



REMASCO

Environmental Screening Report

October 2011

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REMASCO

Environmental Screening Report

1.0 INTRODUCTION

This Environmental Screening Report has been prepared to meet the requirements of the environmental assessment process described in O.Reg. 101/07. The content of this report follows those contained in the Guide to Environmental Assessment Requirements for Waste Management Facilities referenced in the Regulation. The Regulation requires that any waste management project to be constructed in Ontario be reviewed to determine if there will be environmental effects. This report is the culmination of a process that was announced to the public in January 2011, and has involved public meetings and consultations with municipal government personnel.

The project under consideration in this report involves the installation of three different facilities that will utilize the REMASCO gasifier to recover the energy from ENERPAX fuel pellets so that the energy can be used to heat greenhouses in the Kingsville area of southwestern Ontario and provide electrical energy to one group of these greenhouses. The ENERPAX pellets are manufactured from residual municipal solid waste at a government approved processing facility, the DONGARA Pellet Factory, located in York Region in the Greater Toronto Area.

The project incorporates a detailed assessment of emissions from the facilities based upon test work conducted on the approved pilot facilities operated on the Southshore site since 2008. During the original approvals process for the pilot facilities in 2007 the Proponent undertook to complete a Human Health Risk Assessment study related to the emissions prior to applying for approval of a commercial scale facility. Such an assessment requires that the emissions from the facility be quantified and modelled thereby providing estimates of concentrations in the air and on the ground for input into the Human Health Risk Assessment study. Both these tasks have been completed and detailed reports on these studies are available under separate cover. The results of these studies are summarized in this report.

Preparation of the Environmental Screening Report is only one part of the approvals required before the project can proceed. The Ontario Ministry of the Environment [MoE] will require application for a Certificate of Approval [CofA] for a Waste Disposal Site which will include requirements with respect to handling and storage of the ENERPAX fuel pellets and disposal of residues from the gasifiers and the APC systems. Since the facility will be part of an agricultural operation, the MoE cannot require that the proponent obtain a Certificate of Approval Air that governs the conditions for operating the combustion equipment on site; however, as they have done with the Pilot Project approvals, such conditions will be included in the Waste approval. The Proponent understands that the facility must meet the A-7 emission standards in order to operate. The Proponent will be submitting the information required for an Air CofA when it files the Waste Processing Site application. Both the Air application and waste application will be subject to review by the MoE before the Waste approval will be issued.

2.0 PURPOSE OF THE PROJECT

REMASCO, Renewable Energy Management & Services Company, is incorporated under 2132656 Ontario Inc. REMASCO's corporate mandate is to identify, develop and secure sources of renewable solid fuels that can be used in an environmentally conscientious and economically viable manner to generate heat and power. In addition to having assessed a wide range of suitable, but not yet viable agricultural residues, REMASCO has entered into a twenty year contract with Dongara Pellet Plant LP under which REMASCO will receive, transport, store and utilize 60,000 tonnes/year of ENERPAX+™ fuel pellets. The contract allows REMASCO the potential to expand this quantity should opportunities to expand occur. The ENERPAX+ fuel pellets will be manufactured in a MoE approved waste processing facility in York Region. The fuel pellet is to be derived from only clean-burning waste components, carefully selected from a post-source-separated municipal solid waste stream and supplemented with other clean burning, high calorific wastes sourced from industry.

REMASCO has operated a pilot gasifier system at the Southshore Greenhouse site since 2008 under a Provisional Certificate of Approval Waste Disposal Site Number 2887-7AAQTX Issue Date: May 2, 2008. This approval and subsequent amendments allowed the Company to develop a gasification system that provides thermal energy for heating the greenhouse complex. While the gasifier can utilize a wide variety of renewable fuels that could be exploited without the requirement that the facility have a waste certificate of approval, efforts over the development period have focused on using the ENERPAX pellets. Since the pellets have been classified as a waste by the MoE, any facility that uses them must have a Waste CofA.

After 30 months of work, the gasifiers have been proven to be efficient and reliable, and testing conducted according to the requirements of the Provisional CofA has shown that the facility is capable of meeting all the emission standards laid out in Guideline A-7 (revised October 2010). The two gasifiers currently installed at Southshore supplied hot water for the greenhouse during both the 2009-10 and 2010-11 heating seasons. The system has allowed the greenhouse operators to offset some of the fossil fuel typically used for heating the facilities.

The success of the project has encouraged the proponent to plan full scale application of this technology to meet the majority of the thermal energy needs of greenhouses. In the immediate future plans to expand the greenhouses operated by the Mucci Group will require the expansion of the existing gasifier boiler plant on the Southshore site. However, with a contracted supply of 60,000 tonnes of pellets per year, REMASCO must consider other opportunities to expand the use of its technology so that all the pellets can be used.

On the Southshore site, the opportunities for an expansion of activities include developing a power plant that can use the gasifiers/boilers in a co-generation mode to supply both electricity and heat to the Mucci Group greenhouses on and adjacent to the Southshore property. This would require adding another 500 HP boiler/gasifier in the existing building to expand heating capacity, and building a separate power plant building to house four 500 HP gasifiers/high pressure boilers that can produce steam for power generation. Greenhouses consume significant quantities of electricity year round. This provides an opportunity for year round operation of the gasifiers and the four high pressure gasifiers proposed for the power plant would provide steam to drive a turbine/generator set for the 110 acres of greenhouses operated by the Mucci Group in the vicinity of the Southshore facility. With a total installed capacity of 3,300 Boiler HP, the Southshore site will consume 32,000 tonnes of pellets per year.

A company associated with Southshore and Mucci Farms, Agriville, (all three collectively hereinafter referred to as the Mucci Group) operates 60 acres of greenhouses approximately 4.5 km northwest of the Southshore site. Agriville has requested that 4 gasifiers, 2,000 Boiler HP, be installed on its site to produce thermal energy. While the electricity use at Agriville is not large enough to warrant the installation of electricity generating

equipment on that site, the thermal requirements of the site are anticipated to require another 20,000 tonnes per year of pellets.

The proponent is in discussions with other facilities to install gasifiers to provide energy from the additional pellets they have contracted to receive. The proponent recognizes that any new facility will require a Waste CofA. Since additional sites have not yet been identified, this Screening Environmental Assessment is focused on the Southshore and Agriville complexes.

The proponent has applied to have the existing approvals for the Southshore pilot facility extend until the summer of 2011 to allow the existing gasifiers to operate throughout the 2010-2011 heating season. It is the intent of the proponent to have some of the components of the new system operational for Fall 2011, with additional equipment being brought on line as it is manufactured.

The proponent has an opportunity to extend the application of its technology to serve the needs of the greenhouse community in the Kingsville/Leamington area. The technology provides a clean heating system and offers an opportunity to utilize the production of the Dongara Pellet Plant in a manner that has been proven to meet the standards of the MoE.

3.0 PROJECT DESCRIPTION

3.1 *Introduction*

Every greenhouse in the Kingsville area has a heating facility, typically housed in a space that is separated from the greenhouse areas, to heat the facility. The heating facility includes hot water boilers fired with a wide range of fuels: natural gas; various grades of fuel oil; coal; or wood. The boilers to be built by REMASCO have the same function. The aspects of the REMASCO facilities that will make them unique are the combustion system employed, gasifiers, and the fuel. The REMASCO facilities will employ a purpose designed gasifier to extract the energy from ENERPAX fuel pellets. The fuel pellets are manufactured from residual MSW in a facility approved by the Ontario Ministry of the Environment [MoE].

Like the heating facilities in other greenhouses, the REMASCO facilities will be housed in a space that has concrete floors. Unlike the greenhouses themselves, the REMASCO equipment is to be housed in structures that are not heated, are not enclosed with glass and, generally have a lower roof height than the peak of the surrounding greenhouses. Other than gas fired boilers, all other facilities must provide fuel storage facilities on site. Coal piles, wood piles, or oil tanks must be installed. Wood stored outside the building is typically placed into open piles, or in areas surrounded by berms to reduce migration of chips and dust. Coal is typically stored in storage bins or silos. REMASCO facilities will utilize vertical fuel storage silos.

The flue gases from all boilers are exhausted through stacks to the atmosphere. The configuration of these stacks varies by facility, however, conventional boiler plants have no air pollution control facilities to clean the gas being exhausted from the boilers. The REMASCO facilities will be equipped with APC systems. These systems utilize reagents injected into the gas stream to control and removal of various contaminants and fabric filter particulate control devices to remove contaminants and reaction products from the gases. The cleaned gases are then released to the atmosphere. Unlike many of the existing boiler facilities, the stacks at the REMASCO facilities will be of sufficient height to limit the influence of the surrounding buildings on the dispersion of the exhaust gases.

This project description outlines:

- the activities that will be required to install the gasifiers, boilers, steam turbine, and air pollution control systems at the various sites;
- the nature of the gasifiers, their operation, emission control systems and the anticipated releases to the atmosphere during the operation; and,
- the steps that would be taken in the future should the gasifiers need to be retired from service.

Included are descriptions of the buildings that will house the equipment, and their construction.

3.2 *Site Locations and Overview*

The proponent will be seeking approval for several gasifier installations at two greenhouse sites in the Kingsville area:

- Southshore, 1746 Seaciff Drive E, Kingsville, N9Y 2M6; and,
- Agriville, 1600 Kratz Road, Kingsville, N9Y 0A1.

The sites are shown in Figure 1. The Southshore facility and adjacent greenhouses (Mucci farms and the 10 acres on the south side of Seaciff Dr.) currently cover 52 acres. Plans are in place to expand these facilities by 60

acres before the end of 2012. The main Southshore greenhouse is currently heated by two REMASCO gasifiers with a total installed capacity of 800 boiler horsepower supplemented by a combination of natural gas and oil fired boilers.

Typically greenhouse heating systems in the Kingsville area are sized for 30 boiler HP per acre. When expanded to 112 acres approximately 3,300 boiler HP of heating equipment will be needed to meet the peak demand, even with an expanded heat storage system similar to the current facility. The capacity could be met with the installation of the addition of five new REMASCO gasifiers each sized at 500 boiler HP. One of these gasifiers can be installed in the existing building. However, an installation of 3,300 boiler HP capacity would result in there being extra capacity on site during most part of the year.

The electrical requirement of the greenhouses is approximately 10 kW per acre. This electrical load is consistent throughout the year implying that the greenhouses at Southshore will require 1.2 MWe of electricity when the expansion is completed. In addition, each gasifier consumes approximately 100 kWe of electricity. With 7 boilers required to meet the heating capacity, a further 0.7 MWe of electricity would be required on site. In co-generation mode, generating steam to drive a turbine to generate electricity and recovering the remaining heat from the exhaust of the turbine for heating, three 500 HP high pressure boilers/gasifiers would provide the electrical needs of the complex, 2 MWe.

To meet the combined heating and electricity load of the expanded facilities around the Southshore site a total of four high pressure units will be installed in a new 30 m by 60 m building to be constructed north of the existing REMASCO boiler house. This building is referred to as the co-generation facility. The fourth boiler will provide back-up to the high pressure steam supply system, thereby allowing a unit to be taken off line without reducing the amount of power being produced. The fourth boiler will also provide thermal energy to meet the peak heating needs of the facility. The exhaust from pairs of boilers in the co-generation building will be combined and exhausted through fabric filter particulate control device, an induced draft fan, and a stack. Each fabric filter installation will measure approximately 5.5 m in diameter and will be installed outside the building. The two fabric filters and two stacks will be constructed adjacent to the new co-generation building. As noted above, the existing REMASCO boiler plant was designed to house 3 gasifiers and is large enough to accommodate an additional 500 HP low pressure boiler. Installation of the new gasifier will bring the total capacity of the lower pressure gasifiers/boilers on site to 1,300 HP. Expansion of the boiler capacity in the existing REMASCO boiler house will require that the fabric filter associated with that facility be upgraded to absorb the increased flow associated with the new unit. As such, that unit will similar in size to those planned for the new co-generation building. The two existing fuel storage silos on the site will be augmented by two new silos of similar size located next the existing ones. The storage silos will be interconnected to serve all 7 gasifiers that will be installed on the site.

At the Agriville site, the greenhouses currently cover 40 acres. Plans are in place to expand these facilities by 20 acres before the end of 2012. The Agriville facility is currently heated by wood fired boilers that deliver 1,200 HP at peak load. These are connected to the hot water heat storage system. The wood fired boilers require high maintenance. Consuming wood to heat the greenhouses has several drawbacks. Wood supplies are limited, and the volume of wood required means that the facility must utilize an outside storage pile that covers 0.6 acres and requires the use of up to 5 acres of the site for: access to the pile and berms to surround the pile. In addition to the outside storage, an inside storage area measuring 50 m by 30 m is

Figure 1 Site Locations showing Agriville and Southshore REMASCO Facilities in Blue



required to contain and transfer fuel to the furnaces. Outside storage precludes that land from being converted to greenhouse and lowers the overall efficiency of the site.

By replacing the wood fired boilers, the greenhouses can be expanded to the north. The expansion will bring to total projected thermal heating needs for the site to 1,800 HP. REMASCO can supply this requirement by installing four 500 HP low pressure gasifiers/boilers matched to 2 air pollution control trains and stacks similar to those discussed above. The current plan is to install the gasifiers/boilers in the existing buildings where the wood boilers and the wood chip handling equipment are currently located. Pellets will be stored in 4 new silos that will be erected adjacent to the boiler building.

3.3 Equipment Descriptions

The preceding section suggests that the equipment list at the various sites will be very similar. The components included in the equipment installed at any site can be divided by function:

1. Fuel Storage and Handling;
2. Gasifiers and Boilers;
3. Residue Handling Systems;
4. Air Pollution Control Systems;
5. Control and Monitoring Equipment; and,
6. Steam Turbine and Electricity Generator.

Each of the seven gasifier/boiler units that will be situated at Southshore are virtually identical with the exception that the two existing gasifiers are smaller, 400 boiler HP versus the 500 boiler HP capacity that will be installed in the future. The four boilers in the co-generation building will be high pressure steam generators with superheaters and economizers, as opposed to the low pressure steam systems installed at the other locations.

The Air Pollution Control systems will be similar, with the two systems at Agriville and the two systems associated with the co-generation building being identical. The baghouse that will eventually be installed for the Southshore boiler house one will be the same design as those at the power house and Agriville, but larger in size to account for the increased flow from the 1,300 boiler HP of installed capacity.

The power island, steam turbine and electricity generator in the co-generation building will be unique to that installation and, because these components add more complexity to the facilities, the controls associated with the turbine generator will be unique compared to the other boiler houses.

The individual components of the systems are described in the following sections with differences between the installations being identified as appropriate. This approach provides the reader with an understanding of how the components are employed in the system, but avoids the redundancy of describing all the components in each of the three buildings separately.

3.3.1 Fuel Storage and Handling

Pellets shipped to REMASCO are transported in walking floor trailers. At site the trailer is unloaded into a storage silo adjacent to the boiler house. As noted elsewhere there are two silos associated with the existing REMASCO boiler house, see Figure 2. Two more silos will be added at the Southshore site to serve the co-generation installation and 4 silos will be installed at the Agriville site. These silos are typical of the type of equipment used to store various materials at agricultural facilities.



Figure 2 Fuel Storage Siloes at Southshore Greenhouses with Covered Truck Unloading to the Right

Each silo holds approximately 1,200 Mg of pellets (48 ft diameter x 54 ft peak x 35 lbs/ft³ / 2205 lbs/Mg). Upon arrival at site, the trailer enters unloading area, a pit where the pellets can be discharged. Pellets are transferred from the pit to the silos using a 110 ft high bucket elevator. At the head of the bucket elevator pellets can be diverted to the appropriate storage silo. Materials will move through the silos on a first in first out basis. One silo will be emptied as the other is being filled and when the second silo is full, pellets will be diverted to the partially empty silo. Each silo holds sufficient pellets for approximately 48 gasifier days of operation at full load.

A pellet transport system moves pellets from the bottom of the active silo to an intermediate day hopper mounted near the roof of the gasifier building. This hopper feeds the fuel metering bin hoppers serving a particular gasifier. The existing roof bin stores approximately 7 m³ or 8 Mg of pellets, and requires refilling every 4-6 hours to supply two 400 hp gasifiers. The roof bin buffers the material flow from the storage silos to the gasifier metering bins minimising the wear and tear on the bucket elevator by reducing the need to constantly start and stop to replenish the metering bins on the gasifiers. The metering bin hoppers on the gasifiers hold approximately 1 m³ or 500 kg of pellets and regulate the feed of pellets to the gasifier.

New installations in the co-generation building and at Agriville could involve the use of a larger day bin to maintain the same filling frequency while accommodating about a 20% increase in fuel use for the larger gasifiers.

During start up or shutdown of a unit the feed system can operate with the roof bin empty and its bottom slide-gate open to allow different fuels to be fed to the metering bins on different units. In this case, each metering

bin calls for its fuel directly from the source fuel bin and the bucket elevator operates each time a metering bin is calling for fuel. The control of this system is governed by level controls on the metering hoppers.

The metering bins on the gasifiers are equipped with a rotary airlock at the bottom of the bin. This rotary air lock meters fuel from the bottom of the metering bin and drops it directly onto the chain grate of the gasifier. The speed of the rotary airlock is controlled and synchronized with the speed of the grate.

3.3.2 Solid Fuel Gasifier/Boiler Installation

The REMASCO solid fuel systems are basically biomass gasifiers that are connected to a heat recovery boiler to produce the hot water or steam at the pressure required by downstream equipment. Low pressure steam can be used for process heating. Two of these systems are currently installed in the REMASCO building at Southshore, Figure 3. High pressure steam can be used to drive a steam turbine to generate electricity, or it can be used for process heating. The principal source of fuel for the gasifier will be ENERPAX pellets, although waste wood pellets or wood chips can be used during start-up and shut down of the units and can be substituted for the ENERPAX pellets if necessary.

A REMASCO Commercial Gasifier/Boiler unit will be rated at 500 HP output capacity, or 24 GJ/h input capacity. The gasifier is designed with systems to supply fuel to the bed, control how that fuel is processed and how the residues of ash are removed. Downstream of the gasifier, a boiler is used for heat recovery. These gasifiers will be started using natural gas to heat the gasifier chamber and downstream sections prior to ENERPAX pellets being introduced. Upon cessation of pellet feed, natural gas can be used for controlled shutdown.



Figure 3 REMASCO Gasifier System at Southshore looking towards Boiler

The process schematic for a commercial scale gasifier/boiler system is provided in Figure 4.

3.3.2.1 Gasification System and Residue Handling

The gasifier is a refractory lined chamber with a moving grate installed in the lower portion of the chamber. The cast alloy chain grate rotates around the underfired air plenum. A water-cooled, 24" drive pulley driven by a variable speed controlled electric motor is mounted at the ash discharge end of the gasifier to move the grate at the appropriate speed.

As noted in the previous section, fuel is added to the grate from the metering bin. Once the fuel is deposited on the moving grate, it takes approximately 1.5 to 2 hours to travel through the unit. The grate does not tumble or turn the fuel rather the air introduced into the gasifier fluidises the bed material and exposing fresh surfaces. At the feed end of the grate, fuel is added at a rate that maintains an even fuel distribution. The thickness of the bed decreases as the materials move towards the discharge end of the grate. At the end of the grate, the bed is fully consumed, containing minimal unburned material.

Large ash particles are discharged off the end of the grate conveyor, while fine ash particles, siftings, pass through the grate and are pushed along the gasifier floor into the ash sump with a light drag chain conveyor.

The ash created in the gasifier drops into a water-cooled ash sump at the end of the grate. The sump is equipped with an ash auger that discharges the ash through a rotary airlock to a covered drag chain conveyor. The rotary air lock provides the seal between the gasification process and atmosphere. The drag chain conveyor is equipped with strategically placed spray nozzles to cool the ash and minimize dust generation. The ash drag conveys the ash to a 20 m³ lugger bin for haulage to disposal.

A combination of recirculated flue gas and fresh combustion air is blown up through the grate and fuel bed. The grate system has been designed with four independently controlled combustion zones. The first zone utilizes fresh air only while a combination of recirculated flue gas and fresh air is supplied to the balance of the zones. The mix of fresh and recirculated flue gas controls the amount of oxygen in the underfired combustion air and serves to control the temperature within the gasification chamber.

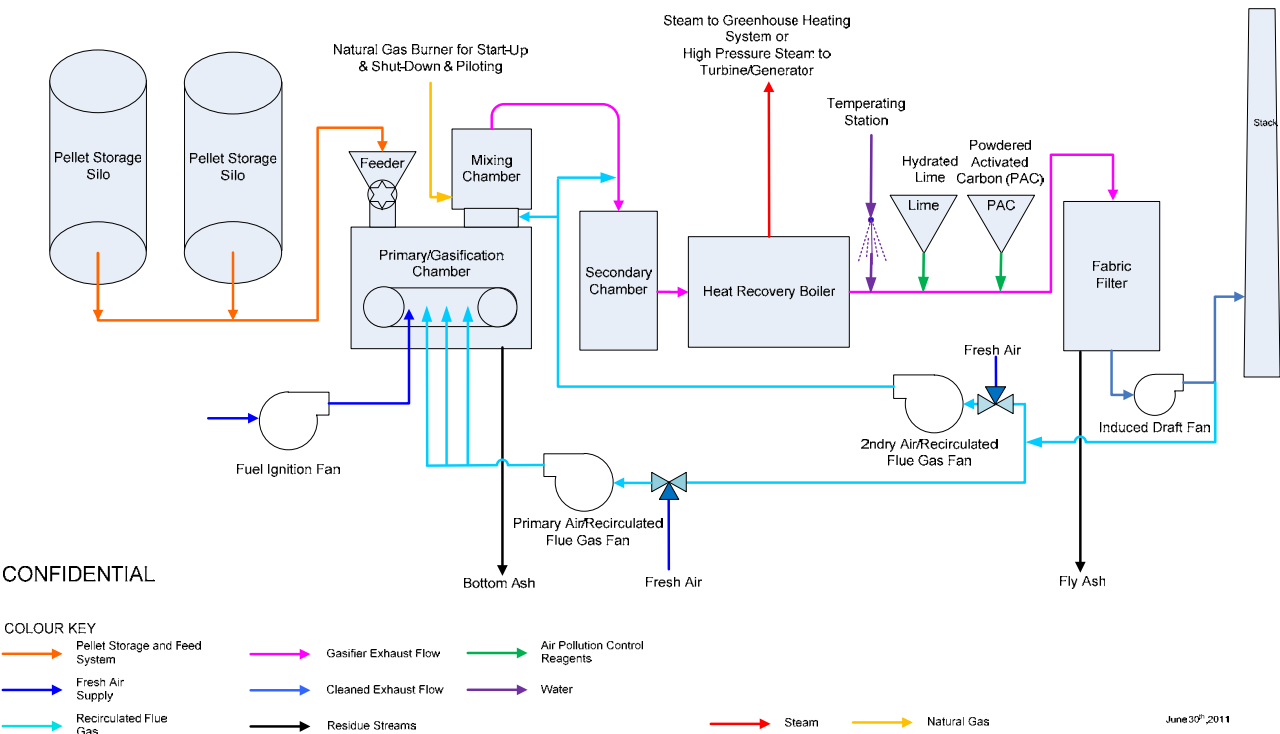
The gases produced in the gasifier chamber exit through the Mixing Chamber and Hot Gas Ducting (HGD) to the secondary combustion chamber. Secondary and tertiary combustion air is injected into this region through nozzles tangentially mounted on the ducts. This air is a mix of fresh air and recirculated flue gas to control the combustion temperature and reduce the amount of oxides of nitrogen produced in the system. Temperatures in the HGD mid-section and Secondary Chamber exhaust are measured as a control parameter for fresh air addition.

