Earth Imagery, 07/08/2018

KEY MAP N.T.S.

SITE LEGEND

- PARKING SPACE TAGS (25)
- BARRIER FREE PARKING SPACE (EX_25)
- TREE / PLANTING
- PROPERTY LINE
- ZONING SETBACKS
- GRAVEL
- EXISTING BUILDING
- PROPOSED BUILDING
- RIP-RAP
- SWM POND
- EXTERIOR DOOR / B.F. ENTRANCE (B.F.)
- UNOBSTRUCTED FIRE FIGHTER ACCESS DOOR/WINDOW/ PANEL
- OVERHEAD DOOR
- TRUCK ROUTE
- FENCE LINE
- SOD / GRASS
- CONCRETE
- ASPHALT
- RECLAIMED ASPHALT
- FARM FIELD



ZONING:
A - AGRICULTURAL ZONE *(REFER TO ZONING INFO TABLE FOR DETAILS)*

OFF-STREET PARKING: *(AS PER ZBL SECTION 5.1)*

EXISTING:

PUMP AND PAST. BUILDING	= 532m² x 1 SPACE / 90m²	= 6 SPACES
SEPARATION BUILDING	= 60m² x 1 SPACE / 90m²	= 1 SPACES
EXISTING BUILDINGS	= 101m² x 1 SPACE / 28m²	= 4 SPACES
TOTAL FOR EXISTING		= 11 SPACES

PROPOSED:

OFFICE	= 74m² x 1 SPACE / 28m²	= 3 SPACES
PRE-PROCESS BUILDING	= 2 230m² x 1 SPACE / 90m²	= 26 SPACES
BOILER & HEAT BUILDING	= 300m² x 1 SPACE / 90m²	= 4 SPACES
PUMP BUILDING x2	= 250m² x 1 SPACE / 90m²	= 3 SPACES
TOTAL PROPOSED REQUIRED		= 35 SPACES
TOTAL PROPOSED PROVIDED		= 46 SPACES

BARRIER FREE (AS PER ZBL SECTION 5.13):

TOTAL REQUIRED PARKING SPACES (1 PER 20 SPACES)	
(11 EXISTING + 36 PROPOSED) x 1 SPACE / 20 SPACES	= 3 SPACES
THEREFORE, REQ'D No. OF BARRIER FREE SPACES	= 3 SPACES
OVERALL TOTAL PROVIDED ON SITE - INCLUDING BARRIER FREE	= 46 SPACES

OFF-STREET LOADING SPACES:

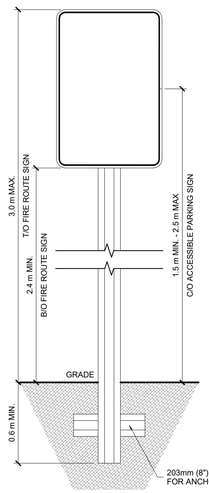
REQUIRED LOADING SPACES *(AS PER ZBL SECTION 5.15)*

GROSS FLOOR AREA *(2 351m² to 7 500m²)*	
TOTAL REQUIRED	= 2 SPACE
TOTAL PROPOSED:	= 2 SPACE

SITE PLAN NOTES:
1. FIRE ROUTE ACCESS REQUIRES FIRE PERSONNEL ACCESS AS REQUIRED BY OBC.
2. FIRE ROUTE TO BE POSTED AND DESIGNATED UNDER MUNICIPAL BYLAW DESIGN REQUIREMENTS AS FOLLOWS:
   - MIN. 6m WIDE
   - 12m CENTRE LINE TURNING RADIUS
   - MAX. 8% SLOPE
3. FIRE ROUTE SIGNS MUST BE STANDARD OF APPLICABLE MUNICIPALITY AND ARE TO BE PLACED AS FOLLOWS:
   - INTERVALS OF NOT LESS THAN 15.2m (50')
   - NOT MORE THAN 45.7m (150') ALONG THE DESIGNATED FIRE ROUTE
   - AT A HEIGHT OF NOT LESS THAN 1.8m (6')
4. ANY SITE FENCING TO BE CONFIRMED WITH OWNER PRIOR TO CONSTRUCTION.
5. STANDARD BUMP BLOCKS TO BE INSTALLED FOR PARKING SPOTS ON GRAVEL SURFACES. PAINTED LINES TO BE INSTALLED FOR PARKING SPOTS ON PAVED SURFACES
6. YARD LIGHTING LOCATION AND ORIENTATION TO BE INSTALLED TO NOT INTERFERE WITH TRAFFIC ON COUNTY ROADS PLUS MINIMIZE INTERFERENCE ON NEIGHBORING PROPERTIES.
7. PROPERTY LINES ARE APPROXIMATE AND MAY NEED TO BE CONFIRMED BY AN OLS.

ZONING BY-LAW INFORMATION TABLE

	ZONING BY-LAW	EXISTING	PROPOSED
LOT AREA (MIN.)	400 000 m²	105 026 m²	105 026 m²
LOT FRONTAGE (MIN.)	183 m	380 m	380 m
FRONT YARD SETBACK	15 m	30 m	22.3 m
EAST SIDE YARD SETBACK	15 m	175.4 m	106.2 m
WEST SIDE YARD SETBACK	15 m	97.7 m	37.1 m
REAR YARD SETBACK	15 m	102 m	77.3 m
LOT DEPTH (MIN.)	NO PROVISIONS	226.3 m	226.3 m
BUILDING FLOOR AREA	NO PROVISIONS	N/A	3 546 m²
GROSS FLOOR AREA	NO PROVISIONS	N/A	3 546 m²
LOT COVERAGE (ALL BLDGs)	20% (MAX.)	N/A	3.4%
LOT COVERAGE (ACCESSORY)	NO PROVISIONS	0%	7.1%
BUILDING HEIGHT (MAX.)	NO PROVISIONS	N/A	14 m
NUMBER OF PARKING SPACES	44	8	47
BARRIER FREE SPACES	3	0	3
NUMBER OF LOADING SPACES	1	3	4
LANDSCAPED AREA	NO PROVISIONS	N/A	74 396 m²
GRANULAR AREA	NO PROVISIONS	NO PROVISIONS	8 336 m²
PAVED AREA	NO PROVISIONS	N/A	11 271 m²



NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. SIGN TO CONFORM TO ALL APPLICABLE BY-LAWS AND GAATES ILLUSTRATED TECHNICAL GUIDE TO THE ACCESSIBILITY STANDARD FOR DESIGN OF PUBLIC SPACES. EXACT SIZE TO BE CONFIRMED BY GC / SUPPLIER.
3. OPTIONAL MOUNTING ON BUILDING OR POLE.

BRANDON WARTMAN, TOWN OF GRIMSBY

NOTES:

PLEASE READ NOTE PAGE AT BEGINNING OF DRAWING SET FOR ALL NOTES REGARDING THIS PROJECT

NO.	DATE:	DESCRIPTION:

NOTES:
1. OWNER: ESCARPMENT RENEWABLES
2. LEGAL DESCRIPTION:
   PART OF LOT 1
   CONCESSION 6
   GEOGRAPHIC TOWNSHIP OF GRIMSBY
   TOWN OF GRIMSBY
   COUNTY OF LINCOLN
3. SITE GRADING, SERVICING AND EROSION & SEDIMENT CONTROL PLAN PROVIDED BY GRIT ENGINEERING INC. REFER TO PROJECT No. GE22-0178-1 DRAWING No. C300 & C500

PROJECT NORTH / TRUE NORTH

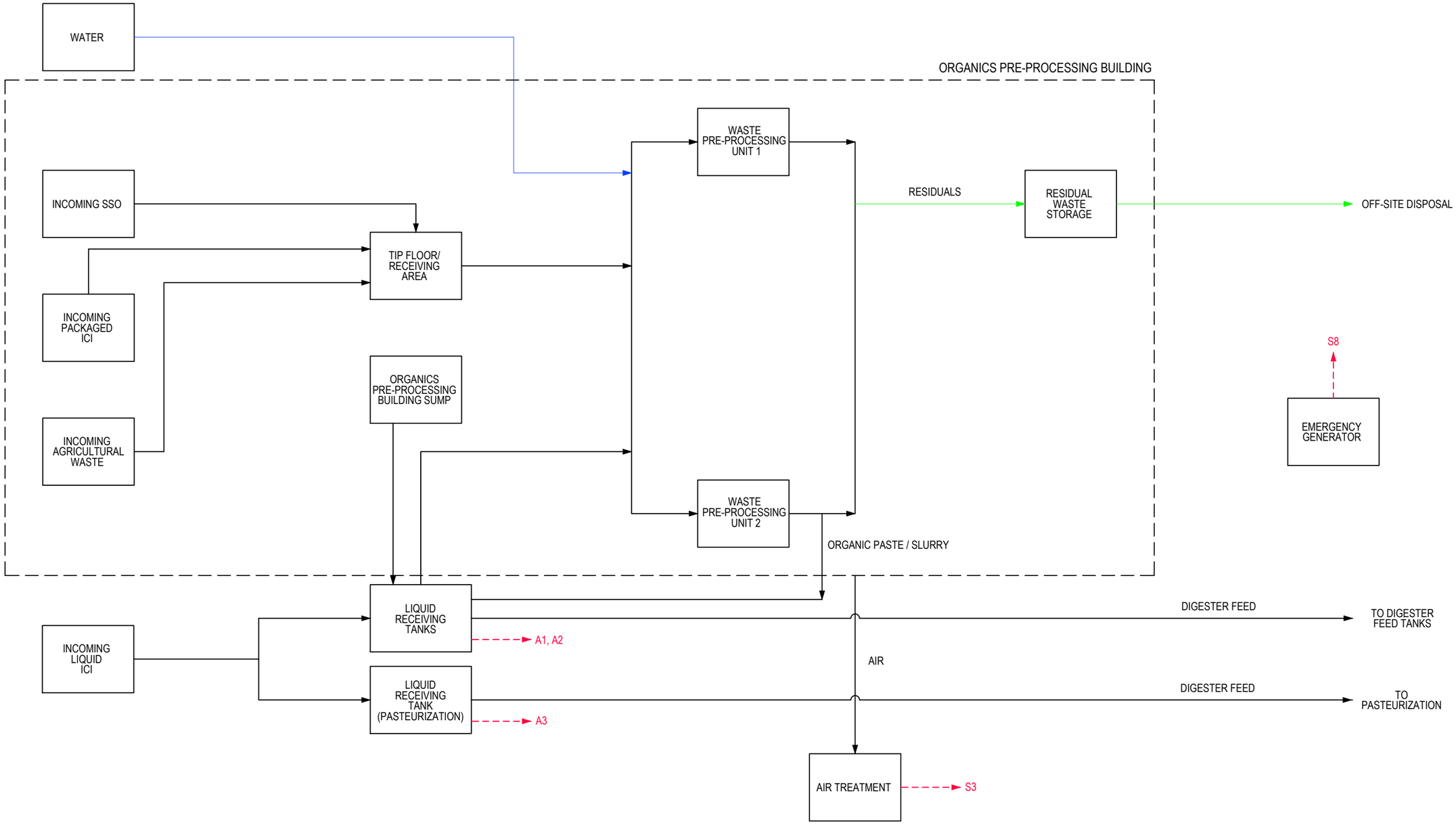
PROFESSIONAL ENGINEER'S SEAL
PROFESSIONAL ENGINEER N. A. HENDRY 9/Feb/2023 PROVINCE OF ONTARIO

STONECREST ENGINEERING INC. EST. 1995
440 Wright Blvd Unit #2, Stratford, ON, N4Z 1H3
519-625-8025 -- info@stonecrestengineering.com

CONTRACTOR TO CHECK ALL DIMENSIONS AND ELEVATIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK

DO NOT SCALE THE DRAWINGS

CLIENT:	ESCARPMENT RENEWABLES
LOCATION:	424 SOBYE ROAD, BEAMSVILLE, ON
PROJECT NAME:	PRE-PROCESS BUILDING
PROJECT STATUS AND VERSION:	CONCEPT DRAWINGS
DESIGNED BY: T.L. / M.W.	PRINT DATE: 2024.02.01
PAGE DESCRIPTION:	SITE LAYOUT
SCALE:	AS NOTED
FILE:	8016-1
PAGE NUMBER:	A1.1



