Environmental Assessment
Registration Document (Class 1 Undertaking)

Expansion of Waste Management Services
Atlantic Industrial Services, Debert Facility

Prepared for:

Atlantic Industrial Services
A division of Envirosystems Inc.
11 Brown Ave.
Dartmouth, NS B3B 1Z7

Prepared by:

AMEC Earth & Environmental
A division of AMEC Americas Limited
32 Troop Ave.
Dartmouth, NS B3B 1Z1

28 November, 2008

TABLE OF CONTENTS

PAGE

EXECUTIVE SUMMARY ... v

1.0 INTRODUCTION ... 1
1.1 COMPANY OVERVIEW ... 1
1.2 ATLANTIC INDUSTRIAL SERVICES ... 1
1.2.1 Debert Facility ... 2
1.3 ATLANTIC INDUSTRIAL CLEANERS ... 2
1.4 AIC SULLIVAN'S ENVIRONMENTAL SERVICES ... 2
1.5 UNDERTAKING REGISTRATION ... 3
1.6 PUBLIC FUNDING ... 4
1.7 REGULATORY FRAMEWORK ... 4
1.7.1 Federal Regulations ... 4
1.7.2 Provincial Regulations ... 5
1.7.3 Colchester County Municipal Regulations ... 5

2.0 PROJECT DESCRIPTION ... 7
2.1 INTRODUCTION AND OVERVIEW ... 7
2.1.1 Nature of Undertaking ... 7
2.1.2 Purpose and Need ... 7
2.1.3 Site Location ... 8
2.1.4 Existing Site Facilities ... 8
2.1.5 Proposed Expansion – Components and Schedule ... 9
2.2 CONSTRUCTION PHASE ... 13
2.2.1 Construction Envelope ... 13
2.2.2 Works and Activities ... 13
2.2.3 Schedule ... 14
2.2.4 Construction-Related Economic Opportunities ... 15
2.3 OPERATION PHASE ... 15
2.3.1 Facility Layout and Operations – Overview ... 15
2.3.2 Waste Types and Volumes ... 16
2.3.3 Wastewater Sampling, Testing and Acceptance Procedures ... 17
2.3.4 Treatment Processes – Overview ... 18
2.3.5 Part I - Treatment of Aqueous-Organic Wastes ... 19
2.3.6 Part II - Treatment of Metal-Bearing Wastewaters ... 20
2.3.7 Part III - Management of Containerized Hazardous Wastes ... 21
2.3.8 Emissions and Discharges ... 21
2.3.9 Transportation ... 24
2.3.10 Stormwater Management ... 24
2.3.11 Malfunctions and Accidents ... 24
2.3.12 Employment ... 26
2.4 FACILITY MANAGEMENT ... 26
2.4.1 Environmental Management ... 26
2.4.2 Training ... 29
2.4.3 Security, Health and Safety ... 30

2.4.4 Community Involvement 30
2.5 DECOMMISSIONING AND ABANDONMENT 30
3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT 33
3.1 BIOPHYSICAL ENVIRONMENT 33
3.1.1 Topography, Geology and Soils 33
3.1.2 Hydrogeology 34
3.1.3 Surface Water 35
3.1.4 Climate 36
3.1.5 Terrestrial and Aquatic 37
3.2 SOCIO-ECONOMIC ENVIRONMENT 41
3.2.1 Existing and Planned Land Uses 41
3.2.2 Community Profile 42
3.2.3 Transportation 47
4.0 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION 49
4.1 PROJECT-ENVIRONMENT INTERACTIONS, VECS 49
4.2 POTENTIAL EFFECTS ON BIOPHYSICAL ENVIRONMENT AND MITIGATION ... 50
4.2.1 Construction Phase 50
4.2.2 Operation Phase 51
4.3 POTENTIAL EFFECTS ON THE SOCIO-ECONOMIC ENVIRONMENT 63
4.3.1 Construction Phase 63
4.3.2 Operation Phase 64
4.4 MALFUNCTIONS AND ACCIDENTS 65
4.5 SUMMARY – ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES 67
5.0 ENVIRONMENTAL MONITORING AND REPORTING 73
6.0 PUBLIC CONSULTATIONS 74
6.1 CONSULTATION ACTIVITIES 74
6.1.1 Government and Stakeholder Consultation 74
6.1.2 Consultation with the Public at Large 74
6.1.3 Issues and Concerns 75
7.0 CONCLUSIONS 76
8.0 REFERENCES 77

LIST OF FIGURES

Figure 1.2-1: Project Location 6
Figure 2.1-1: Debert Facility - Aerial Photo 10
Figure 2.1-2: Existing Facility Layout 11
Figure 2.1-3: Proposed Facility Layout 12
Figure 2.3-1: Overview of Wastewater Acceptance Procedures 18
Figure 2.3-2: Part I and II – Integrated Wastewater Treatment Process 31
Figure 2.3-3: Part III – Management Process for Containerized Wastes Dangerous Goods 32
Figure 3.1-1: Regional Context 39
Figure 3.1-2: Natural Features 40
Figure 3.2-1: Existing Land Use Features 43
Figure 3.2-2: Future Land Use - Debert Industrial Park 44
Figure 3.2-3: Colchester County Subdivisions 45
Figure 3.2-4: Age Distribution for Colchester County Subdivision B 46

Figure 3.2-5: Employment by Sector in Colchester County Subdivision B (StatsCan 2001, AMEC interpretation)....................47
Figure 4.2-1: Water9 Model - Process Schematic, Scenario 1 60
Figure 4.2-2: Water9 Model - Process Schematic, Scenario 2 61
Figure 4.2-3: Air Dispersion Model - Receptor Locations 62

LIST OF TABLES

Table 2.3-1: Waste Types and Volumes....................17
Table 2.3-2: Treatment Processes and Waste Types....................19
Table 2.4-1: Key Environmental Management Features 27
Table 3.2-1: Millbrook Band Reserve Information....................42
Table 3.2-2: Immigration Characteristics (Source StatsCan, AMEC interpretation) 46
Table 3.2-3: Knowledge of Official Languages (Source StatsCan, AMEC interpretation) 46
Table 3.2-4: 2001 Labour Force Indicators (Source StatsCan 2001, AMEC interpretation).......47
Table 4.1-1: Environmental Effects Matrix 49
Table 4.2-1: Predicted Air Emissions with New Waste Streams Treated – Scenario 1 53
Table 4.2-2: Predicted Air Emissions with New Waste Streams Treated - Scenario 2...............53
Table 4.2-3: Summary of Ontario MOE Standards and Ambient Air Quality Criteria (AAQC)....54
Table 4.2-4: List of Discrete Receptors....................54
Table 4.2-5: Source Parameters for Biological Treatment Pond and Holding Ponds 55
Table 4.2-6: Annual Emission Estimate – Present Flow Configuration....................55
Table 4.2-7: Emission Rates for Present Configuration 56
Table 4.2-8: Dispersion Model Results–Maximum Ground Level Concentrations–Scenario 1...56
Table 4.2-9: Annual Emission Estimate – New Wastes Direct to Biological Treatment Pond 57
Table 4.2-10: Emission Rates for New Waste Direct to Biological Treatment Pond...................58
Table 4.2-11: Dispersion Model Results-Maximum Ground Level Concentrations – Scenario 258
Table 4.4-1: Malfunctions and Accidents and Potentially Affected VECs 67
Table 4.5-1: Summary of Potential Effects and Significance of Residual Effects 68
Table 5.0-1: Existing and Future Monitoring and Reporting - Summary....................73
Table 6.1-1: Government and Stakeholder Consultation....................74

LIST OF APPENDICES

APPENDIX A: Industrial Approvals
APPENDIX B: Conceptual Design – Tank Farm, Multi-Purpose Processing Building
APPENDIX C: Waste Goods and Applicable TDG Classifications (Existing and Proposed)
APPENDIX D: Environmental Policies
APPENDIX E: Health and Safety Program (Table of Contents); Safety and Loss Control Policy Statement
APPENDIX F: Contingency Plan – Existing Facility
APPENDIX G: Water9 Model: Details on Data Input and Assumptions
APPENDIX H: Public Consultation (Notice, Project Website)

EXECUTIVE SUMMARY

AIS intends to expand the range of services at its existing Industrial Waste Treatment Facility in Debert, Colchester County, Nova Scotia. The proposed expansion includes additional storage capacity and new processing capabilities to treat wastewater and manage containerized waste materials generally classified as Waste Dangerous Goods. The extension of services requires an amendment of AIS' approval to operate the existing Facility. The planned new services can be provided with modifications and additions to the existing infrastructure and will take place within the boundaries of the existing Facility. The expansion is proposed to be implemented over a two year period (2009 - 2010).

The Debert Facility is located in the County of Colchester, Nova Scotia, less than 2km north of Highway 104 (Exit 13). The Facility is situated within the Debert Industrial Park which the County plans to further develop and extend. The Facility property itself is fully developed. On-site habitat and vegetation is minimal and limited to amenity green (i.e., turf and tree/shrub growth along the fence line, internal road system, and lagoon embankments). Adjacent land uses currently include other industrial/commercial uses, forest lands, a tree nursery and the Debert Paleo-Indian site. The latter is a largely forested area that is designated a Special Place under the Special Places Protection Act and a National Historic Site of Canada.

The existing Facility operation involves comprehensive environmental and safety management features including emission controls, monitoring, health and safety programs and emergency response plans. Following the proposed Facility expansion these will all continue. Adjustments to existing and additional new environmental management equipment, operating procedures, health and safety program and contingency plan provisions will be implemented prior to the start of the new services and in compliance with all permit amendments. The existing monitoring program will continue and will be expanded to address the new services. Adjustments to the monitoring program will be established in consultation with the regulators as part of the application process for permit amendments.

The proposed Facility expansion was examined in detail to determine the potential for adverse effects on the environment. Potential adverse effects on the environment relate to components such as water quality, air quality, vegetation and habitat and road traffic at or near the site. The assessment of effects involved the discussion of potential interactions between the proposed Project works and activities and various environmental components. For the assessment of potential effects on air quality computer based modeling was applied to determine air emissions associated with the future operation of the Facility's holding and treatment ponds. Subsequently. further modeling was undertaken to determine the dispersion of volatile organic compounds and ground level concentrations at various receptor locations.

Taking the Facility's existing and proposed environmental management features into account, none of the potentially adverse effects including air quality-related impacts are likely to be significant. The Project will cause beneficial effects on the local economy. It will secure employment at the existing Facility and support the development of the Debert Industrial Park. In addition, by eliminating the need for long distance haulage of significant quantities of Waste Dangerous Goods, the Facility expansion will result in a net reduction in fuel consumption, greenhouse gas emissions and vehicle operating costs.

1.0 INTRODUCTION

1.1 COMPANY OVERVIEW

Envirosystems Inc. is a member of the Scotia Investments Group of Companies, a Nova Scotia based private investment company. From its Head Office in Dartmouth, Nova Scotia, Envirosystems Inc. manages operating divisions throughout Atlantic Canada, Ontario and the United States.

Envirosystems Inc.'s operating divisions in Atlantic Canada include

- Atlantic Industrial Services;
- Atlantic Industrial Cleaners; and
- AIC Sullivan's Environmental Services.

Operating locations in Atlantic Canada are situated in New Brunswick (Moncton, Saint John, Miramichi), Prince Edward Island (Charlottetown), and Nova Scotia (Debert, Dartmouth, Sydney, Port Hawkesbury, Trenton).

Envirosystems Inc. has earned a solid reputation in providing comprehensive waste management and industrial services to all major sectors, including:

- Pulp and Paper
- Power Utilities
- Manufacturing
- Oil and Gas
- Transportation
- Food and Beverage
- Marine/Shipping
- Federal and Provincial Governments
- Construction
- Aerospace
- Fishing and Forestry
- Agriculture
- Insurance
- Municipalities
- Environmental

1.2 ATLANTIC INDUSTRIAL SERVICES

Atlantic Industrial Services (AIS), a division of Envirosystems Inc., is the largest locally owned industrial and environmental contracting company in Atlantic Canada, specializing in resource recovery and industrial services. The main business lines are as follows:

- **Hazardous waste material transportation and disposal;** this includes the operation of Atlantic Canada's most modern hazardous waste transfer facility in Moncton, New Brunswick.
- **Petroleum hydrocarbon based waste processing and recycling**; this includes oils, fuels, contaminated solids, industrial wastewater and glycol aircraft de-icing fluid. The treatment processes include physical, chemical, and biological processes for the treatment of waste oil and water.
- **Industrial Services** such as chemical cleaning, tank cleaning, emergency spill response, specialty industrial maintenance, snow and ice control, storage tank management, safety watch, demolition and general civil works.

- **Site remediation**. AIS is one of the most experienced contractors in the Atlantic Region in large-scale environmental remediation projects.