Gases entering the secondary chamber are in excess of 1,000°C and remain in the secondary chamber for a minimum of 1 second prior to exiting the chamber. Gas velocity is reduced in the secondary chamber to allow large particulate matter to settle to the floor of the chamber.

3.3.2.2 Heat Recovery

The basic single pass low pressure steam boilers installed for heat recovery at Agriville and Southshore will be manufactured by the Johnson Boiler Co. or The Hurst Boiler & Welding Company. The boilers are positioned in a way that allows quick and easy access to the tubes for periodic cleaning. A positive on-line cleaning system will be installed in each boiler.

Figure 4 PROCESS FLOW DIAGRAM
For REMASCO Gasifier/Boiler @ Southshore Greenhouses



The boiler cleaning system removes any ash building up on the boiler tubes thereby providing continued high levels of heat transfer and reduced contaminant generation potential. The gas exhaust temperature from a clean boiler will be in the range of 325 - 350°F and will increase by approximately 50°F as the boiler tubes begin to foul.

Heat produced by the boiler is either sent directly to the greenhouse or to a steam to water heat exchanger that heats the water stored in the large, outdoor hot water storage tanks currently installed on the properties.

The high pressure steam boilers required for the co-generation operation on the Southshore property will be also be based upon a fire tube design but will be complete with a superheater and economizer section for maximum recovery of energy. The gas exhaust temperature from the boiler will be in the range of 325 - 350°F. Steam produced by the boilers will be sent to the steam turbine/generator set for conversion to electricity. As explained below, the residual heat in the steam exhausting from the steam turbine will be used for heating.

3.3.3 Steam Turbine and Generator (Power Island)

The power island will consist of a 50,000 lb/hr, 3 stage, 450 psi back-pressure steam turbine coupled to a 4160V, 3 phase synchronous generator. Currently the capacity of the generator will be limited to 1.8 MWe. The generator will be connected to at least two of the three greenhouse facilities, as a separate source of supply to each of their existing backup generator systems. The transfer from grid power to island power for each of the three services will be manual. This means that a brief power outage will occur during the transfer from one source of supply to another.

The turbine is referred to as a "back-pressure" unit because, unlike installations where electricity generation is the major consideration and the turbine extracts the maximum energy from the steam by discharging into a vacuum, the steam exiting the REMASCO turbine will only be brought down to 15psig. To utilize the balance of the energy in the steam, a desuperheating/pressure-reducing station will allow any unused steam to be sent directly to greenhouse heating, either through a heat exchanger or for direct use as low pressure steam.

Of the 1.8 MWe generated in the power plant, the REMASCO gasifier/boiler loads will total approximately 700kW and the greenhouses will consume approximately 10kW/acre or 1.1mW for 110 acres.

3.3.4 Air Emissions Abatement System

The exhaust from a pair of boilers passes to the emission control system which includes the recirculated flue gas systems and the induced draft fan that discharges gases to the stack after they go through the fabric filters. Several methods are used to control emissions from the gasifiers. Aside from good combustion control measures that ensure high organic compound destruction rates, and the use of flue gas recirculation to reduce the production of oxides of nitrogen, the main control measure introduces various sorbents into the flue gas stream and removes the resulting reaction products in the fabric filters used for particulate control.

Water is injected into the gas leaving the boiler to maintain suitable gas temperatures for the APC system. Moisture also improves the reaction rate for the lime added for acid gas control. Lime and powdered activated carbon are introduced into the gas stream after the moisture is added and before the exhaust gases enter the fabric filter. To prevent equipment deterioration and optimize the operation of the gasifier/boiler system, the recirculated flue gas is treated and polished to the same extent as the final effluent before being mixed with fresh air to achieve the desired recirculated gas quality for re-introduction into the gasification system.

In the existing facility, provisions have been made to inject lime and powdered activated carbon [PAC] into the duct that carries the gas stream to the fabric filter. Both reagents are injected using a separate small, volumetric

metering screw. The lime feed rate can be adjusted to achieve the desired outlet concentrations of HCl and SO₂. Powdered activated carbon [PAC] injection rates are typically on the order of 1 lb/hr per operating unit, sufficient to reduce mercury and PCDD/F emissions to well below the regulatory levels.

The fabric filter used at the REMASCO sites will be identical in most cases, although a slightly larger system will be required for control of the exhaust from the 1300 HP boilers installed in the existing REMASCO building on the Southshore site. The fabric filters will be modular, walk-in plenum style units designed to provide 3,300 ft² of filter area. With a design flow of 10,000 cfm this equates to an air to cloth ratio of 3.01:1. The filters will be standard fibreglass bags. A pulse air cleaning system will be used to periodically clean the bags. The resulting APC residue, consisting mainly of spent lime and ash is expelled into an air-tight 2 m³ or larger bin.

Gases will exit each fabric filter through a 56 kW induced draft fan and be expelled through a 0.81 m diameter stack. The stack associated with the existing REMASCO boiler house will be 0.91 m diameter to maintain a similar exhaust gas velocity to that of other systems. The speed of the ID fan will be variable to enable control of the draft within the primary gasification chamber.

Unlike some combustion/incineration systems, there are no bypass stacks on the REMASCO gasifier units. Therefore, the only way for exhaust gases to exit the system is through air pollution control systems (*i.e.*, the fabric filter), thereby limiting potential for increased release and associated exposures under upset conditions.

Under facility start-up conditions, natural gas will be used to heat the refractory to just below the standard operating temperatures without flue gas circulation. The ENERPAX pellets will then be added to the hot system, thus reducing the effects of startup/shutdown in unstable conditions. System operation also involves the recirculation of flue gas to the furnace for NO_x control. When there are system upsets, the recirculation flow will decrease during the shutdown resulting in a substantial increase in the effective fabric filter capacity. While both of these scenarios (*i.e.*, start-up and emergency shut-down) may give rise to short-term increases in NO_x emissions, these conditions are infrequent and not sustained.

In addition, all of the proposed REMASCO facilities will have emergency generators that supply sufficient power to allow gasifiers to be shut down in a controlled manner.

3.3.5 Controls, Data Acquisition & Continuous Emission Monitoring Systems

The process control and data acquisition system for the REMASCO commercial test system is an Ethernet capable, Siemens S7-300 process controller (PLC) complete with a PC based supervisory control and data acquisition system. This system is capable of monitoring and providing long term storage for all discrete and analog process parameters measured and controlled by the PLC. Such parameters will include major equipment on/off status, all temperatures, pressures, flows and all required Continuous Emission Monitoring parameters. Two oxygen measurement systems are used for process control purposes. These sensors will be installed as permanent instruments complete with sampling probes, sample conditioning systems and daily calibration capability. Any additional continuous gas measurements that may be deemed necessary for processing the ENERPAX pellets will be specified in the Certificate of Approval issued by the MoE and these will be installed in the systems.

The control system, including the PLC and SCADA PC will be protected from power surges and blackouts using an uninterruptible power supply. In addition, the Southshore boiler building includes a 600VAC emergency power system to maintain power during local electrical grid power failures.

3.4 Operational Phases

According to the guidelines developed by the MoE for Environmental Screening Assessments the proponent must address the potential interaction between the proposed project and the environment during all phases of the project. In this case the phases involve:

- Construction;
- Operation; and,
- Decommissioning.

This section of the project description describes these phases for a typical REMASCO facility, however since there are difference between the existing Southshore gasifier facility, the co-generation facility and the Agriville facility the phases for each of these sites are discussed.

3.4.1 Construction

3.4.1.1 Agriville

The space necessary to house the gasifiers and boilers at the Agriville site is currently erected. Modifications will be required inside the building to accommodate the new gasifiers/boilers, fuel and ash handling equipment. The new air pollution control systems and the new fuel storage silos will need to be erected outside the facility. Construction outside the buildings will require excavation to install the footings for the equipment and concrete pads below the silos, the fabric filter house and the stacks. The areas where the pads will be constructed are currently used as traffic routes and outside storage areas for the Agriville operation.

The fabric filters will require two pads each measuring approximately 7 m square. The silos are approximately 16 m in diameter and 17 m high, and each requires a concrete pad measuring approximately 17 m square. A truck unloading area, suitable for handling a tractor trailer combination and sheltering the unloading operation from the elements will be constructed along side the silos. While the final configuration of the silos has yet to be determined, approximately 1,200 m² of pad will be required for the silos. The adjacent truck unloading area will be 8 m wide and extend the length of the silo pad.

3.4.1.2 Southshore

The existing REMASCO gasifier/boiler house measures 34 m by 31 m and has sufficient space to house 3 gasifier/boiler units, the two existing 400 hp boilers and a new 500 hp low pressure boiler. The existing installation includes two existing baghouses and a stack that takes the flow from the two baghouses. There are two existing fuel storage silos with a covered truck unloading area. No work will be required on the existing building, however the existing baghouses will be supplemented with a third, larger baghouse which will be sized to accommodate 120% of the anticipated flow from the 500 hp third unit. The new baghouse will be over-sized to reduce the loads on the two existing baghouses. Experience suggests that these units are currently restricting the capacity the existing gasifiers. The three baghouses will manage the flow from the boilers when they are producing a total of 1300 hp. A new stack will be erected to accommodate the expanded flow. These elements will be located close to where the existing systems are located.

A new REMASCO co-generation building on the Southshore site will be constructed to house four 500 hp high pressure gasifier/boiler units and the power island that will consist of steam turbine/generator combination. The new building will be similar in construction to the existing REMASCO building, steel frame construction with steel siding built on a concrete pad with a minimal slope on the roof. Construction will involve excavating to accommodate footings for the building walls and the based for a poured concrete floor slab that will support all the equipment. The turbine/generator will be built on a pedestal that will be isolated from the rest of the

building. After the slab has cured the columns are installed, the purlins added between the columns and the siding installed. The roof is installed in a similar manner with the joists being installed on the top of the columns, the purlins added so the roof deck can be fastened to the structure. Inside the building, the gasifier/boilers, the power island and the control room will be separated by concrete block walls.

The new co-generation building will be equipped with a shower/washroom for the staff and water will be directed to the sanitary sewers that serve the site. Rainwater collected from the roof of the building will be diverted to the existing rainwater handling system operating on the site.

Outside the building, two new fabric filter houses and stacks will be constructed. Each will serve a pair of the gasifiers. They will be located adjacent to the boiler end of the facility, relatively close to each other. Fuel for the new boilers will be stored in silos similar to those currently located on site. It is anticipated that the new silos will be located adjacent to the existing silos, possibly on the north side of the truck unloading area so the various silos can be loaded from one unloading system. As with the silos at Agriville, a concrete pad will be built to support the silos and their contents.

Similar to the construction activities for other slabs and footings, some excavation will be required to install foundations followed by pouring equipment supports and the concrete support slabs.

3.4.1.3 Duration of Construction

Construction of the various facilities will be staged. Installation of the third gasifier at Southshore will likely occur in parallel with the installation of the first gasifier at Agriville. These activities are expected to require 6 months to complete.

The co-generation building and supporting facilities including new fuel silos will likely require 9 months to complete to the point that equipment can start to be installed. Equipment installation could require another 6 months. It is anticipated that construction and commissioning of the equipment in the co-generation facility can be completed in 15 months from the time construction starts. The commencement of this phase will depend upon market factors.

3.4.1.4 Work Force Required

Overall it is estimated that the construction operations will require approximately 15 man years of work.

3.4.2 Operation of REMASCO Facilities

The equipment and purposes of the components of the REMASCO facilities were discussed in the previous section. The operational aspects of the facilities will be discussed in this section. The facilities will be managed by staff with experience in operating combustion systems.

It should be remembered that the facility is mechanized. The basic design of the gasifier and combustion chambers has been operated over the last two years as part of the pilot and commercial scale projects at Southshore. The APC system has also evolved and been operated over this period. This equipment is similar in concept and operation to other commercial equipment and the body of operating knowledge developed at Southshore can be translated to all the REMASCO projects.

3.4.2.1 Waste Throughput and Storage Capacity

The maximum quantity of the fuel that can be fed to the gasifier is a function of the calorific value of the material. The individual 500 HP gasifier and its associated combustion chambers has a capacity limited to a maximum input of 25 GJ/h (500 hp X 33480 BTU/hp X 1.0551 kJ/Btu / 0.7). This translates to feeding about 1085 kg/h of ENERPAX pellets to each 500 hp gasifier when it is operating at full load.

In operation, the gasifiers will not be operated at full load all the time. The high pressure boilers associated with power generation will operate year round to generate steam for the turbine, and they will supply heat to the storage system when they operate. The amount of heat provided by the high pressure boilers will be sufficient to maintain operating temperatures in the heat storage system that heats the greenhouses during the warmer months of the year. This means that the low pressure boilers will not need to operate during some months. Furthermore, since the plants in the greenhouse benefit from elevated levels of CO₂ during part of their growth cycle, the gas fired boilers installed in the greenhouses are run to produce CO₂ which is discharged into the greenhouse. Heat generated during the operation of these boilers will further reduce the load on the REMASCO systems. The full capacity of the gasifiers will be required at both sites during the coldest months of the year, January and February. This decreases to 27% of the full capacity in the summer months of July and August. At other times of the year the fuel feed rate will be between these extremes. For the power plant, the need for electricity occurs year round, so the gasifiers will operate at feed rates in excess of 95% for all but July and August when they will operate at an estimated 72% of full capacity. The various operation capacity requirements will be achieved by operating different numbers of gasifiers at similar output rates. Typically the operation will be optimized so that no gasifier will operate at less than 65% of its full capacity.

While ENERPAX MSW fuel pellets are currently classified by the MoE as a waste, in that they are manufactured from residual MSW materials, they are a fuel that is dry, and reasonably odour and dust free. The production from the pellet plant is relatively constant, that is it does not vary by season, thus the variable fuel requirement for the REMASCO facilities requires that fuel be stored on site to even out supply and demand. The pellets will be stored in the silos discussed earlier. These structures are similar to grain storage silos and provide enclosed, dry storage on a concrete pad to prevent the pellets from contaminating the local soils.

While in a normal waste handling facility the MoE require an outline for waste screening procedures and criteria that will be applied to minimize the potential for mixing incompatible materials, this is not considered a concern with the proposed facility. The DONGARA process manufactures the pellets in facility approved by the MoE. That facility removes incompatible materials and ensures the quality of the fuel pellet with rigorous quality assurance and quality control procedures. Any wood used at the REMASCO facility will be obtained from companies that specialise in providing wood chips and pellets for such purposes. Both of these materials are similar and completely compatible with each other.

The ash from the gasifier and residue from the APC system must be disposed. These residues will be deposited in suitable containers to be sampled before transferring the material to an approved disposal site. Since the pellets are projected to have an ash content of approximately 9%, each 500 boiler HP gasifier operating at full load will produce approximately 2,300 kg of ash each day. This ash will be tested prior to being released for transport to an approved landfill.

3.4.2.2 Process Monitoring

ENERPAX pellets shipped to the facility will be weighed by the supplier before leaving his facility. Similarly, any wood waste pellets will be weighed before they are shipped to the facility. There will not be a weigh scale on site. Each load of Enerpax pellets is also followed with a Certificate of Analysis, providing the proximate, ultimate and bulk metals analysis for several homogenized samples taken from that load. Residues leaving the site will be weighed at the disposal site and that information will be collected by the disposal site operators and

used for billing the REMASCO facility. These records will allow the quantification of residues leaving the facility.

The facility will have records of services used: electricity, gas and water supplied to the facility.

Should any complaints be received about operations at site, these will be documented and submitted to the MoE as specified in the existing Certificate of Approval. Included in these submissions will be an explanation of any measures that were taken to prevent a reoccurrence of the events that are thought to have given rise to the complaints. A description of site operations, including process and procedural limitations identified during operation and any modifications that might be made to circumvent these limitations will be documented.

3.4.2.3 Facility and Site Maintenance

A detailed maintenance program is being developed as more operating experience with the equipment is gained. The maintenance program will address two significant areas:

- Equipment maintenance; and,
- Building maintenance.

All facilities and stationary equipment will be inspected and serviced on a basis that meets or exceeds the manufacturer's recommended intervals.

The operating objectives will require:

- the immediate correction of safety problems;
- the minimization of operating downtime; and,
- the correction of all other maintenance problems within 24 hours of being identified.

All identified repairs, deficiencies, and alterations will require that a repair procedure be initiated. This will begin with the issuance of a work order and costs incurred to affect the repairs will be tracked to the completion of the work order.

Maintenance programs will be built around sound inspection schedules, and preventative maintenance schedules designed to meet or exceed the manufacturer's specifications. An important aspect of this work will be that the operations maintenance staff completing daily inspection reports.

The Preventative Maintenance program will be based upon a pre-determined schedule of services, inspections, and parts replacements.

It is proposed that an annual inspection of all facilities and equipment be completed. This inspection will include the following:

- All major structural components, including structural beams, supports, foundations, roof components, external siding, etc.
- All facility systems and sub-systems, including refractory, feeder wear, and the grate chain, baghouse and heated water and electrical distribution systems etc.

This inspection will provide a review of all records and analysis of any identified problems or deficiencies, and will produce a report that details the findings and provides recommendations for the correction of any identified problems.

3.4.2.4 Staff training

Staff training is the cornerstone to being able to carry out the maintenance and inspection programs outlined in the previous section. The purpose of training in the environmental context is to ensure that all personnel who operate equipment that has the potential to create a significant impact on the environment receive proper, adequate, and appropriate training. Personnel training programs are essential for safe working conditions and efficient operations. The training plan will be developed to ensure that the necessary training is conducted and recorded. The plan will address training for new employees to adequately prepare them to work with the REMASCO gasifier. For those with some experience working with this type of equipment training will reinforce their knowledge of safe operating practices. It must also address emergency response training as well as safety, corporate, practical, and regulatory training.

Training must address a number of different topics to ensure that employees receive a comprehensive preparation for their specific jobs. This training is conducted through various training mechanisms, and its content is dependent on the individual's job. New employees receive orientation training and in-depth training on various topics including waste processing procedures, emergency operations and the requirements of the Certificate of Approval issued by the MoE. This training will be supplemented by regular refresher training. All employees will be trained in the contingency/emergency response plan. Health and Safety program will also include:

- Standard Operating Procedures;
- Health and Safety Plan;
- A comprehensive Health and Safety Committee;
- Regular Safety Training Sessions;
- Safety Meetings; and,
- Safety Incentive Program.

3.4.2.5 Contingency plans

Regardless of the degree of supervision applied and the maintenance and inspection plans developed for the facility, some unforeseen occurrences may arise in the course of the operation. Such situations will be the subject of a comprehensive contingency plan being developed for the site. While catastrophic occurrences that could arise from major storms etc. will not be addressed in the contingency plan, more common events such as spills and fires will be covered. Inspections will ensure the maintenance of these measures.

Emergency Preparedness Training is site specific training. The Emergency Coordinator and his crew will review the various emergency procedures and practice using the onsite equipment (i.e. fire hose and nozzles, self contained breathing apparatus, fire pump maintenance, portable monitors, etc.). The emergency responders will participate in 2 training sessions per year. Fire training is incorporated into the emergency preparedness training. In addition to the site training sessions, employees will be encouraged to participate in off site training.

A project specific plan has been prepared for the existing Southshore facility. The plan deals with: fires, floods, power failures and spills. This plan will be executed with local municipal involvement and agreement to those plans has been put in place. All employees will be trained in the execution of the plan. Power failures will trigger an orderly shutdown of the gasifiers with back-up power being provided by the emergency diesel generators installed at the facility. The plan will also address fire contingencies.

Details of contingency issues are outlined in the following table.

Contingency	Response
Equipment breakdown	The equipment design is robust, having been used in this type of technology for many years, where as long as regular maintenance is performed the equipment has been shown to be reliable. In the unlikely event that a major equipment breakdown occurs that cannot be resolved within a 24 hour period, any anticipated fuel shipments to the site will be curtailed.
Fire	The site will be designed within municipal and regional guidelines related to hydrant coverage. In the case of a building fire, the fuel feed to the building will be curtailed. REMASCO have installed a continuous temperature monitoring system in the storage silos with an alarm system. The storage silos are equipped with a deluge system.
Odour, noise or air related complaints by public or staff	All complaints will be recorded by management for review by the company and/or ministry staff at any time. Appropriate action will be taken quickly to mitigate the impact of such complaints. The problem will be investigated and any required adjustments to operational procedures will be acted upon immediately, to minimize any possible future complaints.

3.4.3 Closure

Should the facility be unable to obtain DONGARA pellets at some time in the future, the gasification of waste on site will have to be curtailed. Since the gasifiers are capable of handling biomass materials, such as wood or some other biomass that could be converted to a form suitable for feeding to the gasifiers, steps would need to be taken to cease processing waste on site.

The gasifiers/boilers would be maintained as operating entities on the sites where they are established. The silos would be emptied of DONGARA pellets, and that fuel would be replaced by the biomass that can be used to operate the gasifiers. All bottom ash and air pollution control residues on site after the last of the pellets are consumed will be handled in the same manner as it is currently, namely sent to approved disposal facilities.

Once these steps are completed, the facility can continue to operate as a biomass gasification facility.

Failing use of the facility for biomass gasification, it is likely that, as long as the greenhouse operations continue, the facilities can be used to house boilers to supply heat to the greenhouses. In this case the existing gasifiers and boilers would be removed and scrapped and new boilers would be installed.

4.0 Description of Local Environment and Conditions

The REMASCO projects will be located between Leamington and Kingsville on the north shore of Lake Erie. The study area considered for the projects was a 4 km wide zone north of the lake to north of Road 3E. The eastern boundary was the Albuna Town Line and the zone stretches 8 km to the west to Division St. or County Road 29 in Kingsville. As such, the study area is fully within the boundaries of the Town of Kingsville. This area was defined by the project team as the area most likely to be influenced by any changes that the projects induce with their immediate areas.

As a first step in the Environmental Assessment process it is necessary to characterise the existing environment within the study area. The study area environment considers all those portion of the environment as defined in the Environmental Assessment Act:

- the natural environment and in particularly:
 - air quality;
 - water quality;
 - plants; and,
 - animals including humans; and,
- the socio-economic environment social, economic and cultural aspects such as those pertaining to industry, agriculture, tourism, First Nations Communities, and heritage resources.

The existing environment is described in this section of the report.

4.1 *The Nature of the Study Area*

The study area is bounded on the south by Lake Erie. The land rises about 10 m above lake level within 200 m of the shoreline along much of the study area. As one moves further inland the land has a gentler slope as it continues to rise to over 40 m above lake level 2.5 km north of the lake in the north east corner of the study area. The flat fertile area near the shore is highly suitable for agricultural activities and as such much of the area is used for agricultural activities.

The study area is solely within the municipal boundary of the Town of Kingsville, in Essex County.

