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Environmental Registration Document

Industrial Composting Facility – Holyrood, NL

To:

NL Department of Environment and Conservation

Environmental Assessment Division

P.O. Box 8700
St. John's, NL A1B 4 J6

From:

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25 January 2016

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1 Name of Undertaking

Centralized Industrial Composting

2 Proponent

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3 The Undertaking

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

The collection of organic waste will be very selective and focused on agricultural and food waste, and at later stages fish processing wastes as well as sludges from waste water treatment facilities. 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 other livestock.

The composting processing will consist of long parallel windrows sufficiently spaced to be mechanically turned for proper aeration. The organic waste will be properly mixed with wood chips, saw dust and shredded plants to achieve optimal mix for best particle size distribution, pore size for best aerobic activity, initial water content, and optimal windrow special dimensions.

Finished compost product will be stored on site and sold by the truckload (and bagged to be sold in smaller quantities, at later stage). Finished compost from such organic wastes is then a totally organic fertilizer.

The collecting and processing facility is to be located on a small subsection of a large area of land held by the company at the North and North West of the intersection of the Trans-Canada Highway and Route 90 (Salmonier Line) in the municipality of Holyrood. This section of land is designated for agricultural use by the Town of Holyrood.

With the development and implementation of the proposed composting facility, the goals of the Proponent are:

- To provide disposal site for industrial organic waste, outside of the St. John's Metro area, and
- Producing a nutrient rich soil additive, as a by-product.

3.1 Rationale, Purpose and Need for the Undertaking

The organic waste composting business will generate revenues from tipping fees on raw materials received at the site, and from the sale organic compost (humus, nutrient rich soil additive) as natural organic fertilizer to be used for horticultural, landscaping and agricultural purposes. The processing and production costs of composting are the land site development, the operation of receiving raw materials, laying out the windrows and turning the windrows for aeration purposes, and aggregating and selling the compost as nutrient rich soil additive.

Industrial organic waste composting is a business opportunity worth pursuing because the disposal costs through the Robin Hood Bay landfill are high, in addition to currently high transportation costs. Transportation costs to the Salmonier Line – Holyrood site will be lower for most organic waste sources targeted in the business plan, i.e. organic wastes from agricultural sources that have their origins outside of the St. John’s metropolitan area.

Tipping fees at the composting facility will be correspondingly lower that the Robin Hood Bay Regional Landfill site to attract substantial acquisition of raw materials to the Holyrood site. Therefore, with advantageous disposal cost to the raw materials provider, which are revenues to the composting operations, and low composting cost, and revenues from sales of organic compost available in substantial quantities, the business case for a windrow composting facility as proposed will be viable and sustainable.

The purpose for the undertaking is to add real value to organic wastes in producing a high value organic fertilizer in substantial quantities. Organic fertilizers for local organic farming are not available locally in sufficient quantities at sufficiently low price to support and enhance growth in local organic agricultural production. Currently, such organic wastes are simply buried and lost to the landfill.

The need for such a composting facility clearly exists since most organic wastes in the province are simply land filled or dumped at sea ! Composting is done in small scale operations but the aggregate quantities of organic waste recycled still remain very small. Direct disposal in landfills and dumping in the ocean is plain and simple controlled pollution, with all the associated greenhouse gas emissions produced from transportation, methane generation, and destruction of the natural environment. Such practices in produce no value-added. They are treated simply as a cost of doing business and a cost of infrastructure.

An economically viable and environmentally sustainable composting facility capable of processing substantial amounts of organic wastes available locally will be a real asset to the Avalon region. It will produce large quantities of high quality organic fertilizer compost and help support the growing demand of locally produced organically grown produce. It will enable a much larger local production of organic produce that current consumers want more and more. But the prices are too high because most of these produces are brought in from away.

Such a composting business development and implementation will also contribute to the much needed economic diversification in Newfoundland and Labrador.

4 Description of the Undertaking

4.1 Windrow composting of organic wastes

The Proponent intends to establish an open windrow type composting facility on a 4 – 6 acres site. Choosing an outdoor open windrow composting system is primarily dictated by the lower costs of site development and implementation initially. As the rates and quantities of acquisition of raw materials increases as well as the demand for finished product progresses, more productive composting technologies and equipment will be installed. Such technologies include Aerated Static Pile (ASP) composting and in-vessel composting.

Open windrows are long piles of compost that are turned periodically with mechanical farm equipment. There is no containment per se, therefore odor, dust, leachate and the potential for pathogenic aerosols must be controlled. Aeration is achieved by turning frequently the organic waste in process of composting. Composting generally occurs at slower rates (90 – 120 days in the summer and fall seasons and up to 180 days in the winter and spring seasons) than composting systems within buildings and within vessels.

Source Separated Organics (SSO) to be composted are either premixed prior to being formed into the windrows, or are layered (e.g., typically on a bed of ground yard trimmings, wood chips or sawdust) and then mixed with the turner. To control release of odors when the post-consumer foods products and organic offals in the SSO are "fresh," some windrow facility managers create the windrows and then wait for a few days or a week before the first pile turning. The windrows are covered with a layer of ground yard trimmings, which acts as a biofilter during this initial stage.

4.1.1 Composting defined

There are a number of published definitions of composting, with several of these defining composting as: 'The controlled biological decomposition and stabilization of organic substrates, under conditions that are primarily aerobic and that allow the development of thermophilic temperatures as a result of biologically produced heat. It results in a final product that has been sanitized and stabilized, is high in humic substances and can be beneficially applied to land.'

- Or, less formally - composting is a natural process that turns organic waste into a clean, stable and useful product by the action of bacteria, actinomycetes and fungi. It is worth emphasising a few key words in these definitions: Biological process – composting is a living process.
- Aerobic – in the presence of oxygen, this separates the process from anaerobic digestion.
- Heat is produced – heat is a by-product of composting, it does not cause composting of and in itself.
- Result in a product than can be beneficially supplied to land – while not strictly part of the process it should be a key goal of any composting operation.