ESCARPMENT RENEWABLES
442 SOBYE ROAD, GRIMSBY, ONTARIO
EMISSION SUMMARY AND DISPERSION MODELLING REPORT

PROCESS FLOW DIAGRAM
WASTE RECEIVING AND PROCESSING

Project No. **11226032**
Date **January 2022**

FIGURE 4A

Filename: N:\CA\Waterloo\Projects\662\11226032\Digital_Design\ACAD\Figures\RPT-ESDM\11226032-GHD-0000-RPT-EN-0102_WA-ESDM.dwg
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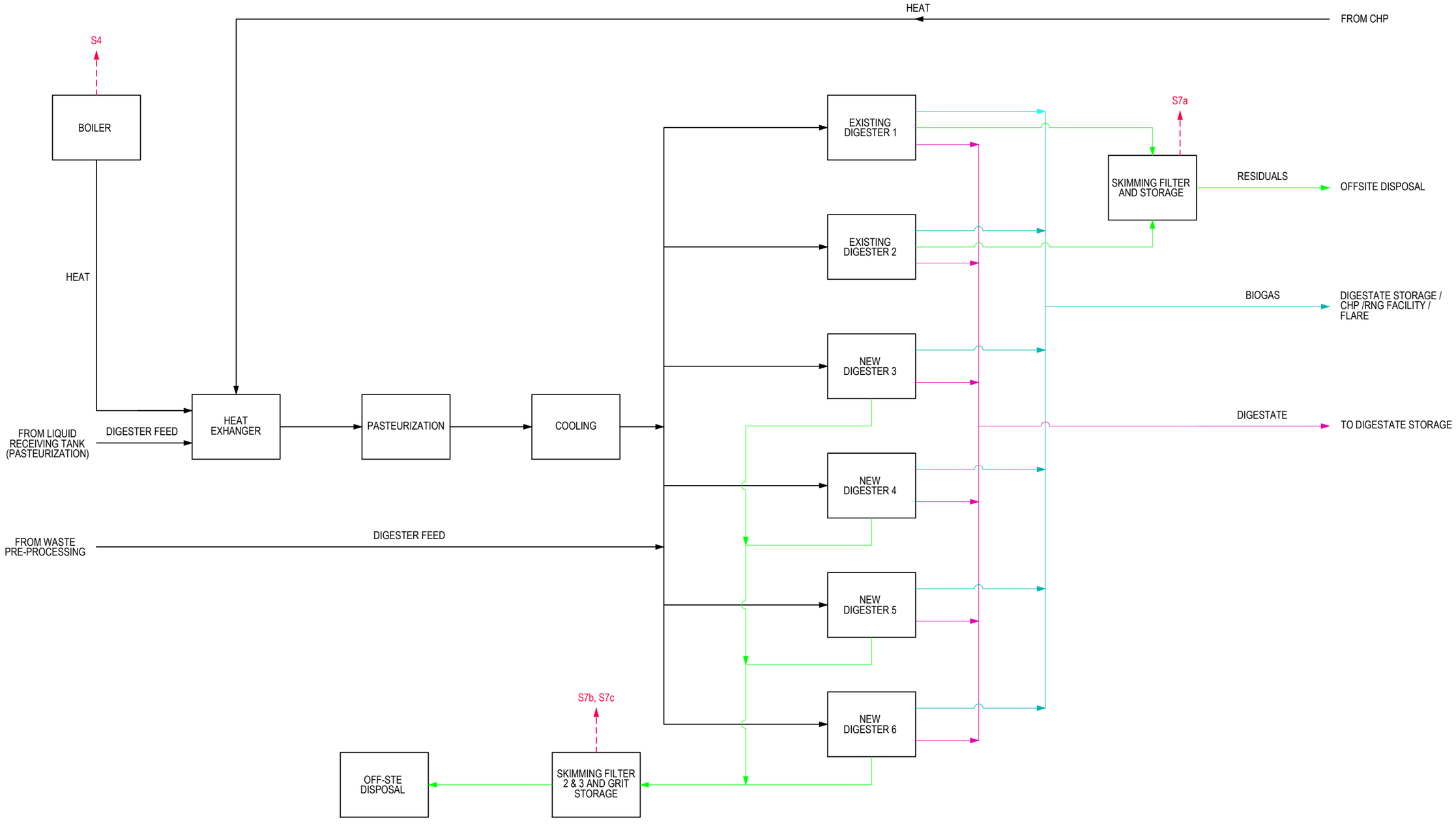

ESCARPMENT RENEWABLES
442 SOBYE ROAD, GRIMSBY, ONTARIO EMISSION SUMMARY AND DISPERSION MODELLING REPORT

PROCESS FLOW DIAGRAM DIGESTION

Project No. **11226032**
Date **January 2022**

FIGURE 4B

Filename: N:\CA\Waterloo\Projects\662\11226032\Digital_Design\ACAD\Figures\RPT-ESDM\11226032-GHD-0000-RPT-EN-0102_WA-ESDM.dwg
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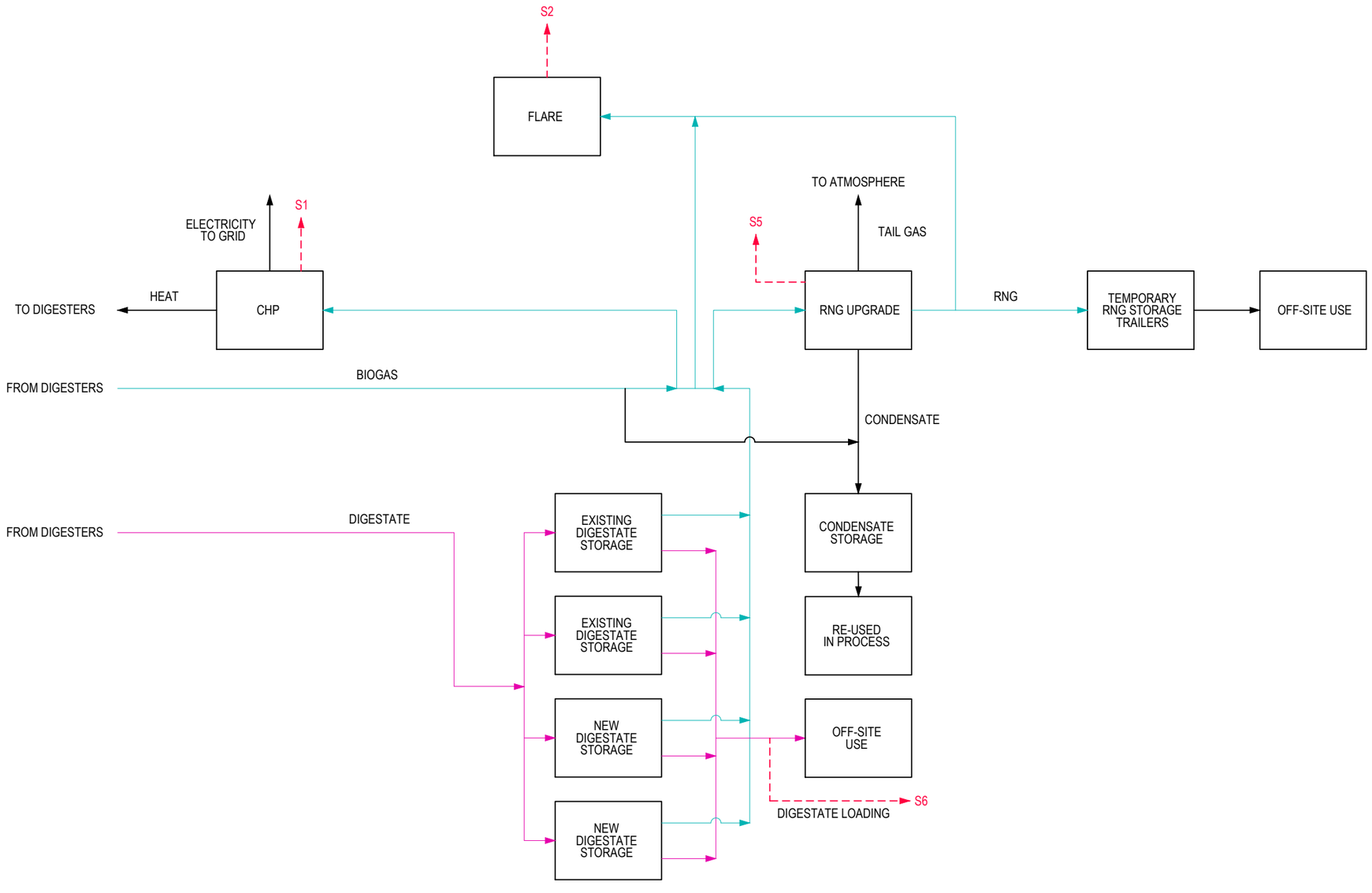

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ESCARPMENT RENEWABLES
442 SOBYE ROAD, GRIMSBY, ONTARIO
EMISSION SUMMARY AND
DISPERSION MODELLING REPORT

PROCESS FLOW DIAGRAM
DIGESTATE AND BIOGAS MANAGEMENT

Project No. **11226032**
Date **January 2022**

FIGURE 4C

Filename: N:\CA\Waterloo\Projects\662\11226032\Digital_Design\ACAD\Figures\RPT-ESDM\11226032-GHD-0000-RPT-EN-0102_WA-ESDM.dwg
Plot Date: 21 January 2022 4:36 PM

Tables

Table 1

Sources and Contaminants Identification Table
Escarpment Renewables
Grimsby, Ontario

Source ID	Source Description	Location	Expected Contaminants	Significant (Y/N)	Rationale
S1	CHP Engines/Turbines	Outdoors	Products of Combustion, Sulphur Dioxide, TRS	Y/N	Some of the contaminants are insignificant. Refer to Appendix C and Table C.1
S2	Closed Flare	Outdoors	Products of Combustion, Sulphur Dioxide, TRS	Y/N	Some of the contaminants are insignificant. Refer to Appendix C and Table C.1
S3	Biofilter Stack	Organics Pre-Processing Building	Ammonia, Hydrogen Sulphide, Odour	Y	
S4	Boiler	Boiler/Heat Distribution Building	Products of Propane Combustion	Y/N	Some of the contaminants are insignificant. Refer to Appendix C and Table C.1
S5	Biogas Upgrade Tail Gas	RNG Upgrading Facility	Carbon Dioxide, Methane	Y/N	Some of the contaminants are insignificant. Refer to Appendix C and Table C.1
S6	Digestate Loading Displacement Air	Outdoors	Odour	Y	
S7a	Grit Removal Building 1	Grit Removal Building	Odour	Y	
S7b	Grit Removal Building 2	Grit Removal Building	Odour	Y	
S7c	Grit Removal Building 3	Grit Removal Building	Odour	Y	
S8	Emergency Generator	Outdoors	Products of Diesel Combustion	Y/N	Some of the contaminants are insignificant. Refer to Appendix C and Table C.1
A1	Receiving Tank #1 Displacement Air	Receiving Tanks - Outdoors	Odour	Y	
A2	Receiving Tank #2 Displacement Air	Receiving Tanks - Outdoors	Odour	Y	
A3	Receiving Tank #3 Displacement Air	Receiving Tanks - Outdoors	Odour	Y	
	Roads, Parking Lots	Outdoors	Dust	N	Not listed in Table 7-2 or 7-3 of Section 7.4 of the ESDM Procedure Document

Table 2A

Source Summary Table - Sorted by Source
Escarpment Renewables
Grimsby, Ontario

Source ID	Source Type	Description	Point Source Data								Contaminant	CAS No.	Emission Data				
			Stack Flow Rate (m^3/s)	Stack Exit Gas Temperature (C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Exhaust Orientation	Source Coordinates X (m)	Source Coordinates Y (m)			Maximum Emission Rate (g/s) or (OU/m^2-s)	Averaging Period (hours)	Emission Estimation Technique	Emission Data Quality	% of Overall Emissions (%)
S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	Nitrogen Oxides	10102-44-0	1.67E-02	1-hr, 24-hr	EF	AA	4%
S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	Particulate Matter	NA-PM	6.31E-03	24-hr	EF	AA	4%
S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	Carbon Monoxide	630-08-0	1.95E-02	1/2-hr	EF	AA	3%
S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	Sulphur Dioxide	7446-09-5	1.17E-03	1-hr, Annual	EF	AA	4%
S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	TRS	NA-02	2.69E-05	10-minute	EF	AA	4%
S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	Nitrogen Oxides	10102-44-0	3.73E-01	1-hr, 24-hr	EF	AA	87%
S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	Particulate Matter	NA-PM	1.41E-01	24-hr	EF	AA	87%
S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	Carbon Monoxide	630-08-0	4.36E-01	1/2-hr	EF	AA	64%
S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	Sulphur Dioxide	7446-09-5	2.61E-02	1-hr, Annual	EF	AA	94%
S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	TRS	NA-02	5.99E-04	10-minute	EF	AA	96%
S3	Point	Biofilter Stack	21.75	25	1.47	20	17	Vertical	618744.3731	4778198.364	Odour	NA-01	2.26E+04	10-minute	EC	A	91%
S3	Point	Biofilter Stack	21.75	25	1.47	20	17	Vertical	618744.3731	4778198.364	Ammonia	7664-41-7	3.03E-02	24-hr	EC	A	100%
S3	Point	Biofilter Stack	21.75	25	1.47	20	17	Vertical	618744.3731	4778198.364	Hydrogen Sulphide	7783-06-4	3.03E-02	10-minute, 24-hr	EC	A	100%
S4	Point	Boiler	0.36	150	0.15	3.5	-	Vertical	618821.73	4778239.017	Nitrogen Oxides	10102-44-0	4.14E-02	1-hr, 24-hr	EF	M	10%
S4	Point	Boiler	0.36	150	0.15	3.5	-	Vertical	618821.73	4778239.017	Particulate Matter	NA-PM	3.14E-03	24-hr	EF	M	2%
S4	Point	Boiler	0.36	150	0.15	3.5	-	Vertical	618821.73	4778239.017	Carbon Monoxide	630-08-0	3.47E-02	1/2-hr	EF	M	5%
S5	Point	Biogas Upgrade Tail Gas	25.70	25	1.28	5	2	Vertical	618945.3893	4778213.216	Carbon Dioxide	124-38-9	3.34E+02	24-hr	EF	A	100%
S6	Point	Digestate Loading Displacement Air	0.03	25	0.30	4	-	Capped	618926.2748	4778187.167	Odour	NA-01	7.69E+01	10-minute	EC	A	<1%
S7a	Point	Grit Removal Building 1	0.94	Ambient	0.50	2.5	-	Horizontal	618836.71	4778201.4	Odour	NA-01	6.42E+02	10-minute	EC	A	3%
S7b	Point	Grit Removal Building 2	0.94	Ambient	0.50	2.5	-	Horizontal	618861.3713	4778259.922	Odour	NA-01	6.42E+02	10-minute	EC	A	3%
S7c	Point	Grit Removal Building 3	0.94	Ambient	0.50	2.5	-	Horizontal	618883.1453	4778255.913	Odour	NA-01	6.42E+02	10-minute	EC	A	3%
S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	Nitrogen Oxides	10102-44-0 (Emergency)	2.22E-01	1-hr, 24-hr	EF	M	100%
S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	Carbon Monoxide	630-08-0	1.94E-01	1/2-hr	EF	M	28%
S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	Sulphur Dioxide	7446-09-5	4.25E-04	1-hr, Annual	EF	M	2%
A1	Area Circle	Receiving Tank #1 Displacement Air	-	-	-	0.3	-	-	618788.9	4778210.06	Odour	NA-01	8.02E+01	10-minute	EC	A	<1%
A2	Area Circle	Receiving Tank #2 Displacement Air	-	-	-	0.3	-	-	618800.03	4778206.98	Odour	NA-01	8.02E+01	10-minute	EC	A	<1%
A3	Area Circle	Receiving Tank #3 Displacement Air	-	-	-	0.3	-	-	618811.12	4778209.47	Odour	NA-01	8.02E+01	10-minute	EC	A	<1%