The zoning in the study area, Figure 5, shows that within the first 2 km of lake the land use comprises: residential, mostly along the shore line south of Seacliff Dr (County Road 20) lake; agricultural; and limited other uses including commercial, manufacturing, recreation and parks. The predominant zoning is agricultural. Included in the agricultural zoning are 23 greenhouse complexes that cover approximately 120 ha of the portion of the study area south of Road 2E. In terms of agricultural operations there are three significant uses in addition to the greenhouses: vineyards; orchards; and field crops. The orchards and vineyards have vegetation coverage and as such are not prone to wind erosion during drier seasons.

4.2 *Natural Environment*

With the land in the study area being used for agricultural purposes, much of the area has been cleared of native vegetation. This results in very few locations in the study area being suitable for animal habitat. The only potentially environmentally sensitive areas are along the municipal drains that serve to transfer field runoff to the lake. The Municipal Drains shown in Figure 6 appear to be disconnected from the lake in some cases, but that is because these areas are naturally occurring gullies that serve as drainage channels. These gullies contain

native vegetation, but no continuously running water so they do not support aquatic life. The areas can however offer shelter to birds and small animals. Since any discharge to these waterways can lead to impacts in the Lake, care must be taken to minimise soil erosion into the open channels.

In the General Development Policies section of the Gosfield South Official Plan¹ there are two sections that address issues related to municipal drains and storm water management:

In the §2.4 Development along Inland Watercourses:

For those inland watercourses, municipal drains and marshes where engineered floodlines are not available, the municipality, in consultation with the Essex Region Conservation Authority and Ministry of Natural Resources, will incorporate appropriate building setbacks from the top of such watercourses, municipal drains and marshes into the zoning by-law. Development proposed within 50 metres of a significant ravine, valley, river or stream corridor will require an EIS and these lands are considered as adjacent lands.

With respect to Stormwater Management in §2.16:

To ensure that run off is controlled such that development does not increase peak flows in watercourses, resulting in downstream flooding and to institute run off control to prevent the accelerated enrichment of watercourses from run off containing pollutants, the municipality in consultation with the Ministry of Environment and Energy, the Ministry of Natural Resources and the Essex Region Conservation Authority may require developers to undertake a storm water management report and to incorporate the necessary measures into the development in order to address these issues. These requirements may also be included in the zoning by-law and development agreements.

There are two areas designated as Park or Open Space in the study area. These are shown in green and labelled P on the Zoning diagram. The Official Plan suggests that these lands should be used to develop recreation and tourism potential in the township as the land is set aside for recreational development, that is in harmony with nature but not deter from the use of adjacent lands for agriculture. The closest area is to the east of the Southshore property approximately 350 m from the eastern property line.

There are no provincially designated wetlands in the study area, the nearest ones being west side of Kingsville on Wigle Creek and Cedar Creek. In addition to the wetlands, there are three woodlots included in the Essex Region Conservation Authority's list of environmentally significant areas in Gosfield South Township. These woodlots are located west of Division Street.

¹ Kingsville\PUBLIC\Municipal Info\Municipal Departments\Planning Department\Gosfield South Official Plan accessed from <http://www.town.kingsville.on.ca/wps/wcm/connect/KINGSVILLE/KINGSVILLE/MUNICIPAL+INFO/Municipal+Departments/Planning+Services/Planning+Documents/>

Figure 5 Zoning in Study Area

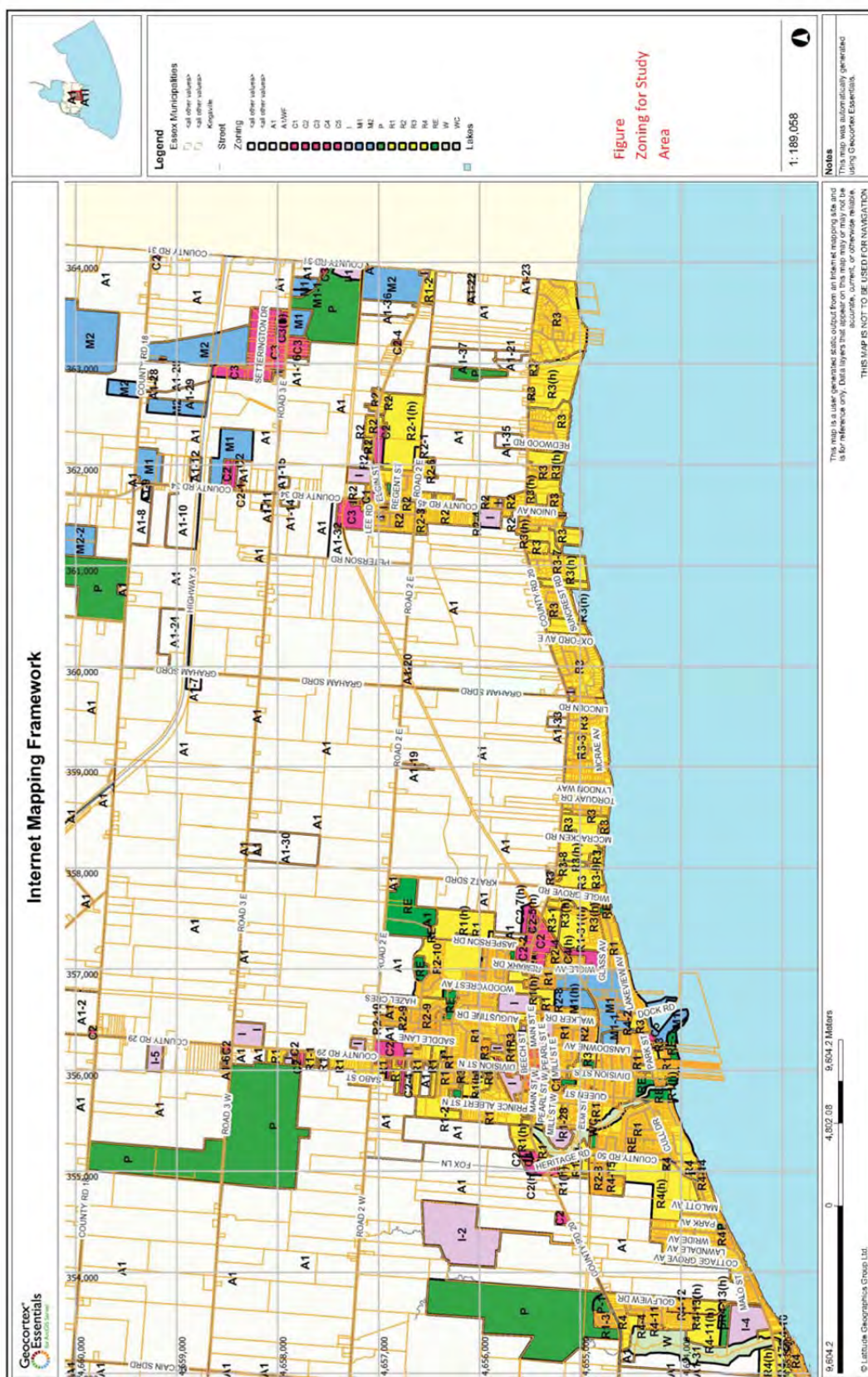


Figure 6 Municipal Drains in Study Area



4.2.1 Air Quality

Local air quality is a function of sources of air pollution in the community and the potential for pollutants from upwind regions to move into the area. Locally the largest sources of contaminants released to the atmosphere are associated with the operation of the greenhouses which need to be heated during the cooler parts of the year. The Air Quality Assessment report provides details of the heating requirements and the potential effects of these heating operations.

During early discussions with members of the public they mentioned that there can be a noticeable deterioration in air quality at certain locations during some months. Comments suggested that dust levels can be a problem, and that it is not uncommon to see “dirty or black snow”. Dust can arise from agricultural activities particularly mechanised operations associated with planting and harvesting crops, and from wind erosion from unvegetated fields.

Black snow would likely reflect soot released from heating operations. Such conditions were reported to occur more frequently in proximity to greenhouses that were known to be heated using solid fuels such as coal and wood. It was also observed that some plumes leaving stacks at greenhouses take on a black appearance suggesting soot is being released from the boiler operation. A large portion of the costs of operating the greenhouses is heating, so the operators attempt to use the most economical fuel possible for their particular installation. When natural gas is a “low” priced fuel, the use would be expected to increase and the quantity of contaminants released to the atmosphere would be reduced.

Open agricultural land used for growing field crops however can be subject to wind erosion when the crops are removed. These dust sources are likely to be most active in the spring and the fall. In the spring, after the snow melts and before the crops reach a few inches in height the wind will liberate materials from the surface. In the fall, after the crops have been removed, a similar situation exists. Because soil moisture attenuates wind erosion, the amount of dust liberated from the surface depends upon the amount and frequency of rainfall.

No ambient air quality parameters are measured locally. The MoE operate monitors in Chatham and Windsor. The Windsor monitors are likely influenced by the urban sources of air emissions and the proximity to Detroit. The Chatham monitor, located in a residential and office area of the municipality approximately 2 km from active farming areas, is likely to experience agriculturally related emissions similar to those that would be experienced in the study area. Emissions from heating systems could be lower than might be seen in the study area with 117 ha of greenhouses in the 2 km wide zone next to the lake, however, the Chatham data serves as a good baseline for the study area in the absence of site specific data.

4.2.2 Water Quality

With the exception of the lake, there are no water bodies in the study area. Some local aggregate extraction operations have ponds on their sites due to the ground water levels in the area. As noted in the discussion on the natural environment above, development controls are in place to limit the amount of runoff that enters the municipal drain systems that discharge to the lake. These measures are aimed at reducing degradation of the lake water quality due to algae blooms due to nutrient addition, or the introduction of suspended particulate matter or other contaminants.

4.3 Socio-Economic

As shown in the Zoning figure and discussed in the previous section the Official Plan of Gosfield South defines acceptable land use within the study zone. The highest priority is given to agricultural use, and various measures are in place to ensure the continued use of the lands for agriculture. The study area is defined as rural

area. The land use plan for that area, particularly inside the study area, includes some extractive industrial activity in the north east corner of the study area, with the hamlet of Ruthven and its supporting infrastructure including the water plant, and Lakeshore Residential East. The predominant land use is agricultural.

4.3.1 First Nations Communities

The nearest First Nations Community is the Caldwell First Nations has an office located in Leamington to the east of the study area. This First Nations Community was considered in this study.

4.3.2 Economic Base

Economic development within the Kingsville area is heavily dependant upon agricultural activities. The area has Class 1, 2 and 3 agricultural land and a favourable climate that encourages a wide range of agricultural activities from the greenhouse operations through orchards, vineyards, field crops and a limited amount of livestock, although the latter is found mainly north of the main study area.

Statistics Canada in the 2006 Census reports agricultural statistics for Kingsville². A total of 342 farms are listed in the census with total receipts in excess of \$221 million. The farms occupy a total of 19,961 ha of land in the Kingsville area, with 18,049 ha in crops. The field with the largest acreages include: soybeans (9,623 ha); wheat (3,264 ha); and, corn (2,685 ha). Vegetables are grown on 62 farms covering 506 ha, excluding the greenhouse operations. The crops include sweet corn (195 ha); tomatoes (205 ha); and peppers (39 ha). Fruits, berries and nuts are grown on 59 farms covering 963 ha with the predominant crops being apples (464 ha); grapes (332 ha); peaches (93 ha) and cherries (19 ha). The total greenhouse coverage in 2006 was 201 ha at 60 farms. Nearly all of this space was dedicated to vegetables (187.6 ha).

The Kingsville area has a growing tourism business due to its proximity to various attractions such as Pelee Island as well as beaches, hiking trails and venues for other recreational activities.

4.3.3 Transportation

Kingsville is conveniently located with easy access to international border connections and Highway 401. County Road 20, (Seacliff Drive), traverses the south side of the study area. This road has a traffic volume on the order of 10,000 vehicles per day. It connects using Hwy. 77 to the 401. Hwy. 3, just to the north of the study area, connects directly to Windsor and the border crossings with Detroit. Regional roads serve farms north of Seacliff and provide travel in both the north south and east west directions.

4.3.4 Energy Generation and Transmission Corridors

Recently there has been considerable development of wind farms north of the study area. These facilities take advantage of the generally consistent winds that blow in the area, and the wide open spaces associated with farm fields. These developments contribute to the generation of electricity in the local area. Major transmission corridors are not present in the study area, although local utilities are upgrading transmission capacity along some of the regional roads.

2

http://www26.statcan.ca:8080/AgrProfiles/cp06/Table1.action?prov=00&geog_id_amal=350137013&tab_id=1&search=search&loccode=22081&placename=kingsville&placestart=0&geog_id=350137013&offname=Kingsville

5.0 Other Required Approvals and Permits

REMASCO are required to undertake a proponent driven Environmental Screening of the project to ascertain if there will be any negative environmental effects from the project as conceived. Should it be determined that there is a possibility of environmental effects, the proponent must undertake steps to reduce the probability and severity of any identified impacts. These issues are discussed in some detail later in this document.

The approval process is not completed at that point because the Ontario Ministry of the Environment must still issue a Certificate of Approval under Part V of the Environmental Protection Act. Furthermore, there are some site specific approvals that must be obtained from local government agencies or their delegates. Among these approvals are:

- development and approval of a storm water management plan by the Essex Region Conservation Authority, required under the Town's Land Development By-laws;
- a waste management approval from the Essex Windsor Solid Waste Authority; and,
- zoning approval from the Town of Kingsville.

These approvals are discussed in this section.

5.1 Part V Certificate of Approval

The Part V Approval must be obtained by any proponent seeking to operate a waste disposal site as explained in the following paragraphs from the MoE³:

"The mandate of the Ministry of the Environment (Ministry) is to ensure the protection, and where degraded, rehabilitation of the natural environment. This mandate also includes preservation of natural resources for the enjoyment and benefit of present and future generations, both human and animal.

This mandate is sanctioned by several pieces of legislation in the Province of Ontario, which include the *Ontario Water Resources Act* (OWRA), the *Environmental Protection Act* (EPA), the *Pesticides Act* (PA), the *Safe Drinking Water Act, 2002* (SDWA), the *Nutrient Management Act, 2002* (NMA), the *Environmental Assessment Act* (EAA), and the *Environmental Bill of Rights, 1993* (EBR), together with regulations made under these Acts.

These Acts and regulations establish the authority and responsibility of the Ministry, the legal requirements for Applicants of various proposals, obligations of the owners of existing facilities and equipment with respect to their impact on public health and the environment, and the rights of residents of Ontario with respect to those proposals, facilities and equipment. These requirements and rights include the need to obtain approvals or permits prior to the implementation of proposals that may have the potential to impact public health and/or the environment, and includes the right of the residents of Ontario to be made aware of proposals in order that the public has the opportunity to comment on those proposals.

The statutory requirement for a Certificate of Approval (C of A) for a waste management system is contained in section 27 of the EPA. Section 27 requires that approval be obtained from the Director before using, operating, establishing, altering, enlarging or extending a waste management system or a waste disposal site. The actual C of A is issued by the Director under section 39 of the EPA."

As explained in the Project Description, the REMASCO project will use ENERPAX fuel pellets manufactured by the Dongara Pellet Factory [Dongara]. Dongara processes municipal solid waste (excluding blue box material)

³ MoE, 2011. GUIDE FOR APPLYING FOR APPROVAL OF A WASTE MANAGEMENT SYSTEM Version 2.0. Issued under Sections 27, 30, 31 and 32, Environmental Protection Act, R.S.O. 1990. PIBS 4185e at http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_079386.pdf

into a fuel pellet that can be used as an alternative fuel in a variety of thermal facilities. These include district heating facilities or thermal electrical generation facilities. Under Regulation 347 of the EPA, the definition of municipal waste includes any solid fuel, whether or not it is a waste, derived in whole or in part from municipal waste. By applying this definition the MoE considers the use of the ENERPAX fuel pellets to be a form of final disposal of domestic waste. Thus, the use is subject to approval under the Waste Management System Approval Process.

The Approval Process involves the preparation of a detailed application for the MoE in a form outlined in the previously referenced guide. Once submitted the proposal is subject to a technical review as described below:

“During the technical review of an application the EAAB Application Assessment Officer, Review Engineer, or Waste Evaluator will assess/consider:

- a) The completeness and adequacy of the submitted application and supporting information;
- b) The compliance of the proposal with the Ministry Acts, regulations, policies, objectives, and environmental guidelines;
- c) The Financial Assurance dollar estimate if required; and
- d) Comments and concerns of any supplementary reviewers.

The Application Assessment Officer, Review Engineer or Waste Evaluator will hold Applicants accountable to document compliance and are required to identify deficiencies in the application and supporting information.

During this review it may be determined that additional information is necessary for proper assessment of the application, or that the application involves aspects which require submission of additional fees. A failure to provide the additional information/fee requested within the Ministry stipulated timeline, or to work with the Ministry to negotiate a new timeline, will result in the cancellation of the application.

If during the review a non-compliance with published Ministry requirements is identified, the Director will issue a non-compliance letter requiring a revision to the proposal. If the Applicant fails to revise the proposal so that compliance with the Ministry's requirements is accomplished, the application will be refused in accordance with the process described below.”

When the review is completed, the Application Assessment Officer prepares a recommendation to the approving Director to either approve the application, in which case they would draft a C of A, or to refuse the application. The approving Director may grant approval for the proposal or, if in his/her opinion it is in the public interest to do so, refuse to grant approval or grant approval on such terms and conditions as he/she deems necessary. In granting an approval, the Director usually imposes terms and conditions on the C of A. These conditions cover the operation and performance of the waste management system and may cover such items as design, maintenance and operation of the equipment and minimum performance requirements necessary to achieve compliance with the EPA and all applicable regulations and guidelines.

In the case of a typical waste project approval that involves a process that can result in the release of contaminants or odours to the atmosphere the proponent would be required to obtain a second approval, the Air Certificate of Approval under Section 9 of the EPA. The approval procedure for an Air approval follows a similar path to that discussed above for Waste approval. The applicant submits an application and it is reviewed by a specialist to ascertain that the project meets the requirements under O.Reg. 419/05, Air Pollution, Local Air Quality.

Agricultural facilities are exempt from the provisions of Section 9 of the EPA, however, in granting approval for the Pilot Facility at Southshore the MoE included a review of the proposal similar to a Section 9 application. The requirements of the Section 9 approval were incorporated into the Part V approval for the Pilot Facility. REMASCO understand that they will be required to submit the necessary information to support a review similar to one that would be conducted for a Section 9 approval.

5.2 Storm Water Management

As discussed in Chapter 4, the General Development policies in the official plan related to the REMASCO sites requires that any developer consider the issues of storm water management on their site. This is particularly important for greenhouse sites where a vast portion of the property will be covered with impermeable surfaces that can increase the runoff potential for the property. As noted elsewhere when the greenhouses were developed on both sites storm water management plans were created and approved by the Essex Windsor Conservation Authority. The REMASCO facilities will not significantly increase the run-off from the properties and as such REMASCO will be included in the storm water management plans from the site, particularly any adjustments that must be made with respect to expansion of greenhouse space.

5.3 Waste Management Approval

Any project classified as a solid waste management facility requires approval from the Essex Windsor Solid Waste Authority [EWSWA]. EWSWA is a municipal agency created by the County of Essex and the City of Windsor to provide waste management Programs and facilities for the residents and businesses in the County and the City. These include: Landfill Sites, Transfer Stations, Blue Box Recycling Collection, Household Chemical Waste Management facilities and programs, white goods collection, recycling and other waste reduction and public education programs. Under this mandate, the EWSWA require information about materials that will be disposed in their landfill. Ash from the thermal treatment of MSW is suitable for disposal in an MSW landfill according to the MoE, but to err on the side of caution, the EWSWA require that data compiled by REMASCO on ash quality be submitted to the Authority. Furthermore, one presumes that it is within the mandate of the EWSWA to ensure that the storage and disposal of fly ash (as defined as hazardous waste) is handled in a manner that is acceptable to the Authority.

Since the approval of the Pilot Project and the commencement of operation of the pilot facilities, REMASCO has used the landfill facilities operated by the Authority.

REMASCO has been in contact with EWSWA throughout the Pilot Project and the Environmental Screening process and anticipate that the screening process and the Part V approvals from the MoE will be sufficient for the EWSWA to approve the project. REMASCO will continue to provide the necessary data to the EWSWA until such time as the Authority changes their requirements.

5.4 Zoning Approval

Any development on lands in the Town of Kingsville must comply with the Zoning By-laws as discussed in the previous section. The projects will be located on land that is currently zoned for agricultural activities. As noted greenhouses are a unique agricultural activity because they represent a large growing area in which the climate is controlled to maximise productivity. To maintain these conditions these facilities must be heated, and every greenhouse includes boiler plants to provide this heating. Such facilities use some form of fuel to heat the water/steam used for heating. REMASCO plans to use the ENERPAX pellets which, given the definition in O.Reg. 347 discussed earlier, means that a product created from municipal waste will be used.

Since the facilities need approval as waste management sites, it would appear that this could create a conflict between the permitted uses on agriculturally zoned lands. However, the Pilot Facility was granted approval under the zoning bylaw as the use was deemed to be necessary to the operation of the greenhouse. While the fuel is different, the heat the fuel provides is used in the same way as that from any other boiler.

The Town will need to confirm that the REMASCO facilities are an adjunct use for the agricultural operations that are undertaken on the site and comply with existing zoning bylaws.

6.0 Screening Criteria Checklist

When O.Reg. 101/07 was passed it required a number of steps be taken by proponents to ensure a complete evaluation of the potential effects from a proposed waste management project. Part of that is the completion of an environmental screening criteria checklist discussed in this section of the report.

It should be noted that the REMASCO project is only classified as a waste management project because it is the intent of REMASCO to utilize the ENERPAX pellets in the gasifiers. These pellets are currently classified by the MoE as a waste material and as such their use is governed under the Waste Management provisions of the Environment Protection Act.

The MoE developed a Guide for the assessments envisioned by O.Reg. 101/07. The Guide includes step by step process instructions and a Screening Criteria Checklist. The Screening Criteria Checklist is an important step in the process. To quote from the Guide:

“The screening criteria checklist can be found in Schedule I of the Guide. Proponents must fill out the checklist by answering a series of questions, based on the screening criteria, to identify the potential for any negative effects on the environment. The screening criteria are presented in the form of a checklist with the option of a “Yes” or “No” response. The screening criteria reflect the broad definition of “environment” contained in the Act (i.e. social, cultural and economic environment in addition to land, air, water, etc.).

Mitigation measures are not to be considered in concluding that there is “No” potential negative environmental effect. That is, if the proponent determines that there is a potential environmental effect, but that the effect could likely be addressed through mitigation, the proponent answers “Yes” to the question. This approach will ensure that the potential environmental effects of a project and the proponent’s proposed plans and methods for mitigating and managing any impacts are open to discussion and review by all interested persons, including Aboriginal communities and government agencies, and that the proponent has made a commitment to implement mitigation measures.”

The screening criteria check list approach is also used for Environmental Screening Assessments of Electricity Projects, O.Reg. 116/01. There are some differences in the two lists, mainly due to the specific nature of the projects. However, REMASCO has chosen to combine the two criteria lists because part of the project includes the co-generation facility with its electricity generating capacity.