This process can be effectively accomplished in the backyard by occasional application of a fork. This option should not be discounted, as home composting can effectively contribute to waste reduction in some circumstances, but for collected waste in commercial or municipal quantities, a rather more engineered solution is required.

4.1.2 The composting process

Composting is an application of the natural processes of decay. The distinction being that sufficient organic material is gathered so enough energy (food) is available to support a large and active microbial population, which, through respiration, generates sufficient heat to accelerate the process. This also achieves a selective sterilization of potential pathogens and seeds that is variously known as sanitization, pasteurization or disinfection. Recognition of the process goes back to ancient times, and it is readily achieved on a small scale although often not very efficiently.

Composting is traditionally driven by a succession of microbial processes. Broadly the process may be considered as comprising four phases: heating, thermophilic decomposition, mesophilic decomposition and curing.

In the heating phase microbial respiration in the presence of oxygen causes the temperature in the compost mass to rise. As this occurs there is a change in the microbial population from organisms that thrive at ambient temperatures to those that prefer elevated temperatures up to around 55-60°C (thermophiles)2. While sufficient readily metabolisable material (energy) remains in the waste, the action of the thermophiles maintains the high temperature. From a practical standpoint this ensures that pathogens and weed seeds are destroyed and results in rapid waste treatment. It is important to note though that temperature is a function of microbial activity and heat removal from the process; a balance must be struck between allowing sufficient heat to accumulate to provide optimal conditions for compost microbes, and the elimination of seeds and pathogens, and removing sufficient heat to prevent overheating. While very high temperatures can be generated in composts, these are not particularly beneficial as very few organisms are able to function above 65°C; various publications list the optimum temperature for composting as being between 53 and 65°C, with a number indicating that the temperature should not exceed 60°C.

As the readily available sources of energy (nutrients) decline the compost cools (as the rate of microbial respiration slows) and a new population of mesophilic microbes, preferring warm temperatures, becomes established. The compost remains warm and active, and considerable degradation can still occur. Indeed, where there is a high proportion of cellulosic material (wood, etc.) the mesophilic phase of composting is likely to be the longest and support the greatest numbers and diversity of microbes. Eventually, all the readily degradable material has been utilized, the temperature returns to ambient, and active composting has ceased. At this stage the compost is usually referred to as 'immature'. This is because it contains relatively high levels of ammonia and other compounds that are toxic to plants. Microbes able to oxidize ammonia to nitrate are not able to survive at elevated temperature. During curing these microbes recolonize and phytotoxic compounds are dissipated and stabilized.

Depending upon the goals of the process, and end use of compost, the curing stage can often be omitted. Where a compost-rich plant growing medium is produced, curing (and appropriate validation) is essential. Where compost is spread broadly to land, curing can often be dispensed with. Good engineering can optimize the composting process, but it must be recognized that the process is driven by the biology of microbial degradation.

Normal composting will require approximately 6 to 8 weeks during the Spring, Summer and Fall and slightly longer during winter months. The normal turning period will be weekly when the compost is fresh and actively decomposing. Turning will be done using specialized windrow turning equipment mounted on the rear of a farm tractor. Once the active composting phase is completed the compost will stay in the windrows for approximately 6 - 8 weeks for curing when less frequent turning can be used if necessary. After this, the compost should be quite stable, odour free and easy to handle for transportation to market.

4.2 Geographical Location

The proposed location for the site is a 1.5 to 2.5 hectares (4 – 6 acres) section of land in the 95 hectares large area of land held by the Proponent, at the North North-West corner at the intersection of the Trans-Canada highway and Route 90 – Salmonier Line. This large section of land is a green-field site with virgin boreal forest and totally undeveloped.

The land owned by the Proponent is approximately 500 metres bordering the North side of Route 90 and 1,400 meters bordering the East side of the Trans-Canada highway, to the South East shores of Harbour Main Pond. An aerial photo of the section of land is shown in Figure 1. A site survey is presented in Figure 2.

The majority northerly portion of this large section of land is part of the Harbour Main – Chapel Cove watershed area. However, the south eastern portion bordering the Salmonier Line (Route 90) where the proposed facility will be located is outside this watershed area, and covers an area of 161,273 square meters (= 16 ha = 40 acres) – See Drawing M-01 in Appendix 2. Consequently, there is plenty of good available land to safely and properly locate the proposed facility.

The proposed composting facility site will be accessible from Route 90 and will be located from 300 meter to 800 meters from Route 90. The entrance to the site will be located 450 meters from the Trans-Canada. The roadway leading to the site will be perpendicular to the Salmonier Line in a section of land free of peat bog and isolated from any waterway or marsh. The preliminary layout of composting site area and location is presented in Figure 3.

