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Environmental Preview Report

Argentia Access Road Industrial Composting Facility

Registration 1838

To:

Honorable Perry Trimper
Minister
Department of Environment and Climate Change
Government of Newfoundland and Labrador
P.O. Box 8700
St. John's, NL A1B 4J6, Canada

From:

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P. O. Box 19, 10 Point Road
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18 November 2016

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1. Name of Undertaking

The undertaking has been assigned the name:

"Argentia Access Road Industrial Composting Facility Project"

2. Proponent

2.1. Name of the Proponent

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3. The Undertaking

3.1. Nature of the Project

Metro Environmental Services Inc. (MESI) intends to establish a commercial indoor composting facility to process a variety of organic waste collected from agricultural and industrial sources in Newfoundland.

The collection of organic waste will be very selective and focused on agricultural and food waste. The organic waste to be composted will consist of mink farm offal / carcasses, spent hens and dead birds, poultry feathers and slaughterhouse offal from poultry, sheep, cattle, hogs and fish processing wastes at later stages of operation.

The finished product will be a high quality compost to be sold for soil conditioning for agricultural and landscaping purposes.

3.2. Purpose, Rationale and Need for the Project

In the development of the business plan and of the environmental assessment process, MES has received a lot of positive feedback and information from a variety of waste management stakeholders. They all expressed a great interest in MES's project.

Currently in Newfoundland, agricultural and industrial organic waste is simply buried in landfills and dumped at sea. Everyone should recognize that it is a terrible environmental and waste management practice. But the waste management industry knows that there are no alternative available in Newfoundland at the moment. We all know about fish offal being dumped at sea in substantial quantities. But most people are unaware of the extent of burial space required to dispose of substantial quantities organic wastes that the proposed composting facility intends to process into a valuable soil amendment material. The proposed facility will not have the capability, by far, to process all organic waste buried in landfills.

These large quantities of organic waste are buried at landfills such as St. John's, Sunnyside and Norris Arm. These burial practices create substantial landfill gases and odor problems, and more importantly contribute directly to the pollution of the groundwater, which ends up in the drinking water supply. As we all know, many towns have experienced boil-order situations that are very disrupting to the resident.

For example, the town of Sunnyside has recently implemented a completely new potable water treatment system with new potable water disinfection and treatment technology based on stabilized hydrogen peroxide to reduce the disinfection by-products of water treatment to a safe level. Sunnyside operates an industrial landfill receiving raw organic wastes, as well as a contaminated soil treatment facility.

We also all know that the cost of disposal at landfills is very high. That cost is directly transferred to the municipal tax base of the towns and cities being serviced by these landfills. In contrast, an industrial indoor composting facility will divert organic waste and wood products and demolition wastes from the landfill, for which the landfill is not capable of properly processing and recycling. The proposed industrial indoor composting facility will use organic waste and waste wood products to create a valuable product that exists only in short supplies currently in Newfoundland. We also know that the combined volume of organic waste and waste wood products is significant relative to the total waste buried at landfills. The operation of the industrial composting facility will substantially reduce the amount and volume of landfill use, thereby extending significantly the service life of these landfill facilities.

Organizations and companies producing organic waste, as well as the landfill and waste management agencies have indicated to MES that such a composting facility was badly needed. All these stakeholders have responded very positively to the prospect of establishment of an industrial indoor composting facility on the Avalon Peninsula.

3.3. Impact on the region and the Province

The establishment of an indoor composting facility at the proposed location will have very beneficial environmental and economic impact on the local area, the Avalon region and the Province overall.

3.3.1. Environmental Benefits

- Substantial amounts of organic waste and waste wood products diverted from the landfills;
- Extending service life of landfills;
- Reduction in operating costs of landfills (due to reduction of waste volume to be buried);

- Recycling of highly polluting solid wastes into organic soil amendment product for the farming and landscaping industry;
- Reduction of carbon footprint due to a more centralized geographical location of the composting facility for the Avalon region, Burin Peninsula and Bonavista Peninsula;
- Recycling of wood waste that are otherwise being landfilled;

3.3.2. Economic Benefits

- Direct employment for the Whitbourne and surrounding area, with construction and operation of the proposed composting facility;
- Acquisition of supplies and services from the local area;
- Additional traffic stopping at Whitbourne for food, gas, etc...;
- Diversification of the local economy;
- Supply of value-added soil amendment products to the local area and the Avalon and beyond to the agricultural and landscaping industry, at a price lower than other equivalent products;
- Import substitution of soil amendment products (import into the province from other province or the USA);
- Supply of organic[1] soil amendment product to facilitate the development of local organic farming for production of fresh organically grown vegetables – (organic soil amendment will be available and affordable to these local organic farmers);
- 100% Newfoundland local small business venture. Not a mainland or American company coming in to only provide low wage jobs.

3.3.3. Potential Negative Impact

- Part of the economic development of the greater Whitbourne area includes the development of cottage lots and summer homes. Whitbourne is in a good location with its proximity to St. John's and Long Harbour through the Trans-Canada Highway. Therefore, the presence of an indoor industrial composting facility could be deemed to be a deterrent to the cottage and summer home industry as well as other

[1] The intended meaning of the term "organic" is not "certified organic". There are many different standards for "organic" depending on the specific food products. Here we only mean that it a substantially organic product as a replacement for chemical fertilizers and as a soil amendment to lighten up the soil, add humus to increase the overall fertility of the soil for plant growth. As MES progresses in the production of compost, the company may explore the organic certification avenue, based on market demand.

tourism related economic activities that may be developed in the area. However, the proposed indoor composting facility will be located at least 2.0 km as the crow flies (along Route 81 - the road to Whitbourne) from any town site and cottage areas, and will be set back from the Argentia Access Road sufficiently, such that no one (other clients of the composting facility) will even know it exists.

- The design and operation of the indoor composting facility will be such as to have no environmental impact as it relates to the quality of life enjoyed by the residents and visitors of the greater Whitbourne area. Both the ongoing Environmental Assessment and Registration process imposed by government regulations and the requirements of all the Federal and Provincial regulations relating to such a project will ensure that there will be no negative impact on the greater Whitbourne area in terms of any nuisances such as odors, pest, unsightly buildings, etc… Furthermore, MES commits to building and operating the facility to the highest standards to peacefully and responsibly produce value-added products that are in demand in Newfoundland. MES certainly commits to full compliance with all government regulations to successfully operate in the best interest of all stakeholders, including the residents and visitors of the greater Whitbourne area.
- Negative environmental from the facility operation will be effectively nil. In the unlikely or rare event that odors become a problem, both the odor management plan and immediate adjustment to the operation will take care of the problem in short order. There are a number of processing and production measures that can be implemented immediately to mitigate any eventual environmental impact.
- In the very unlikely situation of eventual decommissioning of the indoor composting facility, the remaining raw material would be processed and the building would be cleaned, disinfected, and either demolished or modified to accommodate a different use or occupancy.
- The location of the indoor composting facility will be outside of any incorporated municipality. There will be no municipal taxation applicable directly, but there will be no municipal services required or provided by any municipality. MES will tender the services of local voluntary Fire Departments of Whitbourne, Long Harbour and Chapel Arm and will pay the required compensation.

3.4. Contribution to Community

With the operation of the indoor composting facility, MES will provide employment and pay tax to both provincial and federal governments. Such

taxes are completely incremental to the current situation of solid waste management and processing.

Currently, the inadequate processing of organic waste through landfills impose a direct cost to the population of Newfoundland without generating any tax revenue to governments. Therefore, the current situation is a significant net loss or net cost to the population with no benefit derived from the activity, other than inadequately disposing of waste with substantially polluting our natural environment and potable water resources.

The operation of the indoor composting facility will have the five (5) significantly positive effects of:

1. Reducing substantially negative environmental practices to the betterment of the environment;
2. Recycling two types of solid waste – organics and wood;
3. Reducing the current waste management landfill operating cost and extending the service life of the landfills;
4. Producing value-added products at a lower price than the current supply from the mainland, that are in real demand in Newfoundland;
5. Generating tax revenues to Federal and Provincial coffers.

The provincial waste management strategy aims to reduce waste by maximizing and adopting recycling opportunities, divert waste from landfill, improve environmental health and environmental protection, and reduce cost to the taxpayer.

Each year, Newfoundlanders and Labradorians generate more than 400,000 tonnes of waste materials at a rate of approximately two kilograms per person per day (0.73 tonnes per person per year).

"Per capita residential solid waste disposal was highest in Newfoundland and Labrador (429 kilograms) and lowest in Nova Scotia (158 kilograms) in 2008."[2]

Large scale industrial composting is an explicit objective of both the Eastern Waste Management (Eastern Regional Service Board) and the provincial Department of Environment and Climate Change. One of the many environmental standards adopted by these organizations is "Municipal solid waste compost facilities will collect all organic waste that has been separated from other solid waste and convert it to a beneficial product - compost." [3]

[2] **http://www.statcan.gc.ca/pub/16-201-x/2012000/part-partie3-eng.htm**
[3] **http://www.greateravalon.ca/provincial-solid-waste-management-strategy**

The establishment of the proposed indoor composting facility fits as an integral part of the desired provincial and regional waste management strategy. And that is why all the stakeholders involved in the waste management industry have indicated such a strong support and encouragement for MES's project.

4. Description of the Undertaking

4.1. Geographical Location; Physical Components; Existing Environment

4.1.1. Argentia Access Road Location

The Argentia Access Road was selected for the indoor industrial composting facility for the following reasons:

1. This was the best site available meeting all the necessary criteria in terms of location, access, distance for towns and residential properties, zoning and government regulatory requirements;
2. The site is relatively well centrally located in the Avalon region and relatively close to the Burin and Bonavista Peninsulas, where there are most of the organic waste generators, carbon material suppliers and end product users;
3. The site can be directly accessed through the major transportation routes (Trans-Canada Highway and Argentia Access Road);
4. The site is geographically isolated at substantial distance from the nearest communities (4 km from Whitbourne and Markland and from any surrounding cottage areas). Figure 1 provides GPS location coordinates of the site on the most recent aerial photo map.
5. The site is designated agricultural land and is sufficiently large to establish the proposed indoor composting facility without causing any nuisance.

4.1.2. Site Description

The proposed location for the site is initially a 2.5 hectares (6 acres) section of land in the 23 hectares large area of crown land under application by MES, on the west side of Highway 100, Argentia Access Road, 4.0 kilometers from the intersection of the Trans-Canada highway and Route 100. This large section of land is a green-field site with virgin boreal forest and totally undeveloped. The

land under application by MES is approximately 700 metres bordering the West side of Route 100 and 450 meters deep. The parcel is outside of any municipal boundaries. There is no protected watershed area involved with the parcel of land and the nearest body of water from the boundaries of the land is 750 meters away. As well, there are no cabins or cottages in the areas surrounding the proposed site. An aerial photo of the section of land is shown in Figure 1.

The proposed composting facility site will be accessible from Route 100 and will be located from 100 meter to 150 meters from Route 100. The entrance to the site will be located 4 kilometers from the intersection of Route 100 with the Trans-Canada Highway. The roadway leading to the site will be perpendicular to Highway 100 in a section of land free of peat bog and isolated from any waterway or marsh. The aerial photo of the area showing the location of the site is presented in Figure 1 and Figure 2.

Figure 1 - Land Location of the Proposed Indoor Composting Facility (Lat = 47.4175; Long = -53.5820)

Figure 2 - Site Location on Hwy 100 Argentia Access Road

4.1.3. Proximity of the Site

The site is 4.0 km from the Trans-Canada intersection along Route 100, the Argentia Access Road. And as the crow flies the site is:

- 2.7 km from the closest residences in Little Island Cove,
- 3.3 km from Markland,
- 4.4 km from Whitbourne,
- 3.9 km from the T' Railway site,
- 7.7 km from the Placentia Junction cabin area,

- 4.5 km from the Peak Pond cabin area,
- 6.0 km from Holiday Hill cabins,
- 8.0 km from Blaketown, and
- 4.0 km from the highway stop on Trans-Canada, with gas stations, restaurants, motel and the Tourism Information Centre.

These distances were measured and verified using the distance tool of Google Map.

4.1.4. Topography of the Site

The topography of the land is substantially flat with a slight slope toward Route 100. Presently, the land site intended to be used for the composting facility, is a green-field site. Typical local boreal forest covers all of the 23 hectares of the crown land section under application by MES. The land area features wooded areas, peat bog areas and barren areas, as typically encountered in eastern Newfoundland. See Figure 3 below.

Figure 3 - View of the land from Hwy 100 looking North

There are no waterways and only one very small pond in this large section of land. And the nearest substantial pond, Trout Pond, is at least 750 meters North-North West of back corner boundary of the proposed land parcel.

4.1.5. Current Ownership and Zoning of the Site Land

The ownership of this parcel of land rests with the provincial government, Lands Branch of the Department of Municipal Affairs (Crown's Land). The zoning of the land for the proposed undertaking is classified as a waste disposal site located in an unincorporated area that is subject to the Protected Road Zoning Regulations. The proposed use is classified as Rural Industrial, which is a permitted use in this zone under Section 6 of the Protected Road Zoning Regulations. Upon successful establishment of the indoor composting facility on the site, MES intends to purchase the title of land from Crown Lands as per terms required by the Department of Municipal Affairs.

An application for Crown lands has been submitted for the proposal, and a decision on the application will be made pending the outcome of the environmental assessment and a review of all referrals from the Crown lands application.

4.2. Construction

4.2.1. Land Development and Construction Period

MES intends to start site work as soon as the project Environmental Assessment Registration process is completed with the release of the project by the minister of Environment and Climate Change. MES will likely be in the position to start such site work in late December. The construction of the buildings will then be done in spring time of the year 2017, depending on winter and spring weather conditions. The construction of the facility will then be completed toward late spring, and operations will start in late spring.

If the Environmental Assessment Registration process is completed later, then the facility and site design will be completed, and the construction will be done in the spring and summer of 2017. Commissioning and ongoing operations will then start as soon as construction is completed with all the inspections and approvals obtained from the authorities having jurisdiction.

4.2.2. Tree Screen to Eliminate Visibility of the Facility from Route 100

Land Management Division of the Department of Municipal Affairs requires that developments of a rural industrial nature must be set back a minimum of 100 metres from the centre line of the highway with a tree screen of not less than 50

metres, and must be separated from any adjacent incompatible developments by a minimum of 150 metres with a tree screen of not less than 100 metres.

MES has every intention to comply with these requirements and the site is well suited to easily meet and exceed these requirements.

4.2.3. Construction Facilities and Equipment

Typical heavy equipment will be used during the construction period. Standard construction operating procedures with these machines will be used to operate efficiently and responsibly. These equipment will be maintained in good state of repair. Fueling on site will be done with standard equipment and procedures, including the use of spill kits to mitigate any accidental spills. A construction trailer and portable toilets will be used, as it is typically done in such isolated or remote sites.

4.2.4. Access Road Design

The access road from Route 100 to the indoor composting buildings and yard will be designed to meet the requirements of the Department of Transportation and Works, which include:

- Positioning the site access road so as to achieve the required intersection sight distance;
- Breaking and reinstalling the guiderail along Route 100 to accommodate the site access road (if and as required);
- Construction of a 10 metre wide top surface on the access road, which is a requirement of commercial developments; and
- Installation of a 600 millimeter diameter culvert (minimum) across the access road.

The access driveway to the facility will be equipped with a gate to control access to the facility and prevent unauthorized entry and dumping.

4.2.5. Indoor Composting Facility – Site Layout and Buildings Details

A drawing and site layout of the facility is presented in Appendix I. It shows a site layout capable of receiving raw materials from dump trucks, a service building for weight scale operation, facility office, staff lunch room, washrooms and locker room, as well as the indoor composting facility building. The floor

of the indoor composting building will be an impervious concrete slab with internal drainage to handle and collect excess leachates and waters to be reused in the ongoing composting process, either mixed with new raw materials or sprayed over composting windrows. As mentioned before, the pound (pit) to receive and mix the raw materials will also have an impervious concrete surface.