The criteria check list, Table 1, and the instructions must be viewed in the context of the project description and instructions in the Guide. It is stated in the Guide that the project not be divided into smaller sections that would result in piecemeal approvals:

“In assessing the magnitude and extent of a problem or opportunity, it is important that the project not be broken down or “piecemealed” into component parts or phases, with each part being addressed as a separate project. If the component parts are dependent on each other, then the component parts must all be described in the project description.”

While not truly “dependent” upon each other, the REMASCO plan is an integrated one that uses the same technology to generate energy for use in greenhouses, and since the facilities being considered a relatively close to each other all three components were considered in this study.

The second consideration is that the project description incorporates not only the gasifiers that comprise the thermal recovery system but also their associated APC systems that clean the flue gases. These systems are

integral to the concept of the facility and the ability to recirculated flue gases back to the gasifier to limit the generation of NO_x in the process. The remaining flue gases that are released must be cleaned to a level that meets Guideline A-7. The technology has been demonstrated to be capable of meeting these standards. Given that Guideline A-7 has been applied for the pilot facility, an air pollution control system must be an integral part of the design.

Table 1 Environmental Screening Checklist

The criteria table answers the question: *Might the project.....*

CRITERION	YES	NO
1.1 have negative effects on surface water quality, quantities or flow?	X	
1.2 have negative effects on ground water quality, quantity or movement?		X
1.3 cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off site?	X	
1.4 cause potential negative effects on surface or ground water from accidental spills or releases (leachate) to the environment?		X
2.1 have negative effects on residential, commercial or institutional land or other sensitive land uses within 500 metres of the site boundary?		X
2.2 be inconsistent with the Provincial Policy Statement, provincial land use or resource management plans?		X
2.3 be inconsistent with municipal land use policies, plans and zoning by-laws (including municipal setbacks)?		X
2.4 use lands not zoned as industrial, heavy industry, or waste disposal?	X	
2.5 use hazard lands or unstable lands subject to erosion?		X
2.6 have potential negative effects related to the remediation of contaminated land ?		X
3.1 have negative effects on air quality due to emissions of (for parameters such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide, sulphur dioxide, residual oxygen, opacity, hydrogen chloride, suspended particulates, or other pollutants)?	X	
3.2 cause negative effects from the emission of greenhouse gases (CO ₂ , CO, methane)?	X	
3.3 cause negative effects from the emission of dust or odour?	X	
3.4 cause negative effects from the emission of noise?	X	
3.5 cause light pollution from trucks or other operational activities on site?		X
4.1 cause negative effects on rare (vulnerable), threatened or endangered species of flora or fauna or their habitat?		X
4.2 cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?		X
4.3 cause negative effects on wetlands?		X
4.4 have negative effects on wildlife habitat, populations, corridors or movement?		X
4.5 have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g., water temperature, turbidity, etc.)?		X
4.6 increase bird hazards within the area that could impact surrounding land uses (eg airports)?		X
4.7 have negative effects on locally important or valued ecosystems or vegetation?		X
5.1 result in inefficient (below 40%) use of a non-renewable resource (efficiency is defined as the ratio of output energy to input energy, where output energy includes electricity produced plus useful heat captured)?		X
5.2 result in generation of energy that cannot be captured and utilized?		X

CRITERION	YES	NO
5.3 result in practices inconsistent with waste studies and/or waste diversion targets (eg result in final disposal of materials subject to diversion programs)?		X
5.4 have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?		X
5.5 have negative effects on existing agricultural production?		X
5.6 have negative effects on the availability of mineral, aggregate or petroleum resources?		X
5.7 be located a distance from required infrastructure (such as availability to customers, markets and other factors)?		X
5.8 have negative effects on the availability of forest resources?		X
5.9 have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?		X
6.1 have negative effects on neighbourhood or community character?		X
6.2 result in aesthetics impacts (eg visual and litter impacts)?		X
6.3 have negative effects on local businesses, institutions or public facilities?		X
6.4 have negative effects on recreation, cottaging or tourism?		X
6.5 have negative effects related to increases in the demands on community services and infrastructure?		X
6.6 have negative effects on the economic base of a municipality or community?		X
6.7 have negative effects on local employment and labour supply?		X
6.8 have negative effects related to traffic?	X	
6.9 be located within 8 km of an aerodrome/airport reference point?		X
6.10 interfere with flight paths due to the construction of facilities with height (ie stacks)?		X
6.11 cause public concerns related to public health and safety?	X	
7.1 have negative effects on heritage buildings, structures or sites, archaeological sites or areas of archaeological importance, or cultural heritage landscapes?		X
7.2 have negative effects on scenic or aesthetically pleasing landscapes or views?		X
8.1 cause negative effects on land, resources, traditional activities or other interests of Aboriginal communities?		X
9.1 result in the creation of non-hazardous waste materials requiring disposal?	X	
9.2 result in the creation of hazardous waste materials requiring disposal?	X	
9.3 cause any other negative environmental effects not covered by the criteria outlined above?		X

6.1 Rationale for NO Designation

There are 49 Criteria listed in the table above. Of these, 37 have been assigned to the NO category. This section of the report reviews those criteria and comments on the reason the proponent assigned this status.

6.1.1 Water Resources

The criteria associated with ground water have been assessed as NO. Ground water concerns are typically raised when a waste material may be deposited on the ground or in an unlined landfill where it could result in leachate that would travel to the groundwater system. All the facilities installed at the greenhouses will be placed on concrete pads providing a barrier between the soil and any material that might be deposited on the surface. Since there will be no liquids that would be spilled outside the buildings, or under the fabric filter houses, any spills can be cleaned before they might present a concern.

There will be no water taken, nor any non-sewer water discharges from the facility thus there is no potential to influence ground water.

6.1.2 Land Use

Five criteria were assigned a “no” designation in the Land Use related category. The properties that the REMASCO facilities are proposed to be installed on are currently used for greenhouse operations. The REMASCO facility is an adjunct land use, that is heating facilities are required for the greenhouses. Should the REMASCO projects not proceed the heat will be generated from other heating boilers which will occupy part of the land on the sites. At Agriville the REMASCO units will replace existing boilers and create no change in the current use of the boiler areas. As such it is anticipated that the REMASCO projects will have no negative effects on residential, commercial or institutional land within 500 m of the site boundaries; are in line with Provincial policies on land and resource use; and are not located on hazard contaminated lands.

6.1.3 Air Quality, Noise and Light Pollution

Only one criterion in this section was labelled as “no”, the one related to light pollution from vehicle activity on site. As noted in the transportation assessment, there will be a limited number of trucks needed to deliver pellets to the sites REMASCO propose to occupy. At most 10 trucks could arrive and depart from either of major sites during the day. They will deliver pellets to the site or remove residual materials from the site. Given the haul distances involved, most of the deliveries will take place during the day limiting the potential for light pollution from vehicle headlamps. Moreover, the pellet trucks serve the same function as vehicles that currently deliver fuel to the sites. Even if there are deliveries in the non-daylight hours the majority of the vehicle movements will occur over roads that are located some distance from residential buildings and thus the trucks are not anticipated to cause light pollution.

6.1.4 Natural Resource Interactions

A series of criteria address the potential for the project to interfere with vulnerable, threatened or endangered species of flora and fauna; protected natural areas; wetlands; wildlife habitat, populations, corridors or movements; fish or their habitat; increase bird hazards; or negatively affect locally important ecosystems. In all cases these criteria have been assigned to the “no” category.

The major reason to this designation is that the sites are close to existing greenhouse operations in fields that have been cultivated in the past. Since cultivating the land disturbs many aspects of the natural environment to

the extent that flora and fauna will already be displaced regardless of the construction of additional structures on site. Thus there is little potential for disturbing aspects of the natural environment. That said it is important to recognize that sensitive areas, such as the municipal drains and the lake have the potential to be influenced by changes in drainage patterns around some of the sites. These aspects are addressed in the next section of this chapter.

Given that the pellets are dry, relatively odour free and stored in enclosed silos there is no potential for this material to attract birds to the sites, thereby not creating the type of hazards envisioned to be possible at landfill sites, particularly when they are located in proximity of an airport.

6.1.5 Resource Use

The fifth group of criteria address resource use issues. The first of these criteria come from the Electricity Projects list and was included because the project includes the installation of a co-generation system to make electricity and heat for the greenhouses using the ENERPAX pellets as a fuel. Since the fuel is a recycled material that would otherwise have been discarded, and the energy recovery from the systems will be at or exceed 70% the project clearly will have no negative impacts on resource use. In fact it allows the diversion of fossil fuels to other uses. The pellets are created from waste materials after materials that can be diverted to other uses have been recovered. Thus, the pellet materials have no higher use and the project is not inconsistent with waste diversion targets.

As noted earlier, heating facilities are needed at the greenhouses. Most fuels, with the exception of natural gas, require storage facilities on site. Building storage facilities is thus similar to other installations as is constructing the boiler houses, so the REMASCO projects would not create additional negative impacts. The REMASCO projects will have no negative impact upon land use for agriculture. It is anticipated that the REMASCO projects, that use a lower cost fuel, will improve the economics of operating the greenhouses and likely allowing the operators to expand greenhouse facilities. The greenhouse facilities are on agriculturally zoned land with full access to all parts of the property. Installing the REMASCO facilities will not change the existing situation.

There are no known mineral, aggregate, petroleum, forestry, game or fish resources on the sites that could be impacted by the project. The energy generated on site will be used on site, thus there are no distance related limitations associated with the proposals.

6.1.6 Socio-Economic Impacts

Impacts on the local community in terms of employment and the economic base in the community; aesthetics; local facilities; recreation or tourism facilities; increased demand for community services; or effects on local airports are considered in this section. Most of these criteria were assigned “no” designations for the following reasons.

The proposal does not involve a traditional waste processing facility. As such there is little opportunity for the REMASCO facilities to create negative impacts on the neighbourhood or the community. The waste arriving at the site is in the form of pellets that are delivered in a closed truck, transferred to a closed silo, and fed to the gasifiers through an enclosed fuel transfer system. As such there is no opportunity for the waste to create a litter or visual impact, nor to cause any negative impacts on local businesses, institutions, or public facilities, nor to conflict with recreation or tourism in the area. Furthermore, the waste will not attract vectors or birds and thus, even if there was an airport within 8 km of the site, there would be no increase in bird populations in the area. The facility will allow the operators to expand their greenhouses, creating more product and benefit the local community by increasing the need for supplies for the operations and workers in the facilities.

6.1.7 Effects on Heritage Resources or Scenic Vistas

As noted earlier in this section the properties on which the REMASCO facilities will be installed are currently used as agricultural land. Land, heavily cultivated for agricultural purposes has been disturbed and thus any archaeological sites are unlikely to still exist. Development on the Southshore site will be in the middle of the site, away from the only drainage area on the site, thus will not disturb the drainage area.

Land around the two sites is relatively flat, thus site lines are not likely to be disrupted by the new facilities on the Southshore site. The sites are far removed from the road and the existing greenhouses, and new facilities will largely shelter the new co-generation building from the view of surrounding land owners.

The Agriville REMASCO installation will, with the exception of the fuel storage silos and the fabric filters, be inside existing buildings. The new outside facilities will be shielded from the road by new greenhouse facilities, thus REMASCO will not disrupt views and vistas.

6.1.8 Effects on Aboriginal Communities

The land used for the REMASCO projects is currently owned by the operators of the greenhouses and has been used for agricultural purposes for many years. As such there is no wildlife on the site, nor are there any resources that might be of interest to the Aboriginal community. The closest Aboriginal community is located in the Leamington area to the east of the Southshore site. They were approached as part of the public consultation program and did not indicate that they had any concerns about the project.

6.1.9 Other Environmental Effects

During the course of the project and the consultations with the community, no additional environmental impacts were identified.

6.2 *Potential Negative Impacts*

The balance of the criteria in the table were identified at the start of the project as having the potential to experience negative impacts as a result of the installation of the REMASCO systems. This assessment reflected the concerns voiced by members of the public and municipal officials in meetings and discussions concerning the project. As such these issues were the subject of study during the projects. This section of the report identifies and discusses the reasons that the criteria in the preceding table were designated with "yes".

6.2.1 Surface Water Issues

Concerns were raised about the potential for effects on surface water runoff arising from the new co-generation building on the Southshore site. There are considerations about the effects of construction activities and the operating impacts of having more land covered with buildings thereby reducing the ability of the land to absorb rain water and snow melt and increasing runoff from the site. With the potential for increased runoff comes the potential for soil erosion and thus discharge of silt to the lake and the impairment of surface water quality. The other potential surface water quality concern is that there will be process water discharges to local drainage ditches/municipal drains.

Construction activities, as described earlier in this document, will be restricted to a relatively small area, the construction of pads for the pellet storage silos and new APC systems at both Southshore and Agriville, and the larger scale construction of the foundation and floor of the co-generation building. It is estimated that the pads for each of the fabric filters will be on the order of 12 m square, while those under the silos and pellet unloading

area will occupy approximately 1,200 m². The co-generation building will be larger than the existing REMASCO building on the Southshore site that measures 34 x 31 m because it will need to house an additional gasifier, and the steam turbine generator combination. At this time it is contemplated that the building will measure 50 m by 31 m.

Construction will require levelling of the ground where the pads are to be constructed, followed by excavation for footings. Once the footings are poured and slabs are poured the disturbance of the site will be minimal. The construction locations will be more than 50 m from the edge of the drainage ditch along the east side of the property. This separation affords sufficient space to control any potential runoff from the construction area and ensure it does not reach the municipal drain system.

The Southshore site is currently covered by over 12 ha [120,000 m²] of greenhouse structures. To manage the runoff from these structures the site has a storm water management system as mandated by the municipality. The new coverage on the site as a result of the installation of the REMASCO co-generation building will add less than 3% to the surface coverage on the site. The runoff associated with the new coverage will be able to be controlled by the existing storm water management system which limits the rate of release of water from the site and therefore limits the potential for soil erosion.

At Agriville the new storage silo pads and the APC pads will be constructed adjacent to the existing building, approximately 100 m west of the eastern property line. A municipal drain runs down the eastern property line. There is sufficient separation to minimise any effects of construction on surface water entering the drain system. The Agriville greenhouse covers over 17 ha, [170,000 m²], of the site. There will be no new buildings constructed at Agriville to house the new REMASCO gasifiers as they will be installed inside the existing structure. Thus the new pads on the site will form a much smaller percentage of the land coverage at that site compared to the Southshore site. The current storm water management system at that site will be very capable of handling the additional load.

Any plans for site construction will be required to develop and implement storm water management measures.

It was concluded that, because storm water management systems are required as part of municipal approvals, and existing systems are capable of handling that load, construction and runoff control from the sites has little potential for negative environmental impacts.

Sanitary water effluents from the cogeneration will discharge to existing greenhouse sanitary drains. Floor drains will discharge into holding tanks and holding tank water will be used for bottom ash quenching and bottom ash dust abatement. Neither floor drain effluent, process water, nor boiler blow down water will be discharged to the environment as they will be collected in the holding tank discussed earlier in the document. This water will be used for purposes in the facility however if the volume collected exceeds the amount that can be used, the water will be hauled to the wastewater treatment plant.

6.2.2 Land Use Issues

The REMASCO facilities are an adjunct land use to the greenhouses. They house the heating plants for the sites. Both sites currently have heating facilities, or will require expanded heating facilities when the greenhouses are expanded. Some alterations to the existing buildings might be required, including the installation of fuel storage silos at the Agriville site. These will be next to the existing building. The size and form of these facilities will have no effect on development on surrounding lands, nor on the use of those lands, and they will meet municipal standards. The co-gen plant at Southshore will be a new facility with silos, air pollution control equipment and a building on the Southshore site. Since a facility of similar size would be required to support

the heating needs of the expanded greenhouses, this will have no impact on land issues surrounding the facility. None of the lands to be used for these purposes are unstable or hazard lands, nor are they contaminated.

6.2.3 Air Quality Impacts

Experience suggests that a facility that meets the MoE A-7 Guidelines for air emissions will have little impact upon air quality or human health in the vicinity of the development:

Negligible effects are predicted for facilities that meet stringent requirements and standards for design, operation and pollution control. Therefore, concerns for human health and the environment should not limit the selection and approval of incinerators or landfills.⁴

REMASCO has operated its gasification equipment on the Southshore site under the terms of a Certificate of Approval for the Pilot Facility. That approval required the facility to test emissions from the operating equipment on a frequent basis and compare those results to the A-7 emissions standards. The results of the testing were submitted to the MoE for review. That testing has shown that the REMASCO facility is capable of meeting the Guideline A-7 standards. The Proponent will be required to operate in compliance to those standards when the Waste CofA is issued. The MoE will specify operating conditions for the facility and, in particular, the acceptable emissions from the facility.

Air quality impacts, and health risk assessment studies conducted at various incineration facilities have confirmed that a facility such as REMASCO's operating in a manner that satisfies A-7 should cause little impact on air quality in the surrounding community. Regardless of that assessment, REMASCO undertook in 2007 that it would commission a Human Health Risk Assessment study to evaluate the potential impacts of air emissions on the residents as part of its environmental screening process even though it was not expressly required by the MoE. This commitment responded to the general concerns about air emissions that are frequently expressed by members of the public.

A Human Health Risk Assessment [HHRA] utilizes computer models to develop estimates of the atmospheric levels of contaminants associated with the facility and the rate of at which contaminants might be deposited on the ground in the area surrounding the facilities. Based upon these results, the Human Health Risk Assessment specialists ascertain the potential for these contaminants to enter the body of humans living in the area. Based upon their knowledge of the effects of these contaminants, the specialists then determine the risk that these levels might pose to human health.

In general, an HHRA is a scientific study that evaluates the potential for the occurrence of adverse health effects from exposures of people to chemicals of concern [COCs] present in surrounding environmental media (*e.g.*, air, soil, sediment, surface water, groundwater, food, *etc.*), under existing or predicted exposure conditions. HHRA procedures are based on the fundamental dose-response principle of toxicology. The response of an individual to a chemical exposure increases in proportion to the chemical concentration in critical target tissues where adverse effects may occur. The concentrations of chemicals in the target tissues (the dose) are determined by the degree of exposure, which is proportional to the chemical concentrations in the environment where the receptor resides, works or visits.

⁴ MoE, 1999. ENVIRONMENTAL RISKS OF MUNICIPAL NON-HAZARDOUS WASTE LANDFILLING AND INCINERATION TECHNICAL REPORT SUMMARY. Standards Development Branch, Environmental Sciences and Standards Division, Ontario Ministry of the Environment. July. Available at: http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/std01_079370.pdf

It is important to note that the HHRA addresses the effects of existing emissions and those that will occur after the REMASCO facilities are operating to evaluate the potential for adverse health effects. This responds to general questions raised in the early stages of the Environmental Screening Assessment about the potential cumulative effects of the REMASCO facilities. Even though the REMASCO facilities would serve the same functions as existing boilers – heating the greenhouses – the question that needs to be addressed is how would the REMASCO operations add to air emissions in the Kingsville area?

As part of the air quality assessment that utilized the results of REMASCO testing programs to define the range of effects from the proposed sites, the study team also reviewed the operations of existing greenhouses in the Kingsville area. Using commonly accepted design loads for heating greenhouses in the Kingsville area, and emission factors for the different types of fuels employed to heat greenhouses, the study team developed an estimate of the contaminant emission rates from the existing boilers in the 117 ha of greenhouse space located within 2 km of the north shore of Lake Erie between the Albuna Town Line and Kingsville.

Just as the REMASCO emissions were modelled, the emissions from the existing boilers were modelled using the same approach. Some assumptions about the nature of the emissions from the existing greenhouse boiler facilities were made to facilitate estimates of their impact on ambient air quality in the community. Since the greenhouses are not the only sources of potential air emissions in the vicinity, ambient air quality monitoring information collected by the MoE was used to characterise a baseline for the community. By combining the monitoring data with the results of the modelling of both the existing greenhouse operations and future operations with the REMASCO facilities, the potential for cumulative effects was addressed. These results were then employed by the HHRA specialists for their human health risk assessment.

The following sections of this report summarise the work contained in the Air Quality Assessment report and the Human Health Risk Assessment Report that are available under separate cover.

6.2.3.1 Air Quality Assessment

The objective of the Air Quality Assessment was to determine:

- the existing air quality in the community;
- the specific impacts that might be associated with the operation of the REMASCO facilities; and,
- the cumulative effects of converting the heating systems at the various sites to REMASCO units.

In some areas of the province air quality is monitored on a continuous basis. The effects of new sources in such regions can be assessed by modelling the releases and combining these results with the appropriate values from the monitoring data. The MoE recommends that the 90th percentile of the hourly monitoring data be used for a representative average of short term ambient air quality conditions. Over longer time frames, the recommendations suggest that the maximum 24 hour monitored value be used as a conservative reflection of daily conditions and that the annual mean be used to estimate annual levels. Furthermore, the MoE suggest that these values be combined with the estimates of the contribution of the new sources to assess cumulative impacts. Should these combined values be near criteria levels it is suggested that the proponent consider ways of reducing emissions, or at the very least find ways to reduce the level of the impact in the local community. Significant air quality effects are thus dependent upon the rate at which contaminants are released from all local sources. The predicted levels can be used to assess whether there could be detrimental effects for humans, animals or the environment in general.

Local air quality can be influenced by releases that occur upwind of the region under consideration. For instance, ozone and smog in the atmosphere in southern Ontario is attributed in part to emissions in the United States. If monitoring information is available in an area, the extent of outside influences can be ascertained by

comparing contaminant levels on different days. Absent pre-existing local monitoring data, other approaches must be employed to determine local air quality. This could involve setting up local monitors, or estimating the effects of local sources on local air quality. To produce reliable results from monitoring it should be conducted over an extended period of time so all circumstances can be included. Estimating local emission rates allows the comparison of the effects of changing emission sources on a consistent basis. The question becomes, how detailed must the estimates be: does one deal with only a major sector, such as the existing greenhouses, or should the contributions from heating all the buildings in the community, the traffic and other sources be included? For this study, the existing greenhouses were considered and the other sources were assumed to be adequately represented by using monitored levels from Chatham and Windsor. Thus the existing environment was characterised by superimposing upon the results of modelling emissions from existing greenhouses the representative background levels for communities in south western Ontario. It should be recognized that this approach accounts for the largest local source group, the greenhouse heating systems, and assumes that the combined effects of domestic space heating and traffic in the community are covered by values from the other communities. This approach also allows comparison of greenhouse emissions that result from the use of fuels other than natural gas.

Even in south western Ontario, greenhouses require heating through a large part of the year. It is estimated that the average acre of greenhouse in Kingsville requires 30 Boiler horsepower [BHP] of energy during the coldest months of the year. During extremely cold periods, these requirements can increase to 35 – 40 BHP of demand for short periods. Boiler loads vary throughout the year in response to ambient temperature. The greenhouse's boilers are fired with several different fuels: #6 bunker fuel oil; more refined oils; coal; wood; or natural gas. Burning any fuel will result in emissions to the atmosphere. Part of the Air Quality Assessment attempted to ascertain the emissions from the REMASCO projects compared to the emissions from other types of fuels.