Figure 1 - Location of land area held by the Proponent

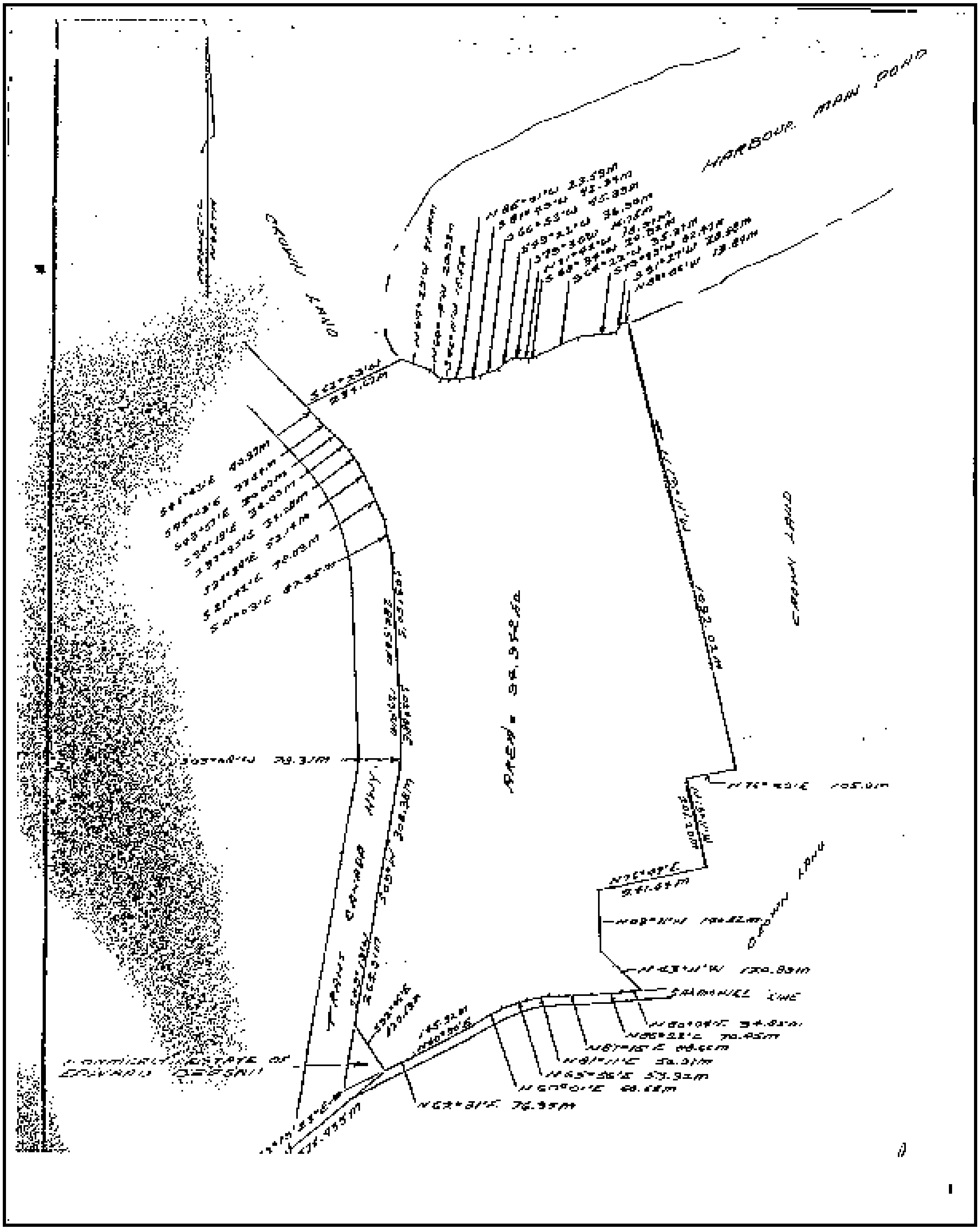


Figure 2 - Land Survey for the Proposed Site

4.3 Physical Features

The site will consist of a large opened area with gated entrance, to receive the raw materials in a pound built with impervious surfaces. A building for storing and securing equipment will be placed on site. Piles of wood chips and plant shredding supplies will be generated on site or brought to site to mix with organic wastes to be composted in open windrows. The largest area occupied will be for the windrows. These windrows will be aligned with the slope of the land so that drainage of runoffs can be controlled and handled at the lower part of the site. On the opposite side of the site from the entrance, piles of finished product compost will be stored until they are either removed from site for customer use. A general site layout is presented in Figure 3.

Furthermore, Appendix 2 shows a detailed view of the property and the facility, particularly:

1) A large scale (e.g. 1:12,500) original base map and/or recent air photos or images clearly indicating the site location relative to the protected water supply areas for the town of Harbour Main-Chapel's Cove-Lakeview and the town of Avondale; the TCH and Route 90; adjacent development; and surface water features (brooks, streams, etc.), and indicating the proposed access road.
2) A scaled site plan indicating the following:
    a. dimensions of the land to be developed,
    b. location and approximate dimensions of buildings and structures,
    c. location, dimensions and number of windrows associated with the project, on-site water and sewer services.

A roadway will be built to lead to the site recessed in the land by 100 meters. The site will be grubbed and graded. All vegetation will be removed, sorted and shredded for later use in the composting process. Top soil will be saved and later mixed with compost produced on site to produce top grade screened topsoil to sell to the landscaping and construction industry. The site will be then consist of fill-grade soil and gravel, graded to control the water runoffs, generally sloping toward Route 90.

Figure 3 - Facility Layout and approximate location

The topography of the land features a ridge or hill, roughly parallel to Route 90 and about 800 meters from the road. The land then slopes down toward the road on the South East side and toward Harbour Main Pond on the North West side.

Equipment and amenities involved in the organic waste processing and composting will include:

- A security gate at the entrance to the site by Route 90 – Salmonier Line;
- A weigh scale – to weigh raw materials coming in the site and finished products coming out of site;
- A raw material receiving and storage pound – built with concrete walls and asphalt or concrete slab to contain and keep the organic waste runoffs;
  - The water leaching out of the raw material in the pound will be absorbed by the saw dust and other shredded materials that will be mixed, in the pound, with the raw material to make the material to be laid out in windrows;
  - The pound will be covered to prevent rain and snow from accumulating in the pound;
  - Consequently, there will be no leachates coming out of the pound draining directly into the surrounding soils.
- A small storage and operations building – wood-framed, slab-on-grade with an electrical service;
- A septic system to process waste waters originating from leachates from the windrows, from raw material pound and toilet facility within the building;
- Backhoe or loader to move bulk materials throughout the site;

- Windrow turner or equivalent combination of farm equipment to turn and aerate the open windrows;
- Screening equipment to provide finished product free of rocks, non-biodegradables, garbage, etc, including screened topsoil.