The types of building construction envisaged for the composting facility are both pre-engineered steel building and fabric building. The detailed design of the facility will involve the final selection of the building construction – steel or fabric. Both types of building enclosure are used for industrial composting in Canada. Both building types are capable of supporting the infrastructure required for an indoor industrial composting facility. At the moment, MES leans toward a pre-engineered steel building construction. But the Consultant needs to do a comprehensive analysis about the pros and cons of each type of building construction in the design process. Considerations such as combustibility of construction, size, and layout relative to fire protection systems requirements; functionality and layout; ventilation system(s) and odor control systems (biofilter) and pollution prevention systems sizing and layouts; corrosion protection; lighting and electrical systems; structural resistance; life cycle costing, etc have to enter in the detailed design of the facility. A sufficient engineering and costing analysis must be done to make the right decision about the building type for all stakeholders involved, including the public.

For the purpose of information in the Environmental Preview Report, please see below examples of industrial composting buildings, in both steel and fabric types.

4.2.5.1. Pre-Engineered Steel Frame Building


CASE

4.2.5.2. Fabric Building

4.2.6. Ventilation System

The organic raw material receiving and the composting windrows will be located inside the indoor composting building. The building will be equipped with a mechanical ventilation system whereby the outdoor air will be continuously drawn into the building and exhausted outdoors through a biofilter system located inside the building to remove all odors and any particulate within the air stream. The building will therefore be under slight negative pressure so as to contain within the building any air that has not been exhausted through the biofilter. This will control and contain any odor within

the building envelope and prevent any odors from migrating outdoors. The raw material receiving area will have an outside overhead door leading to a vestibule equipped with industrial/warehouse type overhead curtains that will limit the volume of outdoor air drawn indoor, so that the ventilation system can be of reasonable scale and capacity. The biofilter system will abate odors within its confines and clean the air stream exhausted outdoors. The biofilter will have to be selected, sized, operated and maintained properly for the duty cycle such that its performance is ensured. The use of such biofilter system is typical in existing indoor industrial composting facilities. MES has retained the services of a professional engineering consulting firm – Innovative Development & Design Engineers Ltd. (IDDEL) - to design the indoor composting facility. IDDEL is also preparing the Environmental Assessment Registration and this Environmental Preview Report on behalf of MES for the Environmental Assessment division of the Department of Environment and Climate Change.

4.2.7. Biofilter and Odor Removal

A biofilter for odor control operates on chemical reactions on odorous vapors contained in the air stream going through. Typically, a biofilter is an oxidizing and polishing dry air scrubber, which provides a multi-stage chemistry for the control of odors from hydrogen sulfide (H2S), mercaptans, ammonia, amines and other odors generated in composting or wastewater treatment systems. It is a simple, reliable, easy to use, effective and economical solution to odor removal.

A biofilter is the most common odor control technology that has been shown to be both economical and effective in farms and composting facilities. Biofiltration can reduce odor and hydrogen sulfide emissions from livestock and poultry facilities by as much as 95% and ammonia by 65%. This method of odor control has been used in industry for many years. Biofilters are most easily adapted to mechanically ventilated building or on the pit fans of naturally ventilated buildings. Biofilters can also treat air vented from covered manure storage covers.

A biofilter is simply a layer of organic material, typically a mixture of compost and wood chips or wood shreds that support a microbial population. Odorous air is forced through this material and is converted by the microbes to carbon dioxide and water. Key factors influencing biofilter performance are the amount of time the odorous air spends in the biofilter (contact time) and the moisture content of the filter material. The biofilter reliance on microorganisms requires an appreciation of ecological concepts which must be considered in biofilter design. Biofilter design includes the sizing of the biofilter bed,

selecting fans to push the air through the biofilter, choosing biofilter media, moisture control, operation and management, and cost of construction and operation.

Biofilters can be configured as either open or closed beds. Open bed biofilters are the most prevalent configuration used today. Open bed biofilters are typically 10 to 18 inches deep and are much larger than closed bed biofilters. Open bed biofilters are typically built outdoors on the ground and are exposed to a variety of weather conditions including rain, snow, and temperature extremes. Closed bed biofilters are mostly enclosed with a small exhaust port for venting of the cleaned air. Closed bed biofilters usually treat smaller airflows, typically have deeper media (2-3 feet or more) to reduce the space needed to achieve the required treatment, and are more expensive. Figure 1 illustrates elements of an open-bed biofilter. They are:

- A mechanically ventilated space with biodegradable gaseous emissions.
- An air handling system to move the odorous exhaust air from the building or compost storage through the biofilter.
- An air plenum to distribute the exhaust air evenly beneath the biofilter media.
- A structure to support the media above the air plenum.
- Porous biofilter media that serves as a surface for microorganisms to live on, a source of some nutrients, and a structure where moisture can be applied, retained, and available to the microorganisms.

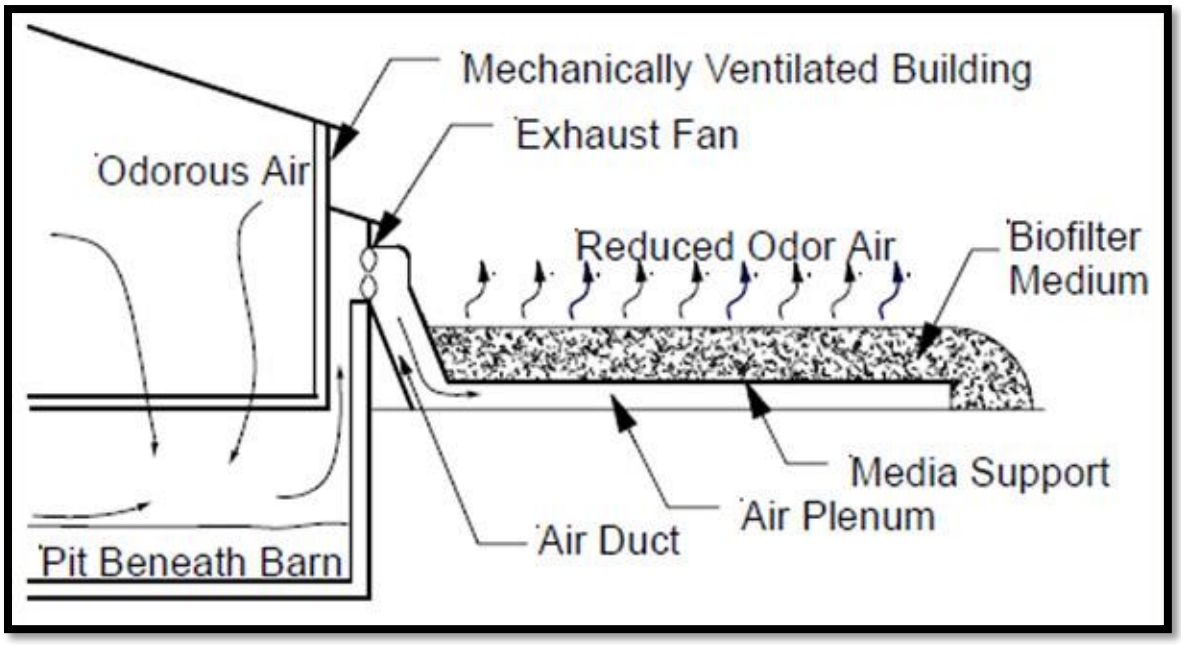


Figure 4 - Open Bed Biofilter System

The odorous air is exhausted by a fan from the building and uniformly distributed through the biofilter media. Microorganisms attached to the organic media create a biofilm. In the biofilm, the microorganisms oxidize the biodegradable gases into carbon dioxide, water, mineral salts, and biomass (i.e., microorganisms). The cleaned exhaust air then leaves the biofilter.

Biofilter designs are based on the volumetric flow rate of air to be treated, specific air contaminants and concentrations, media characteristics, biofilter size (area) constraints, moisture control, maintenance, and cost. These parameters all play a role in either the efficient cleaning of airstreams or in the economical operation of the biofilter.

MES recognizes that odor removal and control is of utmost importance for the successful operation of the indoor composting facility. MESs is totally committed to building and operating the indoor composting facility with a totally effective odor removal system, such that odor will not be an issue or nuisance at all.

4.2.8. Leachate Collection System

Indoor industrial composting involves the reception of raw material, the mixing of the raw material with a carbon containing material (wood chips), laying the mixed material into windrows, and periodically mixing/turning the material laid out in windrow to accelerate the composting to completion.

Leachate is the watery liquid that naturally drains out of a pile of material. This leachate is valuable and useful in the composting process. Therefore the leachate will be properly collected and used in the composting process as a source of water and to a much minor level, a source of protein.

The raw material will be received into a pit or pound, made of concrete, which will be designed to collect, by gravity flow, the leachate into a reservoir. From this reservoir, a sump pump with proper piping will be used to wet (re-wet) the composting material mix laid out in windrows.

At the early stage of composting, the mixed material laid out in windrow will produce leachate in relatively small quantities. Collection of the leachate will be done with a trough/floor drain system that will drain to the leachate reservoir.

The entire leachate collection system will be designed and built so that it can be easily cleaned (hosed down) and disinfected to prevent further contribution to odors or vectors.

The leachate collection and handling system will be a closed system, completely within the confines of the indoor composting facility. There will be nothing collected from outdoors and there will be nothing going outside the building.

4.2.9. Employment

During the construction phase, the level of employment is projected as per Table 1, and for the operation phase as per Table 2.

The projected employment during construction will span the period from March to July 2017. Most of these jobs will be contractual through subcontractors.

For the production/operation phase, the permanent employment will start as soon as the construction phase is completed. In this case, all the employees will be direct hire (no subcontractors).

Table 1 - Employment during construction

Occupation	NOC 2011 Code	Number of Workers	Duration (Month)	Person-Year Equivalent
Construction Manager	0016	1	6	0.50
Construcion Superintendant	7204	1	6	0.50
Heavy Equipment Operator	7521	2	3	0.50
Truck Driver	7511	2	3	0.50
Concrete Finishers	7205	4	0.5	0.17
Steel Workers	7201	4	3	1.00
Carpenters	7271	6	3	1.50
Pipe Fitters	7252	2	1	0.17
Electricians	7242	2	1	0.17
Painters	7294	2	1	0.17
Plasterers	7284	2	1	0.17
Laborers	7611	2	6	1.00
HVAC Technician	7301	2	1	0.17
Totals		**32**	**6**	**6.50**

Table 2 - Employment during operation

Occupation	NOC 2011 Code	Number of Workers	Duration (Month)	Person-Year Equivalent
Operations Manager	9213	1	12	1.00
Heavy Equipment Operator	7521	2	12	2.00
Truck Driver	7511	2	12	2.00
Laborers	7611	2	12	2.00
Totals		**7**	**6**	**7.00**

4.2.10. Waste Management during Construction

The site work and construction of the indoor composting facility represents a relatively small construction project in terms of scale, budget and schedule. Any clearings will be kept and shredded to use in the composting facility operations. The soils on site are suitable for site development and construction. There will not be any significant surplus or deficit of soil and fill. Manufactured aggregates and related materials will be delivered on site as required.

Any solid waste generated by the construction activities are going to collected, held in containers and disposed as per standard construction site operations

practices. Portable toilets will be used until a functional septic system is in place.

4.3. Operation and Maintenance

4.3.1. Sources of Feedstock and Carbon Fibres

As indicated in the Environmental Assessment Registration document, and its addendum, MES intends to collect and process organic waste consisting of offal from poultry, mink, sheep, cattle, hogs and fish processing wastes.

The sources of carbon fiber will be come from shredded wood collected lumber waste diverted from landfills, wood chips from saw mills and lumber producers, and any source of waste wood that can be reused.

Both the organic raw material and the carbon source will have to be free of any contaminants that would compromise either the composting process or the required quality of the finished product. MES will have quality control processes in place to ensure that pollutants and contaminants are not simply diverted from landfills to end up uncontrolled at the composting facility.

4.3.2. Duration of the Composting Process

From the reception of the raw material to the produced finished product as a soil amendment material, the composting process duration is 6 to 8 weeks. Therefore, the composting production will be a batch type process whereby different windrow sections will be at a different stage of composting. MES will then be able to received raw material on an ongoing basis to satisfy the needs of the raw material suppliers.

The duration of a composting cycle depends on many variables such as the specific nature of organic raw material input, the required carbon input from wood chips or other carbon sources, the moisture contents of organic materials and wood chip, as well as the amount and timing of additional water required to optimize the composting process performance over the composting cycle. All these parameters and more enter in the planning and preparation of a compost recipe. This requires knowledge and experience at composting.

On the notion of a projected date for a completed facility construction to be in May or June 2017, MES is expecting to start operation immediately after that.

4.3.3. Estimated Annual Volumes for the First Five Years

MES is planning to have a 60 feet wide by 400 feet long building to enclose the composting activities. The composting process consists of receiving of raw materials – organic waste (indoor), shredding wood waste (outdoor), mixing of raw materials with wood chips (indoor), laying the raw compost mix into windrows (indoor), turning/aerating composting material in windrows (indoor), and storing finished product (outdoor).

With one building (60 ft x 400 ft) dedicated to indoor composting, MES estimates a nominal annual production of compost of 13,200 tonnes. This production will require about 6,500 tonnes of organic waste and 10,000 tonnes of wood chip annually. On a monthly basis this represents 550 tonnes (37 tandem truck loads) of organic raw material to be received at the site, and 825 tonnes (55 tandem truck loads) of wood waste.

MES expect to operate with one building and a compost production level of 16,500 tonnes per year for at least the first two years of operation. Production growth can only be done incrementally by adding buildings. Depending on market conditions, specific raw material available to process and other business related conditions, MES will consider adding another building of the same size, which would then double the production capacity. Therefore, it would be realistic to consider the subsequent 3 years to of operation at a production level of 33,000 tonnes annually.

4.3.4. Incremental Increase in Feedstock Over Time

The first 3 to 4 months of operation will involve a specific selection of raw materials to be composted using specific compost recipes and the execution of the specific composting recipe and process to completion. This will provide MES with the basic necessary experience to then focus on what available raw material sources work best in the composting process for the longer term. Therefore that start-up phase will determine MES's ability to ramp up the production to targeted levels over time.

If all goes well and MES finds one or two consistent sources of raw materials in abundant supply, that compost faster, more easily and better, then the production ramp up will be quicker and easier to execute and control. However if several different composting recipes of varying lengths have to be

implemented concurrently on an ongoing basis, the production management will be more complex. Consequently, the ramp up period will be longer.

Clearly, the goal of MES is to be able to reach full production capacity of the singular building facility within the first 6 months of operations. MES will engage a composting specialist over that period to assist in this commissioning phase.

4.3.5. Composting Workflow Process and Equipment

Successful composting involves up to seven different steps, as illustrated in Figure 5. Throughout all of the steps, odors and other nuisance conditions (e.g., dust, litter, and vectors) and leachate must be proactively managed. MES will implement this process as illustrated in Figure 5.

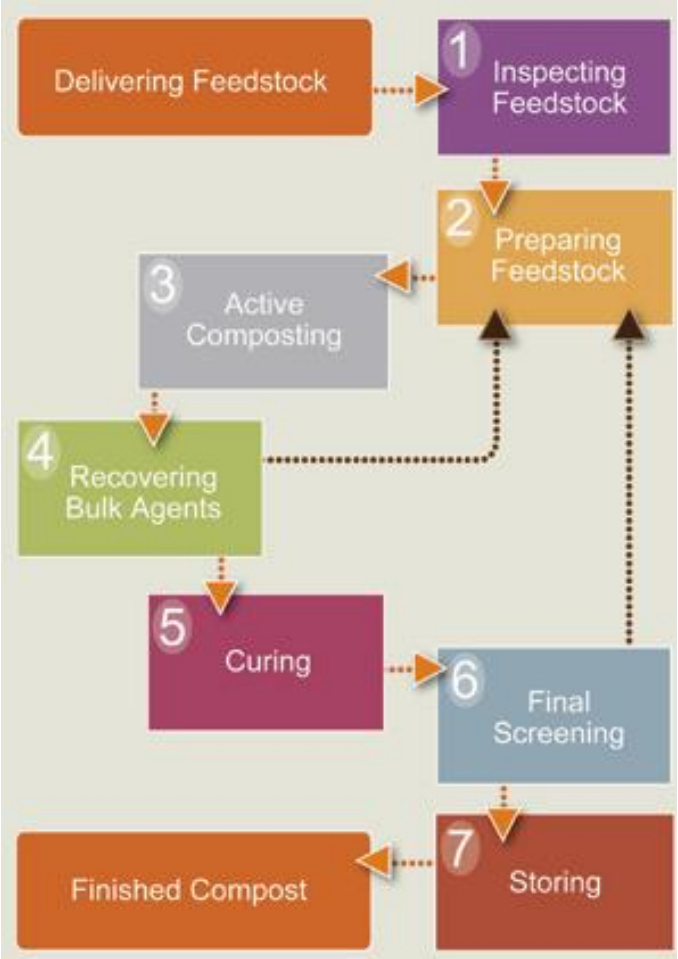


Figure 5 - Steps of the Composting Process

Step 1: Inspecting Feedstock.

