Coronation Organics Processing Centre & Anaerobic Digester

Design and Operation Report ECA Application

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EXECUTIVE SUMMARY

This Design and Operation Report is submitted as part of the Ministry of the Environment, Conservation and Parks (MOECP) Environmental Compliance Approval (ECA) application. This report details the design and operation of the proposed Coronation Organics Processing Centre and Anaerobic Digester that is to be owned and operated by 2683517 Ontario Inc. in Scarborough, Ontario. This report covers a range of topics related to the safe and environmentally sound operation of the facility.

The facility consists of two parts, an Organics Processing Centre (OPC) and Anaerobic Digester System. The facility is designed to work together to process and transfer organic residues for the generation of renewable natural gas and organic fertilizer (digestate). The OPC is designed to be able to provide clean organics for the anaerobic digester system or for export from site. The anaerobic digester system uses the clean organics to generate renewable natural gas for injection into the existing natural gas grid and digestate for export from site for use as an organic fertilizer.

The Design and Operation Report provides an updated description of the facility and the associated drawings. Following this description, details regarding the types of feedstocks that will be used at the facility are provided. The report proposes testing requirements that will ensure the production of high quality digestate for use as an organic fertilizer.

This report proposes record keeping for the facility and provides a summary of site monitoring to ensure environmental protection of air, land, and water surrounding the facility. A decommissioning plan is laid out for the facility for the end of life of the project. Lastly, descriptions of the additional plans that have been created for the facility are provided.

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1.0 Facility Description

2683517 Ontario Inc. is developing an organics processing facility and anaerobic digester system in Scarborough, Ontario. The facility is located at 633 Coronation Drive in Scarborough, Ontario (43°45'57.1"N, 79°09'38.7"W). The proposed Facility is a waste processing, resource recovery and disposal facility that uses anaerobic digestion to convert organic residues to biogas for generation of renewable natural gas and organic fertilizer.

The Facility is currently permitted via ECA Number 4568-AJTR84 is held by Optimum Environmental Corp. The existing permit includes construction and demolition (C&D) and organics processing on the same permit but as the operation of these two processes is different and that they operate independently of one another, it is requested that the Permit be split into two separate ECA Permits. The only shared equipment between the two facilities will be fencing and gates, the weigh-scales that are used to weigh trucks as they enter and exit the property and the roads on the site. All other activities are separate. This Design and Operation Report is for the Coronation Organics Processing Centre and Anaerobic Digester to be owned by 2683517 Ontario Inc. As such this Report is part of a new ECA permit application.

The Organics Processing Centre (OPC) is designed to process up to 1240 metric tons per day of organics. Of this material, the anaerobic digester system can process up to 620 metric tons/day. Note that any reference to ton in this application is metric tons. Any organic material that is processed through the OPC that is not used as feedstock to the anaerobic digester will be exported from the site to other operating anaerobic digester facilities or other appropriately permitted facilities.

The anaerobic digester system will use processed organic residuals from IC&I and SSO material to produce renewable natural gas (RNG) for injection into the natural gas grid and digestate for use on agricultural land.

Appendix A contains site plans for the facility. The site plan provides the following information:

- Location of the facility
- On-site roads, access routes and public roads and walkways
- Property lines
- Layout of all equipment associated with the facility such as buildings, tanks and equipment
- Surrounding features including natural features such as water bodies
- Fencing and paved areas
- Lot elevations

1.1 Land Use

The lot is currently zoned as heavy industrial where both organics processing and anaerobic digestion are allowable land use activities. The site is located within a heavily industrialized area on Coronation Drive in Scarborough. The site was previously used for a variety of processing operations. Since processing ceased, environmental remediation was undertaken and completed; the site has approval from the Ministry of Environment, Conservation and Parks to proceed with design and construction for the proposed facility.

The surrounding area contains mostly flat topography with Lake Ontario to the South of the facility (prevailing wind from the north-east and north of the facility). The area is comprised of heavy industrial zoning. The site is connected to City sewer and water.

Drawing AD- SP-1 (Appendix A) shows the location of the facility and surrounding land. To the south of the facility is an active railway line with East Point Park and Lake Ontario to the south of the railway. To the east, west and north of the facility are other industrial activities with heavy industrial zoning designations.

The nearest residential area is located approximately 440 meters away to the north of the facility.

1.2 Site Security

The facility is enclosed with a fence and two gates (one for incoming trucks on the west-side of the lot and one for outgoing trucks on the east-side of the lot which are closed except during a delivery. Truck drivers require a passcode to open the gate to enter the facility and there is an intercom system to allow for communication between the driver and the operations staff at the facility.

The facility will operate continuously (24 hours a day, 7 days a week, 365 days per year). This allows for delivery of feedstock and export of digestate when there is less traffic and will decrease congestion at the site. Operation staff for the facility will be on-site continuously.

To increase site security, the facility will have signage notification for truck traffic delivery showing the routes they should travel onto and off of the facility. A weigh scale is located at both the entry and exit to the facility to weight incoming and outgoing trucks. See drawing *OPC-SP3* (Appendix A) for the location of the weigh-scales and the truck traffic route.

2.0 Process Description

Site Plan drawings for the facility are located in Appendix A. Included with the Site Plan drawings, there is an Organics Processing Centre Process Schematic (Drawing OPC-G1) and a Mass Flow for the AD Facility (Drawing AD-G2); these can be referenced while reading the process description.

All mass units used throughout this report are metric tons.