With this planned facility infrastructure, the Proponent intends to process no more than 900 tonnes of raw material annually. As business develops over time, infrastructure will be upgraded and expanded as required to meet business volumes and regulatory requirements.

4.4 Physical and Biological Environment

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 95 hectares of the land section held by the Proponent. The upper areas of the hill features bedrock crops and barren areas, as typically encountered in eastern Newfoundland. See Figure 4 below.

Figure 4 - View of the land from Trans-Canada Highway looking East

There are no waterways or pond in this large section of land, other than the bordering of the Harbour Main Pond at the North boundary and a small pond toward the North West side by the Trans-Canada Highway, approximately 700 meters from Route 90 intersection. In the northern area of the land section, a small waterway with associated marsh areas meanders from the Trans-Canada to the Harbour Main Pond shore.

Where the proposed composting facility site will be located, the facility will be about 1.5 kilometer away from the river draining the Big Triangle Pond hydrographic basin into the North Arm of Holyrood bay in the southernmost part of Conception Bay. There is a marsh area with peat bog on the South side of Route 90, which is outside of the land section held by the Proponent, as shown in Figure 5 below. The closest marsh/peat bog area to the proposed composting facility site will be at least 500 meters away.

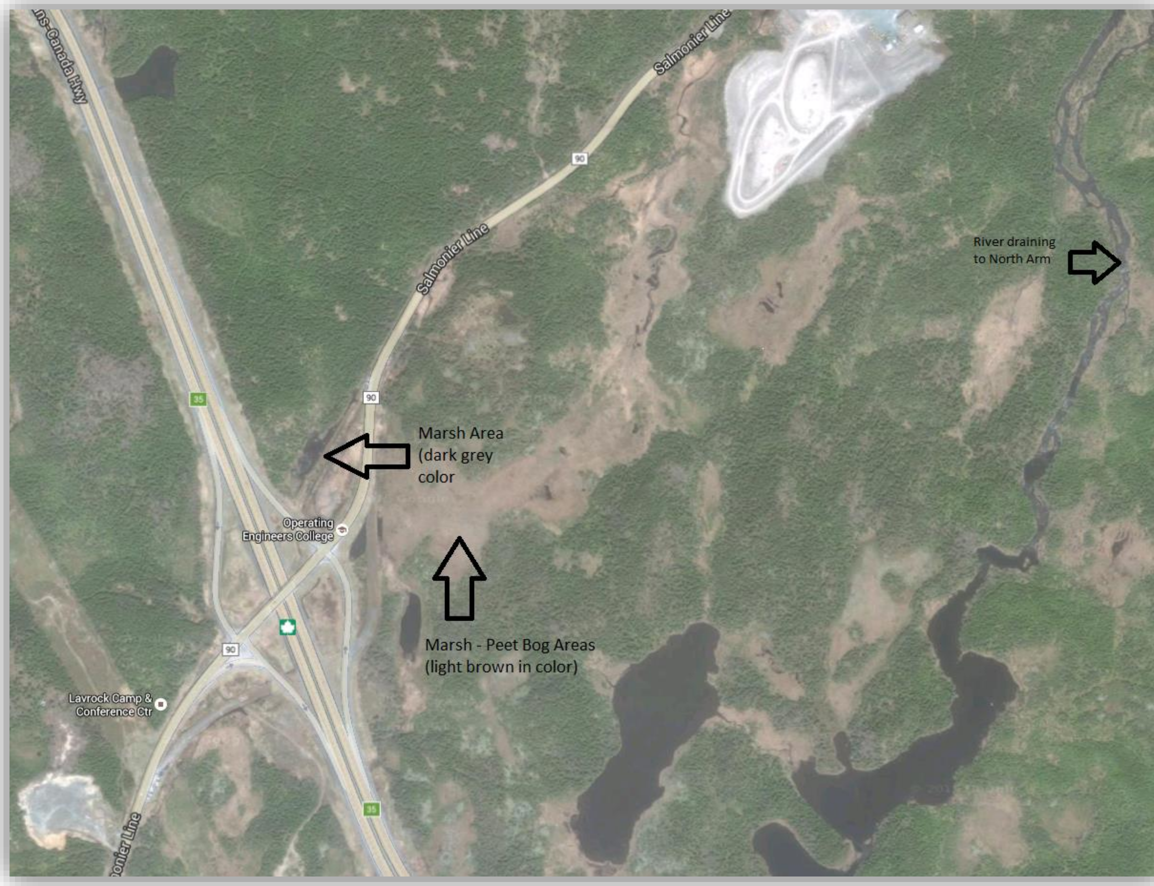


Figure 5 - Aerial View of Surrounding Hydrological Systems

4.5 Construction

4.5.1 Construction Schedule

Total construction period for this project is as follows:

- Detailed Engineering and Construction Drawings – 2 months
- Access Road Construction – 1 month
- Grubbing and Grading the site – 3 months
- Construction of Pound, leachate collection system – 1 month

Proposed date of first physical construction related activity on site is May 2016 or as soon as governmental and municipal approvals are in place.

4.5.2 Sources of Pollutants

We do not anticipate particular sources of pollutants of any substantial consequences in the construction activities. Or at least, no different than civil works associated with residential developments. Proper engineering design will be done to ensure that all codes and standards are met, which typically mitigates environmental risks adequately.

The site itself is isolated from residential areas. The closest occupant is the Operating Engineers College across and up Route 90, at least 500 meters away. So nuisance to neighboring occupants will be nil.