This step involves visually inspecting and removing deleterious materials that are unacceptable or non-compostable items (e.g., metal cans, glass bottles, and plastic film). Particular emphasis is also placed on removing contaminants that could pose safety concerns to workers in the facility (e.g., sharps, and glass or metal pieces); or negatively impact finished compost product quality.

Step 2: Preparing Feedstock.

This step refers to the changes made to the feedstocks' physical and chemical characteristics in order to provide optimal conditions for active composting. This may involve grinding to change particle size, blending to ensure the feedstocks are homogeneous, or adding amendments or other materials to adjust physical or chemical characteristics of the feedstocks.

Step 3: Active Composting.

This step involves the rapid decomposition of feedstock components that degrade easily. Once the feedstocks have been amended and mixed with other materials, they are placed into the windrow where active composting takes place.

The active composting step is characterized by high levels of biological activity that create a high demand for oxygen. The activity of these microorganisms also results in a rapid rise in temperature within the feedstock mixture. When the optimal oxygen, moisture, and nutrient levels are present, the biological activity can raise the feedstock mixture's temperature from ambient levels into the 55 to 65°C range within 24 hours.

Most pathogenic bacteria, viruses, and parasites are inactivated when exposed to temperatures in excess of 55°C for 15 or more consecutive days.

The heat produced by the microorganisms that are decomposing the feedstocks provides several important benefits. Most importantly, it allows for the populations of pathogenic microorganisms in the feedstocks to be reduced to acceptable levels, as defined in regulatory guidelines and standards. The active composting phase's high temperatures also render weed and plant seeds inactive.

However, the temperatures encountered during active composting can also cause large quantities of water to evaporate from the composting piles. If this loss of moisture is not properly managed, and the moisture content of the material is allowed to drop below the optimal range (i.e., 55 to 65%), then the

microorganisms are impeded, and the composting process slows down. If feedstocks are allowed to dry out too much (i.e., less than 40% moisture), they may also become a source of dust, increasing the risk of fires and causing health issues for site staff and visitors

This step of the composting process generally requires the closest monitoring, as it could result in objectionable odors and other nuisance conditions (i.e., the attraction of flies and rodents). Active composting can last from 3 to 4 weeks, or it can take 8 to 12 months. The wide variation in time can be attributed to several factors, including the type of feedstocks, the degree of feedstock preparation, the type of composting technology used, climatic conditions, and the level of operator control and management. In the case of MES's indoor composting facility, active composting will take 2 to 3 weeks.

Step 4: Recovering Bulking Agents.

Some composting facilities recover coarse bulking agents, such as woodchips, from the feedstocks for reuse before curing by passing the materials over 2- or 2.5-centimetre (cm) screens; the smaller particles continue on to the curing step, and the larger particles are recycled back to the preparing feedstock step.

However, removing bulking agents reduces the free air space (FAS) within the material. This increases the potential for anaerobic conditions to develop, which can lead to objectionable odors and may create the need for closer monitoring and more frequent turning during the curing step. Thus, leaving bulking agents in the material and recovering them during the final screening step improves passive aeration during the curing step.

Step 5: Curing.

This step involves microorganisms converting carbon into carbon dioxide and humus, and nitrogen into nitrates, which is a much slower biological process. Microorganisms begin to decompose more complex organic structures, such as the lignins and cellulose contained in paper, wood, and plants, and stable humic substances are formed in the curing piles.

As the more readily degradable materials in the feedstock are consumed, the types of microorganisms in the feedstock change, and the overall populations become smaller. These changes results in a lower oxygen demand and lower temperatures, characteristics of the curing step.

The curing step is considered complete when the stability and maturity criteria are met. The terms ‘‘stability’’ and ‘‘maturity’’ are often used interchangeably, but they are actually two separate indicators that measure different properties:

• Stability is a measure of the biological activity in the compost material. Conceptually, material with a high amount of biological activity (e.g., more than 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day [4 mg C-CO2/g OM/day]) indicates that the decomposition process is still occurring and that the material is not ready to be used as a soil supplement.

• Maturity is a measure of the broader chemical condition of compost and is used to indicate the presence or absence of phytotoxic effects (i.e., harmful to plants), which are usually caused by higher levels of ammonia or organic acids. Phytotoxic effects can also be caused by using compost that is not fully stabilized.

Stability is determined by using various tests that measure the oxygen demand or carbon dioxide evolution by microorganisms in a sample (i.e., higher oxygen demand or generation of more carbon dioxide indicates a sample is less stable), or by measuring the temperature increase (or lack thereof) in samples under controlled conditions. Temperature rise indicates that the microorganisms are still actively decomposing materials and generating heat; if this is still happening, the material is less stable.

The most common maturity test used is a seed germination test. However, ammonia and volatile organic acid concentrations in the compost also provide a measure of maturity.

Due to the potential for false positive results, two tests should be used when assessing whether compost is finished: one test for stability and one for maturity.

Based on such information, MES will establish a quality control process that will follow the CCME Guidelines for Composting Quality and meet the requirements of the customers and the authorities having jurisdiction on the matter such as the Department of Environment and Climate Change, and others.

Step 6: Final Screening.

This step involves refining the cured compost before it is sold or used so that it is a more suitable soil amendment. Most commonly, this involves passing the material over 1- to 1.25-cm screens to remove oversized materials, such as large compost particles, stones, and uncomposted bulking agents (which can

be reused in the active composting step). Screening can also remove some of the remaining physical contaminants that may be present, such as glass or metal pieces. Finished compost is sometimes further refined to produce value-added products. For example, compost can be blended with topsoil, sand, or gypsum to make customized horticultural media. Finished compost can also be dried and reformed into a pelletized or granulated product using specialized processing equipment.

MES intends to produce bulk screened compost initially. Further refinements such as packaged compost or other value-added products could be developed later depending on market demand.

Step 7: Storing.

Properly storing the finished compost product is the final step of the composting process. Whether compost is in bulk form or placed in bags, it should be stored in a manner that prevents dust or odors from developing, and prevent contamination of the product from weeds, leachate, or other contaminants. For example, large stockpiles of finished compost can become a source of odors if they are saturated with rainfall, and can quickly become infested by weeds. Fire prevention and control should also be considered in finished product storage areas, since compost can be a fuel source.

At the initial stage of operation of the composting facility, the cured compost will be held indoor until space in required for curing compost. We know that the demand for cured, finished compost, is mostly seasonal, from May to October. Cured compost needing to be stored outdoors will be over winter. Cured compost can be stored on an impervious surface such as a geomembrane, asphalt or concrete slab. The cured compost pile can be covered with impervious membrane to be protected from rain and snow. As a result, any cured compost stored outdoors will not emit any odors because it will be held at low temperatures, covered and protected. The piling height will be low enough to prevent any heating leading to spontaneous combustion.

4.3.6. Volume and Constitution of Output from the Facility

An estimate of the volume and constitution of output from the facility for each of the first five years is virtually impossible to determine with any accuracy until MES experiences the actual start-up phase of the facility. This start-up phase will determine which raw materials will be preferably and actually composted based on availability, ease and speed of composting, and many other variables.

As indicated in section 4.3.3 above, MES's goal is to reach an annual production capacity of 13,200 tonnes after about 6 months of initial operation and double that production with the construction of an additional building in year 3 or year 4 if all goes well.

The grades of the soil amendment (final product) that will be produced at the facility will be sold in bulk. If at a later stage there is a demand or opportunity for packaged compost products, MES will consider this option.

There are no plans for on-site application of final compost product. It will only be a case of temporary storage of compost on site. The finished compost piles will be covered with an impervious membrane to prevent degradation from rain, sun, snow, etc. It will also prevent nitrogen and phosphorus overload of the underlying soil in the storage area.

MES expects that all its annual production of finished compost will be sold. The demand for topsoil and amended topsoil in eastern Newfoundland is much larger than the possible annual production from the proposed composting facility. The amount of finished compost that may be on site at any one time will peak at spring time. MES anticipates the demand for compost to be greater than the production of the facility.

4.3.7. Testing and Quality Control

In Canada, the following standards have been jointly developed to govern compost quality:

• The Fertilizer Act
• Canadian Council of Ministers of the Environment (CCME) Guidelines for Compost Quality
• Bureau de Normalisation du Québec (BNQ) Organic Soil Conditioners—Composts

As a result of the foresight of the agencies involved, these standards are closely harmonized, so if one standard is met, it is relatively easy to meet the requirements of the others.

Table 3 - Compost Quality Standards

	Canadian Food Inspection Agency *Fertilizer Act*	CCME *Guideline for Compost Quality*	BNQ *Organic Soil Conditioners—Composts*
Maximum trace element concentrations	X	X	X
Maturity	X	X	X
Pathogens	X	X	X
Foreign matter (including sharps)	X	X	X
Moisture content and Organic Matter	X		X
Labelling	X		

The frequency of testing of the final compost product required to be conducted and reported to the Department of Environment and Climate Change, is to sample and test every batch of finished compost. This is to ensure compliance with CCME Compost Quality Guidelines.

Testing procedures will be carried out as per the Guidance Document NL Environmental Standards for Municipal Solid Waste Compost Facilities – 2010, as per Table 2 – Recommended Sampling and Laboratory Practices to Asses Trace Element Concentration of MSW Compost Products.

Table 2 - Recommended Sampling and Laboratory Practices to Assess Trace Element Concentration of MSW Compost Products
• Obtain multiple composite samples from randomly selected locations within a pile or windrow. • Use plastic containers for sampling and storage to avoid contamination; use field blanks ("samples" without the substance being analyzed) to test for such contamination during sample storage, transport, and processing. • Analyze replicate subsamples of each composite sample, being careful to mix samples thoroughly and reduce particle size as needed. • Use National Institute of Standards and Technology (NIST) or comparable standard reference materials to determine the accuracy and precision of the digest/analysis technique. • Add a known concentration of the element of interest to compost digest solutions to check for potential matrix interferences. • Carry reagent blanks throughout the digest and analysis protocols. • Report metal concentrations of the compost on a dry weight basis. • Report the ash content of samples.

- Report all quality assurance data along with sample data so that data quality can be independently evaluated.

Note: Additional care must be taken with some metals such as selenium and mercury that may volatilize during processing and for organic compounds that may volatilize or undergo chemical transformation prior to analysis.

Parameters to be tested are as per CCME Guidelines for Compost Quality as per Table 4 below.

Table 4 - Summary of CCME Guidelines for Compost Quality

	Category A	Category B	
	Maximum concentration within product (mg/kg dw)	Maximum concentration within product (mg/kg dw)	Maximum cumulative additions to soil (kg/ha)
Trace elements			
Arsenic	13	75	15
Cadmium	3	20	4
Chromium	210	1060	210
Cobalt	34	150	30
Copper	400	757	150
Lead	150	500	100
Mercury	0.8	5	1
Molybdenum	5	20	4
Nickel	62	180	36
Selenium	2	14	2.8
Zinc	700	1850	370
Pathogens[a]			
Compost produced solely from yard waste must meet PFRP criteria[a] ***or*** the following pathogen content limits:			
Salmonella	Less than 3 MPN/4-g (dw)		
Fecal coliform	Less than 1000 MPN/g (dw)		
Compost produced from all other feedstocks must meet PFRP criteria ***and*** the pathogen content limits.			
Foreign matter and sharp foreign matter			
Foreign matter	Less than or equal to 1 piece greater than 25 mm in any dimension per 500 mL	Less than or equal to 2 pieces greater than 25 mm in any dimension per 500 mL	
Sharp foreign matter	None greater than 3 mm in any dimension per 500 mL	Less than or equal to 3 pieces per 500 mL, 12.5-mm maximum dimension	
Maturity/stability			

All compost will be mature and stable at the time of sale and distribution. To be considered mature and stable, it must be cured for a minimum of 21 days, and meet one of the following requirements: • Respiration rate less than or equal to 400 mg O_2/kg VS (or OM) per hour • CO_2 evolution rate less than or equal to 4 mg C-CO_2/kg OM per day • Temperature rise above ambient less than 8°C
Organic compounds
Avoid composting feedstocks with high concentrations of persistent bio-accumulating organic contaminants.

Notes:
[a] To meet PFRP criteria for in-vessel and ASP composting, maintain material at operating conditions of 55°C or greater for 3 consecutive days. For windrow composting, maintain material at a temperature of 55°C or greater for at least 15 consecutive days during the composting period. During the high-temperature period, turn the windrow at least 5 times.

°C—degrees Celsius; ASP—aerated static pile; C-CO_2—carbon-carbon dioxide; dw—dry weight; g—gram; mL—milliliter; mm—millimeter; O_2—oxygen; PFRP—Process to Further Reduce Pathogens; VS—volatile solids

Commercial laboratories such as Maxxam Laboratories with proper accreditations will be engaged to conduct the analytical work. The test results will be recorded and managed and made available to government inspectors.

Nutrient analysis of finished compost will be done as necessary to satisfy any requirement of customers and/or government department or agencies. Nutrient analysis is meant to help evaluate the quality of compost as an agronomic or horticultural resource. The following parameters are measured and reported in nutrient analysis of compost: pH, Soluble Salts (Electrical Conductivity), Bulk Density, Percent Solids and Moisture Content, Organic matter, Nitrogen, Total Nitrogen, Organic Nitrogen, Nitrate and Ammonium, Total Carbon, C:N Ratio, Macronutrients, Micronutrients, Heavy metals.[4]

From this quality assurance procedure, only compost batches tested that meet these regulatory requirements will be considered finished product.

4.3.8. Business Case for this Project

The basic business model for the indoor industrial composting facility rests on the facts that:

- The facility gets paid a tipping fee for receiving the raw material;
- The facility gets paid a tipping fee for receiving the waste wood and other carbonaceous materials;

[4] https://soiltest.umass.edu/fact-sheets/interpreting-your-compost-test-results

- The facility processes the materials by composting process taking place indoor to avoid imparting any negative environmental impact to the surrounds;
- The facility incurs labor, material and overhead costs to carry out its business;
- The facility sells the finished compost product as soil amendment to agricultural and landscaping industry markets;
- The facility remits taxes to governments.

The required capital investment and commitment is substantial, and the regulatory regime from environmental assessment registration, to release, to construction and to ongoing operation is very stringent and costly all along. This regulatory regime is designed to protect the public and the environment. MES intends to do everything in its power to be successful. This means establishing and running a quality operation that meets all market and regulatory requirements for the finished compost produced.

4.3.9. Quarry Materials

At this stage, the MES does not foresee requiring much of any quarry materials for the site development. Manufactured aggregate will be required for building foundations or for drainage purposes. Like any other construction projects, quarry materials required for the project will be sourced, either from a site permitted under the Quarry Materials Act, 1998, or from an external source as a by-product of development and for which royalties have been paid under the Quarry Materials Act, 1998, or from within the legal boundary of the project site.

During operations, the facility will neither require nor produce any quarry type materials.

4.3.10. Compliance with OHS Act and Regulations

MES will ensure that activities associated with the industrial composting operation will be conducted in compliance with the Occupational Health and Safety Act and its Regulations.

MES recognizes the responsibility to comply with OHS regulations, which includes ensuring that sub-contractors hired to perform work also comply with OHS legislation.