This comparison was completed using the specific emissions associated with the various fuels as listed in emission factors published by the United States Environmental Protection Agency and the United Nations Environment Programme. These emission factors were standardised by expressing the mass of the contaminant released on the basis of the amount of energy produced as shown in Table 2. The table lists the contaminants considered in the HHRA discussed later in this document and all inorganic contaminants that were measured at the REMASCO facility in the spring 2010 testing program. The highlighted data denotes the lowest contaminant emission rate associated with the specific fuels. For comparison, the A-7 emission limits were converted to the same emission factor basis and listed in the right hand column of Table 2.

To model the emissions from the existing greenhouses it was necessary to estimate the emissions from each greenhouse site. This estimate was based upon the assumption that the typical boiler operating rate was 30 boiler HP per acre of area covered. Given a 75% thermal efficiency, this translates to a required boiler input rate of 1.34 MMBtu/hr/acre [3.31MMBtu/hr/ha]. Combining this input factor with the specific greenhouse area, the total input for any facility was estimated, and in turn, the emissions could be calculated using the emission factors in Table 2. It remained to make an assumption about the types of fuels used in the greenhouses before defining the specific release rate for any specific facility.

Most greenhouses in the Kingsville area use approximately 10 boiler HP/acre of energy derived from natural gas boilers since these units also provide the CO₂ needs of the greenhouse. This input is supplemented by additional natural gas, coal, oil, or wood combustion. Since each facility will have its own fuel use profile, some assumptions had to be made about fuel use for the greenhouse developments. These assumptions were then applied across the 117 ha of greenhouse assessed in the study. Of the 30 boiler HP per acre, 30% of the total usage was assumed to be supplied by each of wood and natural gas, or 9 boiler HP/acre each. Coal was assumed to provide 25% of the usage, 7.5 boiler HP/acre. Oil was assumed to provide 15% of the usage or 4.5 boiler HP/acre. With the natural gas for the systems supplying CO₂ this results in a blend of fuel used being 58% natural gas, 18% wood, 15% coal and 9% fuel oil. To estimate emissions from specific greenhouse complexes, the appropriate fuel emission factors [lb/MMBtu] in Table 2 was multiplied by the decimal fraction

Table 2 Emission Factors [lb/MMBtu] for Different Fuels based upon US EPA and UNEP Data

Compound	FUEL TYPE					A-7 Limit as EF
	Coal	Oil	Wood	Gas	REMASCO	
Antimony	9.33E-07	3.56E-05	7.90E-06		4.48E-07	
Arsenic	2.98E-05	8.95E-06	2.20E-05	1.96E-07	3.69E-07	
Barium		1.74E-05	1.70E-04	4.31E-06	1.27E-06	
Beryllium	2.35E-06	1.89E-07	1.10E-06		6.39E-08	
Cadmium	8.17E-06	2.70E-06	4.10E-06	1.08E-06	6.31E-07	1.53E-05
Chromium	2.48E-05	5.73E-06	2.10E-05	1.37E-06	1.34E-05	
Cobalt	1.32E-05	4.08E-05	6.50E-06	8.24E-08	4.19E-07	
Copper		1.19E-05	4.90E-05	8.33E-07	4.73E-06	
Lead	2.61E-05	1.02E-05	4.80E-05		1.37E-06	6.57E-05
Manganese	6.10E-05	2.04E-05	1.60E-03	3.73E-07	6.47E-06	
Mercury	1.60E-05	7.67E-07	3.50E-06	2.55E-07	1.71E-06	2.19E-05
Molybdenum		5.34E-06	2.10E-06	1.08E-06	1.04E-06	
Nickel	1.63E-05	5.73E-04	3.30E-05	2.06E-06	2.54E-05	
Phosphorus		6.42E-05	2.70E-05		4.23E-06	
Selenium		4.63E-06	2.80E-06		5.64E-07	
Silver			1.70E-03		2.54E-06	
Sodium			3.60E-04		1.50E-04	
Strontium			1.00E-05		8.13E-07	
Tin			2.30E-05		2.92E-05	
Titanium			2.00E-05		5.48E-07	
Vanadium		2.16E-04	9.80E-07	2.25E-06	6.76E-08	
Zinc		1.97E-04	4.20E-04	2.84E-05	1.02E-05	
PCDD/F TEQ [UNEP Default]	2.34E-11	5.82E-12	1.17E-10	1.16E-12	2.54E-11	8.76E-11
Hydrogen Chloride	5.83E-02				5.48E-02	2.96E-02
Sulphur Dioxide	1.10E-02	2.24E-02	2.50E-02	5.88E-04	1.92E-02	6.13E-02
Total Particulate Matter	5.83E-01	6.8E-02	3.50E-01	7.45E-03	1.39E-02	1.53E-02
PM-10	3.79E-01	1.6E-02	3.20E-01	7.45E-03	6.93E-03	
PM-2.5	4.80E-01	1.2E-02	1.90E-01	7.45E-03	3.46E-03	
Oxides of Nitrogen	4.27E-01	3.73E-01	3.50E-01	9.80E-02	2.34E-01	2.17E-01
Vinyl Chloride Monomer			1.80E-05		3.78E-07	
Benzo(a)pyrene	1.84E-09		2.60E-06	1.18E-09	4.98E-08	
Benzene	6.31E-05	1.45E-06	4.20E-03	2.06E-06	9.96E-07	

for the use of that fuel and the resulting values for each fuel type were summed to provide an estimate of the average emission rate for the existing greenhouses. The calculated emission rates for the existing greenhouses are shown in Table 3.

The emission rates used for the modelling the REMASCO emissions were based upon the spring 2010 testing results. This testing was completed on the most advanced version of the gasifiers after modifications were made to various parts of the system. Earlier data showed similar results for most of the measured parameters, with the changes having resulted in some reductions in emissions. Using one data set, ie results obtained under the same operating conditions for all contaminants, provides some confidence that the facility could duplicate this response in the future. The test data found that inorganic contaminants on the A-7 list were between 1/13th and 1/49th of the A-7 standards. The PCDD/F and SO₂ emission rates were approximately 1/3rd of the A-7 values. Dust emissions were 90% of the guideline as were those for oxides of nitrogen.

Table 3 Estimated Emission Rate [g/s/ha] for Greenhouse Heating Systems

Contaminant	Emission Rate [g/s/ha]	
	Fuel Mix	REMASCO
Antimony	1.24E-05	1.17E-06
Arsenic	2.43E-05	9.62E-07
Barium	9.03E-05	3.32E-06
Beryllium	1.48E-06	1.66E-07
Cadmium	7.38E-06	1.64E-06
Chromium	2.30E-05	3.50E-05
Cobalt	1.79E-05	1.09E-06
Copper	2.70E-05	1.23E-05
Lead	3.51E-05	3.57E-06
Manganese	7.79E-04	1.69E-05
Mercury	8.46E-06	4.44E-06
Molybdenum	3.87E-06	2.71E-06
Nickel	1.59E-04	6.61E-05
Phosphorus	2.77E-05	1.10E-05
Selenium	2.40E-06	1.47E-06
Silver	7.97E-04	6.63E-06
Sodium	1.69E-04	3.90E-04
Strontium	4.69E-06	2.12E-06
Tin	1.08E-05	7.61E-05
Titanium	9.38E-06	1.43E-06
Vanadium	5.44E-05	1.76E-07
Zinc	2.86E-04	2.65E-05
PCDD/F TEQ [UNEP Default]	6.71E-11	6.61E-11
Hydrogen Chloride	2.28E-02	1.43E-01
Sulphur Dioxide	2.22E-02	4.99E-02
Total Particulate Matter	4.19E-01	3.62E-02
PM10	3.13E-01	1.81E-02
PM2.5	1.94E-01	9.05E-03
Oxides of Nitrogen	5.67E-01	6.11E-01
Vinyl Chloride Monomer	8.44E-06	9.84E-07
Benzo(a)pyrene	1.22E-06	1.30E-07
Benzene	2.00E-03	2.59E-06

HCl emission rates used in the modelling were 1.85 times the A-7 guideline value. REMASCO recognizes that the approved facility will have to meet the A-7 standard for all contaminant emissions and will commit to meeting those standards. As such all the modelling of emissions was based upon the latest testing data, or the A-7 standards.

The model used to determine the concentration of contaminants in the community calculates a concentration for the contaminant at pre-selected points around the sources. It uses historical weather data to describe the movement of the atmosphere based upon wind speed, wind direction and various factors that influence the amount of turbulence in the atmosphere. Five years of hourly weather data were used in the model.

The plume leaving the stack has thermal buoyancy due to the temperature difference between the gas leaving the stack and the atmosphere. This buoyancy is more pronounced in colder weather. The plume also has momentum imparted by its velocity as it leaves the stack. Typically it is assumed that the concentration of contaminants emitted from a source will be maintained at a reasonably constant level, that measured by the

stack testing program, however the rate at which contaminants leave the stack will vary with the stack gas flow rate. Since the rate of emission is used in the model, and flue gas flow varies according to the firing rate of the boiler emissions can be linked to the boiler input level at any time throughout the year. The emission characteristics of the exhaust: the temperature of the gas; the gas's flow rate and thus exit velocity; the height of the stack; and the emission rate are entered into the model. If tall buildings are located close to the stack they can influence the movement of the plume as it disperses downwind and this effect is also addressed by the model.

For the REMASCO stacks, the various characterisation parameters could be determined from the current configuration and operating scenarios. An elevated stack height was employed to limit the influence of the greenhouses and the boiler building on the dispersion of the plume. Care must be taken to ensure that high structures, such as the storage siloes, do not unnecessarily influence the plume dispersion.

For the existing greenhouses, data on structures and stack heights were not readily available. Assumptions had to be made about these sources. The assumptions were based upon observation of these installations and estimates of stack emission conditions based upon typical operations. Without specific data however the modelling could not incorporate the effects of downwash caused by buildings close to these emission sources.

It was observed that, for the most part, the highest stacks on existing greenhouses were approximately twice the height of the surrounding structures. Since most greenhouses are a standard height, 8 m, a stack height of 16 m was used to represent the existing sources. The emissions were assumed to be exhausted through a single stack because both the number and precise location of the stacks was not available. As noted earlier, the stack flow rate was estimated based upon the installed boiler capacity for the complex - 30 boiler HP/acre. It was also observed that some of the stacks did not open directly to the atmosphere but rather had caps to prevent rain entering the stack. These caps limit the ability of the plume to rise as it leaves the stack because there is limited vertical velocity from the stack. This in turn limits dispersion of the plume. Under such circumstances the MoE recommends that the velocity leaving such stacks be set to 0.01 m/s. By using this approach for the existing greenhouses a worst case situation was modelled.

The model calculated the concentrations at 10,000 receptor points around the sites. A uniformly spaced 100 m x 100 m grid spacing was used to define these points. The grid extended south from 4661000 and east from 356000. This represents a 10 km x 10 km modelling area centred on a point between the Southshore and Agriville sites. The grid extends about 4.5 km north of the northern boundary of the area where the majority of the greenhouses are found and well out into the lake on the south. The area extends from west of County Road 29 to nearly 2 km east of County Road 31. Of the 10,000 receptors defined above, 13 were designated as special locations. These are locations where air contaminants could affect people who may be more susceptible to air pollution. They include receptors at schools, day care centres, recreation centres, or amusement activities where children may be exposed; at hospitals and seniors' residences where the resident's health may be more fragile; and at residential areas where children might be exposed. In addition, to address the potential for transfer to crops the special receptors included: an asparagus field; an apple orchard; and a vineyard.

The modelling runs addressed three different situations:

1. REMASCO associated sources were modelled in both the concentration and deposition mode, without plume depletion. This allows the concentrations to be compared to the O.Reg. 419/05 criteria levels. The deposition data for all particulate bound contaminants and air concentrations were made available to the HHRA study.
2. NO₂ modelling of existing greenhouses and the REMASCO emissions using NO_x emission factors with a NO₂/NO_x ratio of 0.1, the default in AERMOD, and the Ozone Limiting Method with a background ozone concentration of 40 ppb. This approach assesses the effects of NO_x emissions from the existing

sources and the REMASCO sources, separately and combined, and allows the projections to be summed with the existing NO₂ data to determine the anticipated levels in the community before and after the REMASCO projects go into operation.

3. Particulate emissions were modelled as total particulate matter, particulate matter finer than 10 µm in size [PM₁₀], and particulate matter finer than 2.5 µm in size [PM_{2.5}]. No deposition was included in this evaluation. The PM_{2.5} results were used to determine the cumulative effects of the REMASCO emissions with respect to existing conditions and the new operations.

While most of the modelling was completed with the AERMOD model and estimated emission conditions from the REMASCO facilities, two special situations were evaluated: the potential that the lake breeze effect could increase concentrations; and, the effect of potential upsets in the operation raising the emission levels. Using MoE accepted procedures the potential for breezes from the lake having effect on the emissions from Southshore and Agriville were evaluated. It was determined that these sources would release plumes that would not intersect with the thermal internal boundary layer and thus not further calculations were necessary as AERMOD will adequately represent worst case dispersion situations. The upset scenario, based upon an MoE accepted procedure were determined and the effect of these emissions were determined at the location of the maximum predicted ground level concentration. These results are presented in the discuss that follows.

Impacts from REMASCO

The model undertakes calculations for every hour of the 5 year period and the maximum value at each receptor over the period was determined. These values were used to produce the plots the maximum 1 hour; 24 hours; and annual averages. These maximum values, for each averaging period at each of the 10,000 receptors were reviewed to determine the receptor where the highest level was predicted. Furthermore, these files were used to determine the maximum values predicted at each of the special receptors.

The predicted maximum values from the REMASCO facilities predictably occurred around the Southshore facility where emissions from 7 units were modelled. The maximum was found to occur on the Southshore property north of the stacks in an area where new greenhouses will be built. The worst case situations occur on a winter evening/night when fresh air vents in the greenhouses will likely be closed and the effects of these levels are not anticipated to affect workers. Furthermore, the modelling showed that the further one moves away from the stack the lower the estimated levels become, thereby suggesting that if values at the maximum point of impingement are acceptable compared to ambient air quality criteria, any point further away will also be acceptable.

Table 4 summarizes the maximum concentrations predicted from the operation of the REMASCO facilities. The table includes the average emission rate, and the maximum predicted values for 1 hour, 24 hour and annual averages for airborne concentration and the annual deposition value. Where appropriate, the hourly and 24 hour average maxima are compared to the criteria levels from O.Reg. 419/05. The percentage value shows how close the predicted maxima are to the criteria levels. None of the predicted values exceed the criteria level. Even when modelled at the A-7 emission level HCl emissions result in a 24 hour maximum value that is approximately 50% of the standard.

All of the metals listed in Table 4 are far less than one percent of the 24 hour criteria standard level, and most are much less than ½% of the standard. Of the special organics at the bottom of the table, only vinyl chloride has a standard level and the prediction is that the maximum vinyl chloride will be far less than 1% of the standard. The criteria contaminants, common combustion products like NO_x, particulate matter and sulphur dioxide dominate emissions and produce maximum levels that are higher than the other substances. These substances are estimated to result in point of impingement maxima that when compared to respective standards are 1.4% of the sulphur dioxide, 2.2% of the particulate matter and less than 23% of the NO_x standards.

Table 4 Summary of Maximum Point of Impingement Values for REMASCO Facilities

Compound	Average Emission Rate	1 Hour Maximum	O.Reg 419 Criteria Levels		Max POI 24 Hour	O.Reg 419 Criteria Levels 24 Hour Average		Annual	Max Dep Annual
	[g/s]	[ug/m3]	1 Hour Average [ug/m3]	(%)	[ug/m3]	[ug/m3]	(%)	[ug/m3]	[g/m2]
Aluminum	2.27E-05	3.46E-03			1.83E-03			9.78E-05	1.04E-05
Antimony	1.08E-06	1.65E-04			8.71E-05	2.50E+01	0.0003%	4.65E-06	4.93E-07
Arsenic	8.90E-07	1.36E-04			7.18E-05			3.84E-06	4.06E-07
Barium	3.07E-06	4.68E-04			2.48E-04			1.32E-05	1.40E-06
Beryllium	1.54E-07	2.35E-05			1.24E-05	1.00E-02	0.1242%	6.64E-07	7.02E-08
Bismuth	2.22E-07	3.39E-05			1.79E-05			9.57E-07	1.01E-07
Boron	6.30E-04	9.61E-02			5.08E-02	1.20E+02	0.0424%	2.72E-03	2.87E-04
Cadmium	1.52E-06	2.32E-04			1.23E-04	2.50E-02	0.4905%	6.55E-06	6.93E-07
Calcium	2.73E-04	4.17E-02			2.20E-02	1.35E+01	*1 0.1632%	1.18E-03	1.24E-04
Chromium	3.24E-05	4.94E-03			2.61E-03			1.40E-04	1.48E-05
Cobalt	1.01E-06	1.54E-04			8.15E-05			4.35E-06	4.61E-07
Copper	1.14E-05	1.74E-03			9.20E-04	5.00E+01	0.0018%	4.91E-05	5.20E-06
Germanium	1.54E-06	2.35E-04			1.24E-04			6.64E-06	7.02E-07
Gold	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Indium	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Iridium	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Iron	4.04E-04	6.16E-02			3.26E-02	4.00E+00	0.8149%	1.74E-03	1.84E-04
Lead	3.30E-06	5.04E-04			2.66E-04	2.00E+00	0.0133%	1.42E-05	1.50E-06
Magnesium	2.84E-05	4.33E-03			2.29E-03	1.20E+02	*2 0.0019%	1.22E-04	1.30E-05
Manganese	1.56E-05	2.38E-03			1.26E-03			6.72E-05	7.11E-06
Mercury	4.11E-06	6.27E-04			3.32E-04	2.00E+00	0.0166%	1.77E-05	1.87E-06
Molybdenum	2.51E-06	3.83E-04			2.03E-04			1.08E-05	1.14E-06
Nickel	6.12E-05	9.34E-03			4.94E-03	2.00E+00	0.2469%	2.64E-04	2.79E-05
Palladium	1.54E-07	2.35E-05			1.24E-05			6.64E-07	7.02E-08
Phosphorus	1.02E-05	1.56E-03			8.23E-04			4.40E-05	4.65E-06
Platinum	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Potassium	3.90E-05	5.95E-03			3.15E-03			1.68E-04	1.78E-05
Rhodium	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Rubidium	1.54E-06	2.35E-04			1.24E-04			6.64E-06	7.02E-07
Selenium	1.36E-06	2.08E-04			1.10E-04			5.86E-06	6.20E-07
Silicon	7.10E-05	1.08E-02			5.73E-03			3.06E-04	3.24E-05
Silver	6.13E-06	9.35E-04			4.95E-04	1.00E+00	0.0495%	2.64E-05	2.80E-06
Sodium	3.61E-04	5.51E-02			2.91E-02			1.56E-03	1.65E-04
Strontium	1.96E-06	2.99E-04			1.58E-04			8.45E-06	8.94E-07
Sulphur	2.84E-02	4.33E+00			2.29E+00			1.22E-01	1.30E-02
Tellurium	9.89E-07	1.51E-04			7.98E-05			4.26E-06	4.51E-07
Thallium	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Tin	7.04E-05	1.07E-02			5.68E-03	1.00E+01	0.0568%	3.03E-04	3.21E-05
Titanium	1.32E-06	2.01E-04			1.06E-04	1.20E+02	0.0001%	5.69E-06	6.02E-07
Tungsten	1.27E-06	1.94E-04			1.02E-04			5.47E-06	5.79E-07
Uranium	7.70E-07	1.17E-04			6.21E-05			3.32E-06	3.51E-07
Vanadium	1.63E-07	2.49E-05			1.32E-05	2.00E+00	0.0007%	7.03E-07	7.43E-08
Zinc	2.45E-05	3.74E-03			1.98E-03	1.20E+02	0.0016%	1.06E-04	1.12E-05
Zirconium	3.18E-07	4.85E-05			2.57E-05			1.37E-06	1.45E-07
Total Particulate	3.34E-02	5.10E+00			2.69E+00	1.20E+02	2.2456%	1.44E-01	1.52E-02
PCDD/F	6.12E-11	9.34E-09			4.94E-09			2.64E-10	2.79E-11
Sulphur Dioxide	4.63E-02	7.06E+00	6.90E+02	1.02%	3.74E+00	2.75E+02	1.3584%	2.00E-01	
Oxides of Nitrogen	5.53E-01	8.44E+01	4.00E+02	21.10%	4.46E+01	2.00E+02	22.3080%	2.38E+00	
Chlorine	5.93E-04	9.05E-02			4.78E-02	1.00E+01	0.4784%	2.56E-03	
Hydrogen Chloride	7.13E-02	1.09E+01			5.75E+00	2.00E+01	28.7544%	3.07E-01	
Vinyl Chloride Monomer	6.62E-06	1.01E-03			5.34E-04	1.00E+00	0.0534%	2.85E-05	
Benz(a)pyrene	5.85E-07	8.93E-05			4.72E-05			2.52E-06	
Benzene	1.78E-05	2.72E-03			1.44E-03			7.67E-05	

Hydrogen chloride, modelled at the A-7 emission level, produced a point of impingement value that was less than 29% of the criteria level for this contaminant. REMASCO anticipates that emissions of this contaminant will be lower than the emission level and thus the maximum HCl level will be lower.

As might be expected, since the sensitive receptors where people live, work or play, are further from the sources than is the point where the maxima occur, the predicted values at the sensitive receptors are lower than the maxima listed in Table 4. This will result in even values that will be a smaller percentage of the criteria levels than those listed in Table 4. The values at the sensitive receptors were used by the HHRA experts to evaluate the potential impacts on human health. These are discussed in the next chapter.