Notes:

EC - Engineering Calculation
EF - Emission Factor
AA - Above Average
A - Average
M - Marginal

Table 2B

Source Summary Table - Sorted by Contaminant
Escarpment Renewables
Grimsby, Ontario

Contaminant	CAS No.	Source ID	Source Type	Description	Point Source Data								Emission Data				
					Stack Flow Rate (m^3/s)	Stack Exit Gas Temperature (C)	Stack Inner Diameter (m)	Stack Height Above Grade (m)	Stack Height Above Roof (m)	Exhaust Orientation	Source Coordinates X (m)	Source Coordinates Y (m)	Maximum Emission Rate (g/s) or (OU/m^2-s)	Averaging Period (hours)	Emission Estimation Technique	Emission Data Quality	% of Overall Emissions (%)
Ammonia	7664-41-7	S3	Point	Biofilter Stack	21.75	25	1.47	20	17	Vertical	618744.3731	4778198.364	3.03E-02	24-hr	EC	A	100%
Carbon Dioxide	124-38-9	S5	Point	Biogas Upgrade Tail Gas	25.70	25	1.28	5	2	Vertical	618945.3893	4778213.216	3.34E+02	24-hr	EF	A	100%
Carbon Monoxide	630-08-0	S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	1.95E-02	1/2-hr	EF	AA	3%
Carbon Monoxide	630-08-0	S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	4.36E-01	1/2-hr	EF	AA	64%
Carbon Monoxide	630-08-0	S4	Point	Boiler	0.36	150	0.15	3.5	-	Vertical	618821.73	4778239.017	3.47E-02	1/2-hr	EF	M	5%
Carbon Monoxide	630-08-0	S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	1.94E-01	1/2-hr	EF	M	28%
Hydrogen Sulphide	7783-06-4	S3	Point	Biofilter Stack	21.75	25	1.47	20	17	Vertical	618744.3731	4778198.364	3.03E-02	10-minute, 24-hr	EC	A	100%
Nitrogen Oxides	10102-44-0	S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	1.67E-02	1-hr, 24-hr	EF	AA	4%
Nitrogen Oxides	10102-44-0	S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	3.73E-01	1-hr, 24-hr	EF	AA	87%
Nitrogen Oxides	10102-44-0	S4	Point	Boiler	0.36	150	0.15	3.5	-	Vertical	618821.73	4778239.017	4.14E-02	1-hr, 24-hr	EF	M	10%
Nitrogen Oxides	10102-44-0 (Emergency)	S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	2.22E-01	1-hr, 24-hr	EF	M	100%
Odour	NA-01	S3	Point	Biofilter Stack	21.75	25	1.47	20	17	Vertical	618744.3731	4778198.364	2.26E+04	10-minute	EC	A	91%
Odour	NA-01	S6	Point	Digestate Loading Displacement Air	0.03	25	0.30	4	-	Capped	618926.2748	4778187.167	7.69E+01	10-minute	EC	A	<1%
Odour	NA-01	S7a	Point	Grit Removal Building 1	0.94	Ambient	0.50	2.5	-	Horizontal	618836.71	4778201.4	6.42E+02	10-minute	EC	A	3%
Odour	NA-01	S7b	Point	Grit Removal Building 2	0.94	Ambient	0.50	2.5	-	Horizontal	618861.3713	4778259.922	6.42E+02	10-minute	EC	A	3%
Odour	NA-01	S7c	Point	Grit Removal Building 3	0.94	Ambient	0.50	2.5	-	Horizontal	618883.1453	4778255.913	6.42E+02	10-minute	EC	A	3%
Odour	NA-01	A1	Area Circle	Receiving Tank #1 Displacement Air	-	-	-	0.3	-	-	618788.9	4778210.06	8.02E+01	10-minute	EC	A	<1%
Odour	NA-01	A2	Area Circle	Receiving Tank #2 Displacement Air	-	-	-	0.3	-	-	618800.03	4778206.98	8.02E+01	10-minute	EC	A	<1%
Odour	NA-01	A3	Area Circle	Receiving Tank #3 Displacement Air	-	-	-	0.3	-	-	618811.12	4778209.47	8.02E+01	10-minute	EC	A	<1%
Particulate Matter	NA-PM	S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	6.31E-03	24-hr	EF	AA	4%
Particulate Matter	NA-PM	S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	1.41E-01	24-hr	EF	AA	87%
Particulate Matter	NA-PM	S4	Point	Boiler	0.36	150	0.15	3.5	-	Vertical	618821.73	4778239.017	3.14E-03	24-hr	EF	M	2%
Particulate Matter	NA-PM	S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	1.11E-02	24-hr	EF	M	7%
Sulphur Dioxide	7446-09-5	S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	1.17E-03	1-hr, Annual	EF	AA	4%
Sulphur Dioxide	7446-09-5	S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	2.61E-02	1-hr, Annual	EF	AA	94%
Sulphur Dioxide	7446-09-5	S8	Point	Emergency Generator	0.73	500	0.15	1.83	-	Vertical	618841.516	4778283.622	4.25E-04	1-hr, Annual	EF	M	2%
TRS	NA-02	S1	Point	CHP Engines/Turbines	0.60	150	0.15	9	6	Vertical	618823.2	4778286.86	2.69E-05	10-minute	EF	AA	4%
TRS	NA-02	S2	Point	Closed Flare	0.82	981	2.64	12.3	-	Vertical	618945.0257	4778186.179	5.99E-04	10-minute	EF	AA	96%

Notes:

EC - Engineering Calculation
EF - Emission Factor
AA - Above Average
A - Average
M - Marginal

Table 3

Dispersion Modelling Input Summary Table
Escarpment Renewables
Grimsby, Ontario

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 8	Negligible Sources	Sources and contaminants that were considered negligible were explicitly identified, and therefore were not modelled, in accordance with s.8 of O. Reg. 419. See Table 1 - Sources and Contaminants Identification Table and Appendix B of the ESDM Report for more information
Section 9	Same Structure Contamination	Not applicable as the Escarpment Renewables is the only tenant occupying the site, and does not have a child care facility, health care facility, seniors' residence, long-term care facility or an educational facility located at the Facility
Section 10	Operating Conditions	All equipment was assumed to be operating at the maximum production rates at the same time. See Section 4.1 and Appendix A of the ESDM Report.
Section 11	Source of Contaminant Emission Rate	The emission rate for each significant contaminant emitted from a significant source was estimated, the methodology for the calculation is documented in Table 2 - Source Summary Table. See Section 4.1 and Section 4.2 and Appendix A of the ESDM Report for more information.
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The operating conditions were estimated in accordance with s.10(1) and 1 and S.11 (1) 1 of O. Reg. 419 and are therefore considered to result in the highest concentrations at POI that the Facility is capable of for the contaminants emitted. See Section 4.1 and Section 4.2 of the ESDM Report.
Section 13	Meteorological Conditions	MECP provided meteorological data
Section 14	Area of Modelling Coverage	The modelling coverage used correspond to the receptor grid specified in Section 14 (1) of O. Reg. 419.
Section 15	Stack Height	Please refer to Table 2.
Section 16	Terrain Data	Terrain Data was obtained from the Ontario MECP and was processed using AERMAP.
Section 17	Averaging Periods	The averaging periods required under Schedule 3 were used. For odour the hourly averaging period was converted to a 10-min average.

Table 4

Emission Summary Table
Escarpment Renewables
Grimsby, Ontario

Contaminant	CAS No.	Total Facility Emission Rate (g/s) or (OU*m^3/s)	Air Dispersion Model Used	Max. POI Concentration (OU/m^3) or (µg/m^3)	Averaging Period	MECP Screening Limit [(2)] (OU/m^3) or (µg/m^3)	Limiting Effect	Benchmark Category	Percentage of MECP POI Limit
Ammonia	7664-41-7	3.03E-02	AERMOD v.19191	0.579	24-hr	100	Health	B1	<1%
Carbon Monoxide	630-08-0	6.85E-01	AERMOD v.19191	455.458	0.5-hr	6,000	Health	B1	8%
Carbon Dioxide	124-38-9	3.34E+02	AERMOD v.19191	58880.674	24-hr	255,800	Health	B2	23%
Hydrogen Sulphide	7783-06-4	3.03E-02	AERMOD v.19191	4.136	10-minute	13	Health	B1	32%
Hydrogen Sulphide	7783-06-4	3.03E-02	AERMOD v.19191	0.579	24-hr	7	Odour	B1	8%
Nitrogen Oxides	10102-44-0	4.31E-01	AERMOD v.19191	272.809	1-hr	400	Health	B1	68%
Nitrogen Oxides	10102-44-0	4.31E-01	AERMOD v.19191	57.613	24-hr	200	Health	B1	29%
Nitrogen Oxides	10102-44-0 (Emergency)	2.22E-01	AERMOD v.19191	511.822	0.5-hr	1,880	Health	Emergency	27%
Odour - Receptor	NA-01	2.48E+04	AERMOD v.19191	- [(4)]	10-minute	-	Odour	-	- [(4)]
Particulate Matter	NA-PM	1.61E-01	AERMOD v.19191	21.675	24-hr	120	Visibility	B1	18%
Sulphur Dioxide (Effective July	7446-09-5	2.77E-02	AERMOD v.19191	14.782	1-hr	100 (3)	Health & Vegetation	B1	15%
Sulphur Dioxide (Effective July	7446-09-5	2.77E-02	AERMOD v.19191	0.618	annual	10 (3)	Health & Vegetation	B1	6%
Total Reduced Sulphur	NA-02	6.26E-04	AERMOD v.19191	0.556	10-min	13	Odour	B1	4%

Notes:
NA - Not applicable
(1) The 1-hr maximum concentration was converted to a 10-min average using a conversion factor of 1.65 as specified in the ADMGO, MECP guidance document.
(2) Criteria listed in the MECP Air Contaminants Benchmarks (ACB) List: Standards, Guidelines, and Screening Levels for Assessing POI Concentrations of Air Contaminants dated April 2018
(3) Proposed Sulphur Dioxide Limits to be implimented by 2020 as per the MECP document "Ontario Air Standards For Sulphur Dioxide (SO_2)" dated March 2018
(4) Odour concentration is such that it will not result in odour complaints at sensitive receptors.
B1 - Benchmark 1 - Exceedence of a Benchmark 1 concentration triggers specific actions under the Regulation.
B2 - Benchmark 2 - Exceedence of a Benchmark 2 concentration triggers a toxicological assessment to determine the likelyhood of adverse effect.

Appendices

Appendix A

Existing Renewable Energy Approval

AMENDMENT TO RENEWABLE ENERGY APPROVAL
NUMBER 8541-9HSGG3
Issue Date: April 22, 2020

1414229 Ontario Limited operating as Escarpment Renewables
180 Renfrew Drive, Unit 130
Markham, Ontario
L3R 9Z2

Site Location: Grimsby Energy Inc. Anaerobic Digester
424 Sobie Rd
Grimsby Town, Regional Municipality of Niagara
L3M 4E7

You are hereby notified that I have amended Approval No. 8541-9HSGG3 issued on October 1, 2014 for a Class 3 anaerobic digestion facility , as follows:

A. The Company name and address has been changed:

FROM: Grimsby Energy Incorporated
231 Roberts Rd
Grimsby, Ontario
L3M 5N2
TO: 1414229 Ontario Limited operating as Escarpment Renewables
180 Renfrew Drive, Unit 130
Markham, Ontario
L3R 9Z2

B. The definitions of the "Application" and "Company" of the Approval are deleted and replaced by the following:

4. "Application" means the application for a Renewable Energy Approval dated February 26, 2013, signed by James Detenbeck, President, Grimsby Energy Inc., and all supporting documentation submitted with the application, including amended documentation submitted up to September 2, 2014; and as further amended by the application for an amendment to the Renewable Energy Approval dated June 26, 2017, signed by Gerhard Klammer, CEO, PurEnergy Resources Inc., and all supporting documentation submitted with the application, including amended documentation submitted up to November 17, 2017; and as further amended by the application for an amendment to the Renewable Energy Approval dated October 18, 2019, signed by Jud Whiteside, President, and all supporting documentation submitted with the application, including amended documentation submitted up to April 1, 2020.

