Odour Study Report

Grimsby Anaerobic Digestion Site

ESCARPMENT RENEWABLES

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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.

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

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ESCARPMENT RENEWABLES
424 SOBYE ROAD, GRIMSBY, ONTARIO
ODOUR STUDY REPORT

Project No. **11226032**
Revision No. **-**
Date **Nov 23, 2021**

ODOUR POINTS OF RECEPTION

FIGURE 1

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Print date: 23 Nov 2021 - 13:32

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

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The Power of Commitment