Mitigative measures will be undertaken to prevent/ minimize soil erosion during construction (e.g. siltation fences), spills during fueling/re-fueling of equipment, emissions from heavy equipment. Heavy equipment will be inspected regularly to ensure the equipment will be operating in good condition. This is a standard civil work construction situation whereby the civil contractor will be qualified, will meet construction and municipal affairs regulations and will consult as necessary with the civil professional engineer involved with the work.

4.5.3 Potential Resource Conflicts

The potential effects on the environment related to construction activities such as traffic interferences, noise and dust emissions will be of limited duration. Nonetheless, mitigation measures to avoid or minimize the potential impacts of construction will be carefully defined beforehand and applied whenever required. All of the work performed, along with the materials and methodology, will conform to provincial regulations.

4.5.4 Health and Safety

The Proponent is also a construction general contractor, and is qualified and proactive with respect to Health and Safety Management. The Proponent will have regular inspections of the project to ensure full compliance.

4.6 Operation

The operation of the composting facility will simply involve the receiving of the organic raw material, which will be immediately mixed with wood / plant shreddings or saw dust, and laid to compost in open windrows. Periodic turning and aeration of the windrows will be done with farm equipment. Finished compost will be harvested and moved to the finished product area for subsequent and ongoing sales. Some finished product will be loaded on customer's trucks to be removed from the site, and some finished products may be delivered to clients by the Proponent operating the facility.

The composting facility is intended to be a commercially successful going concern operating for an indefinite period of time. Eventual decommissioning of such a facility would be largely dictated by the relevant regulations in force at that time in the future. Nonetheless, should the facility have to stop operations permanently any time soon, all the raw material would be composted, and using that compost, the site would be hydro-seeded as a first step to regenerate the natural environment originally found. Or the site might be put to other use. The composting process is entirely natural and poses no particular end of life environmental problem.

4.6.1 Sources of Pollutants

4.6.1.1 Raw Materials

Typically for a rural, outdoor composting facility, potentially negative environmental impact can come from several sources in the source separated raw material temporarily stored at the facility, such as leachates from raw materials, vectors and odors.

The most effective method of eliminating all of these issues is to start processing the raw material immediately as it is received. This means mixing the source separated waste material with saw dust, shreddings, wood chips and other plant materials, and laying out windrows progressively. The plant materials mixed with the organic waste provides a matrix to aerate, drain and cover the windrows, such that the leachates, the vectors and odors are eliminated at the source. The nutrients in the leachates are composted, and the water drained off. The organic feedstock will be mixed and buried in the windrows, which will substantially reduce and eliminate the vectors and odors.

Furthermore, the limited amounts of raw waters (leachates) emanated by the feedstock contained in the receiving pound will be used to rewet material still in the active composting stage. This returns soluble plant nutrients to the next compost batch. They will also be mixed and absorbed with saw dust and mixed in the windrows. The objective is to rid all leachates in the pound immediately as the raw material is prepared for windrow layout.

4.6.1.2 Finished Product

As well, environmental and usage risk may come from the relative overall quality of the finished product compost. For this purpose, the 2005 CCME Guidelines for Compost Quality (PN 1340) is the pertinent document that governs the quality control of compost to be sold commercially.

Given the diversity of feedstock and technologies to process them, it will be apparent that the composted product is potentially variable. CCME Guidelines for Compost Quality seek to ensure that the product is safe for people who come into contact with it and the environment receiving it. Two compost classes are recognized in the CCME Guidelines, with some restrictions on their respective use.

CCME Guidelines and other standards address:

- Heavy metals are ubiquitous in the environment, but may be problematic in composts, particularly those derived from bio solids and processing sludge. However, it must be recognized that it is the overall concentration that is important and even compost containing significant quantities of some elements should be able to be used as long as application rates are monitored. It should

also be recognized that many heavy metals are in fact trace nutrients in agricultural systems.
- Chemical contaminants such as pesticides are also subject to limits in some standards but most modern compounds degrade during the composting process.
- Human pathogens, typically Salmonella and fecal coliforms, are given limits. While this requirement can be met by direct testing, it is common to demand specific temperature performance for the composting process. Typically this is 3 days above 55°C or a shorter time at a higher temperature.
- Weed seeds: The composting process will kill most plant propagules, if the composting temperatures are reached.
- Vector attraction reduction (VAR): Putrescible waste is usually attractive to a range of nuisance animals including flies, birds and rodents (vectors). Full composting eliminates the attractiveness of the material by reducing the volatile solids content (converting readily degradable compounds to more stable ones). Legislative requirements are usually based on time at temperature requirements or a measured reduction in volatile solids content.
- Plant growth inhibitors: As discussed above, uncured compost can be toxic to plants. Herbicide carryover is also an occasional problem. Obviously this is a significant factor where the product is used as a component of plant growth medium.
- Physical contaminants: Metal, glass, plastic and stones are all potential contaminants of compost and their prevalence will reflect the feedstock.

More specifically, the CCME Guidelines for Compost Quality are based on the following four criteria for product safety and quality: foreign matter, maturity, pathogens, and trace elements. The guidelines attempt to integrate the concept that exposure is an integral part of risk by establishing two grades of material (Category A - unrestricted and Category B - restricted). The guidelines will help protect public health and the environment and help composting continue to develop as an important resource/waste management solution.

These CCME Guidelines define the finished product quality criteria and the quality control (lab analysis of product samples) required. The Proponent will follow these guidelines, document and file the quality control results to produce an accountable processing and guaranty product quality to its customers.

4.6.2 Wildlife Management

The raw material feedstock will be shipped in covered truck, or packer trucks or container tubs, and upon receipt at the composting facility will be unloaded directly into the pound where it will be mixed with bulk plant shreddings and laid out in windrows immediately. This will greatly minimize or simply eliminate the impact on or interference by wildlife in the area.

There is no possibility of attracting black bears since the black bear does not dwell east of the isthmus. There are no black bear on the Avalon Peninsula.