Local AIS facilities include five storage tank farms, a full-service hazardous waste transfer facility, and three industrial waste treatment facilities. Together, these locations provide extensive coverage of all local industrial centers. AIS also owns and operates its own fleet of trucks for transporting waste materials to further reduce environmental risk and liabilities.

This Environmental Assessment undertaking is focused on increasing the local treatment capabilities at the AIS Industrial Waste Treatment Facility in Debert, Nova Scotia. A brief overview of this Facility is provided in Section 1.2.1 below.

1.2.1 Debert Facility

The AIS processing Facility located in Debert, Nova Scotia (Figure 1.2-1) , is permitted to accept petroleum contaminated waste such as oil, oily solids such as filters and absorbent material, and industrial wastewaters.

The Facility receives collected used oils /fuel and recovers oils from other liquid and solid waste materials received. The collected and recovered oils are thermally treated and then filtered to remove solids. The resulting recycled fuel is placed in storage and sold to a variety of industries as a fuel source.

The Debert Treatment Facility is one of the largest commercial wastewater treatment facilities in Canada. The Facility utilizes a variety of well established treatment processes including dissolved air flotation, biological oxidation, pressure filtration, and ultrafiltration to remove solids and petroleum hydrocarbons from industrial wastewaters to meet applicable regulatory effluent discharge criteria. The wastewater holding and biological treatment system has a volume capacity of approximately 34 million liters and is permitted to discharge 136,200 litres per day to the Debert Industrial Park municipal water treatment system.

This Facility is unique due to its size and ability to treat a wide variety of industrial wastewaters. Over the past 10 years AIS has made significant investments into increasing processing capacity, new treatment technologies, and treatment method research and development. The volume of waste entering the Facility for processing and treatment has grown from 9 million litres per year to over 35 million per year. In March 2008, Envirosystems acquired Barrington Environmental Services and in doing so gained additional treatment facilities in St. John (NB) and Dartmouth (NS). As a result of the acquisition, some of the waste volumes previously received at the Debert Facility are now treated at these locations. Full time staff working out of the Debert Facility has grown from 20 to 27 plus additional part time staff during peak periods.

1.3 ATLANTIC INDUSTRIAL CLEANERS

Atlantic Industrial Cleaners (AIC), a division of Envirosystems Inc., has been in operation for more than 25 years. AIC provides the region's largest and most diverse fleet of industrial, municipal cleaning and remote pipe line video equipment. AIC specializes in cleaning ships' hulls, bilges, fuel tanks, and various industrial process and storage equipment.

AIC services the Atlantic Canada region through its head office in Dartmouth, and operating offices in Sydney, Trenton, Port Hawkesbury, Charlottetown, Saint John, Moncton, and Miramichi.

1.4 AIC SULLIVAN'S ENVIRONMENTAL SERVICES

AIC Sullivan's Environmental Services, a division of Envirosystems Inc., provides services for industrial, environmental, residential and municipal sectors throughout Cape Breton Island. AIC environmental problem and is a contractor for Eastern Canada Response Corp (emergency oil spills).

1.5 UNDERTAKING REGISTRATION

NAME OF UNDERTAKING

Service expansion to include the receipt, storage and treatment of waste materials containing waste dangerous goods.

LOCATION

660 MacElmon Road, Debert, Nova Scotia

PROPONENT

Name:	Atlantic Industrial Services, a division of Envirosystems Inc.
Mailing Address:	11 Brown Ave., Dartmouth, Nova Scotia, B3B 1Z7

CEO OF PROPONENT

Michael Ryan

CONTACT PERSON

Paul Sanford, P.Eng.
Vice President, Atlantic Industrial Services – Waste Division
660 MacElmon Road
P.O. Box 185
Debert, Nova Scotia B0M 1G0
Phone: 902-662-3374
Cell: 902-440-1553
Fax: 902-662-3337
E-mail: psanford@envirosystems.ca

SIGNATURE OF SIGNING OFFICER

Stephen Handrahan, P.Eng.
Senior Vice President Envirosystems Inc

NOVEMBER 28, 2008
Dated

1.6 PUBLIC FUNDING

The undertaking will be 100% privately funded by Envirosystems Inc.

1.7 REGULATORY FRAMEWORK

The Environmental Assessment (EA) process in Nova Scotia is regulated under the provincial Environment Act and Environmental Assessment Regulations. This project triggers the provincial EA process as a Class I (E) Undertaking because it meets the following criteria:

A permanent commercial facility for the handling of waste dangerous goods

Federal and provincial environmental acts and regulations apply to AIS in regards to the design, site preparation, operation of the proposed hazardous waste handling and treatment Facility. In addition to the environmental legislation, other acts and regulations relating to labor standards, construction standards and health and safety regulations will be applicable to the project.

The following provides a listing of some pertinent acts and regulations that may be applicable for the undertaking and/or were considered in the preparation of this Environmental Assessment Registration Document.

Federal:

- Canadian Environmental Assessment Act and Regulations;
- Canadian Environmental Protection Act and Regulations; and
- Transportation of Dangerous Goods Act and Regulations.

Provincial:

- Environment Act and Regulations;
- Transportation of Dangerous Goods Act and Regulations;
- Labor Standards Code; and
- Occupational Health and Safety Act and Regulations.

Municipal:

- Building By-Law;
- Sewer By-Law;
- Garbage Collection and Disposal By-Law;
- Regional Emergency Measures By-Law;
- Canadian National Building Code; and
- Canadian Electrical Code.

1.7.1 Federal Regulations

The Canadian Environmental Assessment Act (CEAA) details the federal environmental assessment process. Federal departments and agencies have to be consulted, if federal funding, land transfer and permitting are requested or applicable.

The proposed expansion of AIS' Hazardous Waste management services at the Debert Facility is not thought to invoke any federal triggers listed under CEAA. No federal funding or federal land is sought for this Project and no permit is required pursuant to federal legislation. In particular, the development and operation of the extended Facility is not expected to cause any adverse effects on fish or fish habitat. Consequently, no federal permit under Section 35 of the Fisheries Act is required.

1.7.2 Provincial Regulations

Under Part IV of the Nova Scotia Environment Act every proponent of an undertaking defined by regulations under the Act must register the undertaking with the NS Minister of the Environment. The Project at hand is classified as a Class I undertaking under Schedule A of the Nova Scotia Environmental Assessment Regulations. As such the registration of this project requires the submission of a Registration Document. If approved, the undertaking will have an Environmental Assessment Approval issued with Conditions of Release.

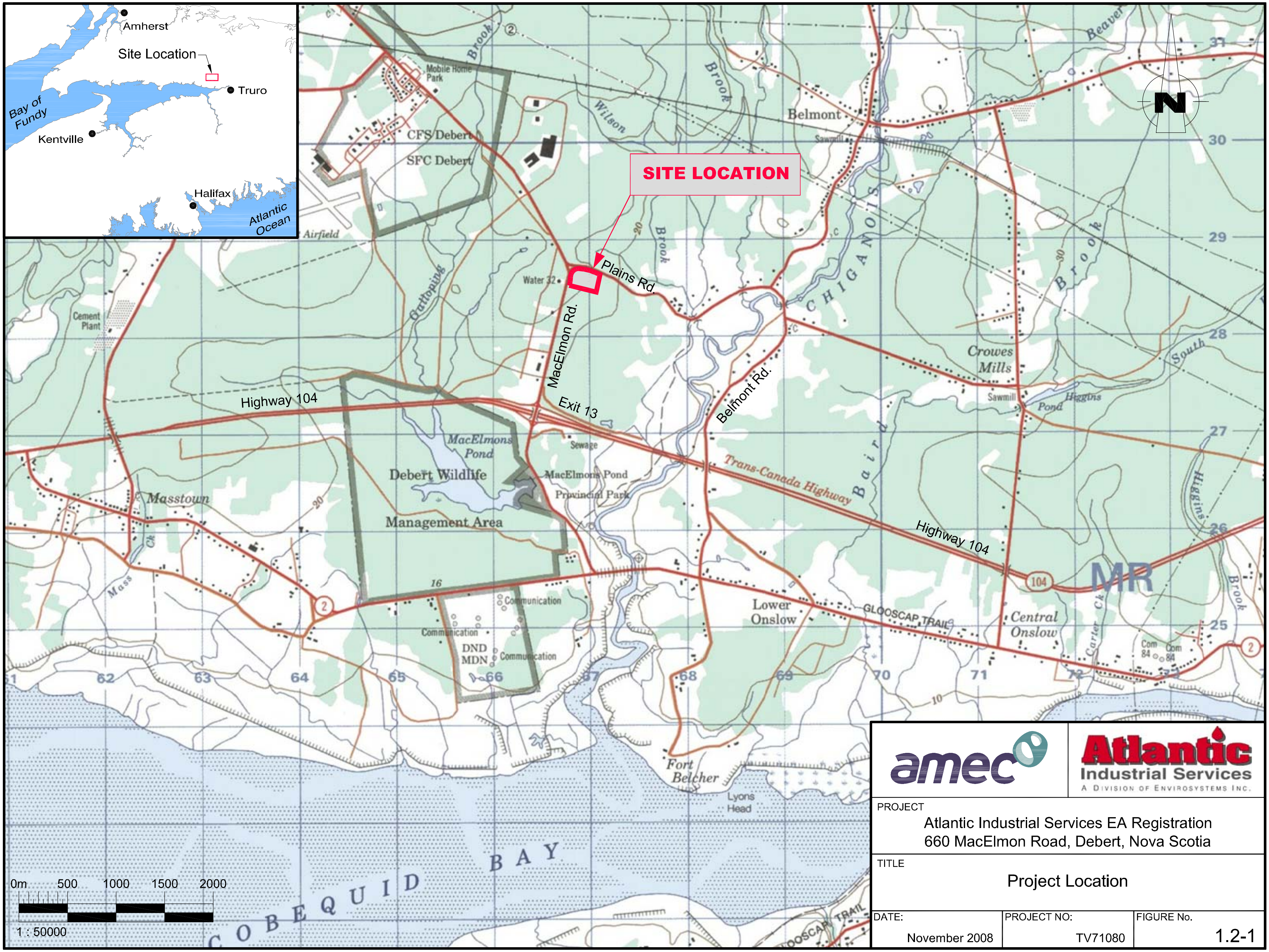
Under Part V of the Nova Scotia Environment Act the Project will also require a provincial Industrial Approval. An Industrial Approval (IA) defines specific operational conditions and limitations, including air emissions, noise, surface water and groundwater monitoring criteria and monitoring plans. An IA application will be made by AIS when EA approval is received.

1.7.3 Colchester County Municipal Regulations

Applicable by-laws and codes enforced on municipal level include:

- Building By-Law;
- Sewer By-Law;
- Garbage Collection and Disposal By-Law;
- Regional Emergency Measures By-Law;
- Canadian National Building Code; and
- Canadian Electrical Code.

The existing Debert Facility has been operating in compliance with the applicable municipal by-laws and codes referenced above. All proposed new service expansions will be developed and implemented to maintain compliance.



amec | Atlantic Industrial Services — A Division of Envirosystems Inc.

PROJECT

Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE

Project Location

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	1.2-1

2.0 PROJECT DESCRIPTION

2.1 INTRODUCTION AND OVERVIEW

2.1.1 Nature of Undertaking

AIS intends to expand the range of services at its existing Industrial Waste Treatment Facility in Debert, Colchester County, Nova Scotia. The proposed expansion includes additional storage capacity and new processing capabilities to treat wastewater and manage containerized waste materials generally classified as Waste Dangerous Goods. The extension of services requires an amendment of AIS' approval to operate the existing Facility.

2.1.2 Purpose and Need

The AIS proposal for expanded services at the existing Industrial Waste Treatment Facility in Debert is in response to identified market opportunities related to waste treatment needs in Atlantic Canada for materials containing waste dangerous goods that are currently being shipped outside Atlantic Canada for disposal. The wastes received at the Debert Facility (current and future) originate from a variety of sources including the oil and gas industry, industrial manufacturers and municipalities.

The purpose of the proposed expansion is to address the identified needs of local businesses and government organizations for:

- Increased local treatment options;
- Reduced waste management costs;
- Reduced environmental liability; and
- Reduced impact on the environment resulting from long distance waste transport.

The costs associated with waste disposal represent a large operational cost and potential liability to both established local industries and new industries planning to develop in Atlantic Canada. Addressing their needs as described above will make local industry more financially competitive and facilitate local industrial growth.

Wastewater Treatment

The existing Debert Industrial Waste Treatment Facility is unique in terms of its capacity to store and treat large volumes, and the wide range of industrial wastewaters that it can treat. The Facility currently treats wastewaters from industries throughout Atlantic Canada and as far away as Ontario.