2.1 Organics Processing Centre (OPC)

The OPC will accept up to 452,600 tons per year (an average of 1,240 tons per day) of putrescible and non-putrescible organic residues for processing, use in the anaerobic digester, and transferring off-site. An average of up to 620 tons/day of cleaned organic residuals will be used as feedstock in the anaerobic digester system (see Section 2.2).

A Layout of the OPC is shown in diagram OPC-SP1, OPC-SP2, OPC-SP3, and OPC-G-1 (Appendix A). These drawings should be referenced while reading the description below.

All deliveries of organic residues are processed through the OPC. When trucks enter the site they follow signage to the OPC. On route to the OPC, the trucks are weighed prior to delivery, trucks are weighed again prior to exiting the facility (OPC-SP3 shows the approximate location of the weigh scales). The OPC is a fully enclosed building that is equipped with fast acting doors and air curtains to mitigate odour escape from the facility when trucks enter and leave the facility. All of the air in the building is continuously drawn from the building and cycled through an odour control unit to ensure that all air within the building is treated prior to recirculation into the building or discharge to the environment. The bay doors will remain closed except for when a truck is entering or exiting the building. Trucks are washed down in the OPC prior to exiting the building.

Non-putrescible organic waste that is brought to site to be processed will be processed within 72 hours of receipt. Loads of putrescible organic wastes will be processed within 24 hours.

It is anticipated that approximately 20 m^3 fresh water/day will be used in the OPC for washing delivery trucks and cleaning within the building. All wash water is drained into the 50 m^3 surge tank and used within the process, eventually being treated within the anaerobic digester system. Drawing OPC-CM2 indicates the location of the drainage points in the OPC.

There is no permanent storage of material at the Site. All processed recyclable material will be collected into 50 yard bins and removed from site when the bin is full. Non-recyclable residual waste, requiring disposal, will be collected into 50 yard bins within the building and removed from site to an appropriate location when the bin is full. It is anticipated that approximately 5-20% (approximately 62 - 248 tpd) of what is brought to site will be removed from the site as inorganics. This is approximately truck 2 - 7 loads per day (34 ton trucks). It is not anticipated that there will be 20% inorganics brought to site on a regular basis – we expect to see this value if source separated organics containing diapers are brought to site (this is not anticipated during start-up and the MECP will be notified if or when SSO containing diapers will be brought to site).

All material that is delivered or exported to/from the site is brought to the OPC as follows:

- Bulk Liquid Receiving (OPC-SP1, Area J)

  Bulk liquids are either received or shipped in the Bulk Liquid Receiving Bay. Bulk liquid deliveries are directed to the 50 m^3 Surge Tank or the Hydrolyzer. Bulk liquids can also be pumped to a truck from the Hydrolyzer for export from site if required.

- Truck load receiving for roll off containers and tractor trailers (OPC-SP1, Area B)

  Truck loads will be unloaded on the tipping bay where the material will be broadcast (OPC-SP1, Area C) in order to allow for visual inspection of undesired materials such as piece of steel or materials that cannot be processed through the separator equipment; these types of items will be placed aside for disposal in the roll off bins adjacent to the tipping floor (OPC-SP1, Point 3).

  The inspected loads will be processed in the Depack and Fractionation Process Area (OPC-SP1, Area H). In this area, material is loaded into the separators (OPC-SP1, Point 1, Area H) where plastics and other inorganic materials are removed. The slurry recovered from the separators into the 30 m^3 Surge Tank (OPC-SP1, Point 8) and is further processed through a grit removal system (OPC-SP1, Points 4) prior to being pumped to the Hydrolyzer.

  Reject materials are stored in compactor bins adjacent to the tipping floor (Drawing OPC-SP1, Point 3).

- Dock receiving for Intermediate Bulk Containers (IBCs) (OPC-SP1, Area F)

  The dock receiving area provides opportunity to manage small to medium sized loads as well as specialty loads such as palletized out of date goods. The dock area is managed by forklift unloading and sorting. Feedstocks received in one of the three docks are sorted in the elevated sorting floor (Drawing OPC-SP1, Area G).

  Where possible loads will be directed to the separators (OPC-SP1, Area H), otherwise unsalvageable goods will be directed to either a bin (OPC-SP1, Point 3) or the Bulk Solids Loading Bay (OPC-SP1, Area I) for export from site to an appropriate location. Canned goods such as juice, soft drinks and soup will be processed in a Vecoplan separator (Drawing OPC-SP1, Point 6); the metals will be recovered for recycling (collected in OPC-SP1, point 3) while the liquids will be pumped to the 50 m^3 Surge Tank. Liquids in the Surge Tank can be combined with solids in the separators to produce a slurry suitable for anaerobic digestion or can be pumped directly into the Hydrolyzer.

- Digestate Export (OPC-SP1, Area A)

  Digestate is exported from the facility in a covered exterior loading area where digestate is loaded into the liquid trucks via a cam-lock connection. This area has a concrete floor and is equipped with truck wash-down capabilities and has a slopped floor with drainage in case of spill (see drainage plan on OPC-CM2).

- Isolation Capable and Quarantine Bay (OPC-SP1, Area E)

  The OPC is equipped with an area for organics residues that require Canadian Food Inspection Agency inspection prior to use as a feedstock in the anaerobic digester.

- Bulk Solids Loading Bay (OPC-SP1, Point I)
  Bulk solids that will not be used in the anaerobic digester facility can be exported from site at Point I in the building. The area is accessible from Area G in the OPC via a knee wall. This allows for export of solids from the facility.