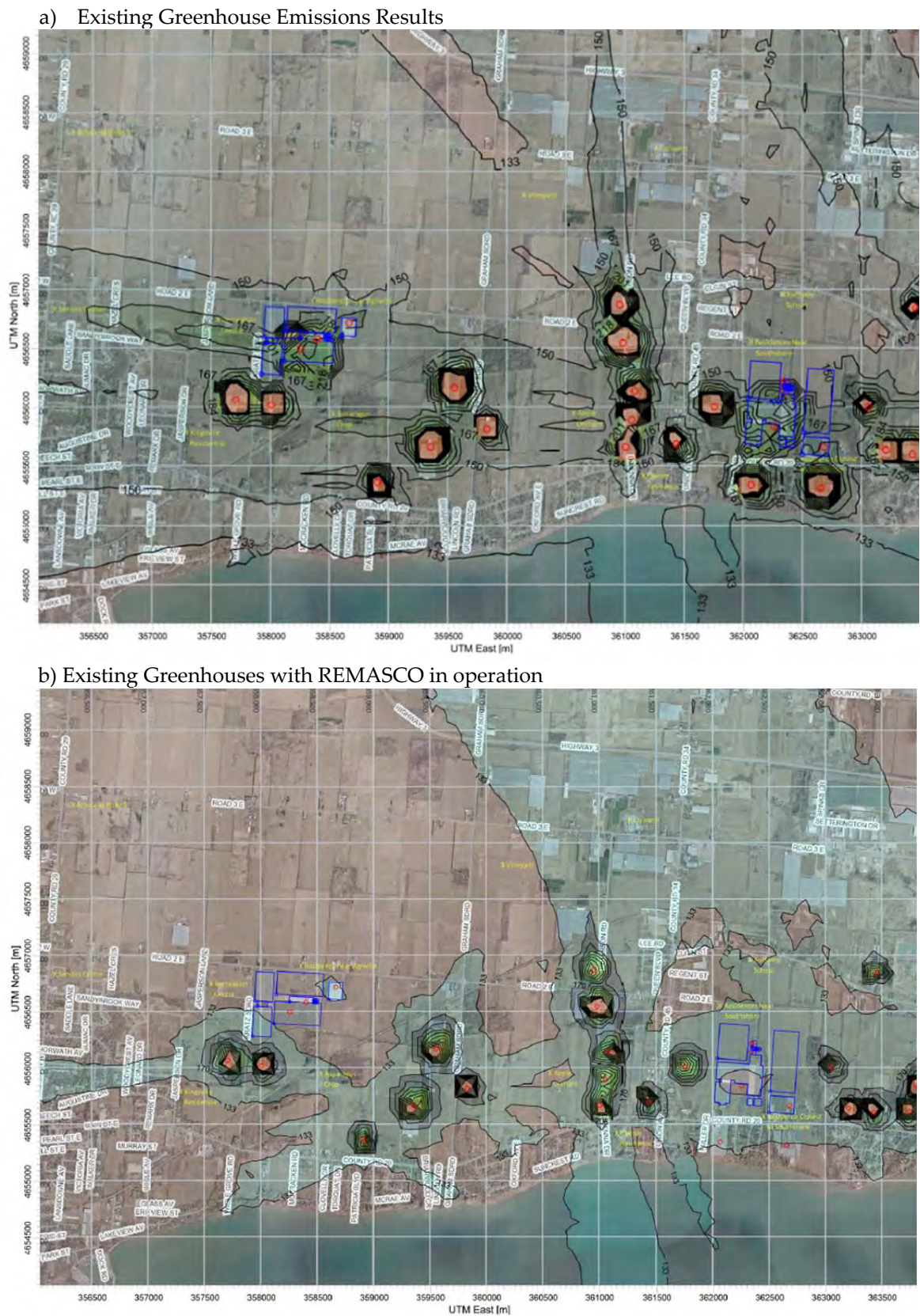
Testing to determine stack emission concentrations is conducted under steady state operating conditions. These tests typically take 5 – 6 hours to complete. There are transitory conditions that can occur in the operation of combustion devices typically on start-up and shut down and during these times emissions can be higher. These conditions were addressed by assessing the potential duration of such situations and the impact these situations could have on emissions. For the purpose of the evaluating upsets it was assumed that hourly emissions were increased by 10 times their normal level for all contaminants except sulphur dioxide and nitrogen oxides where lower upset values were used based upon uncontrolled operating levels. Upsets were assumed to occur for up to 5 hours so for daily and annual standard comparisons the increased emission rate was adjusted to 2.8 times the typical level to reflect the impact of longer averaging times. In all cases the values at the residential receptor having the highest levels under upset conditions are less than the applicable O.Reg. 419/05 criteria levels. The hourly exposure for NO_x under these conditions is 33% of the criteria level. The 24 hour average for HCl, modelled at 10 times the A-7 level, is estimated to be 41% of the criteria level, while NO_x levels for 24 hours are 7% of the standard. As would be expected, the values for metals that have a 24 hour average standard would increase by 2.8 times, bringing the maximum to under 3% of the criteria level.

Cumulative Impacts

To assess the potential changes in air quality after the REMASCO equipment replaces existing boilers at the Southshore, Mucci, and Agriville greenhouses it is necessary to compare existing and future emissions from the greenhouses. As noted earlier, the facilities where the REMASCO equipment will be used are only part of the existing greenhouses in the Kingsville area and thus the emissions from the other facilities must be included in this evaluation. To assess the cumulative effects the contributions of the existing greenhouses as they are now, and their emissions combined with the emissions from the new REMASCO gasifiers were modelled. The differences in the results illustrate the potential for change in ambient air quality. Adding an allowance for ambient monitoring data to the modelled values allows a determination of the overall air quality in the study area. This evaluation was completed for fine particulate matter, PM_{2.5}, and nitrogen dioxide, NO₂. These two criteria contaminants are monitored in Chatham and thus background data is available, and as seen in Table 4, these two contaminants were estimated to be the closest to their applicable criteria levels. The data of most interest for this comparison are those for the maximum 24 hour average for PM_{2.5} and the maximum one hour NO₂ values. The Air Quality Assessment report provides plots showing the results of the analyses. These show clearly that the introduction of the REMASCO gasifiers to heat the Southshore, Mucci and Agriville facilities will improve air quality in the community. Figure 7 contains the two NO₂ plots from the Air Quality report. The top plot is the estimated existing situation, the bottom plot the estimated future situation when the existing boilers are replaced and the co-generation facility is operating.

On the upper plot, the large coloured area represents the zone where the maximum 1 hour values predicted for the operation of all the existing boilers in the study area are at least 133 ug/m³ of NO₂ with only limited areas at levels below this value. There is a considerable area within the 155 ug/m³ range and even zones where the values, especially around the Southshore and Agriville facilities, exceeds 167 ug/m³ for NO₂. While this estimate of typical impacts from the source group is useful, it should not be used to establish the suitability of any particular source.

Figure 7 Comparison of NO₂ Cumulative Impact Modelling



Repeating the modelling after changing the REMASCO associated emissions to reflect the gasifier installation, the bottom plot shows a comparison of what might exist after all the REMASCO facilities go into operation. The areas around the REMASCO gasifier equipped greenhouses see much lower concentrations. The area estimated to exceed 133 ug/m^3 is significantly reduced and higher concentrations are found in a smaller area. These plots illustrate that the emission changes result a reduction of NO_2 levels in the community.

Figure 8 provides a similar comparison for the 24 hour average estimated $\text{PM}_{2.5}$ concentrations before and after the REMASCO gasifiers go into operation. In the existing plot at the top of the figure most of the study area has levels at or above 32 ug/m^3 , with higher isopleths located around the individual sources. In the lower plot, the area enclosed by both the 32 ug/m^3 isopleth is considerably smaller illustrating that the anticipated values in the community will drop with the implementation of the REMASCO projects. The area surrounded by the 64 ug/m^3 isopleth decreases in the bottom plot, as do the levels around the REMASCO facilities, however the elevated concentrations around the other facilities do not change.

The discussion in the previous paragraphs suggests that the ambient air burden will be reduced when the REMASCO facilities are put into operation. However, it does not mention the potential concentrations of NO_2 or $\text{PM}_{2.5}$ that might be present in the atmosphere from sources other than the greenhouses. To account for the other sources: home heating, vehicular emissions, and contaminants transported into the community, the background values from Chatham were added to the modelled values and the total was compared to the ambient air quality standards. Rather than deal with this graphically, it was considered best to consider the results predicted at the sensitive receptors.

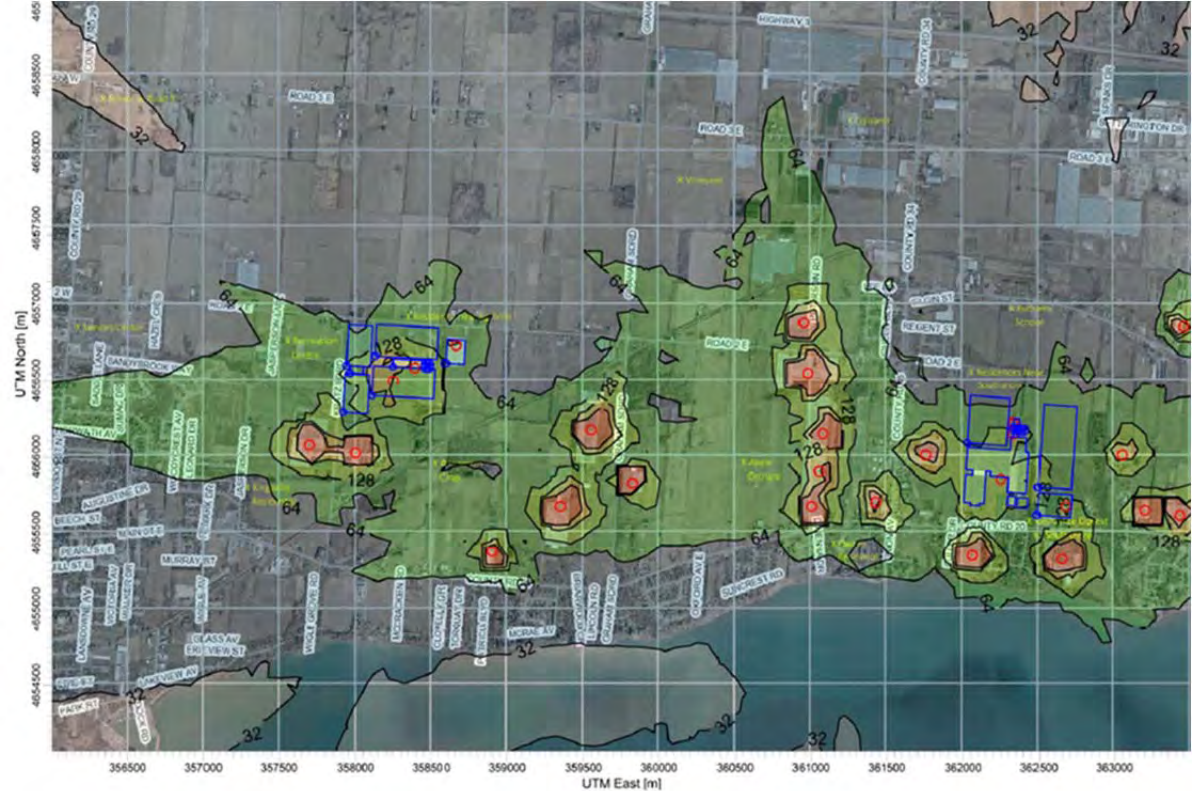
Table 5 shows the estimated cumulative concentrations of NO_2 and $\text{PM}_{2.5}$ at the designated receptors for various averaging times. These concentrations include the monitored ambient concentration value recommended by the MoE for use as background values. For NO_2 these values are: hourly ambient background is 40 ug/m^3 ; for the daily average value is 58 ug/m^3 ; and for the annual average is 21.5 ug/m^3 . For $\text{PM}_{2.5}$ ambient background levels for the 24 hour average is 17 ug/m^3 ; for the annual average is 8.2 ug/m^3 . Combining the maxima calculated at the receptors and the background contribution, estimates of the existing and the future levels of contaminants in the atmosphere were created. The values at the receptors can be compared to the appropriate criteria level shown at the bottom of each section of the table.

The combined values for a 1 hour average of NO_2 concentrations for the existing situation range from $135 - 168 \text{ ug/m}^3$ at the sensitive receptors. This is well below the criteria level for NO_2 1 hour concentrations [400 ug/m^3]. The range for the combined maximum 24 hour averages at the receptors is $89 - 145 \text{ ug/m}^3$ or 44- 73% of the 200 ug/m^3 daily criteria level. On an annual basis the combined NO_2 values ranges from $23 - 42 \text{ ug/m}^3$ or 48 - 70% of the criteria level of 60 ug/m^3 . Replacing boilers at the REMASCO facilities with the gasifiers is predicted to lower the NO_2 levels at the receptors by an average of 11% for both the 1 hour and 24 hour values, and 9% for the annual values. At individual receptors the 1 hour maxima stay the same at three locations, suggesting that levels at those locations are dominated by the existing sources, and one receptor experiences a reduction of 24%. On a daily basis, two receptors do not change and one drops 34%. On the annual basis most of the receptors see less than a 10% drop, but the one closest to Southshore drops 37%.

The $\text{PM}_{2.5}$ standard is for a 24 hour average value. Typically the MoE reports the number of days per year that the monitored values are greater than the standard of 30 ug/m^3 . As can be seen in Table 22, the maxima estimated for the existing situation at all but 3 of the sensitive receptors exceeds this value. It must be remembered that the background value is approximately half the criteria by itself. Overall the maximum daily values drop by an average of over 14% after the REMASCO facilities go into operation. The reduction ranges from a high of 30% to virtually no change again suggesting that sources closer to the receptors are responsible

Figure 8 Comparison of PM_{2.5} 24 Hour Average Cumulative Impact Modelling

a) Existing Greenhouse Emissions Results



b) Existing Greenhouses with REMASCO in operation

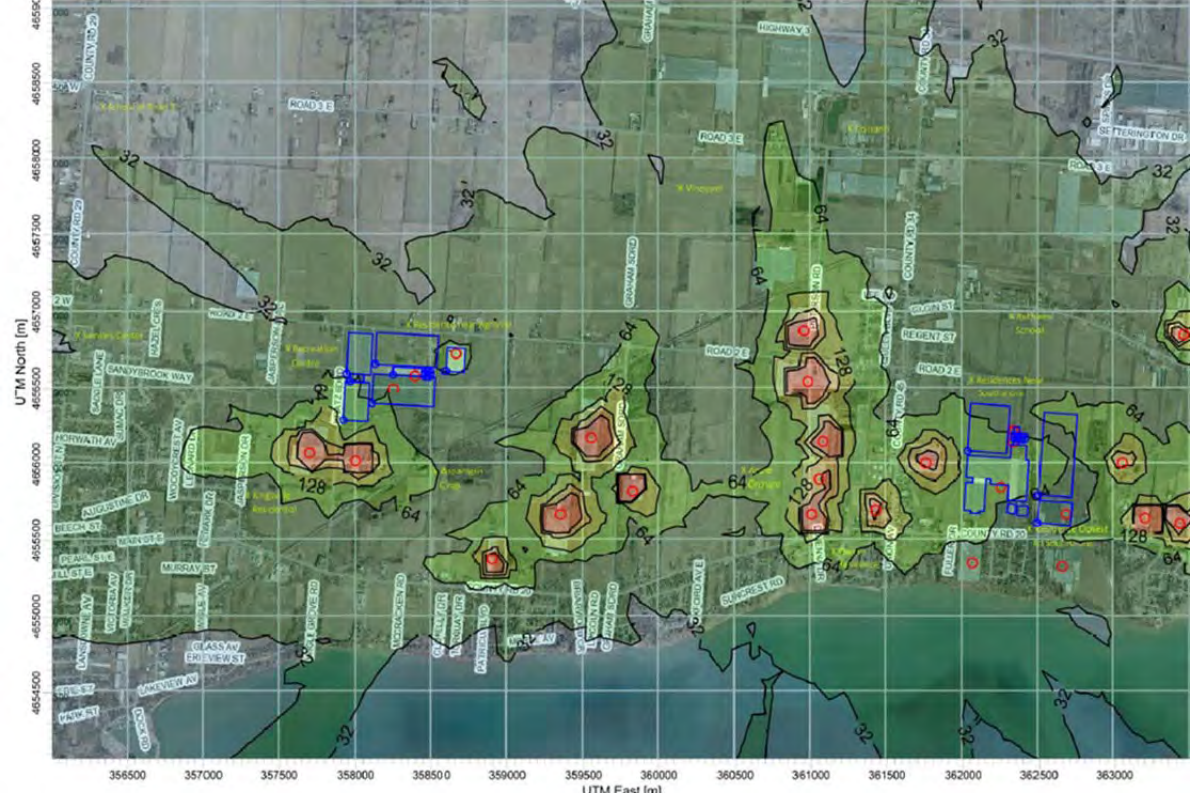


Table 5 Cumulative Estimate of Background for Existing Situation

Existing Source Modelling Results combined with Ambient Monitoring Data						
Number	Description	NO2 1 Hr. [ug/m3]	NO2 24 hr. [ug/m3]	NO2 Ann [ug/m3]	PM2.5 24 hr [ug/m3]	PM2.5 Ann [ug/m3]
1	School on Road 3	179.61	113.66	25.23	48.71	10.24
2	Seniors Centre Kingsville	200.72	124.85	25.11	69.73	10.28
3	Residential Area Kingsville	201.32	155.33	30.11	92.05	13.05
4	Recreation Centre	214.77	146.5	31.02	101.91	13.89
5	Residence close to Agriville	197.74	183.57	41.99	129.28	20.24
6	Asparagus Field	208.13	151.53	36.69	92.96	18.29
7	Apple Orchard	193.61	159.34	38.99	114.05	19.01
8	Vineyard	178.01	122.75	31.56	72.09	14.61
9	Colisanti Complex	183.23	132.54	31.44	67.64	14.57
10	Owner's Residence	188.02	175.84	38.39	102.32	20.98
11	Residence north of Southshore	180.04	157.53	43.05	84.1	20.65
12	Ruthven School	179.01	135.02	37.23	64.96	17.34
13	Residence south of Southshore	226.12	180.67	49.94	135.25	25.59
	Criteria Levels	400	200	60	30	
Modelling Results for REMASCO Only (NO CONTRIBUTION FROM BACKGROUND)						
Number	Description	NO2 1 Hr. [ug/m3]	NO2 24 hr. [ug/m3]	NO2 Ann [ug/m3]	PM2.5 24 hr [ug/m3]	PM2.5 Ann [ug/m3]
1	School on Road 3	12.76	2.54	0.11	0.053	0.0021
2	Seniors Centre Kingsville	15.39	5.15	0.14	0.106	0.0033
3	Residential Area Kingsville	9.11	3.3	0.19	0.074	0.0011
4	Recreation Centre	24.7	11.93	0.43	0.224	0.007
5	Residence close to Agriville	33.39	8.16	0.64	0.079	0.0027
6	Asparagus Field	23.36	14.06	0.35	0.239	0.0056
7	Apple Orchard	21.96	5.89	0.37	0.121	0.0081
8	Vineyard	23.81	4.25	0.28	0.084	0.0058
9	Colisanti Complex	27.9	4.55	0.23	0.081	0.0046
10	Owner's Residence	22.52	6.29	0.36	0.123	0.008
11	Residence north of Southshore	76.27	23.96	1.22	0.799	0.0181
12	Ruthven School	44.33	14.1	1.12	0.28	0.0137
13	Residence south of Southshore	35.69	20.23	0.72	0.391	0.0143
Existing and REMASCO Source Modelling Results combined with Ambient Monitoring Data						
Number	Description	NO2 1 Hr. [ug/m3]	NO2 24 hr. [ug/m3]	NO2 Ann [ug/m3]	PM2.5 24 hr [ug/m3]	PM2.5 Ann [ug/m3]
1	School on Road 3	164.55	100.85	24.5	42.89	9.77
2	Seniors Centre Kingsville	163	113.68	24.22	59.86	9.72
3	Residential Area Kingsville	168.32	141.83	28.64	70.31	12.27
4	Recreation Centre	165.61	155.78	31.15	66.78	11.88
5	Residence close to Agriville	163.66	127.32	28.67	72.79	13.72
6	Asparagus Field	179.66	151.23	33.1	92.87	15.92
7	Apple Orchard	176.69	144.2	36.99	87.76	13.03
8	Vineyard	168.64	113.17	29.68	61.73	13.17
9	Colisanti Complex	183.19	130.65	29.49	59.45	13.22
10	Owner's Residence	187.87	175.63	35.17	102.16	16.18
11	Residence north of Southshore	178.97	128.98	33.01	76.95	16.96
12	Ruthven School	175.95	143.7	37.45	60.36	14.23
13	Residence south of Southshore	198.25	142.54	33.2	85.04	15.59
	Criteria Levels	400	200	60	30	

for the levels predicted at those locations. The maximum annual number is predicted to drop between 2 and 10% depending upon the site.

The results of the evaluation of cumulative effects at the sensitive receptors suggests that current levels of fine particulate matter in the area could be problematic, that is, predicted levels are over the accepted threshold when the measured background levels from surrounding levels are added to the estimated emissions from existing greenhouses.

The estimate of the effect of emissions from the greenhouses should be considered to be conservative. They are likely biased high. This bias arises from the assumptions incorporated into the emission terms. These include: assuming that there was only limited particulate matter control on any of the coal or wood fired systems; using a common fuel mix for all facilities, including the assumed use of wood and coal systems at all sites; and, modelling the releases in a manner that decreases the momentum of the plume and thus the plume rise.

Improved particulate control is incorporated into the REMASCO systems. Furthermore, because the REMASCO stack characteristics are known, the emissions from these sources were modelled as proper point sources taking into account the influence of the buildings surrounding the stack. Thus the models predict an over improvement in fine particulate matter in the community when the existing boilers are replaced with REMASCO gasifiers at Southshore and Agriville.

Existing NO₂ levels are below the criteria levels in all cases, and the effect of replacing boilers at proposed facilities with REMASCO units will be to reduce the emission levels and further lower levels of the contaminant in the community.

6.2.3.2 Human Health Risk Assessment

All chemicals (both natural and man-made) have the potential to cause effects in people and the ecosystem. It is the chemical concentration, the route of exposure, and the inherent toxicity of the chemical that determines the level of effect and potential for unacceptable risk to the exposed receptor for health risks arising from acute and chronic exposures.

As illustrated in the diagram to the right, if all three components are present (*i.e.*, where the three circles intersect), there is the potential for risk of adverse effects. If exposure is low enough, the risks may be considered “acceptable”. Where technically and economically feasible, methods can be used to mitigate “unacceptable” risks.

It is acknowledged that the various uncertainties associated with the HHRA process have the potential to influence estimates of exposure and risk. The methods and assumptions used in the REMASCO HHRA were designed to be highly cautious (*i.e.*, health protective), and have a built-in tendency to overestimate, rather than underestimate, potential health risks.



The current HHRA followed a standard HHRA framework that is composed of the following steps:

- I. Problem formulation;
- II. Exposure assessment;
- III. Hazard assessment; and,
- IV. Risk characterization.

Typically, where potential adverse impacts are predicted through risk characterization, an additional step providing risk management goals and recommendations for mitigative measures to address these concerns is added. For the current EA process, it is this step that would provide recommendations for mitigation measures to REMASCO should any unacceptable health risk to the surrounding community related to facility emissions be identified.

The proposed facility is located in an agricultural area of south-western Ontario. As such, most of the surrounding land is occupied by farmland and would fall into an agricultural land-use category. In addition to the surrounding farms and their residential dwellings, the town of Kingsville is located approximately 3 km southwest of the Agriville cluster. Various other community facilities are located in the area (schools, senior citizen residences, recreation facilities). To assess potential risks related to the projected emissions from the proposed operations, key sensitive locations representative of the surrounding community were selected.

Based upon provincial regulatory guidance, a sensitive receptor location is typically defined as:

- A senior citizen's residence or long-term care facility;
- A health care facility;
- A child care facility;
- An educational facility; or,
- A dwelling.

Based on these definitions, the locations of the nearest sensitive receptors were identified. The selected locations from the surrounding community include:

- Four residential areas: Agriville Residential (receptor R1), Southshore Residential S (receptor R2), Kingsville Residential (receptor R3), Southshore Residential N (receptor R4), and Residence S of Seacliff (receptor R6);
- Two schools: District School (receptor C1) and Ruthven School (receptor C2);
- Three other key community facilities: Recreation Complex (receptor C3), Seniors Residence (receptor C4), and Colisanti Facility (receptor R5); and,
- Three agricultural operations in the area: Asparagus Crop Land (receptor P1), Apple Orchard (receptor P2), and Vineyards (receptor P3).