Standard Operating Procedures and Health and Safety Plans will include:

- A description of the necessary equipment, systems, tools, information, instruction, training and supervision that will be provided and maintained to ensure the health and safety of workers at the facility;
- A description of how the undertaking will be conducted to ensure that persons not employed at the facility are not exposed to health or safety hazards as a result of the undertaking, e.g. persons delivering feedstock and/or buying product;
- A description of the personal protective equipment that will be provided on-site, and periodic indoor air quality testing that will be conducted to ensure a safe environment for workers.

4.3.11. Risk Assessment Where Workers Are Assigned to Work Alone

A health and safety risk assessment will be established in cases where workers may be assigned to work alone or in isolation. Where such assessment identifies actual or potential hazards, appropriate controls will be implemented to eliminate, or minimize these risks. A procedure will be written for checking the well-being of a worker assigned to work alone or in isolation.

The Proponent does not plan or anticipate to have only one person on site to operate the facility. Certainly if a singular person or worker is working at the site, the scope of the work to be performed will be reduced to meet the results of the risk assessment.

4.3.12. Emergency Response Plan

A proper emergency response plan describing measures to be taken to effectively respond to foreseeable situations that may occur as a result of the facility operations will be prepared. Emergency evacuation and response drills will also be carried out regularly as part of the Health, Safety and Environment policies and program of the company. Such an emergency response plan will include lists and locations of proper first-aid kits, fire extinguishers, communication devices, a list of emergency names and numbers appropriately placed; and an action plan including the roles and responsibilities of workers. Such an emergency response plan is standard in industry and will be properly and professionally prepared and implemented.

4.3.13. Workers Facilities

The indoor composting facility will consist of two buildings. A small building located near the entrance yard of the site will house the scale wicket, the company offices, and the workers lunch room, washrooms and change rooms. The washrooms will have shower facilities. The indoor composting facility building will not have any workers facilities per se.

4.3.14. Adequate Ventilation System

The indoor composting facility building will be adequately ventilated to minimize the buildup of bioaerosols and decomposition gases. It will operate in two modes. The ''Standard'' mode will have ventilation rates throughout the building to maintain a zero odor emission while the facility in not manned. A higher ventilation rate will be established for periods when workers are working in the indoor composting facility building. The ''High'' mode of ventilation will be operational for feedstock mixing, windrow formation, windrow turning, watering, and finished product removal from the building. The ''High'' mode will provide good fresh air intake into the building to enable the workers to breathe comfortably air that is dust-free and odor-free.

4.3.15. Air Quality for Equipment Operators

With the proposed ventilation of the composting building, MES is not expecting to have provide additional respiratory protection to workers in cabs of the heavy equipment (e.g. windrow turner or loader).

4.3.16. Odor Management Plan

An Odor Management Plan will be implemented to control the dispersion of odors and prevent public concerns and complaints. Such an odor management plan will be derived from the odor management plan and document - THE COMPOSTING PROCESS: Odour Management – from the Composting Council of Canada, which can be found in Appendix II of this document.

This odor management plan contains all the elements necessary for MES to formulate its detailed odor control system design and operation as indicated in Section 4.2.7 above. All odorous materials and activities will be confined indoor. An adequate ventilation system and biofilter system will be designed and operated. All the desirable and necessary good practices in the handling

of the feedstock, its mixing, its composting and curing will be implemented in the design of the final process to prevent or reduce odors at the source.

From initial commissioning stage, MES will only increase production volumes if odors (and any other operational parameter) are completely controlled and do not impact the surrounding outdoor environment. If odors become a problem at a given production level, MES will reduce the production rate to avoid odors and look to solve the specific problem before increasing production rate again.

In the short term, MES will have determined and optimized the composting recipes, the preferred feedstock, and other significant operating parameters to be able to operate at full capacity with no air pollution or odorous emmissions.

4.3.17. Vector Management Plan

An on-going Vector Management Plan will be implemented at the facility over its operational lifetime.

Whether it is because feedstocks provide a food source or because processing operations generate heat, it is a reality that organic waste processing facilities are an attractant to insects, birds, and other animals, such as mice and rats, coyotes, and bears. Even processing grass, leaves, and brush, which are often thought of as relatively innocuous feedstocks, can attract insects, birds and animals.

The primary concern related to insects, birds and animals is the potential spread of pathogens and diseases. In this context, they are vectors for the spread of diseases. A secondary concern is that birds and animals can scatter feedstocks around the facility site or onto adjacent properties. Larger animals, such as coyotes, also pose a physical threat to site personnel and visitors.

As with other nuisance conditions, the primary means of controlling insects, birds, and animals is to follow sound operational practices. First among these is implementing good housekeeping and maintaining a clean site.

Birds are more difficult to control, since they can fly over fences and other barriers that deter animals. There are several bird control measures that can be incorporated into the facility, such as adapting the design of site buildings and structures to minimize potential perches; installing mist netting inside enclosures, and using air curtains or other barriers on overhead doors; installing windmills with surfaces that reflect visible or ultraviolet light; and installing streamers and flags.

Relative to birds, insects are much easier to control. Insect control focuses primarily on flies and mosquitoes, both of which are vectors for disease and the spread of pathogens.

Mosquitoes lay their eggs in standing water; thus, they are attracted to surface water ponds, and water collected in ditches, ruts, and depressions. While it is not cost-effective to cover surface water ponds, tanks can normally be covered, or screens can be placed over openings and vents. Repairing damaged roads and pads, and regular regrading of working areas, can help prevent standing water accumulation.

Flies are attracted to decaying feedstocks. They are also attracted to the heat given off by the composting process; flies often lay their eggs on the outer surface of the compost pile where temperatures are above ambient, but not high enough that they kill the fly larvae.

The primary means of controlling flies is to process feedstocks as quickly as possible, thereby exposing eggs to heat or other conditions that kill the larvae before they hatch. Flies can also be controlled with various fly traps and bug zappers.

4.3.18. Level of Expertise in the Industrial Composting Process

The appropriate level of expertise in the industrial composting process is vital to the success of the project. At least one employee/operator on-site and the facility manager will be trained in the operation of an industrial composting facility, with training certified by the Composting Council of Canada, Solid Waste Association of North America, or equivalent. The services of an experienced industrial composting consultant may be secured initially to assist in the operation of the facility in the first couple of months.

As related in Section 8 below, MES and its consultants already have extensive expertise in composting, industrial biotechnology and environmental science and engineering.

4.3.19. Chain of Custody Documentation

The content, volume, source and date of each shipment of feedstock received at the facility will be recorded and made available to government inspectors when requested. Proper records will be established and maintained in

consultation with the Pollution Prevention Division of the Department of Environment and Climate Change.

4.3.20. Decommissioning Plan

A decommissioning plan for site clean-up, repair and rehabilitation, and removal or securing of infrastructure, equipment and access prior to closure of the industrial composting facility will be prepared and submitted to the Department of Environment and Climate Change.

Such a decommissioning plan will layout the processes of:

a. stopping the receiving of raw materials,
b. completing the composting of remaining raw materials,
c. selling/removing remaining finished product,
d. cleaning and disinfecting the entire facility,
e. demolishing or converting the facility to another use.

4.3.21. Fire and Emergency Protection Plan

A Fire and Emergency Protection Plan will be developed in consultation with Fire and Emergency Services-NL (FES-NL), to ensure adequate firefighting training and equipment on-site. The plan shall be approved by FES-NL prior to the initiation of construction activities.

Such a plan will be prepared in conjunction with the engineering design of the facility in terms of the fire suppression systems and technologies required by the National Fire Code, the NFPA codes and standards, and any other codes pertaining to the nature and operation of the indoor composting facility.

This fire and emergency protection plan will be communicated to the employees as part of their health and safety orientation and training, as well as to the local Volunteer Fire Department of either Whitbourne, Long Harbour or Chapel Arm, whichever is contracted for firefighting services, and to any other authorities having jurisdiction.

The main indoor composting building will be classified as a medium hazard industrial occupancy category (Occupancy Category F, Division 2) as per the National Building Code 2010. Consequently, the building must meet a variety of requirements including fire suppression systems and flammability of construction, depending on size of building, proximity to ‘‘streets’’ or ‘‘fire lane(s)’’ and other parameters. The building can designed such that no fire sprinkler system will be required and meet the requirements of the codes.

The Fire and Emergency Plan will include:

- A detailed description of the actions facility personnel shall take in the event of various emergency situations;
- A description of arrangements made with the Department and local police and fire departments which will allow for immediate entry into the facility by their authorized representatives should the need arise, such as in the case of response personnel responding to an emergency situation; and
- A list of names, addresses and phone numbers (office and home), if known at the time of submission of the engineering design, of all persons qualified to act as an emergency coordinator for the facility. The final list of names, addresses and phone numbers of such persons shall be submitted as part of the final operations and maintenance manual. This list shall be kept up to date. Where more than one person is listed, one shall be named as primary emergency coordinator and the others shall be listed in the order in which they will assume responsibility as alternates.
- Fire drills and emergency evacuations performed periodically to enhance emergency preparedness.
- Readily available, pressurized water supply, complete with standpipes and fire hoses.
- Driveway, yard and fire lane design that permits easy access by fire-fighting equipment.
- Providing aisles between windrows as a fire break and for access.
- Providing buffer distances between potentially combustible materials.
- Access to earth moving equipment in event of deep subsurface fire occurs and needs to be isolated and dug out.
- Having a readily available stockpile of soil to smother a fire (as an alternative to using water).

4.3.22. Environmental Emergency Contingency Plan

An Environmental Emergency Contingency Plan for the storage and handling of gasoline and associated products, will be prepared and will also include information regarding the location of spill response equipment and a trained contractor, in the event of a spill.

The Environmental Emergency Contingency Plan is part of the greater Contingency Plan for the Indoor Composting Facility which will include:

- Health and Safety plan
- Emergency evacuation plan
- Emergency Response Resources and Equipment
- Hazardous Goods Storage (products, location, inventory)
- Site map
- Fire Contingency Plan
- Petroleum Contingency Plan (spill, fire)
    - Spill prevention
    - Spill response

Such documents are standard operations documents for agricultural and industrial facilities. This Environmental Emergency Contingency Plan will be communicated to the employees as part of their health and safety orientation and training, as well as to the Department of Environment and Climate Change, and to any other authorities having jurisdiction.

4.3.23. Composting Potentially Hazardous Material

MES has no intention whatsoever to accept, receive or compost any potentially hazardous material. MES will be very selective in the nature and quality of raw material it intends to process. MES will inspect judiciously every load of raw material received and dumped inside the indoor composting facility.

MES will not accept and compost any sewage sludge.

Through long standing activities and experience in demolition and environmental remediation conducted through a related company over many years, the Proponent has extensive expertise and experience in hazardous materials assessment, abatement and environmental remediation.

In the unlikely case of receiving raw material containing hazardous materials of any kind, MES will contact immediately the Pollution Prevention Division of the Department of Environment and Climate Change, and deal with the proper removal, remediation and disposal of the potentially or actually hazardous material. Immediate measures will be taken to protect the employees and the public from any exposure to such hazardous materials.

4.3.24. On-Site Waste Management

On-site waste will be placed in suitable refuse containers which will be provided for the collection and weekly removal of waste to an approved waste disposal facility.

MES intends to operate the facility responsibly and professionally. Garbage collection, storage and disposal will be done using standard industry practices.

4.3.25. Renaming of Government Departments

In this document, any references to the former Department of Environment and Conservation have been updated to the current title of Department of Environment and Climate Change, and all references to the former Forestry and Agrifoods Agency are updated the current title of Department of Fisheries, Forestry and Agrifoods.

5. Other Site Locations Considered

In his endeavor to establish the proposed indoor composting facility, MES successively considered several sites before selecting the best suitable site located as proposed on the Argentia Access Road. MES and his Engineering Consultant spent extensive time and efforts to identify and assess these sites in active consultation with governmental departments and agencies, municipalities and related stakeholders.

MES started with a large track of undeveloped land at the north east corner of the Trans-Canada Highway and the Salmonier Line (Site 1). Although the land was initially zoned agricultural land, it has recently been rezoned by the Town of Holyrood for residential development. Furthermore, the majority of the land area is part of the watershed area for Harbour Main and Chapel Cove. Understandably, watershed areas have very restrictive development regulations.

MES then considered Crown Land sites on Incinerator Road, in the Municipality of St. John's, near the Foxtrap Access Road from Trans-Canada Highway. Two sites were considered, explored and assessed. One on the south side of Incinerator Road, which was the actual incinerator site for CBS, decommissioned and removed at least 10 years ago (Site 2). Because of its previous use as a dump site and disposal facility, it was not possible to establish a facility for industrial composting at that site. Rightfully so, Crown Lands would

not issue a lease. MES then looked at a Crown Lands site on the north side of Incinerator Road (Site 3). Although the site initially appeared suitable, MES discovered that the site was too close to the local hydrographic system in the Incinerator Road area which drains through Foxtrap and Seal Cove to Conception Bay. Both City of St. John's and Town of CBS had concerns over the protection of the local watershed and hydrographic system supplying well water to CBS residents.

With the ongoing assistance of staff from the Department of Fisheries, Forestry and Agrifoods, MES considered several Crown Land sites.

- Kennys Gullies near Briens Pond, roughly between Trans-Canada Highway and town site of Avondale (Site 4).
- South east corner of intersection of Argentia Access Road and Newfoundland T Railway track, near Reversing Pond (Site 5).
- North west side of Argentia Access Road, between Hynes Pond and Snows Pond (Site 6).

Site 4 had an excellent location, albeit a more difficult and farther access from Trans-Canada Highway. It offered plenty of space and isolation. But the site had an existing Crown Land lease that could not be transferred to MES.

Potentially suitable, Site 5 was an existing lease that could not be transferred to MES. As well, the proximity of Site 5 to the T Railway track and the relative proximity to Markland made the site impossible to undertake.

Similarly, Site 6 was in too close proximity to Placentia Junction and turned out to be an existing Crown Land lease that could not be transferred to MES.

Figure 5 below shows the locations of the 6 sites explored and assessed, as well as the final site selection on the Argentia Access Road.

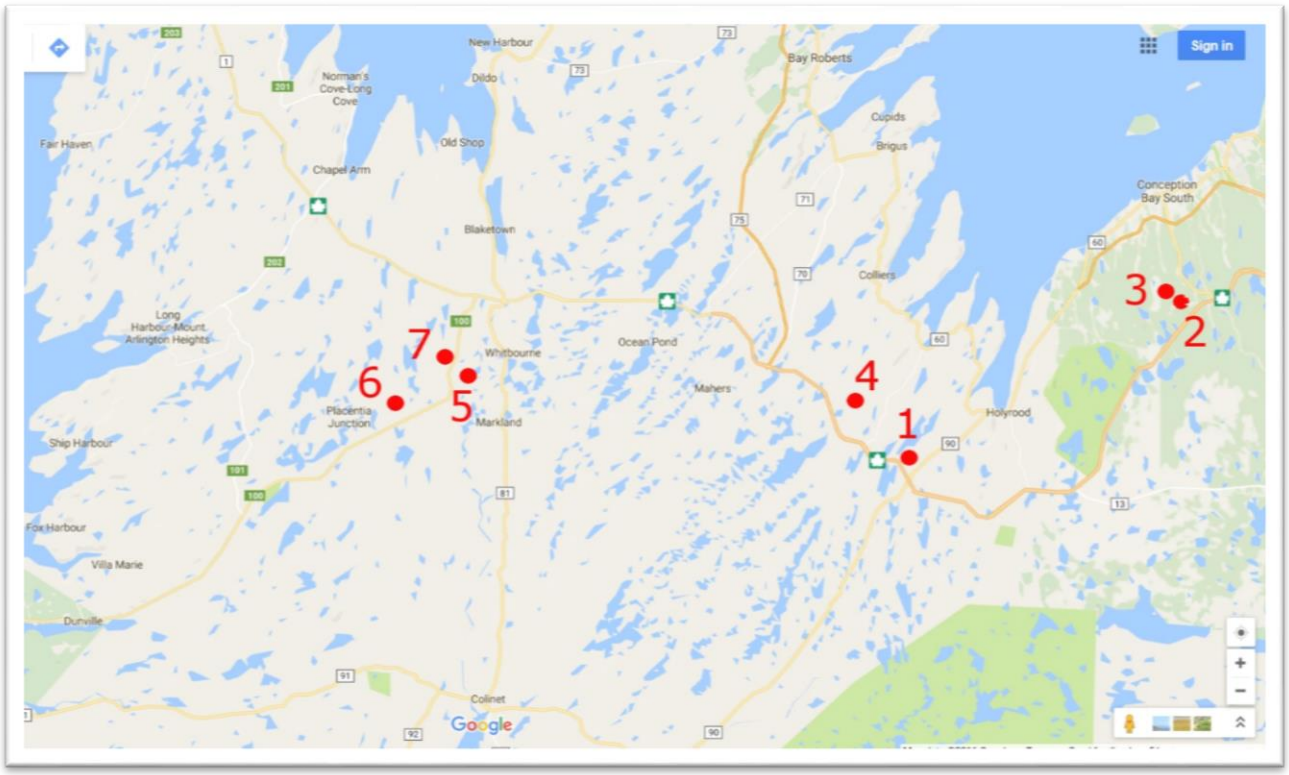


Figure 6 - Location Map of Sites Considered

6. Potential Environmental Effects and Mitigation

The potential effects of the project on the environment and the proposed mitigation to be used to avoid adverse environmental effects, include:

6.1. Clearing of Trees

In the design and construction of the indoor composting facility, MES will limit to a minimum the clearing of trees and brush to only what is necessary for construction and operation of the facility.