- Bin Removal (OPC-SP1, Point 3)
  When bins are full of reject material, they are exported from the site via one of four access doors that are indicated on Drawing OPC-SP1.

The 50 m^3 Surge Tank is located within the Organics Reception Building and is used to allow for fluid movement of feedstocks within the Facility and pumps directly to the Hydrolyzer Tank.

2.2 Anaerobic Digestion

A maximum of 620 tons per day of organics from the Organics Processing Facility can be processed in the Anaerobic Digester Facility – via the Hydrolyzer Tank, Anaerobic Digesters, and Biogas Upgrader.

Organics can be transferred to the 4,000 m^3 Hydrolyzer Tank from the Organics Processing Facility Liquid Surge Tank (OPC-SP1, Point 7), directly from a delivery truck (OPC-SP1, Area J) or immediately after being processed through the Organics Processing Facility (OPC-SP1, Point 4). Material can also be removed from the Hydrolyzer Tank for removal of material from the site if required. The Hydrolyzer Tank is used to pre-treat all of the feedstocks prior to use in the anaerobic digesters (AD). The Hydrolyzer Tank operates at 40 degrees Celsius within the pH range of 5 - 6 in order to facilitate the breakdown of feedstocks and to increase the efficiency of the treatment process in the anaerobic digesters. For emission control purposes, the headspace of the Hydrolyzer is connected to the headspace of the ADs.

There are two 7,000 m^3 completely mixed anaerobic digesters which will process up to 620 tons/day of organic feedstocks that are brought to the site, producing biogas and digestate (organic fertilizer). On a daily basis, approximately 2,800 Nm^3 of biogas/hour (1,680 Nm^3 of renewable natural gas/hour) and 560 tons/day of digestate will be produced by the anaerobic digester.

The anaerobic digesters have a two-stage configuration within one tank; the first stage (approximately 6,200 m^3) does the bulk of the conversion from feedstock to biogas and is a completely mixed AD type. The second stage (approximately 800 m^3) is for polishing/final biogas recovery stage with a short residence time and operates is a plug flow AD type. A schematic of the ADs configuration is shown in drawings AD-A5 and AD-A6 (Appendix A). The anaerobic digesters will operate at a minimum temperature of 35 degrees Celsius and are designed to be able to operate in either the mesophilic or thermophilic temperature range. As explained in further detail in Section 3.1 of this Report, if source separated organics that contain diapers are eventually accepted on-site, using the second stage of the AD as a pasteurizer will provide the required pasteurization for land application of the final digestate. The second stage of the AD would provide a temperature of 50 degrees Celsius for greater than 20 hours of time.

Digestate is pumped to the truck filling station (OPC-SP1, Area A) or Hydrolyzer Tank (to adjust pH or solids content in the Hydrolyzer Tank if required) by adjusting valves. The intention is to continuously transfer digestate off-site where the digestate will be stored until it is land applied as an organic fertilizer.

The membrane roof of the anaerobic digesters is a double membrane roof which provides biogas storage and insulation. The outer membrane is inflated into a fixed position while the inner membrane is flexible in order to store biogas. This membrane is approved for use with biogas and is essentially impermeable to methane gas. As such there is no methane released from the digester to the atmosphere through the digester membrane.

Biogas is composed of approximately 60% methane, 40% carbon dioxide and trace impurities. The anaerobic digestion process generates hydrogen sulphide (H_2S) which will be less 500 ppm H_2S during regular operation of the digester. The anaerobic digesters are designed to be able to inject small quantities of oxygen (less than 0.2%) into the biogas zone to aid in biological desulphurization of the biogas in the anaerobic digester tanks. If hydrogen sulphide is above 500 ppm H_2S, ferric chloride or ferric hydroxide can be added to the digester to convert H_2S to $Fe_2(SO_4)_3$ which is contained in the digestate. During standard operation, hydrogen sulphide is removed from the biogas prior to the biogas being upgraded to renewable natural gas (over 98% methane content) which is injected into the natural gas grid. See Section 2.4.2 below for additional details.

The heat required to run the facility is generated through the use of natural gas boilers. The electricity required to run the facility comes from existing three phase power at the site.

The standard operating pressure in the anaerobic digesters is 2" of water column (0.5 kPa). All of the biogas that is produced is piped directly to a biogas upgrader system to create renewable natural gas for injection into the natural gas pipeline. Should the digester pressure increase to 4" of water column (1 kPa), the operator of the digester will receive high pressure alarm warnings of the increase in digester pressure and all digester input processes are automatically stopped until the digester pressure returns to normal operating conditions.

In the event that the digester pressure continues rises above 4" of water column (1 kPa) the digester is designed with safety measures in place to reduce the digester pressure. The first safety measure is a flare that is sized to combust the biogas generated on-site (with a safety margin). The second safety measure is that if digester pressure continues to raise to 5" of water column (1.25 kPa) a pressure relief valve (PRV) will quickly release pressure in the anaerobic digester. The PRV is a mandatory safety measure required at all anaerobic digester facilities.

2.3 Genecis Demonstration Plant

As part of the overall project, the facility will host Genecis Bioindustries Inc. (Genecis) on-site where they will have a pilot scale facility to convert organic waste into PHA-bioplastic. Currently Genecis is located at this site with a lab-scale facility that converts 200 kg of organic waste into bio-plastics. Their intention over the next three years is to increase the throughput of their lab scale equipment to process up to 3 tons of organic waste/week at the facility (0.07% of the throughput of the AD facility). It is anticipated that they will work closely with the facility during the three years that they are on-site to scale-up their process.