As the gasifiers operate in essence as incineration units, combusting pellets formulated from municipal solid waste, chemicals of concern (COC) were selected on the basis of two documents related to incineration of municipal solid waste in Ontario. These documents include the previously referenced MoE comparison of MSW Landfilling and Incineration and the A-7 Guideline which dictates combustion and air pollution control requirements for new municipal waste incinerators and is referenced in the REMASCO pilot facility approval. The following table lists the final COCs and specific pathways evaluated in the current assessment.

Chemicals Selected for Evaluation in the Current Assessment		
Chemicals of Concern (COCs)	Inhalation Exposures	Oral/Dermal Exposures
Criteria Air Contaminants		
Sulphur Dioxide (SO ₂)	X	
Nitrogen Oxides (NO _x)	X	
Hydrogen Chloride	X	
Particulate Matter (PM ₁₀)	X	
Particulate Matter (PM _{2.5})	X	
Inorganics		
Arsenic	X	X
Cadmium	X	X
Chromium	X	X
Lead	X	X
Mercury (Inorganic)	X	X
Organics		
Vinyl Chloride	X	X
Benzene	X	X
Polyaromatic Hydrocarbons [PAH]		
Benzo(a)pyrene	X	X
Dioxins / Furans		
PCDD/F ¹	X	X

1. The polychlorinated dibenzo-*p*-dioxin and dibenzofuran family of compounds were evaluated as a group using toxic equivalency factors (TEFs) for tetrachloro dibenzo-*p*-dioxin (TCDD) as a surrogate.

For those chemicals evaluated by the multi-pathway assessment (*i.e.*, oral and dermal exposures), the following additional exposure pathways were considered:

- **Incidental Ingestion of Soil and Dust:** Through typical indoor and outdoor activities, individuals may accidentally ingest soil and/or dust particles. Children are typically more susceptible to this exposure pathway, as they spend more time in contact with the ground, and are more likely to put soiled articles, such as toys or hands, into their mouths.
- **Incidental Inhalation of Indoor Dust:** Soils impacted by particles emitted from the proposed facility were assumed to be carried indoors (*e.g.*, by wind, human and/or pet activities) and be present as indoor suspended dust for inhalation by individuals living within the home.
- **Dermal Exposure to Soils and Dusts:** Dermal exposures of human receptors may occur in both indoor and outdoor environments, through direct dermal contact with chemically-impacted soil and dust.
- **Breast Milk Consumption (infants only):** It is assumed that infants living at each of the sensitive receptor locations will be exposed to certain chemicals *via* their mother's breast milk. This exposure pathway was evaluated for those organic COCs, such as dioxins and furans, which have the potential to "bio-accumulate".
- **Ingestion of Locally-Grown Produce:** Locally-grown produce (such as vegetables and fruits grown in backyard gardens) may itself pose a source of exposure to some COCs. As chemicals are deposited from air-borne emissions, they may come into contact with leaves and fruit of crop plants, where they may remain as a surface contaminant, or actually be absorbed into the plant. Deposition of chemicals onto soil may also result in an accumulation in plants through root uptake.

For the sake of conservatism, most of the potential pathways and exposure assumptions typically associated with a residential scenario were evaluated at all sensitive receptor locations. For example, when considering multimedia exposures (*i.e.*, non-inhalation), individuals at each of the assessed receptor locations were assumed to spend 24 hours per day, 7 days per week, 52 weeks per year at this location. This is obviously an

overestimation of potential exposures for the schools. In the case of the Industrial Worker Scenario, the worker was assumed to be present on-site at the maximum ground-level air concentration for 8 hours per day, 5 days per week, 50 weeks per year.

The purpose of the assessment was to evaluate the potential incremental impacts of projected emissions (*i.e.*, from the stacks) of the gasification facilities proposed for the Kingsville area, and to determine the health implications to potentially sensitive individuals living, working, or playing in the surrounding communities, under “worst case” exposure conditions.

Acute Inhalation Assessment Results

The results of the acute inhalation assessment indicated that there are no acute impacts to human health expected as a result of facility emissions to the ambient air of the surrounding community under the residential and recreation/community scenarios.

Chronic Inhalation Assessment Results

The results of the chronic inhalation assessment indicated that there are no chronic impacts to human health expected as a result of facility emissions to the ambient air of the surrounding community under the residential and recreation/community scenarios.

Chronic Multi-Pathway Results

The results of the chronic multimedia (*i.e.*, inhalation, oral and dermal exposures) assessment indicated that there are no chronic impacts to human health expected as a result of deposition of facility emissions onto soils and home gardens of residences in the surrounding community. Furthermore, the worker scenario and the milk and produce consumer scenarios also indicated that there are no chronic impacts to human health expected as a result of these scenarios.

Cumulative Assessment Results

Evaluation of potential exposures under current and future cumulative conditions indicated marginal exceedances of acute and chronic TRVs for NO_x and PM_{2.5} at several receptor locations. In all cases, future cumulative risks with the proposed REMASCO facilities are lower than risks predicted under existing background conditions – indicating that there will be a net benefit in air quality with the installation and operation of the REMASCO facilities.

Upset Scenarios

Evaluation of potential exposures under upset conditions at the maximum residential receptor location indicate that there are no acute or chronic impacts to human health expected as the result of emissions during upset conditions.

The HHRA report reviewed potential health impacts of the proposed REMASCO project to determine if the facility has the potential to cause impacts on the environmental and human health. The study relied upon the results of an Air Quality Assessment discussed in the previous section. That assessment utilized computer models to develop estimates of the atmospheric levels of contaminants associated with the facility and the rate at which contaminants might be deposited on the ground in the area surrounding the facilities. Based upon these results, the Human Health Risk Assessment is able to ascertain the potential for these contaminants to enter the body of humans living in the area. By combining the information from the Air Quality Assessment and knowledge of the effects of these contaminants, the risk that these levels might pose to human health can be predicted. The purpose of the assessment was to evaluate the potential incremental impacts of projected emissions (*i.e.*, from stack) from the gasification facilities proposed for the Kingsville area, and to determine the health implications to potentially sensitive individuals living, working, or playing in the surrounding communities, under “worst case” exposure conditions.

The key findings are:

- The results of the acute inhalation assessment indicated that there are no acute impacts to human health expected as a result of facility emissions to the ambient air of the surrounding community under the residential and recreation/community scenarios.
- The results of the chronic inhalation assessment indicated that there are no chronic impacts to human health expected as a result of facility emissions to the ambient air of the surrounding community under the residential and recreation/community scenarios.
- Acute and chronic inhalation risks were marginally elevated for the worst-case exposures for on-site workers for the respiratory irritant group of COCs. These exceedances were not deemed significant and all predicted on-site concentrations are well below relevant occupational standards.
- The results of the chronic multimedia (*i.e.*, inhalation, oral and dermal exposures) assessment indicated that there are no chronic impacts to human health expected as a result of deposition of facility emissions onto soils and home gardens of residences in the surrounding community. Furthermore, the worker scenario and the milk and produce consumer scenarios also indicated that there are no chronic impacts to human health expected as a result of these scenarios.
- Evaluation of potential exposures under current and future cumulative conditions indicated that in all cases, future cumulative risks with the proposed REMASCO facilities are equal to or lower than risks predicted under existing background conditions. As a result, there will be a net benefit in air quality with the installation and the operation of the REMASCO facilities.

6.2.3.3 Noise Impacts

J. E. Coulter Associates Limited, an acoustic consulting firm, reviewed the potential for noise impacts from the proposed REMASCO gasification systems for Southshore and Agriville described earlier in this report. Their report is available under separate cover. The evaluation included the noise of the seven systems proposed for Southshore site and the four systems proposed for Agriville along with the emergency generators installed in the facilities. The study evaluated the operational emissions from the gasifiers and air pollution control systems and the increased noise that would result from testing the generators. The overall noise from the REMASCO systems was evaluated for its potential noise impact on adjacent sensitive receptors.

The REMASCO boilers and emergency generators are evaluated under the Ministry of the Environment's NPC-205 "Sound Level Limits for Stationary Sources in Class 1 and 2 Areas (Urban)" and NPC-232 "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)". This assessment is consistent with that required for both Environmental Assessments and applications for Air Certificates of Approval.

Within the Class 2 (Urban) area guidelines, the predicted hourly equivalent (1hr L_{eq}) sound level from stationary sources is compared to estimates of the existing ambient sound levels (1hr L_{eq}) or to minimum criteria levels set by the MoE for such areas. The minimum exclusion criteria for Class 2 Areas are 50dB during daytime, 45dB during the evening, and 45dB during nighttime hours. The Guidance suggests that the higher of the levels, the measured ambient level at different periods of the day, or the exclusion criteria define the standard that must be attained. For Class 3 (Rural) areas, the minimum criteria drop to (45dB daytime, 40dB evening, 40dB nighttime).

The ambient sound level is comprised of the noise generated from roadway sources other human activity in the area, but excludes sources such as railways and aircraft. Typically, the quietest ambient sound level period is used as an evaluation of the worst-case situation. If the facility's sound level can remain below the quietest ambient sound level during that period, then the facility is likely to meet the guidelines during all periods of the day. Where the facility exceeds the guidelines, noise control needs to be implemented.

Given the size of the greenhouse facilities, there is the possibility of several different receptors being close enough to the sites to be categorised as sensitive at each site. Depending upon their exposure to local roadways these receptors would then be classified as being in either a Class 2 or a Class 3 area. Given that in all cases the receptors are located adjacent to roadways with limited traffic it was concluded that the minimum exclusion criteria should be applied for all periods. The closest residential buildings to the boiler houses at the two sites were selected as the critical receptors. Each site was considered separately since the distance between the two sites is so great that there will be no effects of Southshore at the receptor close to Agriville or vice versa.

The Agriville site will eventually include up to 4 REMASCO boilers and a 350 kWe emergency generator. The sensitive receptor is the residence located on the north side of Concession Road 2E, identified as Agriville POR1. Being as close as it is to Agriville, it is the best indicator of potential impacts in that area. The residence is located on a well-travelled road thus the area would have a Class 2 designation.

The Southshore site currently has 2 REMASCO boilers and a 350kW emergency generator, and will include up to 5 more boilers. The most sensitive receptors are in a residential area located to the northwest of the Southshore boiler plant, on the south side of Concession Road 2E, identified as Southshore POR2. This area would be classified as Class 3 since there is little traffic on the road adjacent to the houses.

Each greenhouse complex is comprised of similar noise sources but there are different numbers of units at the various sites. For ease of understanding the acoustic aspects of the typical installation summarised in the following paragraphs. The differences in the number of units at the two sites were accounted for in the assessment.

The typical installation involves the gasifier and its associated boiler with the fuel feed system for the gasifier and the air pollution control system downstream of the boiler. In the proposed co-generation facility, a steam turbine coupled with a generator will be used to provide electricity. The gasifiers, boilers, induced draft fans for combustion air and recirculated air and the exhaust fans along with the steam turbine/generator set will be located inside the appropriate building while the fuel storage and handling equipment and the dust collector and stack of the air pollution control system are outside. The fuel storage system consists of vertical silos that use bucket elevators to retrieve and distribute pellets to the boilers. The air pollution control system consists of a baghouse and associated fan that exhausts to the atmosphere via a large vertical stack approximately 21m high. The dominant noise sources, assuming doors and access hatches remain closed, will be the bucket elevator and the dust collector fans.

The REMASCO systems are intended to run 24 hours a day, 7 days a week. The bucket elevator can be assumed to run for 20 min out of every hour throughout the day and night. Hence, if the nighttime guideline levels are met, the daytime guidelines would also be met as the facility would produce a constant amount of noise on an hourly averaged basis.

Both sites incorporate emergency generators. It is assumed that Agriville will have the same type of generator as Southshore. Sound levels can be estimated for these generators based on their rated power output and fuel type. The estimation procedure is usually conservative and will need to be confirmed with the manufacturer's sound levels during Detailed Design. All generators are located inside the REMASCO buildings with ducted cooling air discharge. Fresh air is usually provided via the facility in general (i.e., there is no separate ducted fresh air intake for the generators.) Since these generators are for emergency use, only the daytime test activity was evaluated.

The evaluation of sound from the REMASCO systems was completed based upon measured sound levels from the equipment currently installed at Southshore. The sound levels associated with the existing REMASCO dust collector fans and bucket elevators were measured during a site visit. At Southshore POR2, the closest receptor to REMASCO, the sound levels were measured at 48dBA. This agrees with the 110dB PWLA rating provided

by the fan manufacturer. The fans produce a sound that is tonal in nature, and a 5dB correction must be added to the measured sound level to account for this characteristic. The bucket elevator was found to produce 68dBA at 20m.

At Southshore it will be necessary to add 5 more dust collector systems of a similar nature to equip the full facility. The anticipated sound level will rise to 58dBA including the tonality correction. The bucket elevator would produce about 39dBA at Southshore POR2, accounting for the fact that it does not run constantly. Adding the effects of these two sources will result in an estimated level of 58 dBA at the POR2 receptor. Given the absence of any substantial road traffic, the guideline limit would be 45dBA during the daytime and 40dBA during the nighttime at this location. This suggests that the dust collector fans will require 20dB of attenuation and the bucket elevator may require some minor silencing (i.e., damping of the structure) to reduce its noise by about 2dB. Once these mitigation measures are in place, the overall sound level will be about 40dBA, meeting the criterion level during the nighttime.

The 350kW generator, installed inside the REMASCO facility, will produce sound that can be heard a Southshore POR2. A typical 350KW generator would produce approximately 43dBA at this receptor. Given a daytime limit of 45dBA, and assuming the mitigation measures for the dust collector and bucket elevator have been implemented, the combined noise from the facility (generator, bucket elevator, and dust collectors) would be 45dBA during the daytime. Hence, the generator does not require further noise control provided the cooling air exhaust does not point towards the houses.

At Agriville, the four gasifier/boiler units will require 4 dust collector fans and the associated sound level at the nearest receptor, Agriville POR1, would be 62dBA, including the tonality allowance. The bucket elevator would produce about 42dBA at the receptor, provided it operated in a similar manner to the bucket elevator at Southshore (i.e., no more than 20 min per hour). The overall sound level would then be about 62dBA during the night. The limiting sound level for this receptor would be 45dBA during the nighttime. Implementing the same control measures as Southshore (20dB dust collector reduction and 2dB bucket elevator reduction) would result in an overall sound level of 44dBA during the nighttime.

During the daytime, a typical 350KW generator would produce approximately 48dBA at Agriville POR1. Assuming the mitigation measures for the dust collector and bucket elevator have been implemented, the combined noise from the facility (generator, bucket elevator, and dust collectors) would be 49dBA during the daytime. Given a daytime limit of 50dBA, the generator does not require further noise control, provided the generator's cooling air exhaust does not point towards the houses.

In summary the acoustic assessment concluded that the noise from the dust collector fans is the primary issue. At the worst case, the dust collector fan alone exceeds the guidelines by about 18dB. Prior to the implementation of this project, the dust collector fan discharge will need to be quieted down by approximately 20dB to ensure the overall noise of the facility meets the guidelines at both Southshore and Agriville. The use of silencers or alternate fan selections or a combination of the two may be necessary to achieve this level. During the detailed design stage it is recommended that the proponent work with an acoustic consultant to ensure these conditions are achieved.

The bucket elevators alone do not exceed the guideline levels. Considering the cumulative noise from the facility, however, each of Agriville's and Southshore's bucket elevators will need to be quieted by about 2dB. This can usually be accomplished by damping the structure with Blachford AntiVibe or rubber compounds.

Similar to the need to assess the final configuration of the exhaust fans and stack, the sound from the generators should be evaluated in more detail during the Certificate of Approval application process to ensure that the appropriate silencers are introduced into the cooling air exhaust.

6.2.4 Community Impacts

Two criteria in this group were suggested to have the possibility to create negative impacts: vehicular traffic associated with the REMASCO projects, and the anxiety created in members of the public who were concerned about health and safety issues.

The HHRA discussed in the previous section suggests that no acute or chronic impacts to human health are expected from the implementation of the REMASCO gasifier installations. It is anticipated that the results of the air modelling and the HHRA will reduce the concerns about the project.

It is estimated that under the worst case operating situation a total of 10 trucks could enter and leave the Southshore site each day to deliver pellets and remove residue streams. Traffic data from the County notes that 10,000 vehicles a day pass the Southshore site on Seacliff east of Union. With a very limited number of trucks entering the site in support of the REMASCO operations it is unlikely that there will be any impact on local traffic.

6.2.5 Residue Management Impacts

The facility will generate solid waste in the form of ash from the gasifiers, boilers and fabric filter houses.

The ash from the gasifiers, the residual materials that do not volatilise in the gasifier is discharged from the ash end of the hearth as explained in §3.3.2.1 into a trough where the ash is quenched with water sprays. The water sprays also serve to reduce dust during subsequent material handling and transport of the ash to disposal. A drag chain conveyor moves the ash to the storage bin inside the building.

Some solid particulate matter, generally referred to as fly ash, is carried from the gasifier with the gases that are exhausted. As the gases pass through the mixing chamber, the hot gas ducting and the secondary combustion chamber some of these solids settle to the bottom of the various chambers. Periodically, when the system is shutdown, these areas are cleaned to remove the settled materials. Fly ash is also deposited in the boiler, particularly as the gases are cooled and some of the elements condense to solid form. The boilers are cleaned while the system is operated, both through the use of the on-line cleaning system and soot blowing. The ash removed in these operations settles into hoppers at the ends of the boiler that can be emptied while the system is operating. Both the ash that collects in the boiler, and the ash removed from the various chambers during shutdown, are segregated for storage in a second storage bin.

The dust collected by the fabric filter represents the reaction products created by combining the reagents introduced in the ducts with the contaminants from the combustion process. This material is generally referred to as APC residues. The APC residues will also contain fly ash that is removed from the gas stream by the fabric filter. The APC residues collect on the bags and are removed periodically when high pressure air is introduced at the top of the bag. When the residue is released from the bags, it drops into the hopper at the bottom of the fabric filter housing. The hopper is evacuated into a storage bin so it can be kept segregated from the gasifier ash.

Both boiler ash and the APC residue are classified as a hazardous waste because typically these materials will leach some contaminants at levels in excess of those specified in O.Reg. 347. These wastes are thus classified as leachate toxic materials that must be handled and disposed as a hazardous waste. The containers of leachate toxic waste are tarped and hauled by a company licensed by the MoE to a disposal site capable of safely handling this material. With the due diligence exercised in the handling and disposal of these materials they pose no threat to the environment or human health.

The gasifier ash is essentially ash from the thermal treatment of MSW, since the ENERPAX pellets are manufactured from part of the MSW stream. O.Reg. 347 defines the appropriate procedures for the safe handling and disposal of ash from such operations. The regulation⁵ defines:

“incinerator ash” means the ash residue, other than fly-ash, resulting from incineration where the waste is reduced to ashes containing by weight less than 10 per cent of combustible materials;

While no specific directives in O.Reg. 347 concern the disposal of incinerator ash the guidance to generators issued by the MoE provides a further definition of incinerator ash:

“Incinerator ash (bottom ash) from the incineration of waste that is neither hazardous nor liquid industrial is exempt from the definition of Hazardous Waste. Incinerator ash does not include fly-ash. Incinerator ash is ash residue which contains less than 10% by weight combustible material.”

There are no restrictions on the disposal of this material in O.Reg. 347. As such it is generally accepted that municipal solid waste [MSW] incinerator Bottom Ash is exempt from any special handling requirements if it has a loss on ignition [LOI] of less than 10%. If the LOI requirement is not met Bottom Ash must pass the leachate toxicity criteria of O.Reg. 347 before it can be disposed in a municipal solid waste landfill site.

The gasifier ash, bottom ash from the gasifier, is managed separately from the other residue streams discussed above. It is tested periodically to ensure that it can be classified as “incinerator ash” according to the loss on ignition test, and also with the TCLP test to ensure that it does not contain contaminants that leach at a rate that would render the material leachate toxic waste. The gasifier ash has been found to meet all the criteria and as such is disposed in the local municipal solid waste landfill operated by EWSWA.

6.3 Impact Management Measures

As outlined in the previous sections, measures incorporated into the design and operating plan of the facilities greatly reduce the potential for negative impacts from the development and operation of the facilities. Those items identified as creating a potential for negative impacts are summarised in this section along with the measures that have and will be implemented to reduce the potential for negative environmental effects.

6.3.1 Surface Water Issues

As noted in the previous section, surface water impacts can arise from uncontrolled runoff from developed areas that increases flow and with it the potential for soil erosion. Furthermore, land clearing and construction activities have the potential to increase local runoff temporarily and with this runoff soil erosion can carry suspended particulate matter into the lake.

As noted, the sites proposed for development currently incorporate extensive areas of greenhouse that were developed in accordance with the local municipalities development rules. Part of that approval process requires a stormwater management plan, and such plans exist for the sites. The size of the REMASCO developments compared to that of the existing and proposed greenhouse structures is such that the existing facilities will be capable of handling any additional runoff.

During construction, activities will occur far enough from existing municipal drains and drainage swales that measures can be incorporated into construction contracts that require the contractor to control runoff quantities and prevent the transport of silt into the drainage areas.

⁵ <http://www.e-laws.gov.on.ca/Download?dID=48001#BK0>

The potential for discharge from the operating process is mitigated by the installation of a holding tank to capture boiler blow down water for reuse in the gasifier ash quench system, or for the flue gas cooling purposes. Should the tank reach capacity it can be pumped and transported to the local wastewater treatment plant for processing before discharge to the environment.

6.3.2 Land Use Issues

While the land is not zoned for industrial, heavy industry, or waste management purposes, the operation is clearly an adjunct use to the main operation on site, the greenhouses. Since these require heat, and the ENERPAX pellets are simply a unique source of energy for the heating system the REMASCO projects are not incompatible with existing uses. Only ENERPAX pellets will be received at site. These pellets are densified fuel that does not attract vectors, nor does it create odour issues.

It is anticipated that the municipality will confirm the adjunct use to be within the zoning and development rules.

6.3.3 Air Quality and Human Health

While these aspects of a thermal treatment process can create some anxiety locally, the facility will have to operate in accordance with the standards issued by the MoE under Guideline A-7. The Air Quality and Health Risk Assessment studies summarized earlier, and presented in separate reports, demonstrate that the implementation of the REMASCO projects will result in a reduction of emissions from the facilities that will be served by the units and therefore improve air quality locally. The Health Risk Assessment notes that the project will not, by itself, create any short or long term impacts due to inhalation. Nor are there any chronic multimedia concerns due to deposition. Lastly the cumulative assessment suggests that future cumulative risks with the REMASCO projects operating are lower than those predicted under the existing background conditions.

While the HHRA suggests that the emission values used for the assessment suggest that there is a marginally elevated risk from the respiratory irritant group of chemicals, the Proponent recognizes that the facility will not be permitted to operate with emission rates at the level that was modelled. REMASCO is committed to meeting all the A-7 emission standards on a consistent basis and by doing so any risk posed by the irritant group of chemicals will be reduced to below a level of concern.