6.2. Erosion Control and Runoff

In the design and construction of the facility, MES will ensure that sediments are contained during construction and operation, and will not be permitted to runoff into a water body or wetland. Following good civil construction

practices, MES will take preventative actions, such as: coordinating construction and excavation activities to avoid heavy precipitation and the freezing/thawing cycle; installing sediment control structures prior to land disturbance (e.g., silt fencing, sediment traps, sediment ponds); minimizing the exposed soil area and stabilizing exposed soil as soon as possible with mulch, erosion control blankets and/or native vegetation; monitoring nearby receiving waters for total suspended solids or contaminants from project related activities.

6.3. Wetlands Conservation

In the design and construction of the composting facility, MES and his consultants will identify measures that will be undertaken to conserve wetlands, such as avoiding development on wetlands, maintaining a 30 metre undisturbed buffer around wetlands and watercourses and diverting surface runoff from construction and operation away from wetlands.

The site does not particularly contain wetlands. Otherwise, it would have been deemed unsuitable from the initial evaluation. Detailed inspection and survey of the site will confirm the presence of any particular wetlands, at the pre-construction stage.

A small pond is located in the north western area of the site. This pond and a 30 meter separation from the pond will be maintained to isolate and protect this area from any activities occurring on site.

6.4. Spill Response Plan

With the assistance of his engineering consultant, MES will be developing a contingency plan that ensures a quick and effective response to a spill event. Spill response equipment will be readily available on-site, including absorbents and open-ended barrels for collection of cleanup debris. Personnel working on the project will be knowledgeable and trained in emergency spill response procedures. In developing the contingency plan, the consultant will use the Canadian Standards Association publication Emergency Planning for Industry CAN/CSA-Z731-03.

The contingency plan will be included in the Fire and Emergency Services Plan required by Fire and Emergency Services-NL, described in Section 9 below.

6.5. Storage of Fuels and Lubricants

The storage of oils, greases, diesel, gasoline, hydraulic and transmission fluids will be located at least 100 metres from any body of water. All leaks/spills will be reported as they must, to Service NL at 729-2008 and the spill line: 1-800-563-9089.

6.6. Refueling and Mechanical Maintenance

Following standard good operational practices, MES will be conducting refueling and maintenance activities at least 100 metres from any body of water and on level terrain, and using biodegradable fuels and fluids where possible.

6.7. Handling and Storage of Waste Fuels and Lubricants

MES will be retaining waste oils and used lubricating oil in a tank or closed container, and will be disposing of them in an approved manner following the waste oil regulations of the Department of Environment and Climate Change.

6.8. Wildlife Habitat Disturbance

Negative habitat disturbance on wildlife, including migratory birds, by undertaking vegetative clearing and excessive noise activities outside of the nesting, breeding and brood rearing period (April 15 to August 15 in this region) will be reduced to a minimum. Where vegetation clearing will not avoidable and a nest is found:

- The nest and neighboring vegetation will be left undisturbed until nesting is completed;
- Construction activities will be minimized in the immediate area until nesting is complete.

For guidance on how to avoid the incidental take of migratory birds nests and eggs, please refer to the Avoidance Guidelines (Website: http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=AB36A082-1).

Reducing habitat disturbance will be diligently done, but we may have the opposite problem whereby wildlife may be attracted to the facility because of its operation. This comes back to the proper vector plan that will be established at the beginning and revised as experience teaches us.

6.9. Bird Deterrence

Deterrence measures to prevent migratory and other birds from nesting in unattended stockpiles of soil and/or compost particularly during the breeding season will be developed by MES. If migratory birds take up occupancy of these piles, any industrial activities will cause disturbance to these migratory birds and inadvertently cause the destruction of nests and eggs. Alternate measures will then need to be taken to reduce potential for erosion, and to ensure that nests are protected until chicks have fledged and left the area.

6.10. Bird Repellant

Repelling devices will be used as necessary on the roof of the facility buildings, lighting poles, and product stockpiles. Such repellant may include the use of flags, streamer tape, scarecrows or human-like dummies, and electronic noisemaking devices.

6.11. Reducing Attraction of the Site to Migratory Birds

MES will undertake measures to reduce the attraction of migratory birds to on-site lighting, such as: using LED lights instead of other types of lights where possible; shielding lights needed for the safety of employees to shine down and only to where it is needed; and installing the fewest number of site- illuminating lights needed for safety, at the lowest intensity and smallest number of flashes per minute allowable by Transport Canada.

6.12. Litter Control

MES will put measures in place to ensure that litter, food scraps, feedstock and any other waste shall be made inaccessible to birds, mammals and other vectors so as not to artificially enhance populations of predators of eggs and chicks. Proper waste management practices and equipment will be in place at the site to properly control, collect and dispose of garbage that might be attractive to birds, vectors and wildlife.

6.13. Invasive Weed Control

Compost temperatures of 50 to 60 Celsius are reached during the active composting phase. At this temperature level, all seedling within the compost mix are destroyed. That will ensure that the soil created from the composting operation is not seeded with invasive species such as Purple Loosestrife. Therefore the potential incidence of invasive species at the site will be limited to the wood waste raw material being received and stored outdoors. MES will be selective as to what wood waste the facility will accept, and regular inspections will be done to prevent any progression from potential invasive botanical species. By developing and implementing such additional measures as regular cleaning and inspection of mechanical equipment (including ventilation equipment) will ensure that no vegetative matter is attached to the machinery to diminish the risk of introducing invasive species, such.

7. Project Related Documents

7.1. Internal Documents

Environmental Registration Document, Industrial Composting Facility – Holyrood, NL, Innovative Development & Design Engineers Ltd., 25 January 2016.

Environmental Registration Document, Industrial Composting Facility – Argentia Access Road, NL, Innovative Development & Design Engineers Ltd., 32 March 2016.

Environmental Registration Document Addendum, Industrial Composting Facility – Argentia Access Road, NL, Innovative Development & Design Engineers Ltd., 29 April 2016.

Environmental Preview Report, Industrial Composting Facility – Argentia Access Road, NL, Innovative Development & Design Engineers Ltd., 14 October 2016.

7.2. Department of Environment and Climate Change Documents

Environmental Assessment, A Guide to the Process, Government of Newfoundland and Labrador, Department of Environment and Climate Change, September 2016, (http://www.env.gov.nl.ca/env/env_assessment/EA%20Guide%20to%20the%20Process_2016sept.pdf)

Minister's Decision Letter, Department of Environment and Climate Change, Office of the Minister, 15 July 2016, http://www.env.gov.nl.ca/env/env_assessment/projects/Y2016/1838/1838_epr%20required%20letter.pdf

Guidelines for an Environmental Preview Report for the Argentia Access Road Industrial Composting Facility, Department of Environment and Climate Change, Honorable Perry Trimper, Minister, 8 September 2016, http://www.env.gov.nl.ca/env/env_assessment/projects/Y2016/1838/1838_epr_guidelines_16sept2016.pdf

Minister's Decision Letter, Department of Environment and Climate Change, Office of the Minister, 16 September 2016, http://www.env.gov.nl.ca/env/env_assessment/projects/Y2016/1838/1838_min_lettepr_guidelines.pdf

7.3. Public Notices

Project Registered, Environmental Assessment Bulletin, Department of Environment and Climate Change, 5 April 2016 http://www.env.gov.nl.ca/env/env_assessment/bulletins/Y2016/20160405.pdf

Addendum Submitted, Environmental Assessment Bulletin, Department of Environment and Climate Change, 12 May 2016 http://www.env.gov.nl.ca/env/env_assessment/bulletins/Y2016/20160512.pdf

Decision Extended, Environmental Assessment Bulletin, Department of Environment and Climate Change, 24 June 2016 http://www.env.gov.nl.ca/env/env_assessment/bulletins/Y2016/20160624.pdf

Environmental Preview Report Required, Environmental Assessment Bulletin, Department of Environment and Climate Change, 20 July 2016
http://www.env.gov.nl.ca/env/env_assessment/bulletins/Y2016/20160720.pdf

Environmental Preview Report Committee Appointed, Environmental Assessment Bulletin, Department of Environment and Climate Change, 29 July 2016
http://www.env.gov.nl.ca/env/env_assessment/bulletins/Y2016/20160729.pdf

Environmental preview report guidelines approved, Environmental Assessment Bulletin, Department of Environment and Climate Change, 22 September 2016
http://www.env.gov.nl.ca/env/env_assessment/bulletins/Y2016/20160922.pdf

7.4. Technical Documentation on Composting and Related Subjects

MES and the engineering consultant did extensive research on the subject of indoor industrial composting. Below are a short list of the main documents collected and studied. Many other documents and websites on the subject were consulted and saved.

Technical Document on Municipal Solid Waste Organics Processing, Environment Canada, 2013
http://www.compost.org/English/PDF/Technical_Document_MSW_Organics_Processing_2013.pdf

Various publication from The Compost Council of Canada
http://www.compost.org/English/ENGLISH_INDEX.htm

The Management of Organic Waste in Newfoundland and Labrador, Multi-Materials Stewardship Board, March 2012.

Code of Practice for Compost Facilities, Alberta Environmental Protection, Made under the Environmental Protection and Enhancement Act, RSA 2000, cE-12
http://www.qp.alberta.ca/documents/codes/COMPOST.PDF

Odor Management, The Compost Council of Canada, Christine Phillips, March 2002

http://www.compost.org/pdf/sheet_3.PDF

Leachate Management, The Compost Council of Canada, Christine Phillips, March 2002
http://www.compost.org/pdf/sheet_6.PDF

Guidance Document, Environmental Standards for Municipal Solid Waste Compost Facilities, Department of Environment and Climate Change, Pollution Prevention Division, Marie Ryan, Senior Environmental Scientist, April 2010.
http://www.env.gov.nl.ca/env/env_protection/waste/composting_facility_april.pdf

Composting Processing Technologies, Composting Council of Canada, August 2006
http://www.compost.org/pdf/compost_proc_tech_eng.pdf

Back to Basics Designing the New Colchester Compost Facility, 24th Annual National Compost Conference, Sept. 22-24, 2014, Halifax, NS, Paul Arnold, Bio-Logic Environmental Systems Tom Austin, ABL Environmental Herb Corbett, Municipality of the County of Colchester

Guidelines for Compost Quality, PN 1340, Canadian Council of Ministers of the Environment, 2005, www.ccme.ca

Study of Options for Organic Waste Processing in the Province of Newfoundland and Labrador (Revised Final Report), for Frank Huxter, Department of Municipal Affairs, Scott D. Kyle, P. Eng., Dillon Consulting Ltd., 31 July 2014

Issues Relating To Organic Waste Disposal, Part 1 – The Science Of Organic Waste Disposal, HotRot Organic Solutions (NZ) Ltd, PO Box 4442, Christchurch 8140, New Zealand, www.hotrotsolutions.com

8. Public Information Meeting

An Open House Public Information Session was held on Wednesday November 9th, 2016 at 7 PM at Whitbourne Elementary School in Whitbourne near the site of the proposed indoor industrial composting facility. As mandated by the Department of Environment and Climate Change with the Environmental Preview Report, MES and his engineering consultant delivered a presentation to provide information about the undertaking to the public. The presentation was followed by a question period. A copy of the presentation is included in Appendix III – Public Presentation.

The public meeting was well attended with 35 people from the local area. Both mayors of Whitbourne and Placentia were in attendance, as well as Honorable Ms. Sherry Gambin-Walsh, Minister of the Department of Children, Seniors and Social Development and local MHA for Placentia - St. Mary's district.

We would like to recognize and thank Ms. Patti Kennedy, administrator of Whitbourne Elementary, for her kind assistance in booking the event, and providing an excellent set up for the venue.

As per Section 10(2) of the Environmental Assessment Regulations, 2003, MES has notified the Minister and the public of the scheduled meeting not fewer than 7 days before that meeting. The meeting was announced in the Environmental Assessment Bulletin and posted on the Department's web page, as well as in The Telegram, The Compass, and in the Town of Whitbourne Facebook page.

8.1. Public Concerns Expressed

Questions arose expressing the following five salient public concerns:

8.1.1. Changes to the Project as Proposed

A couple people asked as to why the initial scope of the project and composting facility was smaller and different in the initial submittal of the Environment Assessment Registration documents, and subsequently changed with the Argentia Access Road location selection. These questions also implied that MES may not be sufficiently prepared and competent in the proposed undertaking.

The initial project was formulated and proposed on the basis of a small seasonal composting outdoor operation of sufficient isolation to be feasible as a starting point. The proposed location then was Salmonier Line and Trans-Canada Highway. MES then quickly discovered the great amount of interest from prospective suppliers of organic raw materials in a much larger and more productive facility to process substantial amounts of raw materials. In other words, the need for a viable indoor industrial composting facility became quickly evident. At the same time, MES and its consultant researched the processes, technology, facility design and equipment involved in composting of organic wastes at industrial scale. The feasibility of the indoor composting model and the business case to support became clear.

Since the Holyrood location was not feasible because of zoning and watershed area protection, MES had to look for another site that could meet all the

required criteria for an indoor industrial composting facility. The proposed site at Argentia Access Road is the only site available for the facility that meets the essential site selection criteria. MES identified and investigated 7 different sites in total (see Section 5.0 above).

The current facility design, scale and business model is now definitive. It has been validated in researching and contacting the major stakeholders in the organic waste management industry, both local and in Atlantic Canada. MES has been in contact with suppliers (or sources) of raw materials for organic waste and carbon fiber; facility operators; equipment suppliers; governmental waste management organizations; regulatory and governmental organizations; as well as farming and landscaping industry stakeholders interested in the finished compost products.

8.1.2. Expertise Required

Several attendees questioned MES's ability and expertise that would be required to design, build and successfully operate such an industrial composting facility to avoid any nuisance and environmental impact on the surrounding areas and populations. These people asked whether MES would engage an industrial composting specialist to guide and assist in the design and commissioning of the facility.

Both MES and the Consultant have, by now acquired a good knowledge of what is required in the design and operation of the proposed facility. This includes knowing enough about:

- The nature and sources of feedstock materials available;
- The composting process and the formulation of composting recipes;
- The technology, infrastructure and equipment required for industrial composting;
- The technical risks involved in the composting operations;
- The regulatory aspects of design, construction and operation of the proposed indoor industrial composting;
- The emergency and contingency plans required to address operational risks;
- The business case of industrial composting in Newfoundland.

With the best of intentions and the best preparations and planning, the risks are clearly identified and substantially reduced by a good facility design, a quality construction, and a careful, well planned and executed composting operation.