Their process is comprised of six major processing areas in the Genecis' patent-protected organic waste conversion process to PHA. The steps are as follows:

- Pretreatment: Raw organic waste is sorted to remove traces of inorganic material and ground down to a fine and consistent particle size. Water is added to the mixture.
- VFA Fermentation: The organic-water mixture is placed into a tank containing a proprietary mixed culture of anaerobic bacteria that breaks down the organic particles, converting them into volatile fatty acids (VFAs)
- VFA Broth Filtration: Post-VFA fermentation the liquid mixture, called fermentation broth, is filtered through a membrane, removing remnant solid particles and bacteria debris. Solid material is filtered out and further processed into compost.
- PHA Fermentation: The filtered fermentation broth, containing VFAs, is pumped into a tank containing a second proprietary mixed culture of aerobic PHA-producing bacteria. These bacteria use the VFAs as building blocks to produce PHA polymers
- PHA Extraction: Post-PHA fermentation and production, the PHA producing bacterial cells are broken open in order to extract the bioplastics. Afterwards, several washing steps are performed to remove cellular material and isolate PHA polymers.
- Storage: Clean PHA cells are dried and stored in a controlled environment. The end product is high quality PHA bioplastic powder which is ready to be moulded into a variety of plastic products.

During scale-up, measures will be put in place to ensure that the odour management plan grows with them as their process grows. It is anticipated that they will use a combination of physical barriers, activated carbon filters and wet scrubbers to ensure odour control in their facility. Given that the project

is currently at a lab-scale, the odour control mechanisms will be implemented as the processing grows on-site.

2.4 Odour Control

The control of odours from the facility is crucial to the long-term success of the facility and its integration into the existing industrial area. Below is an outline of the odour control measures at the facility. These are expanded upon in the Emissions Summary and Dispersion Modelling (ESDM) Report.

2.4.1 Organics Processing Centre

In order to control odours related to the reception of organic residues, all deliveries are made within a closed reception building. When a delivery is brought to the OPC, a fast-acting bay door will open and the truck backs up into the receiving bay (OPC-SP1, Area B), the bay door closes prior to a delivery being unloaded. The bay door remains closed except for when a truck is coming or leaving the site. The bay doors are equipped with an air curtain that delivery trucks must drive through when entering and exiting the building which acts as a barrier to fugitive odour emissions.

Odour control for the 28,000 ft^2 (2,601 m^2) building consists of a carbon filter that is sized to process 62,500 ft^3 air/min (106,188 m^3 air/hour). The scrubber system contains 21,146 kg of Sulfursorb-A media for odour control and air treatment. On the exhaust-side of the activated carbon filter, the air is monitored continuously for hydrogen sulphide using continuous emissions monitoring (CEM) to ensure odour control. In addition to the use of the CEM hydrogen sulphide sensors, sniff tests and a daily site walk around are part of ensuring adequate odour control on-site. The activated carbon filter is sized to provide 1.5 years of air treatment, although the lifespan of the filter will vary depending upon the nature of the feedstocks being received at the facility.

The scrubber is designed to provide continuous air treatment even during media change out. The scrubber is subdivided length-wise so that each side can work independently from one another. During carbon change out, one side is shut down for media change-out while the other side remains in operation with a lower flow. Once change-out has occurred, air flow would be switched to the other side. Spent media is removed and landfilled appropriately. The replacement of media within the scrubber is contracted to a third party and is required to be done within 24 hours of notification of breakthrough in the media.

The air intake and return diffusers for the odour control system for the building are indicated on Drawing OPC-OC1. Following ASHRAE Guidelines, 1 ft^3/min per square foot of building must be removed from the building, as such a total of 28,000 ft^3/min (47,572 m^3/hour) of treated air will be discharged from the building, the remaining 34,500 ft^3/min (58,616 m^3/hour) will be recycled back into the building.

All water that is used to wash down trucks and equipment drains into the 50 m^3 Surge Tank. The drainage plan for the OPC is shown on Drawing OPC-CM2 (Appendix A).

2.4.2 Anaerobic Digester System

The headspace of the Hydrolyzer Tank and the ADs are connected and any odours generated in either tank are treated together as part of the biogas pre-treatment system of the biogas upgrader. Gas generated in Hydrolyzer Tank (approximately 140 m^3 CO_2/hour) and biogas generated in the ADs (approximately 2800 m^3 biogas/hour) are treated via the biogas upgrading system. The gas that is captured in the anaerobic digesters will contain up to 500 ppm H_2S. Due to the connection of the headspaces it is anticipated that the biogas will also contain some mercaptans.

For odour control and to clean the raw biogas prior processing in the biogas upgrader, the raw biogas is pre-treated prior to being upgraded to renewable natural gas using an H_2S and mercaptan scavenger called Sulfatreat. The odour control system is designed with continuous emissions monitoring (CEM)

technology to monitor hydrogen sulphide concentration to ensure continuous treatment of air. The system has two scrubbers to be able to provide continuous biogas pre-treatment in the event of breakthrough of H_2S in the treatment media – when breakthrough is detected in one scrubber, gas will be treated in the second scrubber to allow for spent media change out. The replacement of media within the scrubber is contracted to a third party and is required to be done within 24 hours of notification of breakthrough in the media.