AIS has a program of continual investment in research and development to evaluate new treatment methods, and capital expansion to increase treatment capabilities. Under the current Industrial Approval, the Debert Facility is not permitted to accept wastewaters classified under the Transport Canada's Transport of Dangerous Goods (TDG) regulations as Waste Dangerous Goods unless they are classified as waste fuels. Currently, within Atlantic Canada, there is no commercial facility licensed to treat such wastes. These wastewaters, therefore must be transported to permitted treatment and/or disposal facilities outside Atlantic Canada. The wastewater treatment capabilities of the Debert Facility will be expanded – through the addition of three new treatment systems – to include aqueous-organic and metal-bearing wastewaters classified under TDG regulations as Waste Dangerous Goods (further discussed in Sections 2.1.5, 2.3.5 and 2.3.6).

The transport of wastewaters over long distances for disposal represents a significant cost and liability to both AIS, the generator industries, and waste generating municipalities. Global competitiveness is increasing pressure for local industry to reduce costs. The proposed local treatment of industrial waste at the Debert Facility represents a significant opportunity for cost savings for some local industries and municipalities.

Containerized Waste Management

AIS collect waste material contained in drums (e.g. 205-litre steel drums) and similar containerized waste, throughout the Maritime Provinces. Typical wastes include waste liquid oily materials, waste solvents, batteries, paint waste, oil contaminated solids (e.g. Rags and filters), and household hazardous wastes that are collected at municipal Household Hazardous Waste (HHW) events.

A high percentage of the drums collected by AIS are generated in Nova Scotia – by industrial companies, hospitals, and municipal HHW events. Each drum is dedicated to either TDG regulated waste goods or non-regulated wastes. All of the drums are labeled prior to shipment to the Debert Facility.

Under the existing permit, only drums meeting the current acceptance criteria for treatment at the facility can be unloaded at Debert. The TDG-regulated drums are transported to the AIS Hazardous Waste Transfer Facility in Moncton, New Brunswick. Some of these drums are only partially full of waste dangerous goods. This results in inefficiencies, additional liability and additional handling/transport costs which are ultimately paid by AIS customers.

A revised AIS Debert Facility approval would broaden the scope of containerized materials that can be received into the Facility for temporary storage and subsequent repackaging prior to reshipment to a hazardous waste transfer or disposal facility (See Section 2.3.7 for further details).

2.1.3 Site Location

The location of the AIS Debert Facility is shown in Figure 1.2-1. The Facility is located at 660 McElmon Road, in Colchester County, Nova Scotia. (Grid Reference: N5028200,E466700; Map Series: 1:50,000 (11E/6)).

The property is situated approximately 2 km north of the TransCanada Highway (HWY 104) and about 2 km east of the Debert Airport (Figure 1.2-1).

2.1.4 Existing Site Facilities

The existing Debert Facility consists of 13.76 acres [5.5 ha] of land in the Debert Industrial Park (Lot 652-A). The Facility holds the following Nova Scotia Approvals (copies are provided in Appendix A):

- Approval for a Used Oil Collection and Storage operation and associated works, # 2002-029861-A01; and
- Industrial Approval to operate an Oil Re-refining and Wastewater Treatment Facility and associated works, #2000-015375-A06 (This Approval is currently undergoing renewal by NSE).

Figure 2.1-1 provides a view of the Facility from the air. The current general arrangement and Facility components are depicted in Figure 2.1-2.

2.1.5 Proposed Expansion – Components and Schedule

The proposed new services can be provided with carefully designed additions and modifications to the existing Facility infrastructure as shown in Figure 2.1-3. Key elements of the planned expansion include; the installation of new storage tanks, construction of a new multi-purpose building and the addition of three new wastewater treatment systems. An integral part of the Facility expansion involves decommissioning the existing Stormwater Management Pond and redeploying one of the adjacent wastewater holding ponds to serve as its replacement. These additions and modifications will significantly enhance the company's waste management capabilities. The undertaking consists of three primary components hereafter referred to as Part I, Part II and Part III:

- Part I – Treatment of Aqueous-Organic Wastes

  Expansion of facility operations to receive, store and treat additional wastewaters classified as waste dangerous goods due to their organics content. Two of the new treatment systems mentioned above will be used to process aqueous-organic wastes. One system, based on distillation, will be dedicated to processing aqueous-organic liquids rich in organics. The distillation unit will be designed for methanol recovery from aqueous-organic fluids containing 20 to 40% methanol. The second system is based on diffused air biological oxidation. This system will be used to treat aqueous-organic wastewaters contaminated with biodegradable organic compounds at lower concentrations, where recovery is not economically feasible.

- Part II – Treatment of Metal-Bearing Wastewaters

  Expansion of facility operations to receive, store and treat additional wastewaters classified as waste dangerous goods due to their heavy metal(s) content. The third new system mentioned above will be used to treat wastewaters contaminated with heavy metals such as cadmium, chromium, lead and zinc. The system will employ a combination of conventional processing steps. Heavy metals will be recovered from the contaminated wastewaters in the form of solid residues.

- Part III – Management of Containerized Hazardous Wastes

  Expansion of facility operations to receive, store, and repackage containerized hazardous wastes classified as waste dangerous goods. Most of the waste materials (e.g., corrosive liquids, waste solvents, oxidizers, batteries, etc.) will be received in 205-L steel drums. All of the containerized waste will be stored indoors with separate containment for incompatible goods. These waste dangerous goods will not be treated at the Facility.

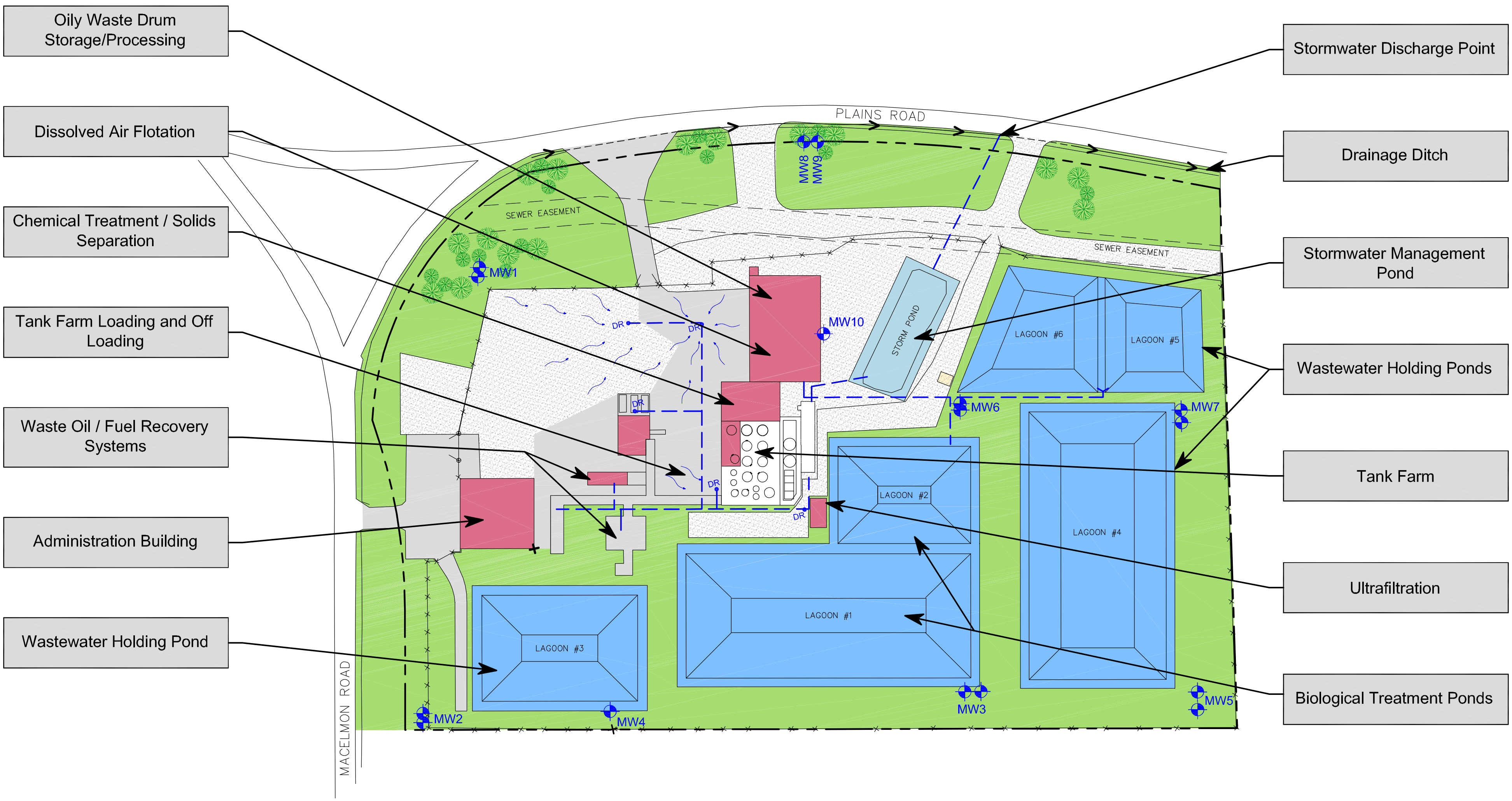
The proposed Facility modifications and additions outlined above are scheduled to be implemented in 2009 and 2010 subject to the necessary approvals. In order for AIS to respond to current market needs, Part I of the proposed expansion needs to be completed and fully operational early in the third quarter of 2009.

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE Debert Facility Aerial Photo

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	2.1-1



Legend:

- Property Boundary
- Fence Line
- Gravel
- Paved (Concrete & Asphalt)
- Vegetated Area (With/Without Tree Growth)
- Buildings
- Stormwater Collection System (DR)
- Groundwater Monitoring Well (MW)
- Surface Water Flow Direction

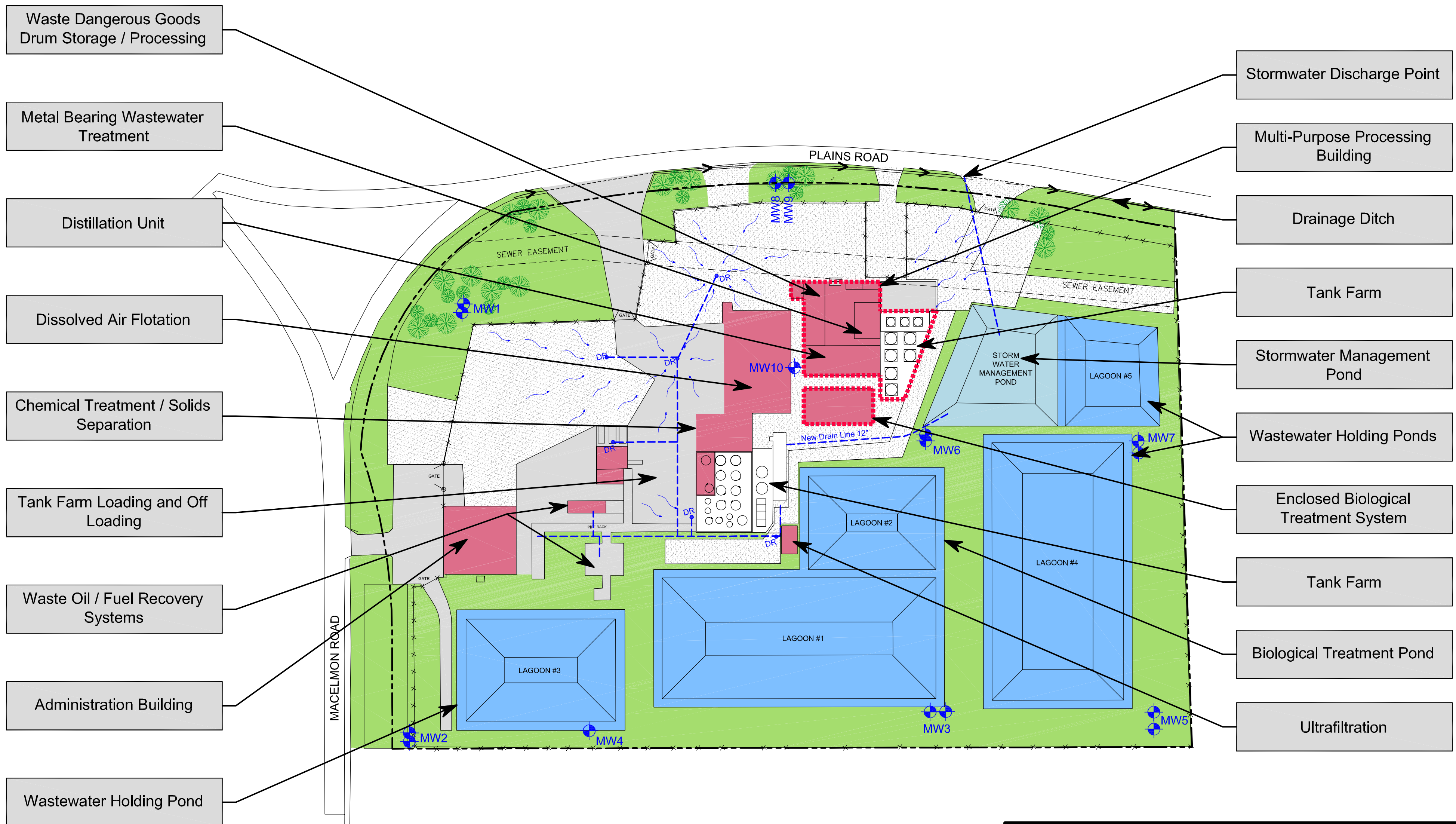
amec

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT
Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE
Existing Facility Layout

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	2.1-2



Legend:

- Property Boundary
- Fence Line
- Proposed Expansion
- Paved (Concrete & Asphalt)
- Gravel
- Buildings
- Vegetated Area
- Stormwater Collection System
- Groundwater Monitoring Well
- Surface Water Flow Direction

0m 20 40 60 80

(Approximate)

N

amec

Atlantic Industrial Services

A Division of Envirosystems Inc.