There is no question that MES intends to engage the best and most qualified engineers and scientists, suppliers, and solid waste management professionals to achieve successful and profitable operation of the proposed indoor industrial composting at Argentia Access Road. A roster of composting consulting professionals is being assembled from referrals and internet searches, and a short list will be established. As the plant commissioning start, such a consultant will be retained to assist in the development of the composting recipes, training personnel and optimizing the operations.

Already, MES has assembled a group of very qualified professionals in the domain of biotechnology and environmental science and engineering.

8.1.2.1. Terrence Penney

MES himself, Mr. Terrence Penney, has been directly involved in environmental remediation projects as a contractor and entrepreneur for over 20 years. Throughout Newfoundland and Labrador, these projects included demolitions, hazardous materials assessments and abatement, site soil assessments and remediation, and industrial environmental remediation. Mr. Penney has extensive knowledge in environmental science and remediation. He has been one of the greatest contributor to environmental remediation of this province. And in the same vein, with his experience, knowledge and business savvy, he is willing to undertake this indoor composting facility project. Upon successful achievement of getting this facility up and running properly, Mr. Penney's contribution to the environment in Newfoundland will be further recognized and appreciated.

8.1.2.2. Hubert Alacoque, P. Eng. MBA

The Consultant, Mr. Hubert Alacoque, P. Eng. MBA, is a consulting engineer based in St. John's, with a 35 year experience as a professional engineer, a consultant and an entrepreneur in Newfoundland.

Mr. Alacoque has extensive expertise, specifically in biotechnology industrial processing, environmental engineering and wastewater treatment in Newfoundland and Labrador. In addition to being a self-employed professional engineering consultant for the last 12 years, Mr. Alacoque worked for in mineral processing for IOC, offshore petroleum exploratory drilling as a subsea engineer, with the National Research Council.

Mr. Alacoque was a key developer and plant manager for the establishment of a state-of-the-art fish protein hydrolysate plant located in Mooring Cove (Marystown) in the late 80's and early 90's. This project resulted from a joint venture between FISHERY PRODUCTS INTERNATIONAL LTD., of St. John's, Newfoundland and EUROPRO S. A., of Boulogne Sur Mer, France.

The joint venture partners designed, built and operated a state-of-the-art fish protein hydrolysate plant. Fish offal was processed into a high quality fish protein digest produced for the animal and aquaculture feed world markets. The plant operated 24 hours a day, 5 to 7 days a week and employed 20 to 30 people. At a capital cost of $20 million, the plant was highly automated, equipped with leading edge technology machinery, equipment and systems. The processing capacity of the plant was 10 metric tons per hour of fish offal collected from all the FPI processing plants on the island. As Plant Manager, Hubert was responsible for the procurement of raw material, the plant operation and administration. This included the receiving and processing of the fish offal as well as the packaging and shipping of the finished products worldwide. Finished product, shipped in marine containers, went to customers in Canada, the US, Chili, Scotland, Norway, France, Belgium, Spain, Japan, Singapore, the Philippines and Australia.

As the plant was being built, Mr. Alacoque was appointed Plant Manager. He went to France for six months to learn this unique process and technology at the plant of the French joint venture partner. Upon his return to Newfoundland, he prepared the organizational structure of the plant, the operating budget and the administrative framework, then hired and trained all the new employees. He commissioned the plant in August 1991 and gradually brought the plant to operating capacity. He was also directly involved in the negotiations between the company and the local union to establish a collective agreement.

As a consulting engineer, Mr. Alacoque also has extensive expertise in hazardous materials, environmental assessment and remediation, and wastewater treatment.

Mr. Alacoque's expertise and resume is therefore very pertinent and useful to the indoor industrial composting project. He has demonstrated knowledge and experience in industrial biotechnology, waste management, wastewater treatment and environmental remediation in Newfoundland.

8.1.2.3. Dr. Mohan Lal

Also involved in the project as scientific advisor is Dr. Mohan Lal. Dr. Lal is a retired professor of mathematics from MUN. He has also been involved in

biotechnology in research and development and in business for the development, production and commercialization of biotechnology based personal-care and nutraceutical products. He is the founder of two companies, Mariana Health Foods Inc. and Star Enterprises Ltd., dealing in biotechnology and nutraceuticals. Dr. Lal has extensive knowledge and background in aerobic and anaerobic digestion processes as it applies to biotechnological applications. As an aerobic digestion process, solid waste composting is well known and understood by Dr. Lal.

8.1.3. Location

A number of questions came up as to why the Argentia Access Road location was retained by MES.

The proposed location was selected and retained based on a number of important criteria:

- Proximity to the Trans-Canada highway;
- Centrally located on the Avalon;
- Isolation from surrounding population and settlements;
- Availability of large enough parcel of land to provide sufficient space and isolation from the road;
- Land Zoning;
- Price of land;
- Topography, geology and hydrology of the parcel of land;
- Regulatory constraints;

Over a period of 6 months, seven (7) sites were successively identified and extensively assessed as to their suitability and availability. Please refer to Section 5 above in this document to see more detailed information on the other sites considered, their locations and their availability.

It is important to note that in any business development initiative, the location of the facility or the store is one of the most important element of the success of the business. Site location of the business is also one of the most difficult constraint to overcome in the establishment of a business premise.

8.1.4. Odors

Clearly, odor was the paramount concern from the public attending the public information session.

Odor and its control were included in the presentation delivered prior to the question period. More information on odor control is included throughout this Environmental Preview Report.

Odor suppression within the composting facility will be achieved with sufficient ventilation, drawing fresh air from outdoor and exhausting inside air through the biofilter.

The elimination of odors from within the building exhausting outdoors will be handled by a biofilter system. The system is presented in Section 4.2.7 and in Section 4.3.16 and Appendix II. Further information on the description and the design of biofilters for odor removal is available at the University of Minnesota Extension, Department of Agriculture, Manure Management and Air Quality. (http://www.extension.umn.edu/agriculture/manure-management-and-air-quality/air-quality/)

MES and the Consultant are very confident that odors will be properly controlled and eliminated with adequate design, construction and operation of the facility. The technology and equipment for odor control are mature, well known and accessible. Most of the agrifood industry operations and plants have to deal with odor control. It is a problem that is commonly solved, such that it is rarely a problem. And since there are mature and extensive pollution prevention regulations in every jurisdiction, including Newfoundland, the odor control system designs, technology and equipment are readily available from a large pool of suppliers.
MES's odor control strategy will include three (3) elements:

1. Odor control starts with operating practices that reduce the emission of odors within the composting building;
2. Fresh air intake ventilation and exhaust out of the building space to provide the required odor suppression level for composting operations and workers comfort and safety;
3. Exhaust air odor abatement system – biofilter- to have a net-zero effect on the immediate surrounds of the facility.

Prevailing winds at the location are south and south westerly in the summer, and north and north easterly in the winter. Rarely would we have a consistent and durable westerly wind sweeping over the Markland/Whitbourne area. Therefore, in any event of odors that may be generated from the proposed composting facility, the probability of experiencing any odors in Markland/Whitbourne will be low to nil.

8.1.5. Fire Suppression

Several members of the public asked about MES's firefighting plan and fire suppression system to be implemented at the composting facility.

MES and the Consultant fully recognize the need and importance of having the right and sufficient fire prevention and suppression system, and firefighting plan. As can be read below, fire suppression and firefighting in compost facilities is well known and well documented. MES intends to be fully equipped and prepared to operate the facility, including the fire protection systems, plans and training required.

Spontaneous combustion appears to be the most common cause of fire in composting facilities[5]. Spontaneous combustion occurs when materials self-heat to a temperature high enough to cause them to ignite. Typically, composting materials ignite at temperatures between 150 and 200°C. As the temperature rises, the speed of temperature increase also rises. For example, heat is generated about 16 times faster at 100°C than at 60°C because the reaction rate approximately doubles with each 10°C rise in temperature.

In a compost pile, the organic matter and microbial activity generate heat from the biological activities; this activity causes the compost temperature to reach 70 to 80°C. At this point, the microorganisms die or become dormant, and the biological heating stops. From that point to the temperature at which organic materials ignite (150°C and higher), heat-releasing chemical reactions take over. These actions include chemical oxidation, slow pyrolysis (chemical decomposition brought about by heat) and condensation of gases within dry charred particles.

Key conditions for spontaneous combustion in compost:

- biological activity
- relatively dry materials
- dry pocket
- large well insulated piles
- limited air flow
- time for temperature to build up

Other factors

- non-uniform mix of materials

[5] **http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex10721 , Agdex 086-9. April 2006.**

- poor moisture distribution
- difficult to know temperature throughout a pile
- lapse or oversight in monitoring

These conditions are all more prevalent within large undisturbed piles that contain raw feedstocks, curing compost and finished compost than in an active composting system.

Biological activity generates heat within organic matter, a goal for composting. However, the temperature is controlled by heat loss through evaporation of moisture, aeration and sometimes mechanical turning. The moisture content of a pile may become too low, reducing the effectiveness of the material to cool through evaporation and thus causing the temperature to rise above desirable levels (above 60°C).

The critical moisture range that supports spontaneous combustion is roughly 20 to 45 percent, while the optimal range for composting is typically 50 to 60 percent. Large piles may inhibit air exchange, therefore not allowing the material to cool.

The combination of organic materials with low moisture contents in a large unmonitored pile with limited air exchange is a prescription for spontaneous combustion.

Different types of fires

In large piles with limited oxygen, a smoldering fire starts when materials reach their ignition temperature. This type of fire is inefficient, producing gases, smoke and heat, but no light. When more oxygen is present, a glowing fire can occur, producing smoke, more heat and higher temperatures. With abundant oxygen, a flaming fire with very high temperatures will ensue.

A large pile containing a smoldering fire could change to a flaming fire if the material is opened up, and oxygen is allowed to fuel the fire.

Preventing fires and preparation

- Design and install proper fire suppression systems with sufficient amount of water and fire suppressants to extinguish a fire in the compost piles, the feedstock piles and other combustible materials within the confines of the facility.

- Consider how to handle all the water that will run off the site as a result of fighting a fire. The run-off will carry nutrients, compost and ash.
- Have the correct equipment on site such as water, fire hoses, related hardware, equipment for moving material and written guidelines.
- Consider equipment such as tractors and skid steers as they could be used to fight a fire. Ensure operators understand how to use this equipment safely during a fire.
- Monitor your organic material for hotspots - high temperature (76 to 80°C), vents, smoke or burnt smell.
- Ensure temperature monitoring equipment can reach the centre of the piles.
- Ensure adequate ventilation and moisture content (above 40%) of pile to release heat.
- Avoid large piles - no greater than 12 feet high.

Emergency response kit

MES will be creating an emergency response kit as part of their overall fire prevention plan. The kit should be designed for easy access and portability. In an emergency, the kit could be placed on a front-end loader or forklift and rushed to the fire scene. Each facility should evaluate its own emergency response needs to build their kit. Such a kit may include:

- 200 feet of fire hose (1 1/2 inch diameter)
- one 1 1/2 inch fire hose Y
- two 1 1/2 inch diameter fire hose nozzles
- one fire hydrant wrench
- two ABC 20-pound fire extinguishers
- keys for the necessary equipment
- response card with instructions for fire pump operation and an emergency call list.

Fire - How to Put it Out

Surface fire - from lightning strikes, sparks or heat from equipment, etc.

- Applying water or chemicals usually works for surface fires.

Spontaneous combustion

- Do not aerate the material - added airflow feeds chemical oxidation thus fueling the fire.
- Equipment or operators should never climb on top of the material when a fire is suspected.
- Remove material from the pile until the burning sections are isolated and quenched.
- Remove coolest material from the edges of the pile first.
- As material is removed spread on the ground or stack in small piles to cool.
- Apply water or chemicals to hot material.
- Smothering a burning pile with soil and waiting for it to cool is not a practical strategy for an internal fire unless the pile can be allowed to sit in place for a long time, sometimes up to two years.

Information adopted from

Rynk, R. 2000. Fires at composting facilities: causes and conditions. BioCycle Journal of Composting and Recycling. January: 54.
Rynk, R. 2000. Fires at composting facilities: handling and extinguishing fires. BioCycle Journal of Composting and Recycling. February: 58.

9. Approval of the Undertaking

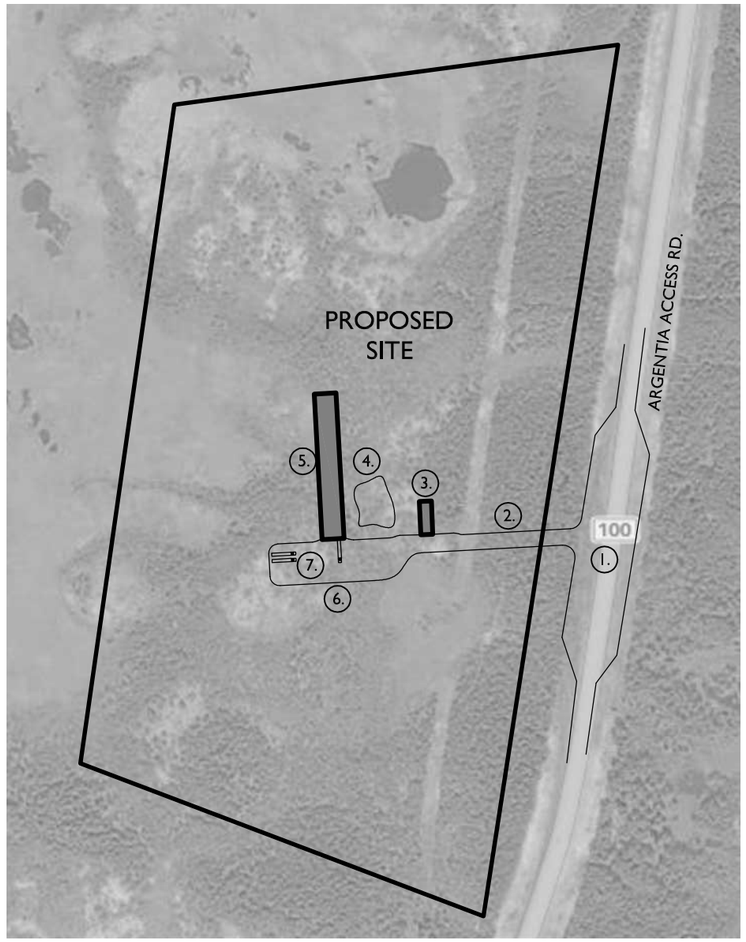
The permits, licences, approvals, and other forms of authorization required for the undertaking prior to the start of construction, together with the names of the authorities responsible for issuing them (e.g., federal government department, provincial government department, municipal council, etc.), including but not limited to the following, are listed below:

- A Certificate-of-Approval (COA) from the Pollution Prevention Division of the Department of Environment and Climate Change. Financial assurances may be required for the issuance of a C of A in the event that the Department may have to take over operation due to environmental issues or abandonment of the site. Contact Ms. Vicki Ficzere at 729-7012.
- Any use of halocarbons or other regulated substances, for example in fire suppression, air conditioning or refrigeration systems, associated with the proposed activity is subject to the Halocarbon Regulations NLR 41/05. Contact Ms. Vicki Ficzere at 729-7012.
- A Water Use Licence from Water Resources Management Division (WRMD) of the Department of Environment and Climate Change. Contact Ms. Dorothea Hanchar at 729-2539.