2.5 Secondary Containment

The facility is designed to ensure environmental protection, including secondary containment at the facility. The structural design will be performed using the data provided in the Geotechnical Report provided by Soil-Mat Engineers and Consultants Ltd., date June 7, 2019 (Appendix B). The Structural Engineer will provide stamped drawings which conform to the most recent codes and standards including the National Building Code of Canada, the Ontario Building Code 2012 (including all amendments) as well as Municipal Bylaws.

In the OPC the concrete floors will include a Xypex additive (Appendix C) to prevent corrosion. Material is not stored within the OPC, rather it is processed and immediately transferred off-site or to the transferred to the Hydrolyzer Tank. The hydrolyzer tank is also constructed using the Xypex additive to protect against corrosion.

The Hydrolyzer Tank and AD Tanks include secondary containment in their design that complies with O.Reg 267/03. This regulation requires secondary containment equal to 110% of the volume of the above ground portions of the tanks. Secondary containment for these two tanks is in the form of an impermeable membrane that runs underneath the tank and up the walls of the tank on the outside of the tank insulation. Between the membrane and the wall of the tank, there is a leak detector sensor that is connected to the SCADA system for the anaerobic digester system. Directly beside the impermeable membrane is an external retaining wall to support the impermeable membrane. The monitoring well allows for inspection to determine if there is leakage from either of the tanks. Details regarding the secondary containment as shown on drawing *SC Secondary Containment* (Appendix A).

The details below describe the leak monitoring plan:

- Both the Hydrolyzer and AD tanks are equipped with level sensors to monitor the level in the tanks. The level sensors are connected to the SCADA system which provides alarms when various appropriate low or high levels are reached. A steady or rapid decrease in a tank would be alarmed to the operator of the facility.

- The monitoring well that is between the membrane and the insulation of the will be used to monitor the water quality and to determine if there is a leak within any of the facility tanks or reception pits. The leak detection equipment is connected to the SCADA for the AD system.

- Water in the monitoring will that moves water away from the footings of the building and tanks will be visually inspected on a daily basis to determine if there is an odour or change in appearance of the water. The results of the inspection will be recorded daily and kept on-site.

- If a leak is detected immediate action will be taken to ensure protection of water quality and to determine and fix the source of the leak. The leak would be reported to the MECP immediately. All of the actions taken would also be recorded and kept on-site.

3.0 Feedstocks and Products

This section of the report provides details pertaining to the feedstocks that will be used at this facility.

3.1 Type and Origin of Feedstocks

It is expected that the OPC will receive approximate 452,600 tons/year of material (1,240 tons/day) which will be distributed non-subject "municipal (non-hazardous)" and non-subject "other liquid waste" materials (see ECA Application, Section 5.4.1). The non-hazardous municipal residues include industrial, commercial and institutional (IC&I) and source separated organics (SSO) and the other liquid waste residues include processed organics and waste from food processing/preparation operations.

Feedstocks will be sourced within the province of Ontario, the majority of which are expected to be sourced from within a reasonable transportation radius of the facility. The volume distribution of feedstocks will be determined as supply contracts are finalized.

The materials accepted at the OPC will not include human bio-solids. At some point, the facility may decide to accept SSO material that could possibly contain diapers. It is not anticipated that SSO with diapers will be accepted at the start-up and commissioning of the facility. If it is decided that these SSO materials that require pasteurization will be accepted at the facility, the MECP will be notified prior to receipt of the change in process. This change in process will require that the second stage of the anaerobic digesters are operated in the thermophilic range in order to meet the pasteurization requirement of 50 degrees Celsius for 20 hours.

3.2 Site Storage of Feedstocks

The following tanks provide storage for feedstocks for the anaerobic digesters:

- 2 above ground surge tanks within OPC building (30 m^3 and 50 m^3), temporary storage to aid with flow of feedstock on-site
- 4,000 m^3 Hydrolyzer Tank (this is a pre-treatment tank but could be used to store material in case of emergency)
- Two 7,000 m^3 Anaerobic Digesters

A maximum of 18,080 m^3 of wet feedstock can be stored within sealed tanks on-site. The anaerobic digester will process approximately 620 m^3 of feedstock per day. If for some reason the anaerobic digester could not process material, feedstock can be stored within the on-site storage tanks until it is used in the anaerobic digesters or exported from site for use at another anaerobic digester facility or other appropriate location.

Materials received in the OPC are processed and moved through the facility in a timely manner. Putrescible materials are processed immediately and non-putrescible materials are processed within 72 hours of receipt.

3.3 Site Storage of Digestate

Digestate is stored in the anaerobic digesters until it is removed by the truck-load to long-term off-site storage for land application as an organic fertilizer.

3.4 Truck Traffic to Site

The site where the facility will be located is also used by GFL Environmental Inc. and for construction and demolition waste diversion. The new project will be integrated within the existing activities on-site which are currently set up for truck traffic. The surrounding area is a mixture of other heavy-industrial activities. The trucks coming and leaving the site will generally travel south/north to/from Highway 401. Given that the area is zoned for heavy industrial use, it is not anticipated that the increased truck traffic will cause a nuisance.

The daily truck and employee traffic has been predicted based on the plant operation capacity and process details described in the present document. The table below details traffic to the site, assuming the use of 20-25 ton trucks being used for deliveries and 34 ton truck being used to export inorganics contamination and waste.