10. "Company" means 1414229 Ontario Limited operating as Escarpment Renewables and includes its successors and assignees;

All other Terms and Conditions of the Approval remain the same.

This Notice shall constitute part of the approval issued under Approval No. 8541-9HSGG3 dated October 1, 2014

In accordance with Section 139 of the Environmental Protection Act, within 15 days after the service of this notice, you may by further written notice served upon the Director, the Environmental Review Tribunal and the Minister of the Environment, Conservation and Parks, require a hearing by the Tribunal.

In accordance with Section 47 of the Environmental Bill of Rights, 1993, the Minister of the Environment, Conservation and Parks will place notice of your request for a hearing on the Environmental Registry.

Section 142 of the Environmental Protection Act provides that the notice requiring the hearing shall state:

a. The portions of the renewable energy approval or each term or condition in the renewable energy approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The signed and dated notice requiring the hearing should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The renewable energy approval number;
4. The date of the renewable energy approval;
5. The name of the Director;
6. The municipality or municipalities within which the project is to be engaged in;

This notice must be served upon:

The Secretary* Environmental Review Tribunal 655 Bay Street, 15th Floor Toronto, Ontario M5G 1E5	**AND**	**The Minister of the Environment, Conservation and Parks 777 Bay Street, 5th Floor Toronto, Ontario M7A 2J3**	**AND**	**The Director Section 47.5, *Environmental Protection Act* Ministry of the Environment, Conservation and Parks 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

Under Section 142.1 of the Environmental Protection Act, residents of Ontario may require a hearing by the Environmental Review Tribunal within 15 days after the day on which notice of this decision is published in the Environmental Registry. By accessing the Environmental Registry at https://ero.ontario.ca/, you can determine when this period ends.

Approval for the above noted renewable energy project is issued to you under Section 47.5 of the Environmental Protection Act subject to the terms and conditions outlined above.

DATED AT TORONTO this 22nd day of April, 2020

Mohsen Keyvani, P.Eng.
Director
Section 47.5, *Environmental Protection Act*

JG/
c: District Manager, MECP Niagara
Christine McLeod, Miller Waste Systems Inc.

Appendix B

Supporting Calculation

Appendix B Supporting Calculations Escarpment Renewables

Usage Rates

The usage rates found in Table B.1 correspond to the operating conditions that would result in maximum emission rate in accordance with s.10 and s.11 of O. Reg. 419/05.

List of Combustion Equipment

A list of combustion equipment and their associated ratings are found in Table B.2.

Emission Calculations

Source: S1 and S2 - Digester *Gas Combustion*

Methodology: Emission Factor (EF)

The estimated maximum emission rate for nitrogen oxides (NOx), Particulate Matter and Carbon Monoxide were determined based on the USEPA AP-42 emission factors from Chapter 2.4, emission factors for digester gas combustion in flares.

The estimated maximum emission rate for sulphur dioxide (SO2) was determined based on an emission factor calculation methodology from the document entitled "Air Quality Emissions and Impact, Milbank Community Foundation dba Midwest Dairy Institute". A hydrogen sulphide content of 10 parts per million (ppm) was assumed and is reflective of typical digester gas composition. An AP-42 Conversion factor obtained by dividing the molecular weight of hydrogen sulphide by a value of 385.1 was used to convert ppm to lb/MMft^3. The calculated emission factor was multiplied by the maximum heat input rating to determine an emission rate. Emission estimates from S1 are provided in Table B.3 and the emission estimates from S2 are provided in Table B.4.

Hydrogen Sulphide Content =	10 ppm
AP-42 Conversion Factor (ppm to lbs/MMft^3) =	0.088 lbs/MMft^3
Weight fraction of sulphur in hydrogen sulhpide =	0.9408 lb S/lb H_2S
Weight fraction of sulphur in sulhpur dioxide =	0.5 lb S/lb SO_2
Heat Content of Digester Gas =	614 MMBtus/MMft^3

The USEPA quotes these emission factor as having a quality rating of "A".

Sample Calculation: Sulphur Dioxide emissions from CHP (S1)

$$EF = 10\ ppm \times \frac{0.088\ lb\ H_2S}{MMft^3} \times \frac{0.9408\ SO_2}{lb\ H_2S} \times \frac{MMft^3}{614\ MMBTU}$$

$$EF = 0.0027\ \frac{lb\ SO_2}{MMBTU}$$

$$ER = 0.0027\ \frac{lb\ SO_2}{MMBTU} \times \frac{3{,}412{,}000\ BTU}{hr} \times \frac{MMBTU}{1{,}000{,}000\ BTU} \times \frac{hr}{3600\ sec} \times \frac{kg}{2.2\ lbs} \times \frac{1000\ g}{kg}$$

$$ER = 1.17 \times 10^{-3}\ \frac{g}{s}$$

Sample Calculation: Nitrogen Oxide emissions from CHP (S1)

$$ER = \frac{3{,}412{,}000\ BTU}{hr} \times 631\ \frac{kg}{10^6 m^3} \times \frac{ft^3}{614\ BTU} \times \frac{1\ m^3}{35.28\ ft^3} \times \frac{1000 g}{kg} \times \frac{hr}{3600\ sec} \times 60.7\%\ methane$$

$$ER = 1.67\ \times 10^{-2}\ \frac{g}{s}$$

Data Quality: Above Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes emission estimates that are developed from tests on a reasonable number of facilities where the source category population is sufficiently specific to minimize variability.

Section 9.2.2 of the ESDM Procedure Document titled "Above Average Data Quality" Emission Estimating Techniques includes emission estimates with a USEPA AP-42 emission factor quality rating of "A" or "B".

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculation for these sources are based on each piece of combustion equipment operating simultaneously at its maximum firing rate.

Source: S4 – Boiler

Methodology: Emission Factor (EF)

The emissions from the natural gas/propane fueled generator have been calculated based on USEPA AP-42 Chapter 1.4, Table 1.4-1 and Chapter 1.5, Table 1.5-1 respectively. The estimated emissions from the boiler are presented in Table B.5.

Sample Calculation: Carbon Monoxide emissions from Natural Gas Burning Boiler (S4)

$$ER = \frac{3{,}353{,}996\ BTU}{hr} \times 1{,}344\ \frac{1\ kg\ NOx}{k10^6 m^3} \times \frac{1000\ g}{kg}\ \times \frac{1\ ft^3}{1{,}020\ BTU} \times \frac{0.0283\ m^3}{ft^3}\ \times \frac{1\ hr}{3600\ sec}$$

$$ER = 2.61 \times 10^{-2}\ \frac{g}{s}$$

Data Quality: Marginal

Section 9.2.4 of the ESDM Procedure Document titled "Marginal Data Quality" Emission Estimating Techniques, includes emission factors with a rating of "D".

Operating Condition, Individual Maximum Rates of Production:

The emission estimates for this source is based on the boiler operating at its maximum firing rate.

Source: S8 – Emergency Generator

Methodology: Emission Factor (EF)

The emissions from the diesel-fueled generator have been calculated based on US EPA Tier 3 standards for "Nonroad Compression-Ignition Engines: Exhaust Emission Standards" (EPA-420-B-16-022, March 2016). The sulphur dioxide emissions were estimated using a typical fuel consumption rate and sulphur content in diesel. The estimated emissions from the generators are presented in Table B.6.

Sample Calculation: Nitrogen Oxide emissions from Emergency Generator (S8)

$$ER = 200\ kW\ \times 4\frac{g}{kW-hr} \times \frac{1\ hr}{3600\ sec}$$

$$ER = 0.22\ \frac{g}{s}$$

Sample Calculation: Sulphur Dioxide emissions from Emergency Generator (S8)

$$ER = 51\ \frac{kg}{hr} \times 15\ \frac{mg}{kg} \times \frac{1\ g}{1000\ mg} \times \frac{1\ hr}{3600\ sec}$$

$$ER = 4.25\ \times 10^{-4}\frac{g}{s}$$

Data Quality: Marginal

Section 9.2.4 of the ESDM Procedure Document titled "Marginal Data Quality" Emission Estimating Techniques, includes emission factors with a rating of "D", and calculations where the scientific/technical integrity of the approach is uncertain.

Operating Condition, Individual Maximum Rates of Production:

The emission estimates for this source is based on the emergency generator operating at its maximum firing rate.

Source: A1, A2, A3, S3, S6, S7a, S7b, S7c – Odour, Ammonia, and Hydrogen Sulphide Emissions

Methodology: Emission Factor (EF)

The odour detection threshold emission factor (EF) must be converted to an odour emission rate (OU/s). The source flow rate (m^3/s) and the odour detection threshold emission factor (OU/s) were used to estimate the emissions. The odour concentration value was based on the document entitled "Odor Threshold Emission Factors for Common WWTP Processes" from St. Croix Sensory Inc., dated April 2008.

The estimated emissions from the processes are presented in Table B.7.

Sample Calculation: Odour emissions from the Receiving Tank #1 Displacement Air (A1)

$$ER = ODT\ \times Q$$

$$ER = 7{,}000\ \times 0.0115\frac{m^3}{s}$$

$$ER = 80.2\ \frac{OU\ m^3}{s}$$

Where:

ER = Emission rate of compound (OU m^3/s or g/s)

ODT = Odour concentration of compound (OU/m^3 or g/ m^3)

Q = aerated air flow rate (m^3/s)

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes emission factor calculations with USEPA emission factor quality rating of "C".

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculations for these sources are based on maximum operating conditions and published emission factors specific to these processes.

Source: S5 – Tail Gas Emissions

Methodology: Engineering Calculation (EC)

The Biogas Upgrade Facility will emit a tail gas of carbon dioxide and methane. The source flow rate was used to calculate a contaminant flow rate based on the design values of 40% of the biogas being carbon dioxide and 60% being methane with 98.5% of this being recovered. Based on the compound densities their maximum emission rates were calculated.

The estimated emissions from the tail gas are presented in Table B.8.

Sample Calculation: Methane emissions from the Biogas Upgrade Tail Gas (S5)

$$ER = 1{,}542\ \frac{m^3}{hr} \times 60\%\ methane\ \times (100\% - 98.5\%\ recovered\ methane)\ \times 0.621\ \frac{kg}{m^3} \times 1000\ \frac{g}{kg} \times \frac{hr}{3{,}600\ s}$$

$$ER = 2.39\ \frac{g}{s}$$

Data Quality: Average

Section 9.2.3 of the ESDM Procedure Document titled "Average Data Quality" Emission Estimating Techniques includes Engineering Calculations.

Operating Condition, Individual Maximum Rates of Production:

The emission rate calculations for this source are based on maximum operating conditions.

Table B.1

Product Usage Rates
Escarpment Renewables
Grimsby, Ontario

Source Designation	Description	Maximum Processing Rate	
S1	CHP Engines/Turbines	1,000.00	kW
S2	Flare	104,700.00	ft3/hour
S3	Biofilter Stack	1,879,344.00	m^3/day
S4	Boiler	983.00	kW
S5	Biogas Upgrade Tail Gas	1,542.00	m^3/hr
S6	Digestate Loading Displacement Air	384.10	m^3/day
S7a	Grit Removal Building 1	0.94	m^3/s
S7b	Grit Removal Building 2	0.94	m^3/s
S7c	Grit Removal Building 3	0.94	m^3/s
S8	Emergency Diesel Generator	200.00	kW
A1	Receiving Tank #1 Displacement Air	55.01	m^3/day
A2	Receiving Tank #2 Displacement Air	55.01	m^3/day
A3	Receiving Tank #3 Displacement Air	55.01	m^3/day

Table B.2

List of Combustion Equipment
Escarpment Renewables
Grimsby, Ontario

Source ID	Description	Ratings (kW)	Ratings (BTU/hr)
S1	CHP Engines/Turbines	1,000	3,412,000
S2	Closed Flare	22,304	76,100,000
S4	Standby Boiler Exhaust 983 kW	983	3,353,996
S8	Standby Diesel Generator	200	682,400

Table B.3

Estimated Emisisons from use of CHP
Escarpment Renewables
Grimsby, Ontario

Maximum CHP (S1) Heat Input Rating (Digester Gas): 3,412,000 Btu/hr

Compound	CAS No.	USEPA AP-42 Emission Factor - Biogas ($kg/10^6m^3$) Methane	Estimated Maximum Emission Rate (g/s) (1)
Nitrogen Dioxide	10102-44-0	631	1.67E-02
Particulate Matter	NA-PM	238	6.31E-03
Carbon Monoxide	630-08-0	737	1.95E-02

Flare Operating on Digester Gas:

Hydrogen Sulphide Content(2) = 10 ppm
AP-42 Conversion Factor (ppm to lbs/MMft3)(3)= 0.088 lbs/MMft3
Weight fraction of sulphur in hydrogen sulhpide = 0.9408 lb S / lb H2S
Weight fraction of sulphur in sulhpur dioxide = 0.5 lb S / lb SO2
Heat Content of Digester Gas = 614 MMBtus / MMft3

Compound	Digester Gas Emission Factor (4) (lbs. SO_2 / MMBtu)	Conversion Efficiency (5) (%)	Estimated Maximum Emission Rate (6) (g/s)
Sulphur Dioxide	0.0027		1.17E-03
Total Reduced Sulphur		97.7	2.69E-05

Notes:

(1) Based on a digester gas heating value of 614 BTU/ft3, methane concentration of 60.7%, and the USEPA AP-42 Chapter 2.4 Table 2.4-4 emission factors for digester gas combustion in a Flare.
(2) Hydrogen Sulphide content based on typical digester gas composition
(3) AP-42 Conversion Factor is calculated by dividing the molecular weight of hydrogen sulphide by a value of 385.1.
(4) The emission factor calculation is based on a document entitled "Air Quality Emissions and Impact, Milbank Community Foundation dba Midwest Dairy Institute, Milbank, South Dakota"
(5) AP-42 Chapter 2.4 control efficiency for a flare operating on biogas converting hydrogen sulphide into sulphur dioxide is 97.7%.
(6) As a conservative estimate the biogas has not been adjusted for air : fuel ratio.