PROJECT	Atlantic Industrial Services EA Registration 660 MacElmon Road, Debert, Nova Scotia
TITLE	Proposed Facility Layout

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	2.1-3

2.2 CONSTRUCTION PHASE

2.2.1 Construction Envelope

All physical works and activities will be confined to the area within the fence line of the AIS property (Figure 2.1-3).

2.2.2 Works and Activities

The physical modifications and additions necessary to provide the proposed new services at the Debert Facility will be implemented as required. Key elements to be developed for the three components of the proposed expansion are as follows:

Part I - Treatment of Aqueous-Organic Wastes;

- Establish a new Stormwater Management Pond ;
- Fill in the existing Stormwater Management Pond;
- Erect new multi-purpose processing building;
- Install new distillation unit;
- Construct new tank farm;
- Install organics waste and product storage tanks;
- Construct new biological oxidation treatment system; and
- Install fugitive emission controls.

Part II - Treatment of Metal-Bearing Wastewaters;

- Install storage tanks for metal-bearing wastewaters;
- Upgrade existing chemical treatment system;
- Install chemical pretreatment reaction vessel;
- Install chemical reagent mix tanks;
- Install treated water holding tank;
- Install secondary containment features; and
- Install ventilation and air emission controls.

Part III – Management of Containerized Hazardous Wastes;

- Develop drum storage area in new building with separate containment for incompatible goods; and
- Install engineered ventilation system and air emission controls.

All of the works associated with the proposed expansion will be located in the north east quadrant of the property. The existing Stormwater Management Pond is located near the center of the area selected for the proposed expansion. In order to accommodate the new works, the existing Stormwater Pond will be filled in and Wastewater Holding Pond No. 6 will become the new Stormwater Management Pond. Wastewater Holding Pond No. 6 is an acceptable replacement option because it is near-by and significantly larger than the existing Stormwater Management Pond. Furthermore, Wastewater Holding Pond No. 6 has a double HDPE impermeable liner system, with interstitial space (i.e., space between the liners) for leak monitoring, whereas the existing Stormwater Pond is clay-lined.

The area allocated for the new biological oxidation treatment tank will be excavated to a depth of approximately 12 ft (4 m). Earth from this excavation will be used to fill in the decommissioned Stormwater Management Pond. It is estimated that an additional 600 yd^3 (456 m^3) of clean fill (approximately 50 truck loads) will be required to backfill the pond and raise the area to the level required for the new building and tank farm. In addition, about 320 yd^3 (245 m^3) of gravel (approximately 30 truck loads) will be required for the base of the new building and tank farm.

The new multi-purpose building will have exterior dimensions of approximately 110 ft x 90 ft (about 33 m x 27 m). It will be a standard modern steel building suitable for appropriate wind and snow loading for the Debert area. Cranes and scaffolding will be used to erect the steel frame. The building will have a concrete foundation and floor. The main building floor will be approximately 8 in (about 20 cm) thick concrete and shall have a finished level 6 in (about 15 cm) below the top of the foundation walls to form a containment barrier.

The new building will house three separate processing areas. The largest of the three processing areas, located at the south end of the building, will be dedicated to the distillation unit. A recessed secondary containment area along the east side of the building will accommodate most of the equipment required for the chemical pretreatment of metal-bearing wastewaters. Space will be provided in the north end of the building and along the west side of the building for receiving, repackaging and storage of containerized waste dangerous goods (see Appendix B for conceptual detailed drawing).

The new tank farm will be located on the east side of the multi-purpose building. It will have concrete walls and a concrete floor. The tank farm will be sub-divided into two main areas, one for aqueous-organic wastes and one for metal-bearing wastewaters. The tank farm will house a total of eight fixed-roof bulk storage tanks ranging in capacity from 40,000 to 110,000 liters. Separate containment will be provided in the tank farm for incompatible wastes.

The new diffused air biological treatment tank will be located south of the multi-purpose building. The dimensions of this concrete tank are anticipated to be about 80 ft long x 40 ft wide x 12 ft deep (about 27 m x 13 m x 4 m) (Note: The tank is proposed to be placed no more than 9 ft (3m) below grade level). The outside of the concrete walls will be coated with a spray applied polymer enhanced waterproofing membrane before the outside perimeter of the tank is backfilled. A network of tube-type diffusers will be installed in the tank to deliver the required air supply. A fabric building or a low profile cover will be installed to enclose the biological treatment system. (see Appendix B for conceptual detailed drawing).

2.2.3 Schedule

It is anticipated that the construction activities associated with the expansion will begin early in 2009 and be completed by the end of 2010.

Part I, the work required to establish the new Stormwater Management Pond and fill in the decommissioned Stormwater Pond will require about 2 weeks. During the next 6 months; the new building will be erected, the biological treatment system will be installed and the tank farm will be constructed. The distillation unit will also be installed during this period.

Part II, the upgrades proposed for the existing chemical treatment system are scheduled to begin in 2010. New tank capacity for metal-bearing wastewater storage and chemical pretreatment and associated air emission controls (if required) are scheduled for the same year.

Activities relating to Part II will extend over a number of months and will mostly be related to indoor work.

Part III, the work required to develop the drum storage area in the new building and install the engineered ventilation system and air emission controls is scheduled for early in 2010.

2.2.4 Construction-Related Economic Opportunities

The estimated capital cost for the proposed Facility expansion amounts to approximately $2,750,000 in total. To the extent possible and feasible, AIS will be using local market suppliers and contractors.

2.3 OPERATION PHASE

2.3.1 Facility Layout and Operations – Overview

The proposed expansion of services will be incorporated into the existing Facility operations over a period of about two years. The existing Facility layout is shown in Figure 2.1-2. Major components of the Facility and its associated operations are summarized below.

Tank Farm Loading and Off-Loading Area:

- Loading and off-loading area for bulk materials at the tank farm;
- Area is 756 sq ft (70 m^2) asphalt and concrete with sloped design to provide containment in the event of an accidental release;
- Accommodates four tanker trucks;

Tank Farm:

- 8,500 sq ft. (790 m^2) tank farm with concrete containment;
- Storage capacity 1.2 million litres;
- 20 tanks for storage of received material prior to processing, process fuel, and commercial recycled fuel;

Waste Oil / Fuel Recovery Systems:

- Two thermal treatment systems for recovery and processing of waste oils and fuels - one a batch system and the other a continuous system;
- The existing recovery systems generate over 5 million litres of recycled fuel annually that is sold to local markets;

Chemical Treatment / Solids Separation

- 3,600 sq ft. (330 m^2) building area used for the separation and recovery of solids contained in wastewaters and sludge;
- Primary components are:
    - two tanks for chemical treatment / sludge conditioning;
    - plate filter press 45 ft^3 (1.3 m^3);
    - two centrifuges;
- Resulting wastewaters are biologically treated on-site and the recovered solids are loaded into bins and transported for third party disposal;

Wastewater Pretreatment / Dissolved Air Flotation

- 1,700 sq ft. (160 m^2) area in the Process Building;

- Uses Dissolved Air Flotation (DAF) technology to remove low levels of oils and solids from wastewater;
- Capacity to process 60 litres per min;

Wastewater Holding Ponds

- Four holding ponds with a total storage capacity of 21 million litres. These ponds are used for storing raw wastewaters prior to treatment.

Biological Treatment Ponds and Ultrafiltration System

- Two independent biological treatment ponds, with a total volume of 13 million litres;
- Following biological treatment, the wastewater flows through the ultrafiltration unit for suspended solids removal prior to discharge;
- The permitted discharge is up to 136,200 litres (30,000 gal) per day to the Debert Industrial Park Municipal Water Treatment Plant;
- The municipal facility further treats the water using biological and UV processes prior to discharge;

Stormwater Management Pond

- A clay-lined stormwater management pond used to collect stormwater from throughout the site;
- Collected water flows through an API oil/water separator and then to the pond;

Drummed Oily Waste Storage and Processing

- 3,700 sq ft (344 m^2) area of the Process Building;
- Incoming containerized wastes are received, sampled and stored in designated areas.
- Liquids are pumped to a product holding tank prior to processing;
- Oil filters are processed in a filter crusher. The resulting oil is recycled; and crushed filters are sent to a metal recycler;
- Oil contaminated solids are bulked into bins for transport to a third party disposal facility;

Administration Building

- 6,900 sq ft (640 m^2) building contains the on-site laboratory, administrative offices and supplies storage warehouse.

Several components of the existing Facility will play a dominant role in delivery of the new services. In particular the primary biological treatment pond, wastewater holding ponds, filter press and ultrafiltration system. These components will be integrated with the new wastewater treatment systems, infrastructure additions and site changes described briefly in Section 2.1.5 and illustrated in Figure 2.1-3. The following text describes the operations of the Facility as it relates to the proposed new services.

2.3.2 Waste Types and Volumes

Feedstock (waste types) currently managed and proposed to be processed at this Facility in the future are listed in Table 2.3-1 together with approximate quantities. The estimated volume for Part I is expected to be generated from onshore oil & gas exploration activities in the Maritimes. The estimated volume for Part II is expected to be generated by Nova Scotia based industries.

Table 2.3-1: Waste Types and Volumes

Waste Type	Approximate Quantities (per year)			
	Existing Debert Operation	Proposed: Part I Aqueous-Organic Wastes	Proposed: Part II Metal-Bearing Wastewaters	Proposed: Part III Containerized Waste Dangerous Goods
Bulk Wastewater (L)	18,000,000	7,000,000	1,000,000	
Used Oils (L)	7,000,000			
Containerized Waste Liquids (Drums)	2,000			
Containerized Waste Solids (Drums)	5,000			
Containerized Waste Dangerous Goods (Drums)				3,200

A detailed list of materials (and their TDG classifications) currently accepted, and those proposed to be accepted in the future are shown in Table C-1, Appendix C.

2.3.3 Wastewater Sampling, Testing and Acceptance Procedures

The establishment and practice of thorough waste acceptance procedures for Waste Dangerous Goods will achieve two major objectives. Firstly, it will ensure that all wastewaters processed at the Facility are in compliance with existing approvals; secondly, it will minimize the transportation of wastes which are subsequently rejected as unacceptable at the Facility. In addition to these requirements, routine analysis and testing will be conducted to support process operations at the Facility and monitor the quality of plant effluents.

Prior to the acceptance of wastewaters AIS will ensure that the waste can be treated to meet discharge criteria. The Facility will accept and will be well equipped to properly handle the new types of waste listed in the previous section.

Rigorous testing and acceptance procedures will be used to screen the various wastewaters. Analysis and testing will be directed by AIS in accordance with standard analytical methods acceptable to the environmental regulators. The analytical methods commonly used for water and wastewater analysis by certified laboratories are generally based on methods approved and/or published by large, highly qualified organizations such as the United States Environmental Protection Agency (EPA), the American Society for Testing and Materials (ASTM), the American Public Health Association (APHA) and the American Water Works Association (AWWA). Figure 2.3-1 illustrates the sequential steps leading to waste acceptance by the Debert Facility operator.