Table 1: Truck Traffic to and from Facility

Trucks – Incoming substrate	50 - 62 trucks/day
Trucks – Outgoing Digestate	23 - 28 trucks/day
Trucks – Outgoing Inorganics Contamination and Waste	2 - 7 truck/day
Employee Traffic	20 cars/day
Other – Deliveries/Utilities/maintenance	2 vans or trucks/week (average on irregular basis)

A Secondary Noise Screening Assessment was carried out for the facility and MECP limits are met at all points of reception.

4.0 Test Procedures

In order to create a high value organic fertilizer (digestate) and to have a stable anaerobic digestion process, feedstock test procedures focus on testing incoming feedstocks. Testing incoming feedstocks ensures that the outgoing fertilizer products will meet the high standard required for use as a fertilizer for land application. The following test procedures are proposed.

4.1 Feedstock Test Procedures

4.1.1 Heavy Metals Test Procedure

Feedstocks will be tested for heavy metals prior to delivery and use at the facility. The following test schedule is proposed:

1. Prior to the first time a feedstock is brought to the facility. The sample must have been collected within 14 days prior to the receipt of material on-site;
2. Once every 1,000 m^3 of this particular feedstock material is received on-site; or if 5 consecutive tests show positive metals results, once per month for that feedstock if more than 1000 m^3 are received per month;
3. Once every 12 months

The proposed limits for the heavy metals testing are found in Table 2 below and are based on the Environmental Management Act, Organic Matter Recycling Regulation. The maximum metal concentration is represented in mg per kg of total solids dry weight.

Table 2: Heavy Metals Maximum Metal Concentration

Heavy Metal	Maximum Metal Concentration [mg/kg of total solids dry weight]
Arsenic	13
Cadmium	3
Chromium	100
Cobalt	34
Copper	400
Lead	150
Mercury	2
Molybdenum	5
Nickel	62
Selenium	2
Zinc	500

If test results indicate that a feedstock has heavy metals concentrations above the proposed limits in Table 2, the feedstock will not be accepted at the facility.

4.1.2 Inorganic Matter Content Visual Inspection

Inorganic Matter Content testing is a visual inspection of the feedstocks being delivered to site and will be conducted to manage the processing of feedstocks.

Broadcast Floor and Tipping Floor – Incoming deliveries that are brought to either the tipping floor or the broadcast Floor (OPC-SP1, Area C and Area G) are inspected visually prior to processing the Depack and Fractionation Process Area (OPC-SP1, Area H) of the OPC. The operator will remove large inorganics that cannot be processed with the separation equipment. If the operator suspects that the inorganic fraction is

greater than 20% (by volume), the feedstock will be investigated prior to the next delivery of the feedstock at the facility to ensure the material is appropriate for processing at the facility.

The operator of the facility is responsible for ensuring the quality of the feedstocks received at the facility. The raw material supply contracts will have quality specifications, providing the operator recourse to the suppler in the case of a breach of incoming quality specifications.

4.1.3 Non-Mandatory Testing

To ensure the health of the anaerobic digester and the success of the co-digestion processes within the AD tanks, the facility will test some feedstocks to ensure successful co-digestion of the feedstock within the digester. The tests that are likely to be performed are:

- Total Solids (TS)
- Volatile Solids (VS)
- Total Chemical Oxygen Demand (TCOD)
- Soluble Chemical Oxygen Demand (SCOD)
- TKN (or Total Kjeldahl Nitrogen)
- Ammonia/Ammonium
- Alkalinity
- pH
- Sulphur (as $SO4^{-2}$)

5.0 Record Keeping

The following records will be kept on-site at all times:

5.1 Delivery of Feedstock

All trucks delivering feedstock must be weighed on the scale upon entry to the facility. Copies of the weigh bill will be left at the facility and contain the name/source of the material, the date and volume/weight of material that was delivered to the facility.

Records of delivery of feedstocks and the associated heavy metal testing results will be kept on-site for at least one year.

5.2 Removal of Digestate and Processed Organics

All trucks removing digestate and processed organics will record the date/time and volume/weight of material removed from the facility as well as the destination of the load.

Records of removal of digestate and processed organics will be kept on-site for at least one year.

5.3 Removal of Inorganics Produced On-Site

Any inorganics that are recovered in the OPC and removed from the facility will be recorded with appropriate date/time, source, volume/weight, and where the material is delivered off-site (landfill site, recycling, etc.).

Records of removal of inorganics will be kept on-site for at least one year.

5.4 Chemicals Used On-Site

Any reagents used on-site will be recorded with the date, time and reason for use.

The following chemicals will be kept on-site:

- Ferric chloride or ferric hydroxide for use within the anaerobic digester to control hydrogen sulphide levels within the biogas.
- Chemicals required to maintain the equipment (oil changes, glycol for the heating system, cleaning agents, etc.).
- Spill clean-up absorbents.

5.5 Operational Records

The facility will have a Supervisory Control and Data Acquisition (SCADA) system which continuously records data such as digester pressure, temperature, use of flare, etc. In addition, the biogas upgrader has its own SCADA system which will record operational information from the biogas upgrading equipment; the two SCADAs are able to communicate with each other in order to facilitate smooth operation. The volume of renewable natural gas injected into the natural gas pipeline will be kept on-site. These records will be maintained for at least one year. The pipeline injection module will be provided by the utility purchasing the renewable natural gas and they will have independent renewable natural gas measuring apparatus.

6.0 Reporting

The following section details procedures for reporting emergency, non-emergency and spill situations. A contact list will be posted in the office on-site.

6.1 Emergency Notification Procedures

In the event of a significant system failure or emergency situation, relevant parties will be informed by the project owner/operator.