Table B.4

Estimated Emisisons from use of Digester Gas Flare
Escarpment Renewables
Grimsby, Ontario

Maximum Flare (S2) Heat Input Rating (Digester Gas): 76,100,000 Btu/hr

Compound	CAS No.	USEPA AP-42 Emission Factor - Biogas ($kg/10^6m^3$) Methane	Estimated Maximum Emission Rate (g/s) [1]
Nitrogen Dioxide	10102-44-0	631	3.73E-01
Particulate Matter	NA-PM	238	1.41E-01
Carbon Monoxide	630-08-0	737	4.36E-01

Flare Operating on Digester Gas:

Hydrogen Sulphide Content[2] = 10 ppm
AP-42 Conversion Factor (ppm to $lbs/MMft^3$)[3]= 0.088 lbs/MMft3
Weight fraction of sulphur in hydrogen sulhpide = 0.9408 lb S / lb H2S
Weight fraction of sulphur in sulhpur dioxide = 0.5 lb S / lb SO2
Heat Content of Digester Gas = 614 MMBtus / MMft3

Compound	Digester Gas Emission Factor [4] (lbs. SO_2 / MMBtu)	Conversion Efficiency [5] (%)	Estimated Maximum Emission Rate [6] (g/s)
Sulphur Dioxide	0.0027		2.61E-02
Total Reduced Sulphur		97.7	5.99E-04

Notes:

(1) Based on a digester gas heating value of 614 BTU/ft3, methane concentration of 60.7%, and the USEPA AP-42 Chapter 2.4 emission factors for digester gas combustion in a Flare.
(2) Hydrogen Sulphide content based on typical digester gas composition
(3) AP-42 Conversion Factor is calculated by dividing the molecular weight of hydrogen sulphide by a value of 385.1.
(4) The emission factor calculation is based on a document entitled "Air Quality Emissions and Impact, Milbank Community Foundation dba Midwest Dairy Institute, Milbank, South Dakota"
(5) AP-42 Chapter 2.4 control efficiency for a flare operating on biogas converting hydrogen sulphide into sulphur dioxide is 97.7%.
(6) As a conservative estimate the biogas has not been adjusted for air : fuel ratio.

Table B.5

Estimated Combustion Products Emissions from Boiler
Escarpment Renewables
Grimsby, Ontario

Maximum Boiler (S4) Heat Input Rating: 3,353,996 BTU/hr

Compound	CAS No.	USEPA AP-42 Emission Factor - Natural Gas ($kg/10^6m^3$)	USEPA AP-42 Emission Factor - Propane ($kg/10^6m^3$)	Natural Gas (Alternate) Estimated Maximum Emission Rate (g/s) [1]	Propane Estimated Maximum Emission Rate (g/s) [2]
Carbon Monoxide	630-08-0	1344	1008	3.47E-02	2.61E-02
Nitrogen Oxides	10102-44-0	1600	1560	4.14E-02	4.03E-02
Particulate Matter	NA-PM	122	84	3.14E-03	2.17E-03

Notes:

(1) Based on the maximum facility heat input rating, a natural gas heating value of 1,020 BTU/ft³ and USEPA AP-42 Chapter 1.4 emission factors for natural gas combustion in commercial boilers (<100 MM BTU).
(2) Based on the maximum facility heat input rating, a propane heating value of 1,020 BTU/ft³ and USEPA AP-42 Chapter 1.5 emission factors for propane combustion in commercial boilers (<100 MM BTU).
(3) The maximum value between the two estimated emission rates (per pollutant) was chosen as input for AERMOD.

Table B.6

Estimated Maximum Diesel Combustion Products
Escarpment Renewables
Grimsby, Ontario

Maximum Emergency Generator (S8) Heat Input Rating: 200 kW

Source ID	Compound	CAS No.	Tier 3 Emission Factor - Compression Ignition [2] (g/kW-hr)	Estimated Maximum Emission Rate (g/s)
S8	Nitrogen Oxides	10102-44-0 (Emergency)	4.00E+00 (3)	2.22E-01
	Carbon Monoxide	630-08-0	3.50E+00	1.94E-01
	Particulate Matter	NA-PM	2.00E-01	1.11E-02
	Sulphur Dioxide	7446-09-5	-	4.25E-04

Estimating SO_2 emissions:

Fuel Consumption	60	L/hr
	51	kg/hr
Sulphur in Diesel	15	mg/kg
Sulphur consumption rate	2.13E-04	g/s
SO_2 Emission Rate	4.25E-04	g/s

Notes:

(1) The generator is expected to adhere to Tier 3 rating of emissions as per US EPA guidelines.
(2) Emission factors taken from US EPA "Nonroad Compression-Ignition Engines: Exhaust Emission Standards" (EPA-420-B-16-022, March 2016)
(3) The NMHC + NOx emission factor from (2) is chosen to conservatively represent total NOx emissions.
(4) The SO2 emission rate is estimated based on sulphur content in diesel (as per Sulphur in Diesel Fuel Regulations SOR/2002-254), and typical fuel consumption rate of a 200 kW generator at full load.

Table B.7

Estimated Odour and Ammonia and Hydrogen Sulphide Emissions
Escarpment Renewables
Grimsby, Ontario

Source ID	Description	Compound	CAS No.	Flowrate (m^3/s)	Source Concentration [1] (ou/m^3) or (g/m^3)	Estimated Maximum Emission Rate (ou m^3/s) or (g/s)
A1	Receiving Tank #1 Displacement Air	Odour	NA-01	0.0115 (2)	7,000	80.2
A2	Receiving Tank #2 Displacement Air	Odour	NA-01	0.0115 (2)	7,000	80.2
A3	Receiving Tank #3 Displacement Air	Odour	NA-01	0.0115 (2)	7,000	80.2
S3	Biofilter Stack	Odour	NA-01	21.75	1,038	22,578
		Ammonia	7664-41-7		0.00139 (3)	0.0303
		Hydrogen Sulphide	7783-06-4		0.001 (4)	0.0303
S6	Digestate Loading Displacement Air	Odour	NA-01	0.030 (5)	2,600	77
S7a	Grit Removal Building 1	Odour	NA-01	0.9438	680	6.42E+02
S7b	Grit Removal Building 2	Odour	NA-01	0.9438	680	6.42E+02
S7c	Grit Removal Building 3	Odour	NA-01	0.9438	680	6.42E+02

Notes:

(1) Odour concentrations based on "Odor Threshold Emission Factors for Common WWTP Processes" from St. Croix Sensory Inc., April 2008 unless otherwise stated.
(2) Based on a fill time of 10 minutes per delivery. Maximum of 8 deliveries per day.
(3) Ammonia content (6 ppm) based on typical tank head gas composition
(4) Hydrogen Sulphide content (1 ppm) based on typical tank head gas composition
(5) Based on a fill time of 15 minutes per delivery. Maximum of 15 deliveries per day.

Table B.8

Biogas Upgrade Tail Gas Emission Calculations
Escarpment Renewables
Grimsby, Ontario

Source ID	Description	Compound	CAS No.	Flowrate (m^3/h)	Contaminant Flow Rate [(1)] (m^3/h)	Density (kg/m^3)	Estimated Maximum Emission Rate (g/s)
S5	Biogas Upgrade Tail Gas	Carbon Dioxide	124-38-9	1,542	617	1.95	3.34E+02
		Methane	74-82-8	1,542	14	0.62	2.39E+00

Note:

(1) Biogas methane content is 60% of which 98.5% is recovered.

Appendix C

Supporting Information for Assessment of Negligibility

Appendix C Supporting Information for Assessment of Negligibility Escarpment Renewables

Sources were screened for negligibility using the following screening protocols listed in the ESDM Procedure Document:

– Combustion of natural gas and propane (Section 7.1.1.)
– Identifying significant contaminants using an emission threshold (Section 7.1.2)
– Specific examples of sources that emit contaminants in negligible amounts (Section 7.2.2 and Table B-3)

Combustion of Natural Gas and Propane

As per Section 7.1.1 of the ESDM Procedure Document contaminants other than NOx are generally considered negligible from this type of source. Therefore, only NOx has been assessed for the following list of equipment listed in Table B.2.

Identifying Significant Contaminants using an Emission Threshold:

Section 7.1.2 of the ESDM Procedure Document states that contaminants that are emitted from a specific facility may be identified as negligible when they are below emissions thresholds that are developed using the following formula:

$$\text{Emission Threshold (g/s)} = \frac{0.5 \times \text{MECP POI Limit } (\mu g/m^3)}{\text{Dispersion Factor } (\mu g/m^3 \text{ per g/s emission})}$$

All facility emissions of contaminants with an MECP POI limit were assessed against the appropriate emission threshold based on the appropriate 1-hour urban dispersion factor of 8,700 µg/m^3 per g/s 20 m from the property boundary. A number of contaminants are deemed to be emitted in negligible amounts, as indicated in Table C.1.

Specific Examples of Sources that Emit Contaminants in Negligible Amounts

Table B-3 of the ESDM Report Procedure Document and O. Reg. 524/98 lists sources that can be considered to be insignificant. The following sources at the Facility are listed in either Table B-3 or O. Reg. 524/98:

– General exhausts, sources such as building exhausts, building ventilation, building intake, change rooms, cafeteria, release valves, etc.
– Roads and parking lot (NAICS code not listed in Tables 7-2 and 7-3 of Section 7.4 of the ESDM Report Procedure Document)

Table C.1

Assessment of Significance
Escarpment Renewables
Grimsby, Ontario

Contaminant	CAS #	Emission Rate (g/s) or (OU/s)	MECP POI Limit [1] ($\mu g/m^3$)	Averaging Period	Limiting Effect	Benchmark Category	Emission Threshold [2] (g/s)	Significant? (Yes/No)
Ammonia	7664-41-7	3.03E-02	100	24-hr	Health	B1	1.40E-02	Yes
Carbon Dioxide	124-38-9	3.34E+02	255,800	24-hr	Health	B2	3.58E+01	Yes
Carbon Monoxide	630-08-0	6.85E-01	6,000	1/2-hr	Health	B1	2.84E-01	Yes
Hydrogen Sulphide	7783-06-4	3.03E-02	13	10-minute	Odour	B1	4.52E-04	Yes
Hydrogen Sulphide	7783-06-4	3.03E-02	7	24-hr	Health	B1	9.80E-04	Yes
Methane	74-82-8	2.39E+00	37,330	24-hr	Health	B2	5.22E+00	No
Nitrogen Oxides	10102-44-0	4.31E-01	400	1-hr	Health	B1	2.30E-02	Yes
Nitrogen Oxides	10102-44-0	4.31E-01	200	24-hr	Health	B1	2.80E-02	Yes
Nitrogen Oxides	10102-44-0 (Emergency)	2.22E-01	1,800	1/2-hr	Emergency	Emergency	8.52E-02	Yes
Particulate Matter	NA-PM	1.61E-01	120	24-hr	Visibility	B1	1.68E-02	Yes
Sulphur Dioxide (Effective until July 1, 2023)	7446-09-5	2.77E-02	690	1-hr	Health & Vegetation	B1	3.97E-02	No
Sulphur Dioxide (Effective until July 1, 2023)	7446-09-5	2.77E-02	275	24-hr	Health & Vegetation	B1	3.85E-02	No
Sulphur Dioxide (Effective July 1, 2023)	7446-09-5	2.77E-02	100	1-hr	Health & Vegetation	B1	5.75E-03	Yes
Sulphur Dioxide (Effective July 1, 2023)	7446-09-5	2.77E-02	10	Annual	Health & Vegetation	B1	7.30E-03	Yes
Total Reduced Sulphur	NA-02	6.26E-04	13	10-minute	Odour	B1	4.52E-04	Yes
Total Reduced Sulphur	NA-02	6.26E-04	7	24-hr	Health	B1	9.80E-04	No

Notes:

(1) MECP POI Limit listed on the "Air Contaminants Benchmarks (ACB) List: Standards, Guidelines and Screening Levels for Assessing Point of Impingement Concentrations of Air Contaminants" publication dated April 2018.