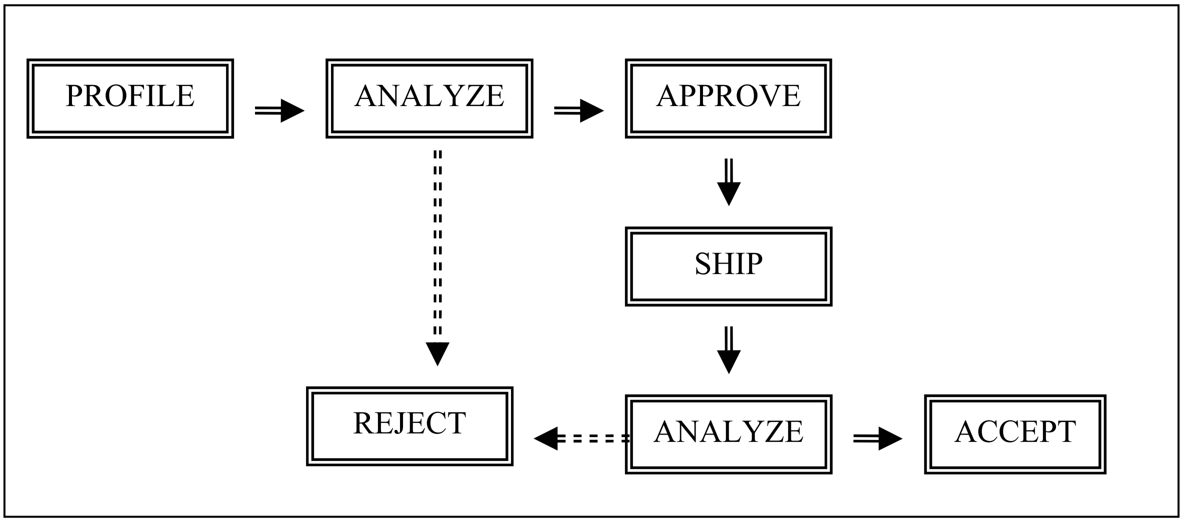


Figure 2.3-1: Overview of Wastewater Acceptance Procedures

As the first step in the waste screening process, prior to any new wastewater stream being shipped to the Facility, the waste generator and qualified AIS staff will prepare a descriptive profile of the waste to be handled. AIS will obtain a representative sample of new wastewater and ensure a complete analysis will be performed on the material. Waste treatability testing may be required in some cases to confirm that the waste can be effectively treated. At this point qualified Facility staff will review all of the information available and approve (or disapprove) the waste for processing at the Facility.

After the waste has been approved for processing, the generator will schedule the waste shipment with the Facility operator and arrange suitable transportation. The generator will complete a shipping manifest describing the waste, its volume, the generator, transporter and receiving facility.

When the waste arrives at the Debert Facility, it will be once again sampled and analyzed to verify the actual-on-hand profile of the shipment. A facility technician will procure a sample of the truck contents for immediate analysis by the Facility laboratory. If there is not sufficient information gathered from this sample, another sample will be taken until the laboratory is satisfied that the truck contents are as stated in the manifest and can be handled and processed in a safe manner. All analytical data will be documented with the generator number and stored on a computer system.

The Facility laboratory will perform the desired analysis according to standard methods for the analysis of water and wastewater. If the test results and the manifest do not match, the shipment may be rejected and either returned to the generator or sent to another appropriate facility; if acceptable, it will be unloaded and stored in the holding pond or tank designated for the waste type.

2.3.4 Treatment Processes – Overview

The treatment processes to be applied in context of the proposed new waste management services are listed in Table 2.3.-2. As discussed earlier, the containerized waste classified as Waste Dangerous Goods is not treated on-site. None of the treatment processes therefore apply. Further detail regarding each of these processes is provided in the following sections as referenced in Table 2.3-2.

Table 2.3-2: Treatment Processes and Waste Types

Treatment Processes	Part I Aqueous-Organic Wastes	Part II Metal-Bearing Wastewaters	Part III Containerized Waste Dangerous Goods
Distillation	x		NA
Acid / Base Neutralization		x	NA
Metals Precipitation		x	NA
Chemical Oxidation		x	NA
Chemical Reduction		x	NA
Carbon Adsorption		x*	NA
Biological (Aerobic)	x	x*	NA
Biological (Anaerobic)	x	x*	NA
Pressure Filtration	x	x	NA
Ultrafiltration	x	x*	NA
Process Description	Section 2.3.5	Section 2.3.6	Section 2.3.7

* Industrial wastewaters containing a combination of heavy metals and organic contaminants

2.3.5 Part I - Treatment of Aqueous-Organic Wastes

Under the existing approval, the Debert Facility already receives, stores and processes wastewater containing waste fuels that are TDG regulated. Part 1 of the undertaking will expand existing operations to include wastewaters containing a variety of hazardous/toxic organic components. The facility will utilize a combination of treatment processes to recover or destroy specific organic pollutants based on the physical properties, chemical composition and organics loading of the wastewater. For example; methanol at high concentrations will be recovered, whereas, low concentrations of phenol in aqueous solutions will be destroyed. It is important to note that liquid wastes contaminated with polychlorinated biphenyls (PCBs) or mercury will not be accepted for treatment at the Facility.

A simplified schematic diagram of the integrated wastewater treatment plant is presented in Figure 2.3-2. In general, plant operations will involve the handling and treatment of bulk quantities of wastewater to yield residual solid wastes and aqueous discharge outputs. The selection and sequential arrangement of unit operations is dependent on the characteristics of the waste to be treated.

After the wastewater is accepted, it is transferred to one of the existing holding ponds, a designated tank in the tank farm, or directly to biological treatment. Wastewater transferred to one of the existing holding ponds is destined for subsequent biological treatment. Wastewater transferred to a tank in the tank farm will be processed to recover organic liquid by-products.

A new distillation unit will be used to recover organic liquid by-products from aqueous-organic wastes. The recovered product will be stored in a designated bulk liquid tank prior to transport for reuse in commercial applications. Based on current information it is anticipated that the annual volume of recovered organics, primarily methanol, will be approximately 1,500,000 litres.

Wastewater recovered from the distillation process is transferred directly to biological treatment, or to one of the existing holding ponds for subsequent biological treatment.

In normal operations, mixed liquor from one of the biological treatment ponds is continuously fed to the ultrafiltration unit. Treated water recovered using this system is discharged to the municipal sewer. The concentrated mixed liquor stream from the ultrafiltration unit flows back to the biological treatment pond.

Biomass is periodically withdrawn from the treatment ponds and dewatered via pressure filtration. Wastewater from the filter press is typically returned to one of the biological treatment ponds, the recovered solids are shipped off-site for third-party disposal.

The Part I-related works are proposed to be implemented immediately following approval.

2.3.6 Part II - Treatment of Metal-Bearing Wastewaters

Under the existing Approval, the Facility already receives stores and processes metal-bearing wastewaters and sludges provided that the levels of contaminants are below those defined as Dangerous Goods under Transport Canada's TDG Regulations. The amended Approval would remove this limitation.

A combination of physical and chemical treatment processes will be employed to remove heavy metals from contaminated wastewaters. A simplified schematic diagram of the integrated wastewater treatment plant is presented in Figure 2.3-2.

The Facility has equipment in place for bulk chemical treatment and solids/liquid separation as illustrated in the schematic. The existing system is comprised of one waste holding tank, one chemical treatment tank, chemical reagent tanks and a conventional 45 ft^3 filter press. Upgrades to the existing chemical treatment tank will provide state-of-the-art equipment to monitor and control key process variables such as pH and oxidation reduction potential (ORP) to enable metals precipitation under controlled conditions.

A new chemical treatment system will be installed in the multi-purpose processing building. This system will include a covered chemical treatment tank, a treated wastewater holding tank, a sludge holding tank and chemical mixing tanks. The new system will be used primarily for chemical oxidation or reduction steps required for the effective removal of heavy metals from some types of industrial wastewaters. A gas scrubber will be used in wastewater treatment operations that generate toxic gasses.

After the wastewater is accepted, it will be transferred to a designated tank in the tank farm. From here, it will be pumped to the selected chemical treatment tank. Chemical treatment tanks will be operated in a batch processing mode using acidic or alkaline additives for waste neutralization and hydrated lime or caustic for metals precipitation.

In the process, the insoluble metal hydroxides will be concentrated by gravity settling prior to pressure filtration. The treated wastewater will be held in a holding tank and analyzed to determine if it meets the Facility effluent discharge criteria for metals or if it requires additional treatment. Some wastewaters may require more than one treatment step depending on the heavy metals present. Treated wastewater that meets Facility effluent discharge criteria for metals will be transferred to one of the biological treatment holding ponds. Solids recovered from the filter press will be transported for third party disposal.

Environmental approval for additional storage tanks and wastewater treatment processes, as required, will be coordinated through the Permit Amendment Application process.

2.3.7 Part III - Management of Containerized Hazardous Wastes

The process for the proposed management of containerized wastes classified as Dangerous Goods is presented in Figure 2.3-3 in a simplified schematic.

Designated areas will be created in the new multi-purpose building for the proper handling and temporary storage of containerized waste that will not be treated at the Facility. It is anticipated that the area designated for drum storage will accommodate about 100 drums (e.g., about 20,000 litres). The average time between receiving and shipping out a drum is expected to be less than 4 weeks.

Containers of dangerous goods will only be opened in the event that a decision is made to repackage and/or consolidate partial containers of similar wastes for transport efficiency. Prior to consolidation, the compatibility of the waste materials will be verified using established procedures currently employed for this purpose at the AIS Moncton Hazardous Waste Transfer Facility. The specific area designated for sampling and repackaging will be designed in accordance with applicable regulations.

The drum storage area will be divided into sections based on waste compatibility with appropriate secondary containment features. As a precautionary measure, this area shall be inspected routinely for signs of drum leakage. Inspections shall be recorded and any remedial action resulting from the inspection shall also be documented. The design and operation details for this area will be defined in an implementation plan to be developed in consultation with the regulators.

2.3.8 Emissions and Discharges

2.3.8.1 Air Emissions

The Debert facility currently operates two thermal mechanical processing systems for the recovery of waste oil and two activated sludge aeration ponds for the biological treatment of industrial wastewaters. Associated unit operations include dissolved air flotation, chemical sludge conditioning, pressure filtration and ultrafiltration.

On-site bulk liquid storage includes a tank farm for used oil related operations and four holding ponds for industrial wastewaters. The proposed expansion will add three new wastewater treatment systems and a new tank farm with a number of bulk storage tanks for industrial wastewaters containing dangerous goods.

In this type of industrial setting air emissions may be released from point and/or area sources. Potential fugitive emissions from point sources associated with the new distillation unit, the new chemical pretreatment system and the new storage tanks are addressed in this section. Air emissions associated with on-site area sources including the primary biological treatment pond and the wastewater holding ponds are discussed in Section 4.2.2.3.

The new distillation unit for the proposed Facility expansion will be designed and manufactured by an experienced process equipment vendor. The main components of the system include a distillation column, reboiler and vapour condenser. The unit will be equipped with modern, state-of-the-art instrumentation and process controls. It will be designed to operate in a continuous-flow processing mode with high efficiency vapour condensing capability. This unit is not expected to be a source of fugitive emissions. Typically, in similar operations, if there are any fugitive emissions from the distillation unit, it is acceptable to vent the emissions back to the bulk storage tank where vapours will collect in the vapour space of the tank and condense.

Aqueous-organic wastes with high concentrations of volatile organic compounds (VOCs) and recovered organic products with high concentrations of VOCs will be stored in designated bulk storage tanks. The vent to atmosphere on some of these tanks may require emission controls to meet environmental regulatory standards. If emission controls are required on one or two of the tanks, appropriately sized canister type devices with suitable adsorbents will be installed on the individual tanks. If emission controls are required on more than two of the bulk storage tanks, a central system may be installed for VOC abatement.

The commissioning phase for processing new aqueous-organic wastes will include ambient air testing and monitoring around the distillation system and the biological treatment operations. Testing and monitoring data will be compared against established regulatory guidelines and air dispersion modeling results discussed in Section 4.2.2.3. Mitigation may include measures such as a reduction in storage volumes and/or processing rates of aqueous-organic wastes, and the installation of additional air emission controls as discussed above.

Metal-bearing wastewaters vary widely in terms of chemical composition and the concentrations of toxic components. Initially, only metal-bearing wastewaters that require relatively simple chemical treatment will be accepted at the Facility. Wastewaters containing heavy metals that can be effectively precipitated by pH adjustment alone, without the release of toxic gas, would be in this category.

Some metal-bearing wastewaters contain complexed heavy metals and require chemical pretreatment steps in order to remove the metals by precipitation. Wastewaters that require such pretreatment must be processed in a covered tank equipped with a gas collection system and a scrubber to capture fugitive gas emissions.

Metal-bearing wastewaters containing complexed heavy metals and organics require the most extensive treatment. In most cases, the unit operations to be employed and the sequencing of unit operations must be carefully selected. The removal and/or destruction of the organics present in such wastewaters could involve chemical oxidation or biological treatment. In some cases liquid phase carbon adsorption may be required as a final polishing step to meet effluent discharge criteria.

Metal-bearing wastewaters will be held in designated tanks. As the concentrations of organic contaminants in this type of waste are typically low, releases of contaminants to atmosphere are not anticipated. In cases when fugitive emissions are expected, the tank vent will be equipped with a canister type device containing activated carbon or a suitable alternative adsorption medium. The storage tank area will be monitored for leaks on a regular basis.

During operations, personnel monitoring will be undertaken and all provincial occupational health and safety standards will be met to ensure a safe working environment for employees.

The multi-purpose building will be equipped with sensors and alarms to detect toxic gases. Should an accidental release occur in the wastewater chemical pretreatment area of the building it will be directed through a gas/liquid scrubbing system to capture hazardous emissions.