- A Site Drainage Plan may be required by WRMD. Contact Dr. Abdel-Zaher
- Abdel Razek at 729-4795.
- A permit from WRMD for the installation of a culvert across the access road to the site. Contact Dr. Abdel-Zaher Abdel Razek at 729-4795.
- All petroleum storage tanks shall be registered with Service NL, and all fuel storage tank systems must comply with the Heating Oil Storage Tank System Regulations and/or the Storage and Handling of Gasoline and Associated Products Regulations. Contact Mr. Robert Locke at 729-2008.
- Approval from Service NL is required for the proposed water and sewerage system. Application must be made to Service NL to review building plans for Fire/Life Safety and Building Accessibility, prior to the construction of on-site buildings. Contact Mr. Robert Locke at 729-2008.
- The site is located within 400 metres of the Argentia Access Road and falls within the jurisdiction of the Protected Road Zoning Regulations. A Preliminary Application To Develop Land must be submitted to the Government Service Centre for processing and a ''Permit To Develop'' issued before any construction takes place. Contact Mr. Robert Locke at 729-2008.
- Electrical plans must be submitted to the Government Service Centre for review and approval. An electrical permit is required for each meter. The applicable permit fees will apply. Contact Mr. Robert Locke at 729-2008.
- A commercial cutting permit must be obtained from the Department of Fisheries, Forestry and Agrifoods prior to any harvesting and or timber removal activities. An operating permit is also required during the declared Fire Season (May 1-Sept 30). Contact the local Forestry Office in Whitbourne at 759-2933 or the Paddy's Pond District Office at 729-4180.
- An application for Crown lands has been submitted for the proposal and a decision will be made pending the outcome of the EA and a review of all referrals from the processing of the Crown lands application. No activity or land clearing is to take place until the Lands Branch has issued the Crown lands title, and that any Crown title issued will be subject to those terms and conditions as prescribed by the Minister of Municipal Affairs. Contact Mr. Peter Hearns at 729-3231;
- A Fire and Emergency Protection Plan for the facility shall be developed in consultation with, and approved by Fire and Emergency Services-NL, prior to the commencement of construction activities on-site. The plan shall describe on- site fire protection equipment and procedures to be implemented in the event of a fire. The plan may also include a contingency plan that ensures a quick and effective response to a spill event. Contact Mr. Derek Simmons at 729- 1608.

- Any quarry materials (e.g. aggregate, fill, rock, stone, gravel, sand, clay, borrow material, etc.) required for the project must either be sourced from a site permitted under the Quarry Materials Act, 1998, from an external source as a byproduct of development and for which royalties have been paid under the Quarry Materials Act, 1998, or from within the legal boundary of the project site. Options for sourcing from a site permitted under the Quarry Materials Act, 1998, include 1) purchasing materials sourced from a permitted site, 2) applying for a subordinate quarry permit to obtain materials from a site for which a quarry permit or lease is held by a third-party, the 3) applying for a quarry permit, whether to establish a new site or re-activate an existing site. Quarry materials (e.g. aggregate, fill, rock, stone, gravel, sand, clay, borrow material, topsoil, peat) may not be legally removed off-site unless they are the byproduct of an approved development. Royalties must be paid on any quarry materials removed off-site. Grubbings (e.g. tree stumps, brush, sod) are not considered quarry materials, however any topsoil or subsoil obtained by screening grubbings is considered a quarry material. Contact: Quarry Rights Section, 729-4044.
- The proposed access road to the site must be approved by the Department of Transportation and Works. Traffic volume to be generated by the site should be provided for further assessment of turning lane requirements. Contact Mr. Patrick Shea, 729-5379.
- The construction of buildings on a Crown Land Lease for Agriculture is only permitted on approval from the Agrifoods Development Branch. Contact Ms. Tara Morgan, 637-2084.

Appendix I – Site and Facility Layout

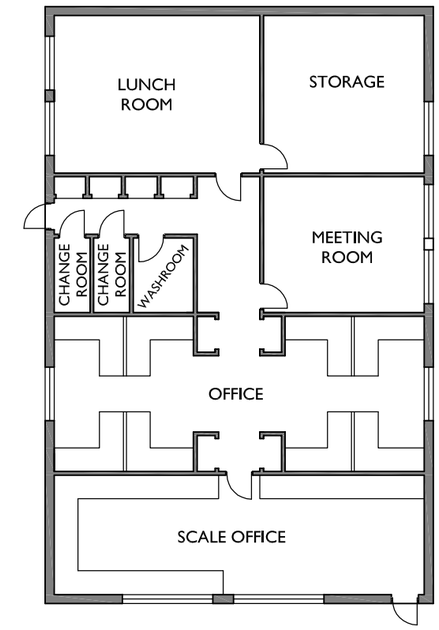


M1 LOCATION PLAN
SCALE: 1:5000

LEGEND

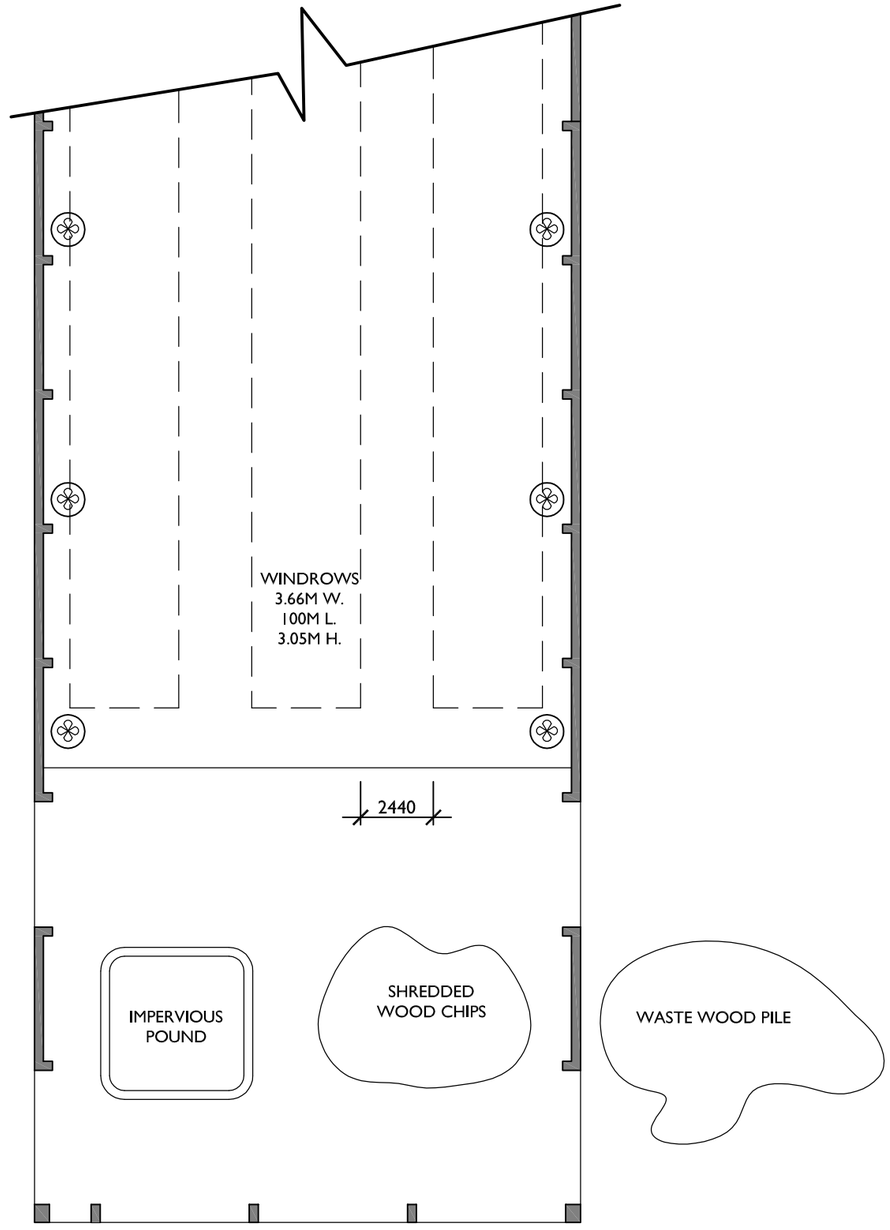
1. PROPOSED NEW TURNING & PASSING LANES. TO COMPLY WITH RELEVANT REGULATIONS.
2. DRIVEWAY INTO PROPOSED SITE. 10M. W. X 150M. L.
3. BUILDING A. (10M. W. X 28M L. = 280M SQU.)
   - SCALE HOUSE
   - OFFICE
   - LUNCH ROOM, WASHROOM & CHANGE ROOMS
4. WOOD CHIP STORAGE AREA
5. BUILDING B. (18.2M W. X 122M L. = 2230M SQU.)
   - DROP OFF & INDOOR COMPOSTING PROCESSING SITE.
6. VEHICLE TURNING AREA AND PARKING
7. MAXIMUM TRUCK SIZE (2.6M. W X 20M L.)

ODOR CONTROL BIOFILTER VENTILATION



TRUCK SCALE

M2 BUILDING A. NOTIONAL LAYOUT
SCALE: 1:200



M3 BUILDING B. NOTIONAL LAYOUT
SCALE: 1:200

Innovative Development & Design Engineers Ltd .
Anderson House, 42 Power's Court,
St. John's, NL A1A 1B6
Tel: (709) 368-8870 Web: www.iddel.ca

Rev.	Description:	Date:
A	ISSUED FOR APPROVAL	OCT 16

North

Drawn by: RC Date: OCT. 2016
Checked by: HA Date: OCT., 2016
Approved by: HA Date: OCT., 2016

Stamp:

Permit:

Client:
METRO ENVIRONMENTAL SERVICES LTD.

Consultants:

Project:
PROPOSED COMMERCIAL INDOOR COMPOSTING FACILITY
ARGENTIA ACCESS ROAD, NL

Drawing Title:
LOCATION PLAN AND BUILDING LAYOUTS

Project No.: 160919 Scale: AS INDICATED @11x17

Drawing No.: A-100 Revision No.: A

Appendix II – Odor Management Plan

9.1. Defining the Issue

Odor control is a primary concern for any facility operator whose property is within range of residential or business areas. When the natural breakdown of organic materials is happening under optimum conditions it produces primarily carbon dioxide, water vapor, and heat. When the process is unbalanced in some way, other gases begin to be produced, some of which have objectionable odors. Odor management, then, is one of the primary motivators for optimizing our composting process.

9.2. Key Concepts

Unlike a mechanical process, the breakdown of organic materials is very difficult to stop. When the necessary components for a particular biological process are not present in adequate amounts, the microbial population will shift to favor microorganisms capable of capitalizing on the existing conditions. For example, when adequate oxygen is available, aerobic microorganisms will dominate the population, but a lack of oxygen will cause organisms that do not require oxygen (anaerobic microorganisms) to take over as the dominant group. These different microorganisms use alternative processes to degrade organic material. This diversity of options is very healthy for our planet as it ensures that most nutrients will be returned to the soil through one biological pathway or another.

From a facility operator's point of view, however, some of these processes are definitely preferable to others because of the associated odours. Microbes utilizing odour-producing processes commonly take over when conditions are:

- **Anaerobic:** processes occurring without adequate oxygen often release strong-smelling gases that many people find objectionable. Many of these odourous compounds are pervasive and likely to be noticed off-site.

- **Low carbon/nitrogen ratio (C:N):** a composting mixture that has a low C:N ratio will often release ammonia as part of the degradation process. Ammonia is not a pervasive odour and disperses easily, and so is more likely to be noticed on-site than by neighbours. It is, however, a signal

that nitrogen is being lost from your mixture, which will lower the nutritive value of the final composted product.

There are two main stages at which material in a composting facility may be exposed to these odour-producing conditions: before entering the facility, and when in the active composting phase.

9.3. Managing Incoming Feedstock for Odour Control

9.3.1. CAUSES OF ODOUR

Material coming onto your site may already have developed a strong odour due either to the nature of the material itself or to the way it has been stored. This can include:

- Material stored under anaerobic conditions: fresh organic material stored in plastic bags or insufficiently ventilated carts. The potential for odour increases if the material has a high moisture content, has been kept in an anaerobic state for a number of days, and/or has been subjected to high temperature and direct sunlight. (E.g. grass clippings, fresh plant material, wet leaves).

- Material that has a low C:N ratio: this can be a particular problem if the material also has a high moisture content. (E.g. bio-solid or other high nitrogen sludges, fish processing or slaughterhouse residuals, raw manure).

9.3.2. MANAGEMENT STRATEGIES

Such feedstocks are often invaluable because of the nitrogen and moisture they provide to the composting recipe. Proactive management strategies can help you to capitalize on the benefits they offer while minimizing the potential for offensive odor release:

I. KNOW your organics delivery schedule or pattern! If you know when a potentially odorous load is likely to arrive you can be ready to deal with the material immediately, minimizing the potential for odors to spread off-site.
II. II. Have a plan in place for dealing with materials you know are likely to be offensive.

This can include the following:

a. Incorporate the material quickly. Have a stock of porous, high-carbon material on hand which can be mixed immediately with the incoming material. Examples being used with success by Canadian operators include wood chips, shavings, or sawdust, dry leaves, and straw. This helps to balance the C:N ratio, absorb the moisture in wet materials, and add porosity so that the mixture can remain aerobic.
b. If possible, work with loads of potentially offensive feedstock inside an enclosed work area ventilated to the outside through a biofilter. Be sure to close the outside doors so that air circulation systems operate effectively.
c. If the material must be stored before blending, add a blanket of finished compost to the outside of the pile to act as a built-in biofilter.
d. Control your pick-up schedule. Homeowners are most likely to mow lawns on weekends. Organics pickups on Monday, therefore, will be much less odorous than those on Thursday, when wet grass clippings have been sitting in carts or bags in the sun for three extra days.
e. Plan your staffing availability so that sufficient people and equipment are available to deal quickly and efficiently with planned load drop-offs.

9.4. Managing the Composting Process for Odour Control

During active composting, effective odour control is best achieved by optimizing your process, ensuring that the microbes have ideal conditions to break down the material

Practical strategies to consider fall into two basic categories: Optimizing the Process and Minimizing Possible Odor Effects.

9.4.1. OPTIMIZING THE PROCESS

a. Check your carbon to nitrogen ratio (C:N) when preparing your mix: recipes with a C:N ratio of less than 25 are likely to lose nitrogen in the form of ammonia. A ratio of 25-40 is better, with 30 being considered ideal for most materials.
b. Check the moisture content of your recipe: while too little moisture will slow the composting process, too much moisture will cause anaerobic conditions—as all of the small spaces in the material fill with water, not enough space is left for the air that the aerobic microorganisms also need. A moisture content between 40 and 60% is considered to provide a good air/moisture balance to support aerobic processes.

c. Know the pH of your recipe. Basic mixtures above pH8.5 will release nitrogen as ammonia.
d. Consider porosity in formulating your mix: a mixture consisting of nothing but fine textured materials will likely become compacted as it settles, preventing air from penetrating the pile. To maintain porosity when composting such feedstocks, include some coarser material (such as wood shavings or chips) so that air can continue to move freely through the material as it breaks down. This is particularly important in systems where the material will not be turned during active composting.
e. Be sure that material is turned or aerated often enough to maintain aerobic conditions. Whether you are monitoring oxygen or temperature in deciding the timing of your management activities [see Sheet #1, The Composting Process], ensuring adequate oxygen will result in more efficient composting as well as control of odorous gases.
f. Ensure that the pile size is not too large: air will not be able to infiltrate to the centre of a large mass. Temperatures may be very high in center.

9.4.2. MINIMIZING POSSIBLE ODOUR EFFECTS:

Even in a facility being managed for optimum composting conditions, equipment problems, unexpectedly wet weather, or unfamiliar feedstocks can result in odours that need to be carefully managed. North American facility operators rely on a variety of helpful practices, including the following:

a. Check local weather conditions before turning or moving compost. Consider the wind direction relative to the location of your neighbors, and aim to handle potentially odorous or dusty material only when they will not be affected. Depending on your geography, the barometric pressure may also play a role in the "behavior" of odorous gases: low pressure may allow gases to flow at ground level while high pressure can allow them to disperse.
b. Keep external doors closed if handling material inside a building vented through a biofilter. This allows the air circulation system to operate properly. If heavy machinery passes through large roll-up doors many times in a day, consider automatic door openers to minimize the length of time the doors are open and to support operator efficiency.
c. Check your biofilter on a regular basis. Process air being passed through a well-constructed biofilter can be cleaned of a high percentage of odorous compounds. Because a biofilter is an organic system, it must be adequately maintained in order to continue functioning at an effective level.
d. Use blankets of finished compost to cover static windrows or piles outdoors. Canadian operators managing unturned biosolids composting

operations have found that a 30 cm/12" layer of compost applied to the outside of a newly-constructed windrow serves as a built-in biofilter, trapping any odorous gases. This layer can also serve as insulation to help the material reach the required processing temperature, particularly in winter. If an insulation effect is desired, a deeper layer may be required in cold weather.

e. Ensure good site drainage. Standing water can result in waterlogged, anaerobic material.