(2) Emission Threshold based on the following default urban dispersion factors from Table B-1 of the ESDM Report Procedure Document:

10-minute	14,368	$(\mu g/m^3)/(g/s)$
1/2-hr	10,563	$(\mu g/m^3)/(g/s)$
1-hr	8,700	$(\mu g/m^3)/(g/s)$
24-hr	3,573	$(\mu g/m^3)/(g/s)$
30-day	1,379	$(\mu g/m^3)/(g/s)$
Annual	685	$(\mu g/m^3)/(g/s)$

B1 - Benchmark 1 - Exceedence of a Benchmark 1 concentration triggers specific actions under the Regulation

B2 - Benchmark 2 - Exceedence of a Benchmark 2 concentration triggers a toxicological assessment to determine the likelyhood of adverse effect.

Appendix D

Dispersion Modelling Input

Table D.1

AERMOD Dispersion Modelling Input Parameters
Escarpment Renewables
Grimsby, Ontario

Source ID	Description	Stack Velocity (m/s)	Exhaust Temperature (K)	Exhaust Diameter (m)	Stack Height Above Grade (m)	Exhaust Orientation	UTM Source Coordinates	
							x (m)	y (m)
S1	CHP Engines/Turbines	33.95	423.15	0.15	9.00	VERTICAL	618823.20	4778286.86
S2	Closed Flare	0.15	1254.15	2.64	12.30	VERTICAL	618945.03	4778186.18
S3	Biofilter Stack	12.83	298.15	1.47	20.00	VERTICAL	618744.37	4778198.36
S4	Boiler	20.00	423.15	0.15	3.50	VERTICAL	618821.73	4778239.02
S5	Biogas Upgrade Tail Gas	20.00	298.15	1.28	5.00	VERTICAL	618945.39	4778213.22
S6	Digestate Loading Displacement Air	0.42	298.15	0.30	4.00	CAPPED	618926.27	4778187.17
S7A	Grit Removal Building 1	4.81	298.15	0.50	2.50	HORIZONTAL	618836.71	4778201.40
S7B	Grit Removal Building 2	4.81	298.15	0.50	2.50	HORIZONTAL	618861.37	4778259.92
S7C	Grit Removal Building 3	4.81	298.15	0.50	2.50	HORIZONTAL	618883.15	4778255.91
S8	Emergency Generator	40.00	773.15	0.15	1.83	VERTICAL	618841.52	4778283.62
A1	Receiving Tank #1 Displacement Air	-	-	5.32	0.30	-	618788.90	4778210.06
A2	Receiving Tank #2 Displacement Air	-	-	5.32	0.30	-	618800.03	4778206.98
A3	Receiving Tank #3 Displacement Air	-	-	5.32	0.30	-	618811.12	4778209.47

Appendix B

Odour Report

Odour Study Report

Grimsby Anaerobic Digestion Site

ESCARPMENT RENEWABLES

29 July 2024

Project name		ESCARPMENT-Grimsby AD Permitting					
Document title		Odour Study Report | Grimsby Anaerobic Digestion Site					
Project number		11226032-RPT-5					
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S4	02	Punith Nallathamby	Matthew Griffin		Matthew Griffin		July 29, 2024

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Executive summary

This Odour Study Report has been prepared in accordance with Table 1 of Ontario Regulation 359/09. A summary of where information is contained in this report as it relates to these requirements is provided below.

Table E.1 Ontario Regulation 359/09 Compliance Summary

Requirements	Location in Report
Set out the following information in respect of the renewable energy project:	
1. The significant process and fugitive sources of odour discharge from the renewable energy generation facility.	Section 3
2. Any negative environmental effects that may result from the odour discharge mentioned in paragraph 1 at all odour receptors.	Section 3
3. The technical methods that are expected to be employed to mitigate any negative environmental effects mentioned in paragraph 2 and the negative environmental effects that are expected to result if the technical methods are employed.	Section 4 and 5

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1. Introduction

1.1 Purpose of this Report

This report was prepared to fulfil the Renewable Energy Approval (REA) requirements as set out in Ontario Regulation 359/09. The report summarizes the operations and odour abatement measures planned for the Escarpment Renewables Anaerobic Digester (AD) facility at 424 Sobye Road in Grimsby, Ontario (Site). Escarpment Renewables currently operates under REA No. 8541-9HSGG3, as amended. The project is a Class 3 AD with a name plate capacity of 1 Megawatt (MW).

Escarpment Renewables intends to complete a Site expansion along with additional Site improvements. This includes acceptance of new waste types and increased waste tonnage, along with building new infrastructure on Site to manage additional waste processing requirements. The proposed Site expansion will have effects on the AD facility's design, capacity, and processes.

The AD facility plans on processing up to 159,000 tonnes of organics annually to generate biogas. The biogas is combusted in a combined heat and power (CHP) system to produce 1 MW of electrical energy. Long-term, sustainable renewable energy generation and diversion of organic materials from landfills will be ensured through the responsible and profitable operation of the AD facility.

Air dispersion modelling has been performed for the significant sources of odour at the Site as outlined in the Emission Summary and Air Dispersion Modelling (ESDM) report. As per the MECP guidelines the Site was deemed to meet the odour standards. Odour emissions from the Site are an indication of a loss in biogas production potential. The AD facility will be designed and operated to prevent generation of odour as much as possible to maximize biogas production.

2. Background

The Site consists of an organics processing facility, which will be capable of receiving and processing up to 159,000 tonnes of organic waste per year by AD. The existing waste storage bunkers will be decommissioned. A new organics pre-processing building will be constructed with all the necessary equipment to receive, temporarily store, and process solid organic material for digestion. Liquid receiving tanks are located near the existing pump and pasteurization building and will continue to receive liquid organic material for processing. The AD facility, which is currently operational, will be expanded with additional digester tanks and additional processing equipment. Digestate management currently consists of two storage tanks which will remain. Two additional digestate storage tanks will be constructed. The existing biogas management area consists of a CHP engine, flare, and biogas storage area. The Site will continue to utilize biogas in the existing CHP. The existing temporary biogas storage will be decommissioned in favour of storing biogas in double membrane roof systems on the new digestate storage tanks. Biogas will also be upgraded to renewable natural gas (RNG) for temporary storage on Site in tube trailers prior to transportation off Site. The existing administration buildings, which consist of an office and staff building will remain. Air treatment will be managed by a new air treatment system that manages potentially odour-impacted air generated within the organics pre-processing building. There is also a stormwater management ponds located at the south end of the Site, which will be unchanged. The Site access consists of a gravel road which will be realigned to make space for additional tanks and equipment.

The Site is committed to controlling odour from its operations to mitigate any negative environmental impacts that may result from odour discharge at the Site.

The project expansion will be constructed on lands owned by Escarpment Renewables, which owns and operates the Site. The Site is located on the northwestern 4.8 hectares (ha) of a 10.5 ha property located on the south side of

Sobye Road approximately 300 metres (m) east of Park Road South. The proposed expansion will further develop the 10.5 ha property to utilize a total of approximately 6 ha.

A detailed description of the project expansion can be found in the Project Description Report.

2.1 Surrounding Land Use

The surrounding area is mostly zoned for agricultural purposes. In the immediate vicinity are a number of poultry and cattle farms. Immediately to the west of the subject property at the southeast corner of Sobye and Park Roads is a closed landfill site owned by the Region of Niagara. This site was closed in 1995. This area is zoned for Agricultural use. To the north is a radio transmission tower field. This area is zoned SC(H), Specialty Crop with a Holding designation.

To the east is undeveloped farmland and a poultry farm that is in the agricultural use zone. The lands to the south of the property are classified as Significant Woodlands, with some wetlands, and contain a small watercourse. This area is zoned for agricultural use with a holding designation, and also has an additional permitted use as a riding stable. The lands to the south also contain areas zoned Environmental Conservation (EC) and Hazard which restricts development in these areas.

The nearest receptor to the Site is a farmhouse located on the west side of Park Road south of Sobye Road. This home is located approximately 400 m from the western property line and is separated from the project Site by the closed landfill which is approximately 8 m above grade.

3. Sources of Odour

The following sources at the Site have been identified as potential odour sources:

– Generation of Biogas, Digesters, and Digestate Tanks – Biogas is generated in Digestion Tanks when organic materials at the AD facility undergo anaerobic digestion
– Unloading of Organic Material – Solid and liquid organic material is transported on Site and is unloaded in the organics pre-processing building (solids) or the receiving tanks (liquids)
– Organic Separation, Preprocessing, and Storage – Once the organics are unloaded at the AD facility, they undergo some separation and pre-processing in the new organics processing building
– Fugitive Building Emissions – Fugitive odour emissions resulting from unloading and preprocessing could be released from the new organics processing building and the pump and pasteurization building if there is not adequate negative pressure in the building
– Digestate Loading to be Shipped Off Site – The liquid digestate will be collected by a hauling company. The digestate will be pumped into trucks that will park beside the RNG Facility for loading. The solid digestate will be separated out and stored in the digestate separation buildings before being moved to the pump and pasteurization building to be loaded on trucks
– Biofilter – The biofilter is used to treat the air that is used for the building ventilation in the unloading and processing areas
– Flare – the back-up flare is used to combust excess biogas during times when the CHP and RNG Facility are not operational, or biogas production exceeds the demands of the engine and RNG Facility

3.1 Odour Generation Variables

Odour varies greatly based on the feedstocks received at an AD facility. There may be some variability associated with the quantity of odour generated from the organic materials at the Site. The odour emissions from this Site have been conservatively estimated. Variables that can affect the generation of odour from the Site include: the level of

decomposition of the organic materials, types of materials at the Site, the flowrate to the biofilter, the operation of the biofilter and the length of time the doors are open. The Site will be operating to minimize odour and will consider these variables in its operations.

4. Odour Abatement Measures

4.1 Generation of Biogas

Biogas is created in the the digesters and the digestate tanks. The digesters and digestate tanks are sealed with double membrane covers. All the biogas from these AD process tanks is combusted in the CHP unit and RNG Facility. If the CHP unit and RNG Facility is incapacitated for any reason or more biogas is generated than can be consumed by the CHP unit and RNG Faciltiy the automated backup flare will combust the biogas. Combustion of the biogas eliminates odour in the biogas. This reduces the potential for odours being emitted from the Site during the actual AD process.

4.2 Unloading of Organic Material

Odours are potentially generated from the incoming organic material, depending on the type of material, as it is unloaded and stored before it is pumped into the sealed AD process tanks. Odours from the unloading will be reduced by minimizing the amount of time that feedstock material is stored prior to addition to the AD process. Fresher material has less potential for odour and greater biogas potential.

The material will also be transported on Site using covered trailers or tanker trucks. The doors at the AD facility will close quickly once the truck is inside the AD facility to minimize the potential release of odours from overhead doors. Unloading of all trucks that are bringing unprocessed organics will be done indoors in negative pressure unloading areas. All air that is vented from the building will be treated with a Biofilter as described in Section 4.6. The building ventilation calculation is also provided in Section 4.6.2.

Liquid materials will be received directly into the outdoor receiving tanks. The receiving tanks will be closed when not receiving material.

4.3 Organic Separation, Pre-Processing, and Storage

Odours are potentially generated from the organic materials as it is separated, pre-processed, and stored before it is pumped into the sealed AD process tanks. The AD facility will be designed and operated to manage all potential odours generated as part of the pre and post-processing steps of the AD process. The Site will have enclosed storage tanks for liquid organic materials. These tanks will be vented to the atmosphere, having negligible odour emissions through breathing losses. Maximum odour emissions from these tanks are expected during the loading process, when the headspace is displaced and exhausted. The operations occurring in the building may be regarded as fugitive sources of emissions. However, the building will be under adequate negative pressure to ensure that all air from the processing activities is vented through the biofilter. Preprocessing and organic solids separation and storage will be done indoors directly under exhaust hoods that create localized negative pressure zones with two to five air exchanges per hour. All air that is vented from these exhausts will be treated with a biofilter, as described in Section 4.6.

4.4 Fugitive Emissions

The building will be kept under negative pressure when the doors are closed so that there will be no fugitive emissions from the building. This negative pressure will be maintained from the draw of air through the building by the biofilter. Air will be drawn into the building using controlled air intake louvers. Although the negative pressure may be lost

during the opening and closing of doors, it is expected that the biofilter fan will provide adequate ventilation. No fugitive emissions are expected to be emitted to the environment as the louvers will close when the doors are open and the intake ventilation air will be drawn through the open doors. When the doors are closed, the louvers will open once more permitting air to enter the building to create the negative pressure once again.

There will be no outdoor waste storage at the Site. All organic material will be transferred and stored indoors. The storage tanks at the Site will be enclosed. During storage tank filling, the headspace of air displaced will be vented.

It is not expected that the storm water management ponds will be a significant source of odour, as it will only collect runoff (i.e., rainwater) from the Site.

4.5 Digestate Loading Activities

A third-party hauler will collect the digestate at the Site and will ship it off Site to be used as a soil amendment or fertilizer. The truck will arrive on Site and will be filled with digestate by pumping it directly from the digestate storage into a tanker. During the filling, the air in the empty truck will be displaced and exhausted.