4.6.3 Other Products or Chemicals to be Used in Production

The Proponent, operator of the composting facility, is not intending to use any chemicals or additives to the composting process. Consequently, no chemicals or environmentally sensitive products will be stored or used at the composting site facility.

Standard fueling methods will be used for the farm and other heavy equipment used at the site. Typically, a fuel tank and pump, carried in the cargo bay of a pickup truck will be used to do the small amount of fueling required to maintain regular operations.

4.7 Occupations

It is anticipated that upon full production one full time equivalents and as the production capacity of the site is increased over time, more part-time positions will be required to operate the facility. Table 1 outlines the occupational classification of the employees required to operate the site responsibly.

Table 1 - Compost Facility Staff

	National Occupational Classification	**Responsibilities**
Facility Manager	2123 Agricultural Representatives, Consultants and Specialists	· Facility oversight · Process and product testing/QA
Equipment Operator	7421 Heavy Equipment Operator	· Equipment operator for compost mixing · Waste/compost transport

4.8 Project Related Documents

- CCME Guidelines for Compost Quality, PN 1340, 2005
- THE COMPOSTING PROCESS: Leachate Management, 2002, Composting Council of Canada, Christine Phillips
- Composting Processing Technologies, 2006, Composting Council of Canada
- Various web resources and documents on composting in cold climates

No other project related documents have been produced for this project, yet.

5 Approval of the Undertaking

Permits, licenses, approvals and authorizations will be required from the following:

- Environmental Assessment Registration and Approval – NL Department of Environment and Conservation
- Development Permit, Town of Holyrood Municipal Council

- Service NL – Government Services Centre, Septic system approval

6 Funding

The project is not subject to any funding approval from any government department or agency.

Approximate capital investment required is $50,000 - $75,000, excluding the cost (or value) of the land owned by the Proponent. The funding for this undertaking will be provided entirely by the Proponent

Date 25 2016

Signature of Chief Executive Officer

7 Appendix 1 – Background and merit of organic waste recycling and reuse

7.1 The cost of organic waste 'disposal'

In a natural environment most living tissue is recycled within an ecosystem. Carbon is fixed by plants, used for growth, consumed by animals and released through respiration or decay. Other elements are similarly cycled within the ecosystem. While this cycling is not perfect, many ecosystems are relatively stable for extremely long periods of time.

In the current human-manipulated environment these cycles have been largely lost or significantly disrupted with two important consequences. Firstly, essential nutrients are removed from productive land and ultimately disposed of to landfill or sewer. This causes problems of both depleted lands and enriched receiving environments. Secondly, organic matter that is necessary for effective soil function is depleted. This depletion is relatively slow with significant effects taking decades to manifest. Nevertheless, as significant depletion of productive land has been occurring for over a century very significant effects are now realized in many areas.

The first cost of landfilling organic waste is thus a loss of productive capacity of the land, a cost that is almost completely ignored. While chemical fertilizers have reduced the impact of this, their long-term use is not a sustainable option, and does not address organic matter depletion; carbon mining. A number of international studies have clearly highlighted improve productivity through replenishment of carbon in soils via the addition of compost.

The practice of landfilling organic waste is problematic because the waste is not stable. The greenhouse gas methane is produced in high quantities (up to 100 kg/tonne of waste) and ground water may be impacted by leachate. Appropriate engineering can mitigate these issues at a cost but avoidance is generally more cost effective and is without long-term risk; even the most efficient landfill gas capture systems only prevents the release of approximately 50% of greenhouse gases. A 2002 USEPA study clearly identified that composting of food waste could reduce GHG emissions by 1.0 metric tonne equivalents of CO2 per tonne of organic waste composted when compared to disposal to landfill with gas capture1.

Composting removes organic waste from landfill, but more importantly applying the product to land replaces organic matter and restores the carbon cycle. Soil organic matter gives the soil structure and preserves biodiversity. In purely functional terms, it improves water retention, (counter-intuitively) improves drainage, suppresses crop disease and increases productivity. Essentially the natural cycles can be restored even though they may now be discontinuous in both time and space. This is a practical and achievable sustainability solution for modern society.

7.2 Organic waste strategies

In the latter half of the twentieth century not only did waste per capita increase but also the individual's direct post-rubbish-bin involvement in its disposal became almost zero. Collection, transport and disposal systems were generally effective, but unsustainable with an obvious disconnect between the waste generator and the waste disposer.

The end of the twentieth and the early parts of the 21st century has seen a significant shift; through education community ownership of waste has become the norm. On the one hand, the cost of waste is being recognized and the amount of waste reduced. On the other, the value of waste, as a resource, is also being appreciated and appropriate systems are being put in place to ensure that this can be realized. Where waste is inevitably generated, key impediments to reuse, recycling or recovery are a lack of cleanliness, mixing and contamination.

Treatment and reuse of organic waste via composting is an established and effective technique. Despite this, relatively little organic waste, especially in terms of food, animal and sewage wastes, is dealt with in this way. The impediments are two-fold. Firstly, organic waste is frequently mixed with inorganic and non-compostable materials, resulting in composting being impractical, or the compost product being of low value. Secondly, the costs of alternative disposal options such as landfill have been low. In recent years landfill charges have risen and composting is now usually a cost competitive option but access to clean waste streams remains problematic.

Waste treatment of all types has tended towards large centralized facilities where economies of scale in processing can be realized. This is not without cost however. Transport charges can be significant, and the 'out of sight, out of mind' mentality engendered in the waste producer is unhelpful. We believe that in many cases community or business ownership of smaller composting facilities to deal with organic waste will be a more effective solution. This offers a number of advantages.

- Transport costs and issues are eliminated.
- Waste contributors have ownership of the solution - this is beneficial in achieving a clean organic waste stream through source separate collection.
- The costs of waste management are internalised within the business or community with advantages for control and management.