2.3.8.2 Residual Liquid Waste Discharge

All treated wastewater from the Facility is discharged to the municipal wastewater collection system for treatment at the Debert Industrial Park municipal water treatment system. It is anticipated that the proposed new waste streams will result in an increased treated water discharge of 5-6 million litres per year. All discharged wastewaters will be treated to meet the permitted discharge criteria for the Facility and comply with the Sewer Bylaw for the Municipality of the County of Colchester.

The existing biological treatment and holding ponds have a volume capacity of over 30 million liters and the permitted discharge is a maximum of 136,200 litres per day. The new proposed discharge can be achieved within the existing discharge limits on an annual basis. The addition of the enclosed biological treatment system will tend to even out the seasonal variations in the rate of treated wastewater discharged from the Facility to the sewer system. This feature may be beneficial to the municipal wastewater treatment plant in terms of its operational stability.

Following the proposed expansion of services the current practice of monitoring the Facility's wastewater discharge quality will continue. Any changes to the parameter's to be monitored, monitoring frequency and average/maximum concentrations, limits, and ranges of monitoring parameters will be established in consultation with NSE as part of the Facility Permit amendment pursuant to Part V of the NS Environment Act.

2.3.8.3 Residual Solid Wastes

Existing wastewater treatment operations at the Debert Facility generate the following residual solid wastes:

- Biological Treatment Solids

  Biomass generated as a normal byproduct of the biological treatment process is collected and pressure filtered at the Facility to yield a solid filter cake. Recovered filter solids are subsequently tested by a certified analytical services laboratory. Based on the test results, the solids are shipped to the appropriate permitted final disposal facility.

- Other Solids

  AIS receive a variety of wastewaters containing solids and sludges. Separation techniques are used at the Facility to recover wastewater and residual solid/sludge material. The recovered residual solids or solidified sludges are subsequently tested by a certified analytical services laboratory. Based on the test results, these materials are shipped to the appropriate permitted final disposal facility.

The processing of containerized materials at the Facility generates oily solids material and recovered scrap metal.

In 2007, the AIS Debert Facility generated approximately 300 tonnes of residual solids that met the criteria for disposal at local landfills. The Facility generated approximately 500 tonnes of residual solids which were transported to the AIS Hazardous Waste Transfer Facility in Moncton where they were bulked and then transported to secure landfill facilities outside of Atlantic Canada. Over 300 tonnes of oily solids were transported for disposal and over 100 tonnes of scrap metal was recovered for recycling.

The residual solid wastes generated from new operations will not increase significantly and is anticipated to be less than five percent of current levels.

2.3.9 Transportation

AIS operates a fleet of trucks and trailers for transporting bulk liquid and containerized waste materials to the Debert Facility for processing, and recovered fuel from the Facility to customers. AIS also employs various subcontracted transportation to supplement the fleet requirements and to transport residual solid wastes for disposal.

The AIS Debert Facility is located approximately 2 km from Highway 104 on MacElmon Road. This highway is the sole access highway to the Debert Industrial Park. There are several businesses in the park that generate a high volume of truck traffic to supply shipping/receiving to their warehouses.

The AIS Debert Facility generates an estimated 100 (one-way) truck trips to/from the facility per week, or approximately 5,000 trips per year. The anticipated increase in truck transport traffic to/from the Debert Facility is 550 (one-way) trips per year, an increase of about 10%.

Processing the proposed new waste at the Debert Facility will eliminate the requirement to transport this material for treatment and/or disposal outside Atlantic Canada. Based on anticipated volumes, this will reduce the transport time for these wastes by approximately 8,000 hours per year. This will generate a significant net reduction in fuel consumption, greenhouse gas emissions and vehicle operating costs.

2.3.10 Stormwater Management

Currently, run off from roof tops and paved surfaces within the Facility boundary is collected and conveyed via the site stormwater management system to the on-site stormwater management pond. During Part I of the proposed expansion, the existing stormwater management pond will be filled in and Wastewater Holding Pond No. 6 will be redeployed to become the new stormwater management pond. The existing upstream stormwater management system and downstream discharge point will be connected to the new pond to complete the overall arrangement.

As a minimum, the stormwater quality is monitored prior to discharge bi-annually (May and November) with respect to general chemistry, metals and organics in accordance with the requirements of the Facility's current Operating Permit (#2000-015375-A06). If stormwater is discharged more frequently, AIS samples and tests water quality prior to any discharge from this pond to the environment.

Following the proposed expansion of services the current monitoring practice will continue. If necessary, changes to the stormwater monitoring requirements will be established in consultation with NSE as part of the Permit amendment pursuant to Part V of the NS Environment Act.

2.3.11 Malfunctions and Accidents

Malfunctions and accidents are considered unplanned events. In contrast to regular Facility operations and procedures, malfunctions and accidents can involve temporary non-compliance with applicable criteria. The following text focuses on those events that are considered credible in the context of the Project. The document does not intend to address all conceivable abnormal occurrences, but rather, to address only those scenarios that have a reasonable probability of occurring (considering the specific aspects of site conditions and Project design) that may have an environmental effect or consequence.

The identified potential malfunction and accident scenarios that may occur at the Debert Facility include:

- Fires (including run off associated with fire suppression);
- Spills and leaks;
- Failure in storm water management system (accidental discharge of contaminated storm water);
- Failures in wastewater treatment processes;
- Transport truck accidents including spills; and
- Failures in air emission control systems.

A major concern in the design of the Facility expansion and the processing systems is the prevention of accidents. Accident prevention requires plant design incorporating backup systems, monitoring and integrated controls. Numerous safety and environmental management features have been built into the existing Facility and its operations. The proposed Facility expansion will also be designed to meet all safety and environmental compliance standards. Notable features of the existing Facility and the proposed Facility expansion include:

- On-site stormwater collection, stormwater management pond, controlled discharge and effluent monitoring;
- Large storage capacity in multiple holding and treatment ponds to inventory wastewaters in the event of treatment process malfunctions;
- Modern process controls and monitoring equipment on both thermal processing used oil recovery systems;
- Automated sprinkler system in the existing Process Building which houses the DAF unit and drummed oily waste operations;
- Continuous monitoring for toxic gases in the existing Process Building;
- Ventilation system in the oily waste drum handling area of the existing Process Building;
- Spare pumps and motors available at all times as part of backup systems;
- New continuous-flow distillation unit equipped with state-of-the-art instrumentation and process controls;
- Fully automated fire suppression system in the new multi-purpose processing building;
- Dedicated high-flow ventilation system and exhaust emission controls in the multi-purpose processing building;
- Continuous monitoring for toxic and combustible gases in the multi-purpose processing building;
- Secondary containment systems for new wastewater storage and holding tanks;
- All new wastewater storage and holding tanks will be equipped with electronic level controls and an electronic panel will indicate liquid levels in the tanks at a central location;
- Clear identification of key equipment components (e.g. identification of tanks by large letters, pipes by type of flow, etc);
- Separate containment for drums of incompatible waste dangerous goods stored in the new multi-purpose building.

Since the design for the proposed Facility expansion incorporates conventional process equipment which has been proven under industrial applications, the likelihood of accidental events resulting from equipment problems and failures is small. The risk of accidental events will be minimized further through the proper training of all staff. Training will be conducted by experts to assure staff comprehension of all rules and regulations (including MSDS).

The detailed design for the Facility expansion will include extensive primary and secondary safety systems. The inherent design features of these systems will reduce the risk of malfunctions and/or accidents at the Facility. In the event of such an occurrence, a Facility-specific contingency plan will be implemented. This plan identifies malfunctions and accident scenarios and establishes responsibilities, emergency response equipment, procedures, training and auditing and is discussed in Section 2.4.1.3.

2.3.12 Employment

The AIS Debert Facility currently has a total of 27persons on staff for the operation of the wastewater treatment and used oil processing. As part of the expansion AIS will add new staff positions at a rate of two to four persons per year over the course of the next three years (2009 to 2011).

2.4 FACILITY MANAGEMENT

2.4.1 Environmental Management

AIS is in the business of Environmental Management. In addition to the proper transport and treatment and/or disposal of waste materials, AIS frequently assists customers with the development and implementation of their Waste Management Plans and site-specific Emergency Response Plans.

AIS is committed to protecting the health and safety of its employees and the public, complying with regulations, and continuously improving its environmental compliance performance. The facilities and mobile units operate under appropriate federal, provincial, and local permits for handling, storing, and transporting hazardous and non-hazardous wastes. All operations, including the Debert Facility have an excellent environmental track record.

In addition to internal reviews and audits, the AIS Debert Facility is often subject to Environmental audits by major clients as part of their corporate environmental programs. The Facility has received high marks and positive feedback from these audits.

2.4.1.1 Policies, Organization, Responsibilities

AIS is a member of the Scotia Investments Group of Companies. Environmental protection and stewardship is a major priority for Scotia Investments, and an overall Environmental Policy is in place for all member companies and their employees. The policy clearly defines the organizational structure, responsibilities, and reporting protocols to be followed (Appendix D). AIS has also developed its own Safety and Loss Control Policy Statement (Appendix E) as part of the AIS Environmental Health and Safety Program (Table of Contents included in Appendix E).

2.4.1.2 Environmental Management Features

Key environmental management features representing integral components of the existing Debert Facility and the proposed Facility expansion are listed in Table 2.4-1.

Table 2.4-1: Key Environmental Management Features

Key Environmental Management Feature	Description	Objective
Existing Features		
Surface water management systems; site drainage	• On-site storm water management system including retention pond • Controlled outlet structures with monitoring point	• To provide for controlled site-run off • Routine monitoring of effluent quality • To provide shut down mechanism in case of emergency (spill containment)
Designated oily waste drum storage	• Area specifically designated for storage and handling of containerized waste including oil filters, oily rags, etc	• Safe and secure drum handling
Fire prevention in Process Building	• Automatic fire suppression system	• Fire prevention and control
Tank farm containment system	• All containment systems are designed to hold 110% of the largest tank or process vessel or 100% of the capacity of the largest tank plus 10% of the capacity of the aggregate capacity of all other tanks, whichever is greater.	• To prevent release of spilled materials to outside environment
Multiple biological treatment and holding ponds	• Multiple on-site treatment ponds, controlled outlet, effluent monitoring • Multiple holding ponds	• To provide flexibility in overall wastewater treatment and storage capability
Ultrafiltration system	• Used to filter mixed liquor from the biological treatment ponds	• Removal of suspended solids prior to discharge
Activated carbon tower	• Emissions control unit, installed at back end of waste oil/fuel recovery system	• To capture VOCs and provide odor control
Proposed Expansion Features		
New tank farm with separate secondary containment for incompatible waste dangerous goods	• Tanks specifically designated for storage of aqueous-organic fluids , recovered organics or wastewater contaminated with heavy metals	• Safe and secure tank operation/ waste management
Tank liquid level gauging system	• Electronic tank level gauging	• Safe and secure tank operation
Tank heat tracing and insulation system	• Electric or steam tank heat tracing and insulation system	• Safe and secure tank operation; tanks containing wastes which can freeze will be protected with this system

Table 2.4-1: Key Environmental Management Features

Key Environmental Management Feature	Description	Objective
Tank venting systems	• Vacuum/pressure controls installed on storage tanks designated for aqueous-organic fluids or liquid organic products • Emission controls may be required on the tank venting systems (canister type devices with suitable absorbents; or central system for VOC abatement (p.22))	• Safe and secure tank operation; reduction of air emissions;
Fire prevention in new multi-purpose building	• Automatic fire suppression system	• Fire prevention and control
Air emission controls in the multi-purpose building	• Integrated supply and exhaust air system; system with high-flow ventilation hoods in designated work area for handling waste dangerous goods; exhaust system equipped with activated carbon adsorption canisters	• To provide air exchange • To control of air emissions
Air emission controls for the distillation unit	• Mixed bed adsorption unit will be installed if required	• To capture VOCs and/or provide odor control
Gas scrubber	• Counter current gas/liquid packed tower – will only be required for the chemical pretreatment of specific heavy metal complexes	• To capture toxic gases released in advanced chemical pretreatment operations
Multi-purpose building with containment systems	• Sealed floors with sump pits for collection of spills	• To contain spills of waste dangerous goods inside the building

2.4.1.3 Contingency Planning

AIS has developed a Contingency Plan specifically for its Debert Facility (Appendix F). It includes a comprehensive identification of responsibilities, chain of command structures, action plans and reporting mechanisms. This Contingency Plan will be updated to specifically include an up-to-date description of the Facility, its proposed new service elements and all relevant failure scenarios. This will involve routine inspection, monitoring and maintenance / repair protocols.