4.6 Biofilter

The biofilter will be used to treat the air that is exhausted from the pre-processing building, from activities including: truck loading and unloading, and organics pre-processing. There will be insignificant fugitive emissions from the building because the building will be under negative pressure when the doors are closed. There will be no outdoor waste storage at the Site. All organic material will be transferred and stored indoors. The inorganic media biofilters planned for the Site will have the following key features:

– 85% odour removal efficiency (manufacturer guaranteed performance rating)
– Sized and configured to provide redundancy to allow maintenance and servicing on one module while still providing treatment capacity on remaining modules by maintaining an inventory of parts, altering the flow rate to the biofilter, or by using the air as combustion intake air for the engines
– Inorganic filter media depth of 1.83 m
– Biofilter will have an empty bed residence time of approximately 34-seconds
– Temperature and humidity of incoming air controlled for optimum biofilter performance
– Permanent inorganic filter material with 10-year warranty to reduce media replacement downtime
– Operator friendly automated controls compatible with Site control system

4.6.1 Inorganic Media Biofilter

Inorganic biofilters have been used in waste processing applications and are being utilized more often as regulations impose more rigid standards on odour emissions. In general, inorganic systems:

– Have a higher capital cost than organic systems
– Require less maintenance
– Have lower operating costs

A prime advantage of inorganic biofilters compared against organic media biofilters, is the lower total pressure drop and the deeper allowable media depth as a result. Typically, an inorganic system employs a media depth of up to 2 m, that can decrease the footprint requirements by half as compared to an organic system. Additionally, the empty bed retention time for these systems are also generally lower (typically 30 to 35 seconds). Inorganic media systems offer less frequent media refreshment cycles. Some vendors offer warranties to support a 10-year life cycle for the media. Much less frequent removal schedules imply less overall maintenance, system shutdowns for media removal, and greater consistency in odour abatement performance. Additionally, odour removal efficiencies are generally higher and

more consistent for inorganic systems. Of note, inorganic systems have low background odour profile and thus, the theoretical maximum removal efficiency.

Escarpment Renewables recognizes that inorganic systems require attention to inlet air. Hydrogen sulphide and ammonia concentrations must be below critical operating levels, or must be removed if they are above prior to exposure of process air to the media. Humidification is critical, and while inorganic systems generally allow for pre-humidification without surface irrigation, the level of humidity must be ensured at near saturation conditions for the media to be effective. A 28 m high stack is included in the biofilter design in order to achieve good dispersion of potential emissions.

4.6.2 Negative Pressure Ventilation

The following calculation has been performed to demonstrate the ventilation/air exchanges that will take place in the building based on the various processing equipment that will be operated. This air volume will be treated by the biofilter prior to discharge to the atmosphere. The air volume calculation has been performed based on the maximum odour generation potential in the summer. The actual air exchanges will vary depending on the process and environmental conditions.

A ventilation system will be provided to maintain negative pressure in the organics pre-processing building. To minimize air volumes requiring treatment, air will be cascaded from areas with lower odour potential to areas with higher odour potential, with air ultimately being drawn from the waste receiving area and into a biofilter. Electrical, control, and administrative rooms will have separate air handling systems that are not connected to the biofilter. Odourous air will not be generated in these rooms and they will be maintained under positive pressure.

The air ventilation calculation includes:

– The volume of air to be ventilated from the shop or storage at an air exchange rate of approximately two exchanges per hour
– The volume of air exhausted from Processing and Residuals Area and Waste Receiving Area at a rate of approximately five exchanges per hour

Estimated Flow Rate Requirements

Building Volumes

Shop/Storage – 2,282 cubic metres (m^3)

Processing and Residuals Area – 7,816 m^3

Waste Receiving Area – 15,661 m^3

Total Volume: 25,760 m^3

Air Exchanges

Shop/Storage – (2,282 x 2 exchanges per hour) = 4,564 m^3/hr

Processing and Residuals Area – (7,816 x 5 exchanges per hour) = 39,082 m^3/hr

Waste Receiving Area – (15,661 x 5 exchanges per hour) = 78,306 m^3/hr

Volume from Previous Rooms

Shop/Storage – 0 m^3/hr

Processing and Residuals Area – 4,564 m^3/hr

Waste Receiving Area – 39,082 m^3/hr

Additional Air Intake Required

Shop/Storage – (4,564 – 0) = 4,564 m^3/hr

Processing and Residuals Area – (39,082 - 4,564) = 34,518 m^3/hr

Waste Receiving Area – (78,306 - 39,082) = 39,224 m^3/hr

Total flow to biofilter = 78,306 m^3/hr

The maximum flow rate to the biofilter is 78,306 m^3/hr. This flow rate will ensure adequate negative pressure.

4.7 Flare

Escarpment Renewables will have an automated back-up flare in the event of bio-gas production in excess of the capacity of the CHP unit and RNG Facility. The flare will combust the biogas or RNG. Combustion of the biogas eliminates odour in the biogas.

5. Operation of Odour Abatement Measures

Escarpment Renewables understands that proper operation and maintenance of the odour abatement measures is essential to the success of the Site, not only to comply with regulatory obligations and to avoid conflicts with neighbors, but also to ensure the continued profitability of the Site. Less biogas translates directly to less renewable energy generation and is therefore a loss of revenue for Escarpment Renewables.

Where possible, Escarpment Renewables will source equipment from local suppliers to ensure that the supplier will be able to assist with the installation, start-up, maintenance, and repair of the equipment in a timely fashion. Where equipment cannot be purchased locally, the necessary training will be provided to Escarpment Renewables staff either on Site or at the supplier's location.

Proper operation of the AD facility, including the odour abatement measures, will result in a AD facility that will not have a negative impact on the neighborhood in which it is installed.

6. Ongoing Site Monitoring

The Site will be inspected on a daily basis to ensure that odours are not a problem. If odours are detected, the following steps will be put in place progressively until the odour is mitigated:

– Confirm all odour mitigation procedures and best practices are followed
– Ensure that the Process Building is maintained under negative pressure
– Inspect outdoor facilities for spills or standing water
– Inspect all piping, pumps, tanks, and other exposed equipment for cracks, leaks, etc.

The Site will maintain spare parts on Site so that in the case of malfunction or maintenance, the repairs can be completed in a timely manner.

7. Complaints Response

Escarpment Renewables design and operating procedures have been developed with the intention of minimizing negative impacts to the surrounding community. However, in the event that complaints regarding the operation of the Site are received, Escarpment Renewables will handle the complaints as follows:

– Escarpment Renewables has an existing complaint log that includes the following information:
  - Weather conditions (wind strength, wind direction, temperature, precipitation)
  - Contact information of the complaint
  - Details of the nature and severity of the complaint
  - Location, time, and date where the problem occurred and any other person to witness or be involved with the event
  - Time, date, and name of Escarpment Renewables/Township/Regional employee who received complaint
  - Any unusual events or activities that were occurring on Site that may have attributed or caused the event which resulted in the complaint
  - Any other information pertinent to the specific complaint
– Coordinate complaint response with MECP staff where there is an exceedance of the MECP legislation limits or a term or condition of the Renewable Energy Approval
– Cooperate with the MECP on voluntary or mandatory compliance instruments and record actions taken in this regard
– Provide complainant with feedback about the problem and how it was rectified, within seven days of the complaint. If the issue cannot be rectified within seven days, Escarpment Renewables will continue to provide the complainant with weekly updates of mitigative actions being taken until the issue is resolved

8. Conclusions

Odour modelling has been performed for the significant sources of odour at the Site. As per the Technical Bulletin “Methodology for Modelling Assessments of Contaminants With 10-Minute Average Standards and Guidelines for Odour under O. Reg. 419/05” dated September 2016; a frequency of exceedance analysis was conducted, and for each modelled year the frequency of exceedance was found to be less than 0.5%; hence the Site is deemed to meet the standard.


Legend
Sensitive Receptor Location
Site Boundary
1 KM Radius
SR1
SR2
SR3
SR4
Sobie Rd
Park Rd S
Kemp Rd E
Mountainview Rd
Walker Rd
Philp Rd
Mud St E
Fairbrother Rd
30 Rd
Church Rd
Konkle Rd
Paper Size ANSI B
0 60 120 180 240
Meters
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N
N
GHD
ESCARPMENT RENEWABLES
424 SOBYE ROAD, GRIMSBY, ONTARIO
ODOUR STUDY REPORT
ODOUR POINTS OF RECEPTION
Project No. 11226032
Revision No. -
Date Nov 23, 2021
FIGURE 1
Data source: Township of West Lincoln Zoning By-Law No. 2017-70, Town of Grimsby Zoning By-law (By-law 14-45), Google Earth Imagery, 07/06/2018

ghd.com

The Power of Commitment

Appendix C

Acoustic Assessment report

Acoustic Assessment Report

424 Sobye Road, Grimsby, Ontario

Escarpment Renewables

August 26, 2024

The Power of Commitment

Ontario

Ministry of the Environment, Conservation and Parks

Acoustic Assessment Report Check-List

Company Name

Escarpment Renewables

Company Address

Unit Number	Street Number	Street Name	PO Box
	424	Sobye Road	

City/Town	Province	Postal Code
Grimsby	Ontario	L3M 0K8

Location of Facility
424 Sobye Road, Grimsby, Ontario

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document “Information to be Submitted for Approval of Stationary Sources of Sound” (NPC-233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact

Company Contact
Peter Lee

Last Name	First Name	Middle Initial
Lee	Peter	

Title	Telephone Number
Site Engineer	289-455-5001

Signature	Date (yyyy/mm/dd)
	2023/11/24

Technical Contact

Technical Contact
Michael Masschaele

Last Name	First Name	Middle Initial
Masschaele	Michael	

Representing	Telephone Number
GHD	519-580-3842

Signature	Date (yyyy/mm/dd)
	2023/11/08

	Required Information	Submitted	Explanation/Reference
1.0	**Introduction (Project Background and Overview)**	☑ Yes	Section 1
2.0	**Facility Description**		
	2.1 Operating hours of Facility and significant Noise Sources	☑ Yes	Section 1
	2.2 Site Plan identifying all significant Noise Sources	☑ Yes	Figure 1
3.0	**Noise Source Summary**		
	3.1 Noise Source Summary Table	☑ Yes	Table 1
	3.2 Source noise emissions specifications	☑ Yes	Table 1/Appendix C
	3.3 Source power/capacity ratings	☑ Yes	Table 1
	3.4 Noise control equipment description and acoustical specifications	☑ Yes	Table 1/Section 5
4.0	**Point of Reception Noise Impact Calculations**		
	4.1 Point of Reception Noise Impact Table	☑ Yes	Table 2
	4.2 Point(s) of Reception (POR) list and description	☑ Yes	Section 3
	4.3 Land-use Zoning Plan	☑ Yes	Appendix A
	4.4 Scaled Area Location Plan	☑ Yes	Figure 2/3
	4.5 Procedure used to assess noise impacts at each POR	☑ Yes	Cadna A/ISO 9613-2
	4.6 List of parameters/assumptions used in calculations	☑ Yes	Section 5
5.0	**Acoustic Assessment Summary**		
	5.1 Acoustic Assessment Summary Table	☑ Yes	Table 3
	5.2 Rationale for selecting applicable noise guideline limits	☑ Yes	Section 5
	5.3 Predictable Worst Case Impacts Operating Scenario	☑ Yes	Section 5
6.0	**Conclusions**		
	6.1 Statement of compliance with the selected noise performance limits	☑ Yes	Section 6
7.0	**Appendices (Provide details such as)**		
	Listing of Insignificant Noise Sources	☑ Yes	Appendix B
	Manufacturer’s Noise Specifications	☑ Yes	Section 4/Appendix C
	Calculations	☑ Yes	Appendix E/Cadna A
	Instrumentation	☑ Yes	Section 4
	Meteorology during Sound Level Measurements	☑ Yes	Section 4
	Raw Data from Measurements	☑ Yes	Appendix C
	Drawings (Facility / Equipment)	☑ Yes	Figure 1

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Project manager	Jason Wilson
Client name	Escarpment Renewables
Project name	ESCARPMENT-Grimsby AD Permitting
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Status Code	Revision	Author	Reviewer		Approved for issue		
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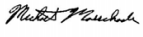
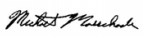
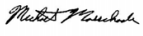
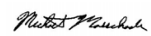
S0	DRAFT	Sam East	Michael Masschaele				
S4	FINAL	Sam East	Michael Masschaele		Michael Masschaele		Jan.25/22
S4	FINAL	Sam East	Michael Masschaele		Michael Masschaele		May 10/22
S4	FINAL	Sam East	Michael Masschaele		Michael Masschaele		Nov.8/23
S4	FINAL	Sam East	Michael Masschaele		Michael Masschaele		Aug.26, 2024

Executive Summary

GHD was retained by Escarpment Renewables (Escarpment) to assess the environmental sound emissions for the anaerobic digestor facility (Facility) located at 424 Sobye Road, Grimsby, Ontario (Site). This Acoustic Assessment Report (AAR) is required in support of the Facility's amendment application to the Ministry of the Environment, Conservation and Parks (MECP) existing Renewable Energy Approval (REA).

The analysis indicates that the cumulative sound emissions of the Facility meet the sound level limits established in accordance with NPC-300 at the nearest residences during the predictable worst-case hour upon implementation of a Noise Abatement Plan.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.2 and the assumptions and qualifications contained throughout the Report.