The company is committed to operating and maintaining the facility and equipment in a manner that ensures compliance with the Guideline A7 criteria at all times. This commitment includes maintaining the continuous emission monitoring systems presently in use, taking daily measurements of NO_x and HCl and subjecting the units to annual testing in accordance with the requirements of its Certificate of Approval.

6.3.4 Noise

The acoustic consultant has identified that under certain circumstances that the existing REMASCO facility creates an unacceptable noise. The problem has been identified as being the type of impellers used in the large induced fans supplied to REMASCO at the time of construction. These impellers are to be replaced with quieter ones and all future induced fans will incorporate only low noise impellers.

6.3.5 Traffic

Traffic movements associated with the REMASCO facilities is very low compared to the average daily traffic levels, particularly on County Road 20. Turning movements into and out of the site have the potential to create temporary slow downs in the vicinity of the entrances, but these are expected to be no greater than the typical movement of vehicles associated with moving the produce to markets. There is sufficient space on site roads that there will be no need for vehicles to wait on the county roads before they enter the site, and thus no impediment to normal traffic movement.

The Proponent will schedule shipments of pellets to arrive during the normal working hours thereby limiting the potential for unusual traffic conditions on the road surrounding the sites during low light hours when the presence of trucks could be more problematic.

6.3.6 Public Anxiety

As noted previously, the air emissions and potential effects on human health and the environment are typically the most mentioned concerns when there are proposals for thermal treatment facilities. Most of these concerns can be allayed by completing the types of reviews undertaken for this project. However, some concerns may still exist and one of the best ways to address these is to provide the public with a means of communicating their concerns, and their experiences with the proponent.

REMASCO instituted a public liaison committee when they started the pilot phase of the project. That committee, consisting of staff from both the Towns of Kingsville and Leamington, the Essex Windsor Solid Waste Authority, the Essex Windsor Environment Committee, staff from the local MoE office and staff from the Ontario Ministry of Agriculture, Food and Rural Affairs [OMAFRA]. These people met with REMASCO staff, their consultants, and interested members of public to discuss the progress of the pilot project. This committee has continued to be involved through the Environmental Screening Assessment project.

REMASCO is prepared to institute a formal Public Liaison Committee to act as an independent committee to overview the operation of the facilities and create a communications channel between REMASCO and its operators and the public. REMASCO will provide the necessary seed funding for this committee, but the committee will operate at arm's length from REMASCO. The committee would operate as a not for profit organization with its own rules of governance.

Providing the public with a line of communication through members of community should ease their concerns about potential interaction with the operators in the future.

6.4 Net Effects of the REMASCO Projects

The Environmental Screening Assessment suggests that the environmental effects of proceeding with the REMASCO projects will have some positive environmental effects:

- Reducing air emissions from greenhouse heating boilers;
- Reducing the use of fossil fuels at the project greenhouses; and,
- Allowing local generation of electricity to reduce loads on the electrical distribution system;

The creation of a PLC to work with the operators and ensure that local concerns are addressed should have the positive effect of reducing anxiety over the operation.

Any negative impacts, related to incremental increases in runoff from the sites, additional truck traffic to the sites, the generation of residue streams at the facility have been shown to be essentially insignificant.

The assessment was based upon emission estimates from the facilities derived from test data and the emission limits outlined in Guideline A-7 issued by the MoE. These limits will be included in the Certificate of Approval that must be obtained from the MoE and there will be requirements for monitoring the operations of the facility to ensure that the performance meets expectations.

The Company is committed to such monitoring programs and will continue to monitor on a continuous basis, oxygen, carbon monoxide and opacity levels along with all the process parameters such as temperatures and flows in the system. In addition, the Company will continue to monitor hydrogen chloride and oxides of nitrogen on a daily basis. All fuel shipped to the facility is accompanied by an analysis report that provides the concentration of various elements in the fuel. This contractual requirement between the pellet manufacturer and the Company will continue in place to ensure that the Company can identify any potential changes in fuel quality.

The Company will undertake to conduct a baseline soil survey around the two sites in 2012 prior to the construction of any new gasifiers. That data will provide documentation of existing levels of contaminants in local soils and these data will serve as a reference for future sampling that can determine if there is any material change in the levels of those contaminants that can be associated with the REMASCO projects.

7.0 Information on Public and Government Consultation

REMASCO recognized from the start of the project that consultation with both the public and their elected representatives was an important step in ensuring the success of their proposed project. For that reason, REMASCO's public consultation program started before they applied for their first permits for the pilot facilities. The public consultation process has included updates to the elected officials as well as establishing and meeting with a public liaison committee on a regular basis throughout the development of the projects. This section provides an outline of the major milestones in this communication strategy.

Consultations with Town Councils

The REMASCO public consultation process officially commenced in early 2007 when REMASCO approached the Town Council in both Kingsville and Leamington to obtain their approval for the installation of a pilot gasifier facility in their community. A presentation was made to each Council, Leamington Council in February 2007 and Kingsville Council in March 2007. This was before O.Reg. 101/07 under the Environmental Assessment Act was promulgated. That Regulation governs the administration of municipal waste demonstration projects such as the REMASCO facility installation at Southshore.

Recognizing the concerns expressed by the councillors at the meetings, REMASCO made commitments to each of the Towns in early 2007. These commitments were:

- a.) To establish a public liaison committee
- b.) To remain transparent and provide the Towns with regular updates
- c.) To undertake a comprehensive Human Health Risk Assessment (HHRA) as part of any environmental assessment that might be required for a full installation of the technology.

Since those initial meetings in 2007, REMASCO has provided the Leamington Council with two updates and the Kingsville Council with five formal updates. Since the pilot project and all currently proposed expansions are located in Kingsville communications have been occurring for a longer than those with Leamington. However, REMASCO recognizes that the population of Leamington may have an on-going interest in the projects and has continued to post notices about the project in the local Leamington papers.

Copies of the council minutes documenting the various times that REMASCO has appeared before council are included in the appendix as exhibits labelled Council Minutes and numbered chronologically. **Presentations from Council meeting should be included in Presentation Appendix**

Each of the municipalities passed resolutions to support the REMASCO pilot subject to the commitments outlined above being honoured, that the performance of the pilot facility was successfully demonstrated and that the rights of the Towns to seek a bump-up to an EA were preserved throughout the permitting process.

In July 2008 the Council in Kingsville notified the MoE Approvals that the town supported the REMASCO project. A copy of that letter is attached as an exhibit labelled Kingsville Support#1.

Around the same time, the County of Essex council passed a motion supporting the installation of the fuel storage siloes on the Southshore site. Exhibit labelled County of Essex Support#1. This was prompted by a letter from the manager of the Essex Windsor Solid Waste Authority concerning the facility, Exhibit labelled Essex Windsor SWA Support#1.

REMASCO covered the costs of the Peer Review of the Air Quality and Human Health Risk Assessment documents by a consultant hired by the Town of Kingsville. A copy of the agreement between REMASCO and the Town is attached in the Appendix as an exhibit labelled Kingsville Support#3.

The Public Liaison Committee

The first REMASCO Public Liaison Committee meeting was held on September 19, 2007. At that time representative from REMASCO met with a representative from Kingsville, a representative of the Essex Windsor Solid Waste Authority and a representative from OMAFRA a provincial department. Two members of the public had indicated an interest in sitting on the committee but were unavailable for the first meeting. That meeting, the minutes of which are attached as Exhibit PLC#1 in Appendix A addressed the scope of the committee's activities and communication with the Councils in Kingsville and Leamington.

The minutes for subsequent meetings are included in Appendix A as Exhibits PLC#2, 5, 6, 7 and 8. **Minutes for the meetings in 2008 and 2011 are missing from the file.**

PLC#2 notes that the application for the 75 boiler HP Pilot facility had been submitted and a formal presentation had been made to Kingsville Council. In attendance at the meeting were staff for NRC/Canmet the agency that was to conduct the first testing on the pellets and emissions from the 75 boiler HP pilot.

PLC#5 in Sept 2008 reported the results from testing of the 75 boiler HP unit and the group discussed the approval that REMASCO had received to install large commercial size gasifiers in a new building on site. The building permit for the new boiler house had been applied for and equipment had been ordered.

PLC#6 in March of 2009 occurred just after the larger gasifiers had been installed. The committee toured the new building and discussed issues related to pellet storage and ash handling. The first testing on these new units was to occur in April.

PLC#7 in Sept 2009 included a detailed discussion of the testing results on the large scale units. It was announced that REMASCO had applied for an extension to their pilot facility approval.

PLC#8 in October 2010 announced that REMASCO were about to enter into the Environmental Screening Process envisioned for Waste Management Facilities in O.Reg. 101/07. There was some discussion about the HHRA study and the municipalities stated that the study would be the keystone in their decision to support the facilities.

The latest meeting of the PLC occurred in March 2011. It was reported that preliminary work had been completed on the air modelling and HHRA preparatory to the Open House that was scheduled for the end of March at the facility. REMASCO reported that the testing had been completed and they were still awaiting the results.

The PLC will continue to be active and members were in attendance at the Public Meeting held in August 2011. In the Personal Contact Data section of the Public Consultation Appendix are 4 letters to potential members of the PLC who said they would be interested to sit on the PLC at the Open House in March, 2011. The exhibit is labelled New PLC Members #1.

Public Events

Since the installation of the first gasifier at Southshore REMASCO staff has been involved in presenting the technology to members of the community through tours, the Open House, the Public Meeting and in interviews with and materials prepared for the media.

Tours of the facility have been conducted for Kingsville Council; Councillors from the Region of York where the pellets are manufactured; the Region of Peel; and the Windsor Essex Environmental Committee (WECEC) and other local politicians (December 2, 2010).

The Open House was held at the Southshore facility on March 30th, 2011. The consultants who were undertaking the air quality and human health risk assessment studies were present to discuss how they were undertaking their studies and present a limited amount of data that they had completed at the time of the meeting. The Open House invitation was published in the local paper and distributed to nearly 300 households in the vicinity of the proposed facilities. The list of households and businesses is contained in the Public Contact Information section of the Public Consultation Appendix. The notice was circulated to the short mailing list of civic and provincial officials and agencies. That list is included in the Public Consultation Appendix. The Notice is attached in the Public Consultation Appendix as exhibit Open House Invite. Copies of the poster presentations from the Open House are appended as Open House Posters. The attendance list for the Open House is included in the Public Contact Information portion of the Public Consultation Appendix. **Open House Posters to be added**

On August 22, 2011 after the results of the ESR had been presented to Kingsville Council REMASCO held a public meeting to discuss the Environmental Screening Project and the results of the air quality assessment and the human health risk assessment. REMASCO placed notices for this public meeting in the local papers and mailed notices to nearly 300 households in the vicinity of the facilities. The list of households and businesses is contained in the Public Contact Information section of the Public Consultation Appendix. A copy of the Notice is appended as Public Meeting August. Also attached in the Public Contact section of the Appendix is the attendance list, Public Meeting Attendance.

When Notice of the Public Meeting was released Gail Stiffler, a resident of Kingsville, took it upon herself to increase the notification of the event in town. She distributed a flyer concerning the project at a local super market on the weekend before the meeting. The flyer is appended as Stiffler flyer. At the meeting a list of questions prepared by a small group lead by Mrs. Stiffler were distributed to the attendees. These are appended as Questions by Stiffler.

Unfortunately the events of the night precluded the presenters' ability to answer all the questions, but a response was prepared and circulated to the many of the people in attendance at the meeting and to the Kingsville Council. A copy of that response, prefaced by a reprinting of the questions is attached in the appendix as exhibit Public Meeting Question Response.

Also included in the appendix are the presentations made at that Public Meeting. These are included in the Presentations section of the Public Consultation Appendix and are reproduced as black and white versions of the slides. Full copies of these PowerPoint presentations are available on the REMASCO web site www.remasco.ca.

Environmental Screening Process

As defined in O.Reg. 101/07 the Environmental Screening Process requires public notification of the start of the process. REMASCO published such notices in the local papers. Copies of both the notice of commencement and the notice of completion as published in the papers are appended as exhibit Public Notices.

Before the project was commenced, a preliminary version of the screening criteria was discussed with the PLC and Kingsville council. That screening along with REMASCO's rationale for the screening answers were circulated to various agencies and other parties at the time of the notice of commencement was published. Also included with the circulated materials were a project description and the opportunity statement related to the project. These materials were also uploaded to the REMASCO web site www.remasco.ca.

Publications

The project created interest with the media. Various publications reported on the use of ENERPAX pellets in the REMASCO gasifier to heat the greenhouses. Attached in the appendix are articles from:

- Windsor Business Magazine
- Greenhouse Canada
- YourHome.ca
- Toronto Start

In addition articles were published in the local media concerning the project, most notably the Windsor Star article on February 3, 2011 and the Kingsville Reporter Aug 23, 2011. Copies are appended.

The project was also covered in a news item on the Windsor A Channel station. A screen shot of the start of that video available on the web is also appended.

List of Agencies Contacted

Throughout the project a relatively short list of recipients have received information on the project by mail. These included officials of the local First Nations group; local and regional offices of the MoE; the Town of Essex; the Essex Regional Conservation Authority; the CAO of Leamington; the Windsor Essex Environment Committee; the Region of York and the Region of Peel; the Ministry of Agriculture, Food and Rural Affairs and the administration and councillors for the Town of Kingsville. A full mailing list is included in the appendix.

Issues Raised

Aside from the list of questions brought to the Public Meeting and the verbal questions from those that attended the Open House there was only limited response from any of the people notified or contacted.

At the public meeting 4 couples indicated that they might be interested in sitting on the PLC. The REMASCO responses to these expressions of interest are included in the appendix at New PLC Members#1.

One person, who chose not to identify him/herself sent an email to Mr. Gallant. That email and the REMASCO response are included in the Public Consultation appendix as Open House Comments and Response.

8.0 Information on Consultation with Aboriginal Communities

The project team used the references identified by the Environmental Assessment branch of the MoE to identify First Nations communities that might be affected by the project. One of the resources identified was the <http://chiefs-of-Ontario.org> web site that lists the Chiefs of First Nations communities in the province. That list includes the Caldwell First Nation located near Leamington Ontario and their chief Chief Louise Hillier.

As can be seen from the mailing list mentioned in the previous section Chief Hillier was placed on the mailing list for the circulation of all communications starting with the Notice of Commencement for the project.

When no response was received to the first mailing, Mr. Gallant also sent emails to the Chief to open the lines of communication. Notifications of various milestones in the project were sent to the Chief throughout the process and to date no response has been received from the Caldwell First Nation.

It should be noted that Deputy Grand Chief of the Allied and Iroquois Indians located in London Ontario was also included in the formal notification list for the project throughout the full project. To date no response has been received from the Deputy Grand Chief or anyone in his office.

9.0 Other Approvals

As discussed earlier in the report, there will be a number of approvals that must be obtained from various agencies. Each of these approvals have implications for the facilities as they defined design/operating requirements that must be met for approvals to be granted. As discussed in Chapter 6, various aspects of the facility will be designed to accommodate the known requirements, and with those measures in place there is limited possibility of negative impacts from the facilities. Each of these issues are summarised in this section.

9.1 Surface Water Issues

The effects of development of more buildings on the sites raises concerns about construction related impacts of silt runoff into local watersheds, as well as long term increases in runoff that can lead to soil erosion. The other potential surface water quality concern is that there will be process water discharges to local drainage ditches/municipal drains.

Construction activities, as described earlier in this document, will be restricted to a relatively small area, the construction of pads for the pellet storage silos and new APC systems at both Southshore and Agriville, and the larger scale construction of the foundation and floor of the co-generation building. These areas are relatively small compared to the greenhouses on site, and storm water runoff can be accommodated in the existing storm water management systems. The Municipality will confirm this determination.

Construction will occur more than 50 m from the edge of the drainage ditch along the east side of the Southshore property and 100 m from the east side at Agriville. This separation affords sufficient space to control any potential runoff from the construction area and ensure it does not reach the municipal drain system. Construction forces will ensure that silt barriers are in place to minimize potential silt deposition in the drainage ditch according to the Municipalities development guidelines.

It was concluded that, because storm water management systems are required as part of municipal approvals, and existing systems are capable of handling that load, construction and runoff control from the sites has little potential for negative environmental impacts.

Sanitary water effluents from the cogeneration will discharge to existing greenhouse sanitary drains. Floor drains will discharge into holding tanks and holding tank water will be used for bottom ash quenching and bottom ash dust abatement. Neither floor drain effluent, process water, nor boiler blow down water will be discharged to the environment as they will be collected in the holding tank discussed earlier in the document. This water will be used for purposes in the facility however if the volume collected exceeds the amount that can be used, the water will be hauled to the wastewater treatment plant.

This will mitigate any concerns about surface water discharges.

9.2 Land Use Issues

The REMASCO facilities are an adjunct land use to the greenhouses. They house the heating plants for the sites. There has been a concern raised about the heating system using a material that the MoE have deemed to be a waste. Since the emissions have been shown to have no effect on air quality in the community, and the pellets are odour free and will not contribute to vectors in the area, there should be few of the usual concerns about waste management facilities. The size and form of these facilities will have no effect on development on surrounding lands, nor on the use of those lands, and they will meet municipal standards. None of the lands to be used for these purposes are unstable or hazard lands, nor are they contaminated.

9.3 *Air Quality Impacts*

Experience suggests that a facility that meets the MoE A-7 Guidelines for air emissions will have little impact on air quality or human health in the vicinity of the development as discussed earlier. REMASCO has operated its gasification equipment on the Southshore site under the terms of a Certificate of Approval for the Pilot Facility. That approval required the facility to test emissions from the operating equipment on a frequent basis and compare those results to the A-7 emissions standards. The Proponent will be required to operate in compliance to those standards when the Waste CofA is issued. The MoE will specify operating conditions for the facility and, in particular, the acceptable emissions from the facility.

The air quality study, and the Human Health Risk Assessment study have shown that the REMASCO facility, when operated at the levels that the MoE will impose, will have no detrimental impact on air quality in the community.

9.4 *Noise*

Noise from the operating facility is another criteria covered in the MoE's approvals related to air emissions. Since these conditions are included in the Waste approval for the REMASCO facility, the MoE will impose standards on the acoustic characteristics of the operation. As such the measures recommended by the acoustic consultant will be incorporated into the MoE's approval and REMASCO will need to implement those measures. The result will be that noise from the facility should not be detrimental to those living or working around the site.

9.5 *Residue*

The Essex Windsor Solid Waste Authority currently monitors the operation of the facility to ensure that residues created by the process are handled in an appropriate manner. This agency overview ensures that residue disposal activities are conducted in a manner that does not pose a threat to the environment or human health. REMASCO anticipates that EWSWA will continue to exercise this overview function on the facilities.

10.0 Public Liaison Committee Activity

As discussed in the Public Consultation section of this report, REMASCO formed a Public Liaison Committee as part of its commitments to the local municipalities when the project was initiated in 2007. That committee, consisting of staff from both the Towns of Kingsville and Leamington, the Essex Windsor Solid Waste Authority, the Essex Windsor Environment Committee, staff from the local MoE office and staff from the Ontario Ministry of Agriculture, Food and Rural Affairs [OMAFRA]. These people met with REMASCO staff, their consultants, and interested members of public to discuss the progress of the pilot project. This committee has continued to be involved through the Environmental Screening Assessment project.

REMASCO is prepared to institute a formal Public Liaison Committee to act as an independent committee to overview the operation of the facilities and create a communications channel between REMASCO and its operators and the public. REMASCO will provide the necessary seed funding for this committee, but the committee will operate at arm's length from REMASCO. The committee would operate as a not for profit organization with its own rules of governance.

Providing the public with a line of communication through members of community should ease their concerns about potential interaction with the operators in the future.

11.0 References to Technical Reports

During the course of the Environmental Screening Assessment several special studies were completed. The largest of these studies were:

- the Air Quality Report; and,
- the Human Health Risk Assessment.

In addition an acoustic consultant was retained by REMASCO to address the issue of noise emissions from the facility to ensure that any required noise control measures were identified during the screening assessment. As part of the project, the Town of Kingsville retained consultants to provide Council with special expertise. These consultants prepared reports including:

- the Air Quality Report peer review;
- the Human Health Risk Assessment peer review; and,
- a Planning Study.

With the exception of the Acoustic Assessment the other reports were brought to Kingsville Council at a special meeting of council held August 15, 2011. The reports are available on the Town of Kingsville's web site at (<http://www.town.kingsville.on.ca/wps/wcm/connect/KINGSVILLE/KINGSVILLE/MUNICIPAL+INFO/Municipal+Council/>). The reports have also been uploaded to the REMASCO web site in PDF form. Given the size of the Air Quality Assessment and Human Health Risk Assessment documents these documents are not being circulated with the Environmental Screening Report. Rather, hard copies of the Air Quality Assessment and the Human Health Risk Assessment will be placed in local libraries along with hard copies of the Environmental Screening Report.

The Technical Report Appendix includes in the following order:

1. The Agenda of the Special Meeting of Council August 15, 2011
2. The Staff Report to Council
3. The Initial and Final Reports of the Planner concerning development issues
4. The Stantec Initial Peer Review of the AQA and HHRA documents
5. The Response from Intrinsik to the Peer Review Comments
6. The Response from A.J. Chandler & Associates to the Peer Review Comments
7. The Stantec Final Review comments on the amended AQA and HHRA reports
8. The Minutes of the Special Council Meeting

Also included at the end of the Technical Report Appendix is the report of J. E. Coulter Associates concerning the assessment of noise released from the REMASCO facility.

12.0 Net Effects Summary with advantages and disadvantages

The facilities proposed will:

- Provide an opportunity for the greenhouse operators to reduce the consumption of fossil fuels for heating their facilities;
- Generate electricity for use on-site thereby reducing the need for additional transmission lines to support greenhouse operations on the Southshore site, and reducing electricity transmission losses while achieving high efficiency for recovering the energy value of the ENERPAX fuel pellets;
- Allow residual waste materials to be used in an environmentally appropriate manner thereby reducing the need to landfill waste; and,
- Result in the overall lowering of air emissions from the facilities in question due to control of emissions from the gasifiers.

On balance, these would appear to be positive benefits from the implementation of the proposed projects.

Appendix
To

REMASCO
Environmental Screening Report

Contains

Public Consultation Materials

October 2011

Public Consultation Appendix

General Information

Consultations with Town Councils
The Public Liaison Committee
Public Events
Environmental Screening Process
Publications
List of Agencies Contacted
Issues Raised

Public Consultation Appendix

Personal Contact Information

Note: During the course of the Environmental Screening Project materials were circulated to various members of the public. While the hard copies of this report include that correspondence, and in particular the addresses of those contacted, it is the opinion of the project team that such information is inappropriate for the version of the report that will be posted on the REMASCO web site, therefore this information, names and addresses and attendance lists along with letters to potential members of the public liaison committee are not included in this section.

Public Consultation Appendix

Presentation Materials

Includes

Presentations to Kingsville Council

Open House Display Panels

Public Meeting Presentations

Appendix
To

REMASCO
Environmental Screening Report

Contains

Technical Reports

and

Peer Review Comments and Responses

October 2011

Contents of Technical Report Appendix

Major Reports

Available under Separate Cover

Air Quality Assessment

Human Health Risk Assessment

Staff Report to Council

Planner's Reports

Peer Review of Major Reports and Responses

Acoustic Assessment Report