2.4.1.4 Monitoring and Reporting

As part of the routine Facility operation, AIS has been conducting a monitoring program in accordance with its operating license. This program involves

- Groundwater: Quarterly groundwater monitoring at on-and off-site monitoring well locations; Third-party sampling and analysis is performed. Results are submitted to AIS and the local NSE office.
- Surface water: Quarterly surface water monitoring at one off-site monitoring location; Third-party sampling and analysis is performed. Results are submitted to AIS and the local NSE office.
- Treated wastewater: Daily monitoring of treated wastewater quality at the point of discharge to the municipal system;

- Stormwater: Water quality sampling prior to release at discharge point (typically bi-annually);
- Sediments: Bi-annual (May and November) sampling of sediments in the discharge channel from the storm water pond (metals and organic parameters);
- Wastewater holding ponds: Bi-annual (May and October) water sampling; and
- Waste received and exported: Monitoring / recording of waste received and sent out by the Facility over the course of one year (Summary Report delivered to NSE by end of each year).

The analytical results are being reported to the NSE Northern Regional Office in Truro. Quarter-yearly meetings are held between AIS and NSE to review and discuss monitoring results, Facility performance, compliance and future plans. This monitoring and reporting practice is expected to include the new activities associated with the proposed expansion. Adjustments to the monitoring / reporting schedules will be established in consultation with the regulator and as part of the approval process under Part V of the Nova Scotia Environment Act.

2.4.1.5 Inventory Control

All waste materials received at the Facility are recorded on a Waste Receiving Report. A copy of the most recent inventory of waste will be available for emergency situation first responders.

All containerized waste will be stored inside the new multi-purpose processing building in designated areas for the various types of waste.

The bulk liquids waste storage tanks or process tanks located inside the Facility or external in the tank farm will never be filled in excess of 90% nominal capacity of each individual tank. The tank levels will be recorded daily. Any storage tanks in the tank farm containing wastes which can freeze will be protected with electric or steam heat tracing and insulation.

2.4.2 Training

Safety is a high priority at AIS. Hiring practices and ongoing employee training are an important part of the AIS safety program. The Envirosystems Group has a health and safety record that is second to none in the industry. AIS is committed to protecting the health and safety of its employees and the public, complying with regulations, and continuously improving its environmental compliance performance. The Facilities and mobile units operate under appropriate federal, provincial, and local permits for handling, storing, and transporting hazardous and non-hazardous wastes.

The AIS Training Policy recognizes training of personnel as a Critical Task and states that "*the company is committed to providing each employee with the required training to ensure every task may be performed with minimal risk of injury*". Section 7 "Training" of AIS's Health and Safety Manual provides the following: Formal Training Policy, "Base-Line" Training Profile for New and Existing Employees, and Training Program Administrative Protocol. The extensive training program ensures personnel are competent to perform assigned tasks and in the use, maintenance and care of all required Personal Protective Equipment (PPE). The critical nature of PPE is reinforced at weekly safety meetings and Pre-Job Safety Analysis. AIS utilizes a Training Matrix to track required training and training renewal deadlines for each employee.

The implementation plan for receiving and processing new waste under the expansion of services will include the development of revised and/or new Operating Procedures and employee training requirements. The plan will identify the training plan for all facility staff and management who will be responsible for the safe and effective handling and processing of these wastes. The implementation plan will also include coordination with the local Fire Department to ensure they are aware of the types of wastes to be received and processed at the Facility.

2.4.3 Security, Health and Safety

For security purposes the Facility is surrounded by chain link fence with controlled gated access. In the case of a fire alarm triggered by the emergency system, the entire building will be evacuated and trained emergency response personnel will re-enter the building with appropriate personal protection equipment.

Hazardous waste management activities carry a potential risk of accidental contamination or exposure to the environment and/or personnel. For worker's health and safety purposes the existing Facility-specific Health and Safety Program (Appendix E) will be reviewed and updated. The Program addresses the following subjects:

- Responsibilities;
- Safe operating procedures;
- Safety equipment;
- Safety training and drills;
- Reporting protocols; and
- Updating mechanisms.

In particular, the Plan updates will address the new waste management processes, the new waste materials to be handled at the Facility, all associated relevant labeling, handling and storage requirements, and personal protective equipment and monitoring devices.

2.4.4 Community Involvement

AIS believes that participating in the local community makes good business sense. AIS' community commitment and involvement includes the following:

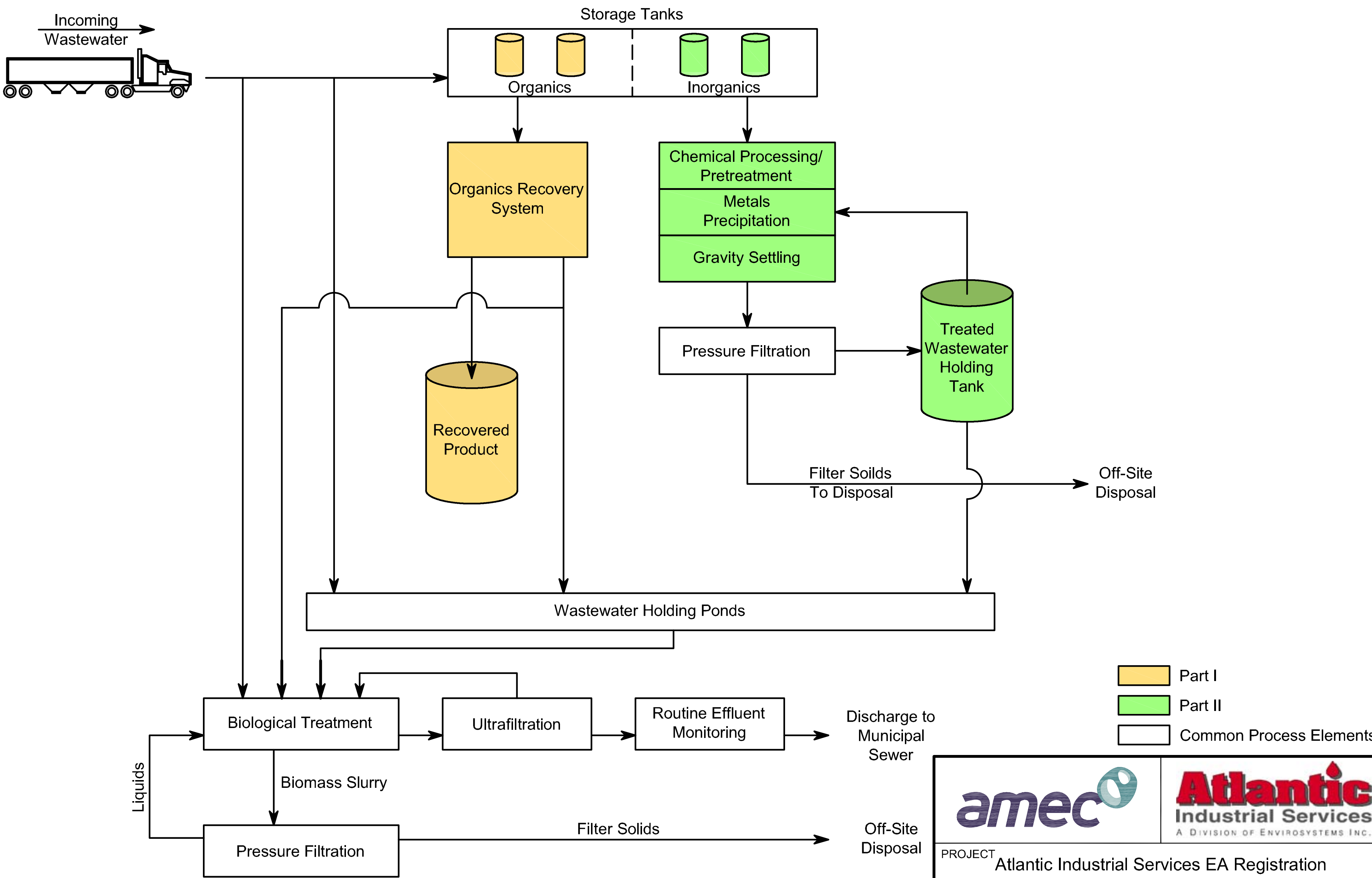
- Support for the Debert Volunteer Fire Department;
- Participation in the annual Debert Field Days community fair, including an environment theme float in their parade;
- Recent support of a local minor hockey tournament; and
- Participation in local Colchester Regional Development Authority functions.

2.5 DECOMMISSIONING AND ABANDONMENT

The additional services proposed to be provided by the Debert Facility do not have any implications for the AIS general approach to future decommissioning of the Facility, nor the requirements indicated in the existing Facility Operating Permit. On an ongoing basis, all waste materials are inventoried at the end of each month and accounting cost accruals are applied for the anticipated processing and/or disposal costs.

Prior to the decommissioning and abandoning of the AIS Debert Facility, AIS will develop a decommissioning plan. The plan will specify decommissioning objectives, approach, activities, schedules, and site rehabilitation and will be developed in consultation with the municipality and regulatory agencies.

Part I and Part II - Integrated Wastewater Treatment Process



amec

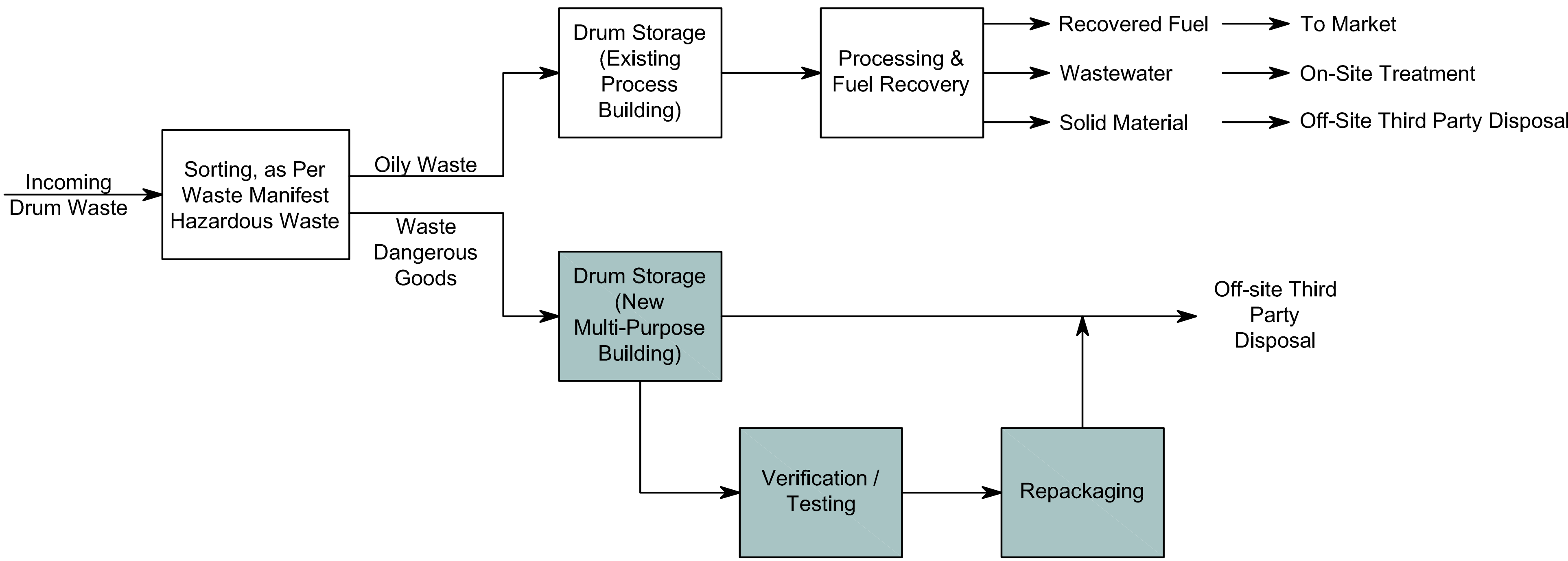
Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE Part I and Part II
Integrated Wastewater Treatment Process

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	2.3-2

Part III - Containerized Waste Dangerous Goods



New

Existing

amec

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE Part III - Management Process for Containerized Waste Dangerous Goods

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	2.3-3

3.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

3.1 BIOPHYSICAL ENVIRONMENT

3.1.1 Topography, Geology and Soils

The AIS Debert Facility is located on the northern shore of Cobequid Bay, an eastern extension of the Minas Basin, in the Triassic lowland region of Colchester County, Nova Scotia (Figure 3.1-1). This region is characterized by distinctive red beds found along the coastal fringes of the Minas Basin and Cobequid Bay. The red beds consist of weakly cemented sandstones and sandy shale overlain by glacial deposits. The nearly horizontal red beds around Cobequid Bay form a low, slightly undulating area.