6.2 Non-Emergency Notification Procedure

Non-emergency communication includes any project changes, results of the on-going project monitoring or other matters considered relevant by the operator. In the event of a non-emergency situation, the operator will notify the owner of the project and any other parties who would benefit from notification.

6.3 Contact List

Information regarding emergencies will be conveyed to:

1. Emergency Services, 911
2. MOECP at 1-800-565-4923

Below is the Contact List for emergency and non-emergency situations. This will be posted in the office on-site.

Table 3: Contact List

Contact	Telephone
Emergency	**911**
Toronto Paramedic Services & Fire Station 215	(416) 338-9520
Toronto Police Service 43 Division	(416) 808-4300
Provincial Emergency Program Spill Action Centre	(416) 325-300 1-800-268-6060
Ministry of Environment	(416) 325-4000 Toll-free: 1-800-565-4923
CH Four Biogas Inc.	(613) 224-8308

6.4 Spill Reporting

Spills shall be reported as soon as possible (i.e., as soon as someone is available to report the spill when they are not immediately involved in containing or cleaning the spill to avoid environmental impact) to the Provincial Spill Action Centre. The phone numbers are:

- Telephone 416-325-300
- Toll-free 1-800-268-6060
- Toll-free TTY 1-855-889-5775

The following information will be reported to the Provincial Spill Action Centre:

- Name and phone number of person calling to report the spill
- Name and phone number of the person or company in control of the product spilled
- Date, time and location of the spill
- Duration of the spill (if known) and whether the spill is ongoing
- Type and quantity of pollutant spilled, including hazard level or toxicity information
- Source of the spill and information on the cause
- Description of adverse effects
- Environmental conditions that affect the spill (weather, traffic, etc.)
- Actions being taken to respond
- Other agencies and parties responding

Depending on the nature of the spill, other parties may be notified. This includes notification to other staff working at the facility, the City of Toronto, neighbouring industries, the owner of facility or the company delivering product that was spilled (if applicable).

7.0 Monitoring Programs

A monitoring program for the facility will be provided to the owner and operators of the facility during facility commissioning via the Operation and Maintenance Manual. (A sample of this manual has been provided with the Environmental Compliance Approval application). Staff will receive training on the responses to emergency situations during the commissioning and start-up of the facility.

Table 4 below contains a summary of the potential negative environmental effects that could occur from the biogas project in the case of a process fault. The table also summarizes mitigation measures that are in place to deal with the fault. Under normal operations, including the proper management of feedstocks, there are no projected negative environmental effects from the operation of the biogas facility.

Table 4: Environmental Effects Monitoring

Potential Negative Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
System malfunction which could compromise structural integrity of any element of the system	Structural integrity of system maintained	Regular preventative maintenance and system inspection	Operation will cease, including the delivery of all feedstocks. This suspension will facilitate an evaluation of the problem and facilitate necessary repairs. In the event that the site must be decommissioned, details of these procedures can be found in this Report.
Leaching of material into natural environment	No leaching of any materials	Adherence to O.Reg 267/03 Secondary containment in place and use of Xypex concrete additive in OPC building.	Post construction inspection of all material handling equipment. If tank or pipe is leaking, leachate will be pumped out of the facility and leaking tank or pipe will be repaired.
Release of biogas from leaking or ruptured membrane	No release of biogas from membrane	Construction of membrane according to specifications of known best practices. The membrane has been demonstrated to have a permeability of significantly less than $500cm^3/m^2/day/bar$.	Anaerobic digester membrane integrity will be verified on a daily basis by visual inspection as part of the daily maintenance regime. If membrane integrity is compromised, the biogas upgrading unit will not operate properly and the system will be in alarm status. Repair of membrane completed as soon as practical (target is within one day) with all safety precautions taken. Replacement of membrane can be completed in approximately one week.

Table 4: Environmental Effects Monitoring Continued

Potential Negative Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Stormwater runoff from buildings or tanks	No significant change in stormwater quality	Adherence to natural feature setback requirements as shown in the site plan.	No stormwater can enter the OPC, hydrolyzer, anaerobic digesters, or any connecting pipes, thus no contamination can occur. Driveways, parking and gravel areas are designed for drainage and to ensure proper drainage. These areas are kept clean and free of debris and organics to ensure that water runoff in these areas will have no negative environmental impact.
Explosion or Fire	No fires or explosions on-site	Inspection of integrity of biogas membrane and piping. Inspection of fire extinguishers. Co-ordination of emergency response planning with local fire response team, first responders, and police force.	911 in event of major fire or explosion Local emergency first-response would be called to handle any immediate emergency situation. If any of the structures associated with gas upgrading were damaged or destroyed, they would be rebuilt. A structural engineer would inspect the digester for structural damage. If no damage is detected, a new roof can be installed immediately to resume operation. If structural failure were detected, the digester would be emptied into the final storage tank. The damaged digester would either be repaired or decommissioned (as per Section 8).

Table 4: Environmental Effects Monitoring continued

Potential Negative Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
Power Outage	Safely maintain facility during power outage	During a power outage there is neither reception of feedstocks, feeding to the anaerobic digester or biogas upgrading.	To avoid odours during power outage, no deliveries can be made to the facility and biogas cannot be upgraded. Flare power is maintained by battery so that biogas is flared during a power outage.
Flooding	Maintain site safety during flood	Site planned for stormwater management	The hydrolyzer tank and anaerobic digesters can withstand up to approximately 1 foot of flooding as they are closed tanks and water cannot enter them. All tanks are built to remove water away from the footing. The OPC would be protected from flood waters using sandbags. In the event of flooding, delivery of feedstocks to the OPC would be halted until material can be received without risk of water entering the building.