10. Appendix III – Public Presentation

Argentia Access Road Indoor Industrial Composting Facility

Environmental Assessment

October 2016

Information Session

▶Proponent:

Metro Environmental Services Ltd.

Heart's Desire, NL

Terrence Penney

▶Engineering Consultant

Innovative Development & Design Engineers Ltd.

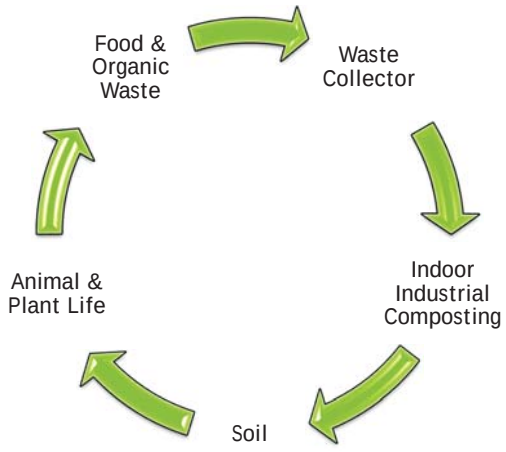
St. John's, NL

Hubert Alacoque, P. Eng. MBA

Outline

1. Indoor Industrial Composting
2. Indoor Composting Facility
3. Operations
4. Benefits to Whitbourne area

1 – Indoor Industrial Composting
Life Cycle of Organics to Compost



Germany recycles and composts 65% of its garbage !!

1 – Indoor Industrial Composting
Benefits of Composting

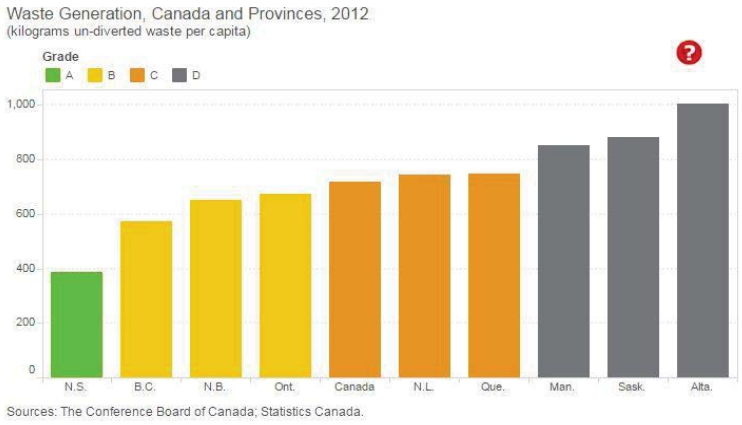
- Waste Reduction
- Creates value and economic benefits
- Enriches soil by turning food/organic waste into beneficial soil additive
- Compost is an alternative to chemical fertilizers
- Prolongs the life of the landfill
- Reduces negative climate change impacts

Canada recycles and composts only 24% of its garbage !!

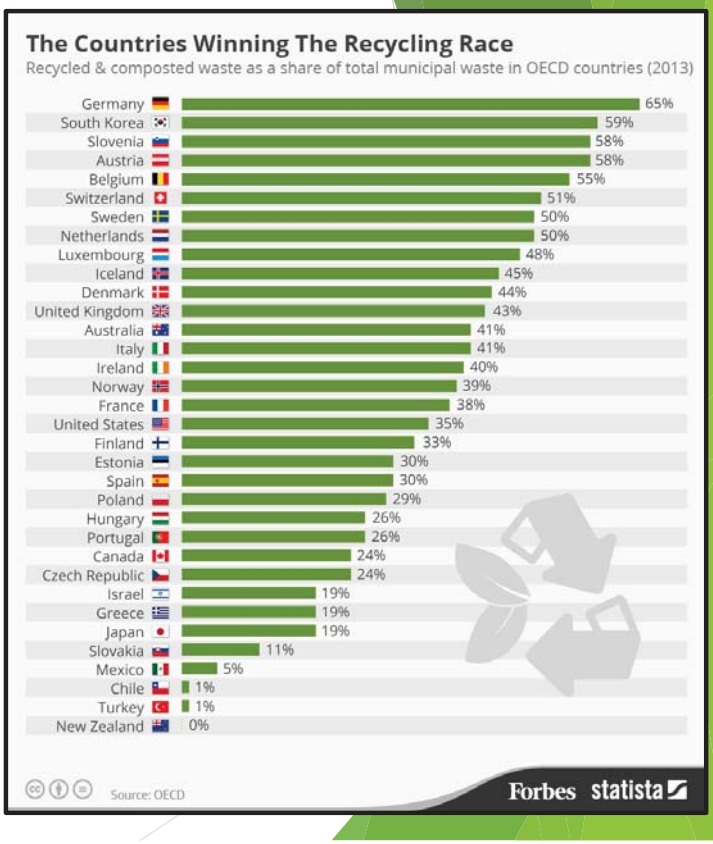
1 – Indoor Industrial Composting
Why Composting ?

- Burying food wastes in landfill produces methane gas emissions.
- Landfills are the third largest source of methane emissions (fossil fuel + livestock farming).
- Methane traps up to 100 times more heat in the atmosphere than carbon dioxide.
- Methane emissions account for as much as 51 percent of greenhouse gas with direct and immediate impact on climate change.
- Paris Climate Change Agreement → Carbon Tax.
- Carbon Tax in Canada → Minister Perry Trimper walks out of federal meeting.

1 – Indoor Industrial Composting
Ranking Countries at Recycling



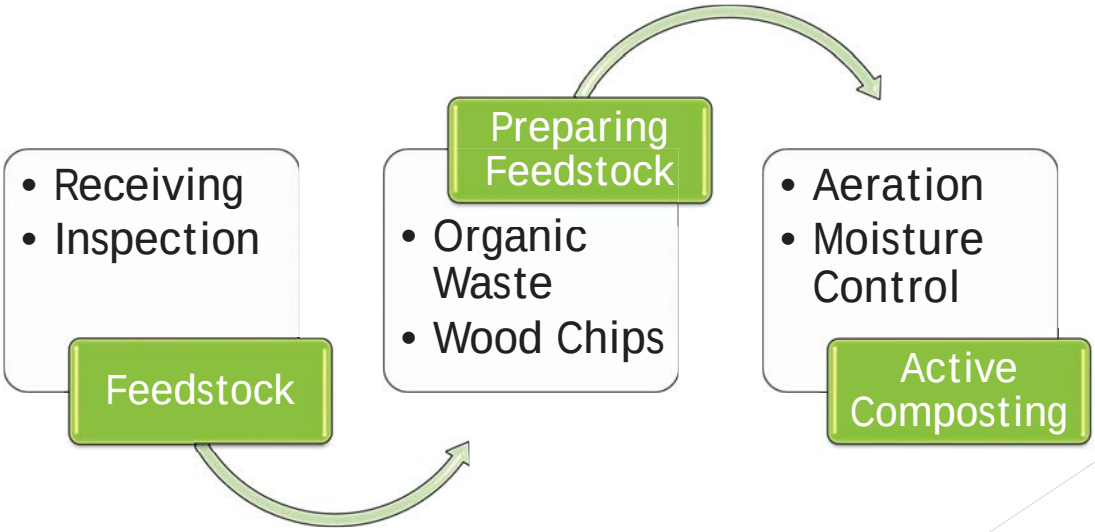
St. John's population recycles only 10% of its garbage … !!!!



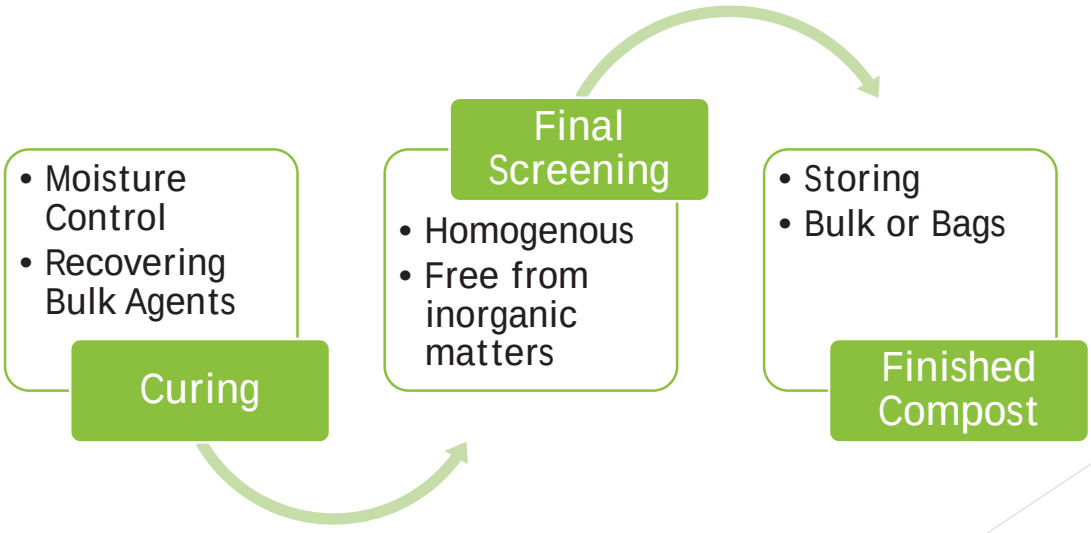
1 – Indoor Industrial Composting
How Composting Works?

- Composting is a method for treating **solid organic waste** in which organic material is broken down by **microorganisms** in the presence of **oxygen** to a point where it can be safely stored, handled and applied to the environment.
- Offal from Food Wastes, Poultry, Fish, Mink, Sheep, Cattle, Hogs, Moose…
- Waste wood and lumber, wood chips …
- Carbon – Nitrogen balance
- Temperature
- Free Air Space
- Moisture
- Time – 4 to 6 weeks

1 – Indoor Industrial Composting
Composting Process



1 – Indoor Industrial Composting
Composting Process



2 – Indoor Composting Facility

- The site will consist of
  - A driveway and yard area for trucks to come in and turn around
  - A weigh scale
  - An accessory building for administration and staff facilities (250 m^2)
  - An indoor composting building (20 m x 120 m = 2,400 m^2)
  - An outdoor storage area for waste wood
  - An outdoor bulk storage area for finished compost

2 – Indoor Composting Facility Composting building

2 – Indoor Composting Facility
Composting building

2 – Indoor Composting Facility
Composting building

2 – Indoor Composting Facility
Composting building

2 – Indoor Composting Facility
Odor Control System

- Odors are substantially reduced by the right balance of Carbon to Nitrogen in the composting mix
- Odors are further controlled by the right moisture in the windrow pile for optimal composting
- Odors are removed with a **biofilter**
- A biofilter is a reliable and effective odor removal system because:
  - It is simple in its design and components
  - It is easy to operate
  - It is a well proven technology
  - It is economical to build and operate

2 – Indoor Composting Facility
Odor Removal - Biofilter

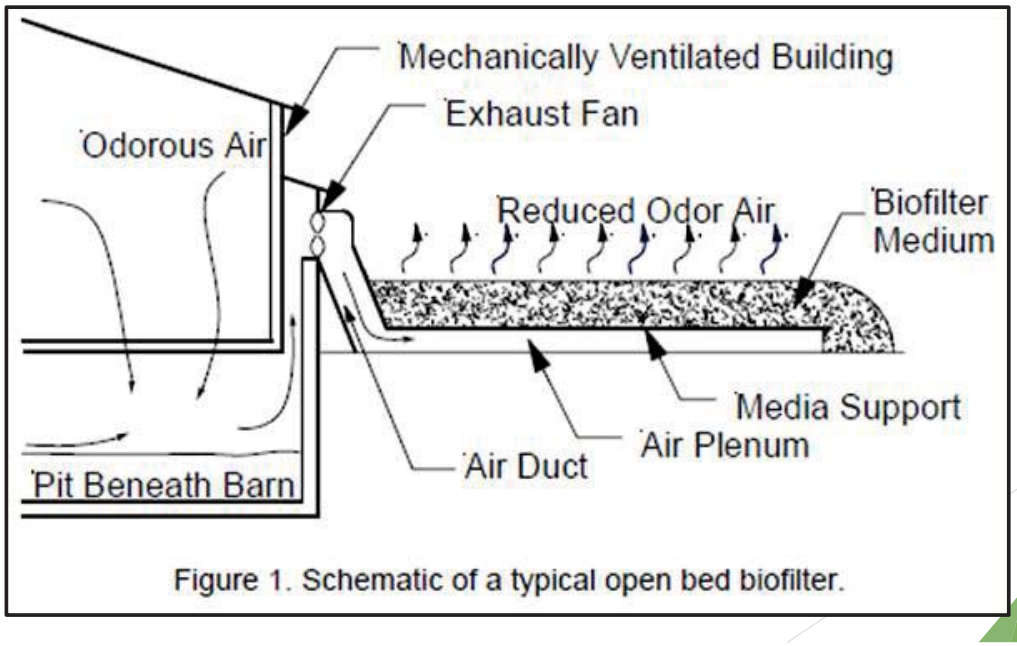


Figure 1. Schematic of a typical open bed biofilter.

2 – Indoor Composting Facility
Odor Removal - Biofilter

2 – Indoor Composting Facility
Odor Removal - Biofilter

2 – Indoor Composting Facility
Vector Control System

- **Vectors** are pest, birds, insects or any animal that would be attracted to the composting facility and process.
- **Vectors** are undesirable primarily because they can transmit pathogens (diseases) to other life forms, by being exposed to unsuitable or contaminated foods.
- A proper composting reaches temperatures between 50 Celsius and 65 Celsius for 4 days or more. This effectively kills all the pathogens in the compost. By then, there is no food in the compost for any vectors.
- Fresh raw material received will be mixed and laid out for composting the same day.
- Birds will be deterred with visual and flying repellants.
- Rats and mice will be controlled with conventional extermination methods.

2 – Indoor Composting Facility Leachate Control System

- Impervious pound to receive and mix raw material.
- Leachate collection system (troughs) in concrete floor of composting building to collect and re-apply to composting windrow piles.
- Approved wastewater treatment system for regular sewage.

3 - Operations

- Sources of organic raw material: farming, slaughter and fish processing
- Sources of carbon fiber: wood/lumber waste diverted from landfill, wood chip, landscaping cuttings
- Duration of composting process: 4 to 6 weeks
- Annual volume: 6,500 tonnes of organic waste + 10,000 tonnes of wood waste = 13,000 tonnes of finished compost.
- Composting process results in a 20% weight reduction.
- Quality Control: Canadian Council of Ministers of the Environment (CCME) Guidelines for Compost Quality as enforced by DoECC.
- Quality Control: Strict inspection of feedstock.
- Contingency Plans: Environmental Emergency Plan; Fire Emergency Plan.
- Regulatory oversight by Dept. of Environment and Climate Change, Service NL, Transportation and Works, Fisheries and Agriculture.

4 – Benefits to Whitbourne Area

- Economic Growth
- Economic Diversification
- Construction Jobs – Potentially 6.5 Person-Years
- Operations Jobs – Potentially 7 Person-Years
- Economic spin-offs
- 100% Newfoundland Content
- Supply of affordable organic soil amendment product to facilitate the development of **local organic farming** for production of **fresh organically grown vegetables**

4 – Leadership in Recycling
City of San Francisco

- San Francisco recycles just about 100% of its garbage
- 850,000 people; 4,500 restaurants & hotels
- 650 tons per day of compost produced in the city and sold to surrounding farms
- Over 200 jobs created
- 3 recycling bins: Green for Compost; Blue for Recyclables; Black for the rest
- Ban on plastic shopping bags and polystyrene
- Fee structure: $25 per Black bin; Green and Blue bins only $2 per month each.

Argentia Access Road Indoor Industrial Composting Facility

Questions …. ?