A number of examples of this approach are in operation around the world. This approach may be less applicable in densely populated areas, but we still argue that decentralized composting (satellite facilities) where waste generation and compost utilization are geographically close is a sensible option.

Similarly, collection of source separated waste should be a goal. Often it is argued that collection of separate waste streams is more expensive than collection of mixed waste. However, this does not take into account the additional cost (both capital and operating) of a much larger processing plant that needs to not only to separate but also treat the waste.

Again collection of source separate waste streams is transferring ownership back to the generator, where it realistically belongs. More recently we have seen a backlash from traditional waste recyclers refusing to process dirty or contaminated recyclables (plastic, glass and metal); this is clear evidence of a maturing industry and is a pointer to the future for all recyclables (organic and inorganic materials).

8 Appendix 2 – Scaled Map of the Property and Facility

M1 LOCATION PLAN

SCALE: 1:10000

LEGEND

PROTECTED WATER SUPPLY AREA FOR THE TOWN OF HARBOUR MAIN-CHAPEL'S COVE

PROPERTY BOUNDARY

AREA SCHEDULE

945,614 M. SQU.	TOTAL SITE
784,341 M. SQU.	PROTECTED WATER SUPPLY AREA
161,273 M. SQU.	AVAILABLE AREA FOR PROPOSED COMPOSITING

iddel

Innovative Development & Design Engineers Ltd .

Anderson House
42 Power's Court,
St. John's, NL A1A 1B6
Tel: (709) 368-8870
Fax: (709) 368-8871

NOTES:
A. Do not scale from this drawing.

B. All measurements in mm, unless otherwise specified.

Rev.	Description:	Date:
B	Issue for Approval	FEB 16
A	Issue for Approval	JAN 16

North

Drawn by: RC	Date:	FEB, 2016
Checked by: HA	Date:	FEB, 2016
Approved by: HA	Date:	FEB, 2016

Stamp:

Permit:

PROVINCE OF NEWFOUNDLAND

PERMIT HOLDER
CLASS "A"
This Permit Allows

IDDEL

To practice Professional Engineering in Newfoundland and Labrador.
Permit No. N0428 as issued by APEGN which is valid for the year 2016.

Consultants:

Client:

METRO ENVIRONMENTAL

Project:

PROPOSED INDUSTRIAL COMPOSTING FACILITY

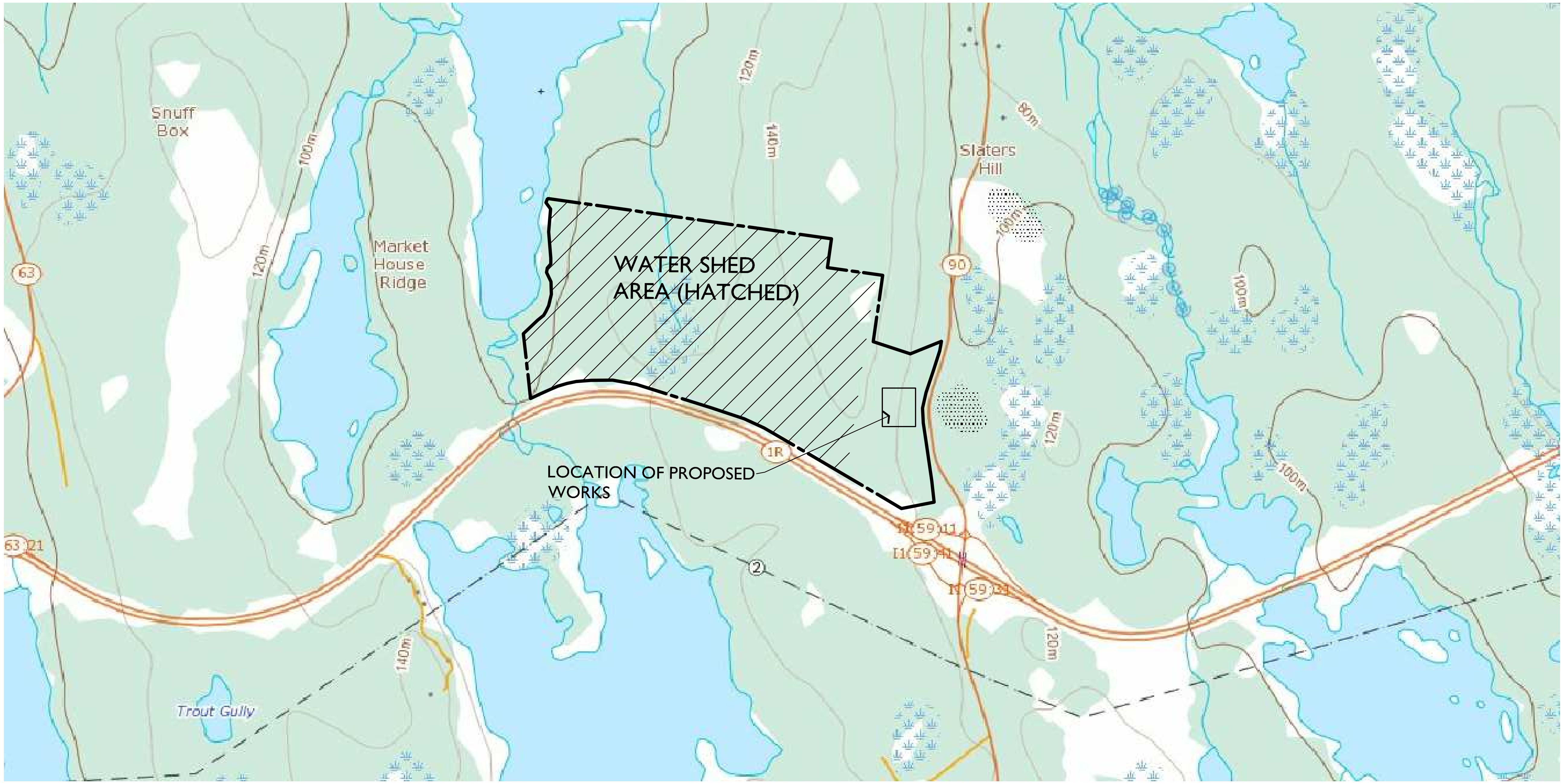
SALMONIER LINE, HOLYROOD

Drawing Title:

LOCATION PLAN

Project No.: 160129 Scale: 1:10000

Drawing No.: M-01 Revision No.: B



M3 LOCAL TOPOGRAPHY AND PROPOSED LOCATION

SCALE: UNKNOWN

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Client:

METRO ENVIRONMENTAL

Project:

PROPOSED INDUSTRIAL COMPOSTING FACILITY

SALMONIER LINE, HOLYROOD

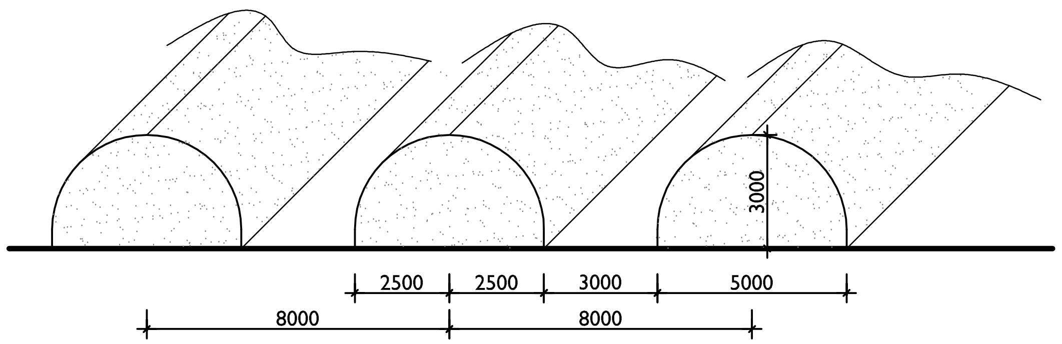
Drawing Title:

LOCAL TOPOGRAPHY AND PROPOSED LOCATION

Project No.: 160129 Scale: UNKNOWN
Drawing No.: M-02 Revision No.: B

M1 PARTIAL SITE PLAN

SCALE: 1:5000



M3 TYPICAL WINDROW CROSS SECTION ISOMETRIC

SCALE: N.T.S.

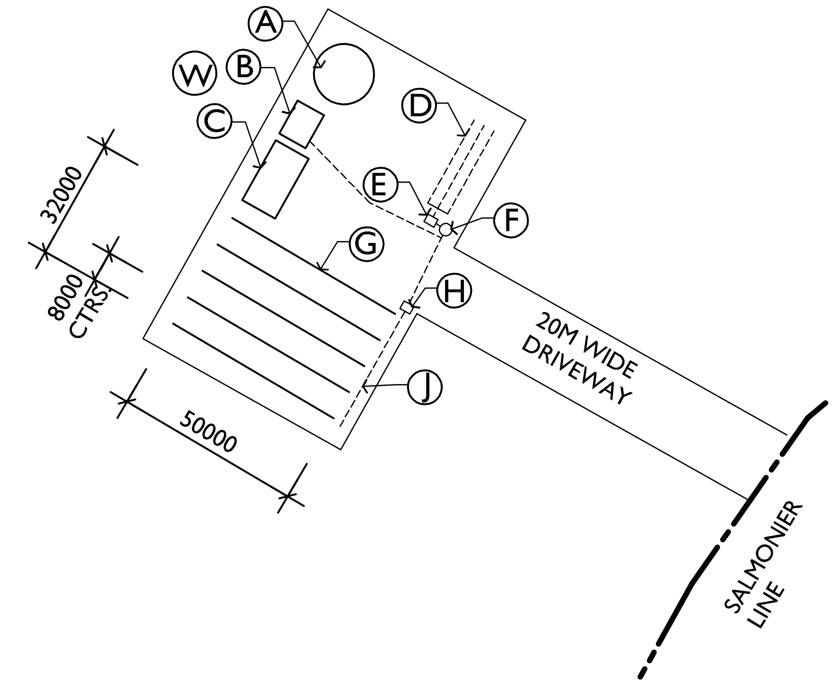
LEGEND

PROTECTED WATER SUPPLY AREA FOR THE TOWN OF HARBOUR MAIN-CHAPEL'S COVE

PROPERTY BOUNDARY

SYMBOL LEGEND

Ⓐ	FINISHED PRODUCT STORAGE
Ⓑ	STORAGE & OPERATIONS BUILDING WITH TOILET(10X8X5M HIGH)
Ⓒ	FEEDSTOCK RECEIVING POUND
Ⓓ	SEPTIC ABSORPTION FIELD
Ⓔ	SEPTIC DISTRIBUTION BOX
Ⓕ	SEPTIC SYSTEM
Ⓖ	WINDROWS
Ⓗ	RUNOFF COLLECTOR
Ⓙ	RUNOFF DITCH
Ⓦ	APPROX. LOCATION OF WELL. MINIMUM 16M FROM POTENTIAL CONTANIMATION.



M2 SITE LAYOUT PLAN

SCALE: 1:2000

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Consultants:

Client:
METRO ENVIRONMENTAL

Project:
PROPOSED INDUSTRIAL COMPOSTING FACILITY
SALMONIER LINE, HOLYROOD

Drawing Title:
PARTIAL SITE & LAYOUT PLAN

Project No.: 160129 Scale: As Indicated
Drawing No.: M-03 Revision No.: B