8.0 Decommissioning Plan

At the end of the lifecycle of the project, the site will be decommissioned. The OPC, anaerobic digester, and hydrolyzer tank are anticipated to last between 20 and 30 years without requiring major maintenance. The underground piping requires intermittent service throughout the lifespan of the project but has no set lifespan itself. When it is deemed that the structures and other physical components are no longer suitable for use in their current roles, a number of options are available.

Mechanical equipment, such as mixers and pumps, can be rebuilt for continued use, sold on the open market as used goods, sold for scrap metal, or disposed of through available recycling and waste disposal services.

Assuming a certain degree of structural integrity, all structures and components can be refurbished in order to renew their usefulness as components in the organics processing and biogas system. This refurbishment would involve repairing concrete and rebar as well as recasting structures where necessary. Underground piping inspection results will determine its suitability for reuse or repurposing.

Structures which cannot be refurbished in order to make them suitable for use, may be reclaimed or adapted such that they are usable for other operations. Similarly, underground piping can be dug up and that which is still in working order used by other people and or projects. Through this mechanism, the major structural and underground piping components of the project may be transitioned for use in other projects.

Those structures or underground piping components which cannot be refurbished or transitioned for use elsewhere can be dismantled and taken to the landfill or available recycling facilities.

If the OPC is decommissioned, the equipment within the building can be refurbished or sold for use in other organics processing facilities. Alternatively the equipment may need to be landfilled or recycled, as necessary.

If the biogas project is decommissioned, the hydrolyzer tank and anaerobic digesters can be refurbished and/or reclaimed as a material storage tank. Should, for some unforeseen reason, this reclamation be impossible, the tanks would be demolished with the waste concrete, rebar, insulation and other components collected and taken to a landfill or recycling facility, should they be available. The hydrolyzer and anaerobic digesters mechanical components would be refurbished for reuse, sold on the used equipment market or sold for scrap parts.

In the event of decommissioning, the underground piping associated with the system would be excavated. Piping materials still in adequate condition for continued use would be reclaimed for normal use or sold on the used equipment market. Should the materials be unsuitable for continued use, they will be disposed of in a landfill or recycled, should facilities and services exist.

In the case of all underground components, any ground which would be excavated as a result of decommissioning activities would be backfilled with excavated material and/or additional granular, as needed. Should such demolition activities occur, the land would be reclaimed to a degree suitable for continued use.

There are no anticipated impacts to land and water and as a result, no activities to remediate land and water are anticipated.

In the event that the project is decommissioned any material in the receiving tanks will be trucked to another anaerobic digester or to a landfill for disposal. A Financial Assurance Letter is included in the Environmental Compliance Approval application.

9.0 Additional Plans

9.1 Operation and Maintenance Manual

The Operations and Maintenance contractor will provide an Operation and Maintenance Manual to the Owner/Operator of the Facility prior to commissioning of the facility. This manual will provide details regarding start-up, operation and shut down of the facility as well as required maintenance activities for the facility. A sample of an Operation and Maintenance Manual is included in the Environmental Compliance Approval application.

9.2 Progressive Odour Management Plan

A Progressive Odour Management Plan has been developed for the facility. This plan identifies possible sources of odour, points of impingement, describes the systems that are in place to mitigate odours and provides a progressive response plan in the event of an odour complaint. The Progressive Odour Management Plan is included in the Environmental Compliance Approval application.

9.3 Emissions Summary and Dispersion Modelling (ESDM) Report and Odour Assessment Report

An Emission Summary and Dispersion Modelling (ESDM) Report is included in the Environmental Compliance Approval application. The ESDM Report includes and Odour Assessment Report

9.4 Stormwater and Leachate Management Plan

A separate Stormwater and Leachate Management Plan has been generated for this facility. The Stormwater and Leachate Management Plan is included in the Environmental Compliance Approval Application submission.

9.5 Acoustic Assessment Report

A Secondary Noise Screening Assessment was carried out for the facility; the results from the Secondary Noise Screening Assessment indicate that an Acoustic Assessment Report is not required for this facility. The Secondary Noise Screening Assessment is included in the Environmental Compliance Approval application.

9.6 Dust and Litter Plan

A Dust and Litter Plan has not been generated for this facility as it is not anticipated that the facility will generate significant sources of dust or litter.

The access driveway and on-site parking will be a combination of asphalt and gravel surfaced. It is anticipated that all new roads will be asphalt. Grasses will be planted on the facility's open spaces.

The facility will be mainly accessed by closed trucks bringing feedstock to the site and by the operators of the facility and as such there is limited opportunity for litter to be left behind. Feedstock brought to the OPC that contains inorganic contamination is deposited directly into the building for processing. Transport of inorganic from the facility for landfill or recycling will be undertaken in closed bins/vehicles.

9.7 Vector and Vermin Plan

A Vector and Vermin Plan has not been generated for this facility as it is not anticipated that the facility will generate significant vectors or vermin. The facility is designed such that vermin/vectors have no access to the organic residuals and odours that would attract any vectors/vermin are controlled. Good housekeeping practices on-site such as monitoring the odour control system, washing down trucks before they leave the site and delivering feedstock within a closed building, prevent vectors/vermin from

becoming a problem on-site. Following the Progressive Odour Management Plan will prevent issues from arising that could result in the attraction of vectors/vermin.