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Appendices

1. Introduction

1.1 Purpose of this Report

GHD has prepared an updated Acoustic Assessment Report (AAR) for the Escarpment Renewables facility (Facility) located at 424 Sobye Road, Grimsby, Ontario. This AAR has been prepared to support the Facility's Renewable Energy Approval (REA) amendment application to the Ministry of the Environment, Conservation and Parks (MECP). The Facility currently operates under REA (Air & Noise) No. 8541-9HSGG3 that was originally dated February 16, 2012 and was most recently amended April 22, 2020. The updates to the Facility and its acoustic assessment are as follows:

– Updated aerial imagery
– New sound measurements taken of all existing equipment (S1 – S8, S17 – S19)
– Evaluation of a proposed Site expansion including a new organic processing building, a renewable natural gas (RNG) upgrading facility with virtual injection, and additional biogas digestion/storage tanks (S10 – S16)

Escarpment operates an anaerobic digestor (AD) for the purposes of power generation from biogas harvested from biodegradable waste. The proposed expansion will expand the capabilities of the Facility to include the generation of RNG. This RNG will be shipped through a ‘virtual pipeline’ (i.e., by truck) to an injection site for direct injection into an existing natural gas pipeline. The Facility operates up to 24 hours per day, 7 days per week and 52 weeks per year under the North American Industry Classification System (NAICS) Code 562210 – "Waste Treatment and Disposal".

This AAR provides an evaluation of the potential noise impacts at the sensitive receptors located nearest to the Facility. The AAR was prepared consistent with the following MECP guidance:

– NPC-103, "Procedures", August 1978
– NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October 1995
– "Basic Comprehensive Certificates of Approval (Air), User Guide, Appendix A - Supporting Information for an Acoustic Assessment Report or Vibration Assessment Report Required by a Basic Comprehensive CofA prepared by the Environmental Assessment and Approvals Branch, Version 2.1, March 2011"
– NPC-300, "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning", August 2013

The Facility is located on Agricultural zoned land. The land immediately surrounding the Facility in all directions and all sensitive receptors are also zoned Agricultural. The land north of the Facility is a subset of agricultural zoning called Specialty Crop which does not permit residential development on existing lots zoned specialty crop per the Town of Grimsby By-Law No. 14-45. As a result, this land does not include any vacant lot receptors. A zoning map and zoning definitions are provided in Appendix A. A site plan is provided on Figure 1. The Facility is in an Acoustical Class 3 area defined by NPC-300 as rural areas with an acoustical environment that is dominated by natural sounds having little or no road traffic. Topographical changes in terrain surrounding the Facility are reflected in the acoustic model.

2. Noise Source Summary

This AAR focuses on the sound emissions from the significant noise sources identified at the Facility with the potential to adversely impact the sensitive receptors. The significant noise sources are identified in the Noise Source Summary Table 1 and the locations are identified on Figure 1.

For clarity, modelling IDs are consistent with the Emission Summary Dispersion Modelling (ESDM) report. Noise-only sources have been identified using an alternate naming method.

As mentioned in Section 4 of this report, GHD has modelled all the significant proposed noise sources associated with the Facility expansion based on provided manufacturer specifications or sound level data that is considered representative of the equipment based on size and power rating. Prior to finalization of equipment selections, equipment specifications (including sound level data) should be reviewed to ensure they are within the "not-to-exceed" sound levels specified in this AAR.

Onsite transport truck activities for shipping and receiving is summarized below:

Type of Vehicle	Day 7 AM- 7 PM (Trips/hour)	Evening 7 PM- 11 PM (Trips /hour)	Night 11 PM- 7 AM (Trips /hour)
All Truck Traffic (Processing Area, Liquid Loading, RNG, Residuals, Digestate)	10	3	3

These modelled truck traffic volumes are greater than what is stipulated in the design and operations report. This has been done to account for the occasional hour where higher than expected truck traffic may occur and to allow for future growth and expansion of the Facility.

In additional to the steady-state noise sources associated with regular operations, the Facility has one emergency generator (source Emg_1) which is tested monthly for routine maintenance during daytime hours only, for up to 1 hour.

The Facility is not a source of impulse noise or vibration.[1]

The significant equipment sources are all either trucking related activities, rooftop equipment, or outdoor equipment located beside the building. The Facility does not have any significant interior noise sources resulting in breakout noise anywhere from the building other than the bay doors modelled. The existing buildings at the Facility are made of standard industrial construction materials. The other noise sources at the Facility have not been included since they are considered insignificant contributors to the overall Facility noise level at the sensitive receptors. A summary of insignificant noise sources is provided in Table B.1 of Appendix B.

3. Point of Reception Summary

The identification of appropriate sensitive point(s)-of-reception (POR) is necessary to conduct the AAR for the Facility. A POR is any point on the premises of a person where sound, originating from other than those premises, is received. The POR may be located on permanent or seasonal residences, nursing/retirement homes, rental residences, hospitals, campgrounds, schools, or places of worship.

The objective of this AAR is to determine the predictable worst-case 1-hour equivalent sound level (1-hour Leq) at the worst-case PORs. The worst-case PORs are defined as the sensitive receptors with the greatest potential exposure to the Facility noise sources due to proximity and direct line-of-sight exposure. The worst-case sensitive POR(s) are:

– POR1 – nearest façade of a two-storey residence on Park Road South approximately 400 m west of the site (4.5 metres [m] above grade [AG])
– POR2 – nearest façade of a two-storey residence on Sobye Road approximately 450 m west of the site (4.5 m AG)
– POR3 – nearest façade of a two-storey residence on Sobye Road approximately 500 m west of the site (4.5 m AG)

[1] Assessment of vibration if applicable is assessed according to NPC-207.

– POR4 – nearest façade of a one-storey residence on Sobye Road approximately 500 m east of the site (1.5 m AG)
– POR5 – nearest façade of a two-storey residence on Mud Street East approximately 800 m south of the site (4.5 m AG)
– POR6 - nearest façade of a one-storey residence on Park Road South approximately 500 m northwest of the site (1.5 m AG)

The location of the worst-case PORs are identified on Figure 2.

In accordance with NPC-300 all PORs locations within 500 m of the Facility were considered including the planes of windows which were assessed for daytime and night time noise limits. In addition, the ground level amenity areas, within 30 m of each POR, were also evaluated for daytime noise limits; however, the noise impact at the worst-case and most exposed PORs are presented herein. GHD also evaluated the zoning surrounding the Facility to identify any potential vacant lots that permit a residential build and has included all relevant PORs.

4. Sound Level Data

4.1 Short Term Steady State Sound Level Measurements

Short-term sound level measurements of the existing equipment and operations were necessary in order to assess the worst-case potential noise impact at the PORs.

Short-term sound level measurements were taken using a Larson Davis LxT System inclusive of a Type 1 Precision Sound Level Meter (SLM), (Serial Number 001181); and a 50-mm (1/2-inch) free field condenser microphone Model 4189 (Serial Number 318571). The SLM was calibrated and checked at 114 decibels (dBA) before and after each measurement period using a Larson Davis CAL200 Acoustic Calibrator (Serial Number 2477782).

The sound descriptor used in the impact evaluation for the Facility noise sources is the 1-hour Leq, which is a time weighted energy average of the source. The Leq sound measurements consisted of short-term readings taken over an observation time of 15-second intervals with the detector in slow response using A-weighting, such that the sound levels are reported in units of dBA. All measurements were recorded and stored in the SLM. In accordance with NPC-103 "Procedures", August 1978 (NPC-103), at least three measurements were taken for each of the Facility noise sources.

Sound level measurements were taken at a reference distance depending on the height of the sources being measured and proximity to other noise sources. The location and reference distance were selected to ensure that the reference measurement was a valid representation of the dominant sources being measured. The measurement location was selected in order to measure the sound emitted in the direction of the worst-case exposure in line with the nearby sensitive receptors wherever possible and/or to minimize the influence of other noise sources and directivity issues.

Sound level measurements were conducted on June 21, 2021. Meteorological conditions consisted of low winds (<20 km/hr), low humidity, and minimal precipitation during the time measurements were conducted.

4.2 Manufacturer or Previously Published Sound Level Data

Estimated sound levels for the proposed equipment is based on GHD noise source library or client supplied manufacturer specifications were used to evaluate the worst-case potential environmental noise impact based on the equipment lists, design data and equipment ratings and design concept available at the time that this AAR was being prepared.

The quantitative sound power level and sound pressure level data documented in this AAR for the proposed equipment must be considered the maximum allowable design values that cannot be exceeded. If any of the proposed noise sources are tonal in character (i.e., prominent or discrete tone, whine, screech and/or hum), a 5 dB tonality penalty should be subtracted from the sound power level and sound pressure level data documented in this AAR, as required under NPC-104. The published reference sound level data or manufacturer specifications used in this assessment are presented in Appendix D.

Where no octave band data was available for equipment sound level, the impact was estimated using the single sound power level for the 500 Hz octave band, as outlined in ISO 9132-2, "*Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Methods of Calculation, 1996"* (ISO 9613-2).

The following assumptions and noise control measures were used to complete the assessment:

– Equipment list, locations and specifications were based on the development concept and figures/information provided by Escarpment Renewables.

– **RNG Facility Inlet Compressor (S15)** is assumed to be a 75-horsepower (hp) 1,800-revolution per minute (RPM) compressor. Sound levels for a 75-hp compressor referenced from Hoover and Keith Noise Control for Buildings and Manufacturing Plants, Electric Motors, Table 7-12:

Octave Band (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	LwA
Sound Power Level (dB)	92.0	87.0	87.0	86.0	89.0	92.0	92.0	90.0	87.0	108.6

This is a maximum allowable sound level limit.

– **RNG Facility Outlet Compressor (S12A & S12B)** - There will be 2 duplex compressor units to compressor the renewable natural gas before storing it in a transport truck. These compressors will have a sound power level of 105.5 dBA (equivalent to 85 dBA at 10 feet) as stipulated by the vendor supplying the equipment:

Octave Band (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	LwA
Sound Power Level (dB)	99.9	94.9	94.9	93.9	96.9	99.9	99.9	97.9	94.9	105.5

– **RNG Facility Chillers (S13A & S13B)** – There will be 2 chiller units associated with the operations of the RNG Facility. These chillers will have a sound power level of 91.6 dBA (equivalent to 63 dBA at 33 feet) as provided by the manufacture and included in Appendix D:

Octave Band (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	LwA
Sound Power Level (dB)	85.6	102.7	97.7	93.0	88.9	85.7	81.4	74.5	68.3	91.6

– **Organic Processing Turbo Separators (Indoor Noise Source S16A - S16F)** -There will be 2 turbo separators inside the organic processing facility for the purposes of processing and sorting incoming waste. These separators will have a sound power level of 101.3 dBA (equivalent to 90 dB at 5 feet) as provided by the manufacture and included in Appendix D:

Octave Band (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	LwA
Sound Power Level (dB)	50.5	67.7	81.7	91.5	92.9	96.1	97	91	83.1	101.3

The noise data is provided in Appendix C and summarized in Table C.1 with drawings and specifications provided in Appendix D.

4.3 Indoor Noise Sources

Mechanical equipment and processes inside the buildings transmit sound to the environment through the building shell (i.e., walls and roof), as well as through ventilation openings and doorways. The amount of noise that passes through the building shell depends on the building's sound transmission loss characteristics as defined by the materials used and the workmanship of the wall and roof construction.

For this assessment, GHD has used the preliminary construction details provided for the building walls and roofs to determine if the proposed construction would require an evaluation of the noise emitted from building wall/roof element. Based on a review of the wall/roof elements and the separation distance to the nearest residential areas, the proposed construction materials are considered to have enough mass (concrete block/high density wall panels) to ensure that there would be no breakout noise through the building structure for most buildings.

For remaining buildings with potential noise emissions from the building or ventilation points GHD has used estimated standard industrial construction materials for these buildings' walls and roofs as detailed. Building walls and roofs will be constructed using typical sandwich-type flat insulated metal panel construction which is assumed to be conservative.

Any windows and/or door openings can be assumed to be closed at most times as the buildings are under negative pressure.

4.3.1 Organic Processing Building – Open Bay Doors

The organic processing building includes the following indoor noise sources:

– Two Turbo Separators (101.3 dBA)
– Fice Idling Trucks (99.5 dBA)
– One Front End Loader (109.5 dBA)

Despite the fact that the building is under negative pressure meaning the bay doors will be kept closed most of the time, they have been modelled as open for a conservative evaluation and to give the Facility flexibility in operations if necessary.

The sound power level data assigned for all indoor equipment was used to calculate the indoor noise potential for the buildings. Noise coming through the open bay doors were modelled as vertical area sources. GHD expects that the Facility will provide GHD with updated equipment selections and specifications following final selection of any proposed equipment to confirm that the noise levels meet the maximum not to exceed noise criteria as specified in this AAR by proper selection or equivalent noise mitigation measures.

A detailed summary of sound power levels in full octave band centre frequencies for the indoor equipment is presented in Table C.1 of Appendix C.

5. Assessment Criteria

Assessment criteria may be determined for a POR based on the MECP's minimum exclusionary sound level limits, as presented in Table B 1 of NPC-300, in comparison to the background sound levels experienced in the area. The "background sound level" is defined as the sound level present in the environment that is produced by noise sources other than those from the Facility and would include traffic sound levels and sound from neighbouring industrial/commercial activity. The higher of the two assessment criteria is selected for purpose of assessment.

5.1 Sound Level Limits for Stationary Noise Sources

5.1.1 MECP Standard Limits

NPC-300 defines stationary noise sources as sound from all sources that are normally operated within the property lines of a facility. The noise impact from stationary sources is evaluated based on operations during a predictable worst-case hour. Stationary noise assessment criteria are generally determined based on the MECP's minimum exclusionary sound level limits, as presented in NPC-300, in comparison to the background sound levels experienced in the area.