From a surficial geological perspective, the area surrounding the AIS Debert Facility is underlain by bedrock described as the Wolfville Formation of the Triassic aged Fundy Group. This formation is generally characterized by reddish-brown sandstones and conglomerates. Siltstones and mudstones are also present, but to a lesser degree (Hennigar, 1972, in Porter Dillon 1991). The Wolfville Formation is further characterized as *"for the most part folded and not heavily fractured other than in the upper meter of weathered bedrock which is commonly broken and soft*" (Porter Dillon 1991, p.2). Test pits dug by Porter Dillon at the Project site provide a further, site-specific characterization of the surficial geology: "*The depth to competent, or unweathered, bedrock at the site ranges from 5 to 12 m below ground surface. Above the competent bedrock is a zone of weathered bedrock in contact with the overlying glacial till soils. This weather zone ranges in thickness for 0.3 to 2.2 m*. (Hennigar, 1972, in Porter Dillon 1991)

The bedrock at the Facility is overlain by sandy glacial till: "*Test pits excavated show that the unconsolidated sediments overlying the bedrock consist of a sandy-silty till. The upper soil horizon (30 – 50 cm) consists mainly of reddish brown, sandy, humic, silty topsoil which fade to grey. The underlying sand is reddish-brown, fine grained, generally homogeneous and loose. The sand becomes more compact with depth. Based on the test pit the depth to bedrock varied from 2.5 – 4.0 m".* (Porter Dillon 1991, p.11)

The village of Debert is located on an inland extension of a tidal marsh at an elevation of 52.5m, between the Debert River and the Chiganois River. The soils found in Debert are characterized as fine, dense sand over moderately coarse to moderately fine textured tills (NS Museum 2007b). These soils, along with the parent formations of red sandstone, siltstone, conglomerate and shale are some of the richest agricultural lands in Nova Scotia.

Agriculture Canada produces a Water Erosion Risk map (Coote et al. 1992) to address the erodibility of soils. The soil erosion risk ranges from low to severe and assumes the soil conditions are bare, unprotected and unvegetated. The soil erosion rates associated with these classifications are as follows:

Low:	6.0-10.9 tons/ha (t/ha)
Moderate:	11-22 t/ha
Severe:	≤ 33 t/ha

The soil erosion risk in the study area is classified as severe. However, with vegetative cover, the natural erosion rate of soils in this area may be negligible. The erosion rate can also be significantly reduced using appropriate management and conservation practices.

3.1.2 Hydrogeology

Hydrogeological Setting

In central Colchester County, large underground freshwater reservoirs exist in bedrock deposits of Triassic age and surficial Pleistocene deposits of sand and gravel. These underlie the area from Debert to Truro. The village of Debert is ideally located for development of large supplies of groundwater. Aquifers in the area include the Wolfville Formation and extensive outwash sand and gravel deposits flanking the Debert River.

Site-specific information on the hydrogeological characteristics is available from a report prepared by Porter Dillon in 1991: "*The groundwater flow regime in the study area consists of two primary components: intermittent flow through the surficial unconsolidated unit which appears to be seasonal, and groundwater flow through the sandstone bedrock sequences of the Wolfville Formation*" (Porter Dillon 1991. p.3).

Pump tests conducted by Porter Dillon indicate that there is a relatively high permeability in the Triassic Wolfville Formation. The pump tests show that wells dug down to between 45 and 60m can produce up to 15 L/s of water (Porter Dillon 1991). It is yet to be determined whether the aquifers are confined or unconfined. Based on previous reports (NSDOE n.d.; in Porter Dillon 1991) flowing conditions exist at some wells such as the Debert Industrial Park Water Supply Well #WS1B (Figure 3.2.1). This suggests confined conditions at moderate depths are possible in the study area.

Groundwater Flow Direction

The hydraulic head data from the Porter Dillon groundwater sampling events demonstrate that the groundwater flow direction is southeasterly and that the groundwater is recharging downward through the surficial into the bedrock. This recharge occurs more predominantly in higher topography regions (Porter Dillon 1991).

Use of Groundwater Near the Project Site

The Debert Industrial Park provides potable water to its tenants via four drilled wells located within the Park. Two of these wells (WS1A and WS1B) are located at a distance to the site of approximately 0.9km and 0.5 km respectively (Figure 3.2.1). The two other wells (WS2A and WS2B) are located approximately 6 km northwest of the AIS Facility. The wells have a combined capacity of 36 L/s (475 imperial gallons per minute) (Porter Dillon 1991; see also Colchester Regional Development Agency 2004).

A review of NSE water well records revealed 14 domestic ground water wells along at what were considered near-by road addresses including Plains Road (homes are located at a distance of about 1 km or more east of the Project site) and Belmont Road (1 to 2 km southeast of the Project site, (Figure 1.2-1). All recorded wells were drilled wells with depths ranging between about 80 and 120 feet and yields from about 6 to 60 imperial gallons per minute.

Groundwater Quality

The existing AIS Facility has currently eight ground water monitoring well locations with a total of 15 wells (i.e., some well locations consist of a shallow and a deep well) (Figure 2.1-2).

Ground water monitoring has been conducted in compliance with the Facility's Operating Approval as part of the ongoing operation. The monitoring addresses all the parameters prescribed in Schedule B of the Operating Approval and samples are analyzed for the following parameters:

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Total Petroleum Hydrocarbons (TPH);
- Metals; and
- General Chemistry.

The analytical results are forwarded on a quarterly basis to NSE, Truro office for review. The monitoring results are subsequently discussed in meetings between AIS and NSE representatives.

With regard to BETX and TPH, the test results for the monitoring wells are measured against the concentration limits for these parameters in the RBCA Tier 1 guidelines based on commercial receptor, non-potable groundwater use. Historically, the analytical results for the monitoring wells have been significantly below the concentration limits specified in the guidelines.

The analytical results for metals and general chemistry are tabulated regularly and monitored for anomalies and trending patterns. Emphasis is focused on heavy metals such as cadmium, chromium and lead which are typically found in used oil. In late 2006 two of the monitoring wells exhibited chromium and lead concentrations above expected levels of variance. Since that time the two wells have been sampled monthly and over a period of 6 to 8 months the metal concentrations are back to levels below 10µg/L with some fluctuation as would be expected. In discussion with NSE it was determined that no further action is required other than continuing the normal well monitoring program.

3.1.3 Surface Water

Water Courses, Drainage

Many streams and few lakes are found in the lowlands region of Nova Scotia. Across the northern shore of Cobequid Bay, rivers drain steeply from the mountains into the Bay. The watercourses closest to the Project site are Wilson's Brook and the Chiganois River, which are 0.17 km and 1.43 km from the existing Facility respectively (Figure 3.1-2). Associated watershed boundaries are included with Figure 3.1.2. MacElmon's Pond is approximately 2 km southeast from the existing Facility.

Based on the Porter Dillon study (Porter Dillon 1991), surface drainage from the Project site is south easterly towards seasonal tributary channels. These tributaries drain to the Chiganois River (Figure 3.1-1 and 3.1-2).

Currently, the surface water from the existing Facility is routed to an API separator then discharged into a stormwater management pond (Figure 2.1-2). After laboratory testing for appropriate contamination levels (Section 2.3.10), stormwater is then discharged to a roadside drainage ditch which runs alongside of Plains Road (Figure 2.1-2). The discharge point is located immediately east of the Facility's east gate at Belmont Cross Road. During a visual site inspection in the July 2008, the ditch carried no water and was grown over by a dense grass/herb vegetation. The roadside ditch drains eastward for approximately 250m where it gradually becomes less defined until the profile ends completely. Water appears to infiltrate into the ground as it is conveyed through the ditch. Any water that has not already infiltrated into the ground and is carried forward to this point appears to infiltrate in the roadside environment and the adjacent densely wooded area (dominated by spruce, pine, and fir tree species). None of the stormwater is directly discharged to any of the local waters courses, i.e., Wilson's Brook or Chiganois River or associated seasonal tributaries.

Surface Water Quality

Surface water quality monitoring in the area was conducted by Porter Dillon in 1991 for locations upstream and downstream of the site. AIS monitors surface water quality quarterly at the location SW#7 on a voluntary basis (Figure 3.1-2). It should be noted that SW#7 is well beyond the AIS property boundary and down gradient from the site. This in fact is the nearest downstream sampling location reported on by Porter Dillon in 1991.

Analytical results are forwarded on a quarterly basis to NSE, Truro office for review. The monitoring results are subsequently discussed in meetings between AIS and NSE representatives.

The Porter Dillon report (1991) concluded that the surface water quality in the monitored locations was good at that point in time. Comparisons of AIS' recent surface water analyses (2007/8) with those reported by Porter Dillon indicate little if any deterioration in surface water quality.

Surface Water Uses

Within the Project's watershed, no permitted surface water extraction has been identified (verbal communication, Mr. W. Faulkner, 2009 (NSE-Truro office). One farmer located about 1km east of the site is reported to potentially extract surface water (less than 23,000 L/day) for irrigation purposes from Wilson's Brook upstream from the Project site This water extraction use could not be confirmed. No other formal surface water users were identified.

The Chiganois River is listed as Salmon fishing area (Area 22) in the Maritime Provinces Fishing Regulations (Section VI – Salmon Fishing Areas) (in: Canadian Legal Information Institute 2008). The segment of the Chiganois River that is downstream from the CN Railway Bridge (south of Belmont) is registered as a recreational fishing area (Fishing Area 6) (NSDOFA 2008). Based on anecdotal information from a resident local anglers do no consider the Chiganois River a popular angling environment. Based on the same source, Wilson's Brook is also of low significance to anglers as it is known for the high number of agricultural drains discharging to the Brook with adverse effects on fish and fish habitat.

3.1.4 Climate

The description of the climatology for the project area is based upon the 1971-2000 climate normals from the Debert weather station, located at latitude 45^{o} 25.200' N, longitude 63^{o} 25.200' W. Debert is characterized by a moderate northern climate, with an annual mean temperature of 6.1^{o} C. During the winter, the temperatures are cold, with the January daily mean being -6.6^{o} C., whereas the summer months are typically moderately warm, with the July daily mean temperature being 18.6^{o} C. From 1971-2000, the extreme maximum daily temperature recorded was 34^{o} C. (Aug. 18th, 1987), while the extreme minimum daily temperature recorded was -35^{o} C. (Jan. 31st, 1993).

The average annual rainfall in Debert is 1014.1 mm., with the extreme daily rainfall having been recorded as 89.4 mm, on August 15th, 1999. The average annual snowfall is 155.4 cm, with the extreme daily snowfall being recorded as 28.8 cm, on Feb. 12th, 1983.

Although the Debert station only reported a limited number of parameters, some inferences can be made from the climate normals for Truro, N.S. (Latitude 45° 22.200' N, Longitude 63° 16.200 W), which experienced average annual sunshine hours as 1687.1, with July showing the highest average annual sunshine hours (223.3) and December indicating the lowest average (64.3). Although the wind data for Truro is sparse, climate normals indicate winds are predominantly from the northwest quadrant during the winter months, which is similar to climate normals for the Halifax Airport station (Latitude 44° 52.800' N, Longitude 63° 31.200' W). During the summer months, the winds are predominately from the southwest quadrant.

3.1.5 Terrestrial and Aquatic

Vegetation

The proposed Facility expansion will be implemented entirely within the boundaries of the existing Facility. Within the fence line, the Facility site is fully developed with little to no natural vegetation and is surrounded by chain link fencing (Figure 2.1-1).

From a regional perspective, the Triassic lowlands are part of the Loucks' Red Spruce – Hemlock - Pine Zone, where the now heavily cut Red Spruce and Eastern Hemlock, were once prominent. In the eastern region, including Debert, softwood, hardwood and mixed wood forests, open land, bog and intertidal habitats are found (NS Museum 2007a). The natural forest in the area consists mainly of Black Spruce, Fir, White Birch, Red Maple, Eastern Hemlock and White Pine with scattered Beech, Sugar Maple and Yellow Birch occurring on low ridges. Jack Pine is also found in the Debert area.

Much of the regional vegetation has been highly impacted, with little of the natural forest vegetation remaining. Extensive disturbances such as fire and clearing of areas for agriculture have greatly influenced the current landscape. Reforestation took place in the late 1940's and early 1950's, providing stands of White Pine, Paper Birch, Fir, Red Spruce, Hemlock and Poplar.

Habitat identification based on aerial photos of the existing facility (Figure 3.1-2) shows a mix of different vegetation off-site. The following habitats and vegetation types can be identified based on aerial photos:

- softwood forest;
- mixed wood forest;
- wetlands;
- tree nursery; and
- agricultural land.

Wetlands delineated in Figure 3.1-2 derive from the NSDNR Wetland Atlas (NSDNR 2001). None of these wetlands is located at or near the Project site or receives direct surface water discharges from the site. In addition to the mapped wetlands, small unclassified (riparian) wetland habitat is likely to be present in association with the floodplains of Wilson's Creek and the seasonal tributaries of Chiganois River. No wetland habitat was identified alongside or at the end of the roadside drain that conveys the Facility's stormwater from the Project site to a point about 250m east of the Facility. At this location the drain ends and water infiltrates into the roadside environment and the adjacent pine/spruce forest habitat.

Fauna

Due to the lack of available habitat within the Facility boundary and the existing perimeter security fencing the presence of wildlife on-site is very limited. In particular, it is highly unlikely that any species at risk that may exist in the surround regional context may occur on-site.

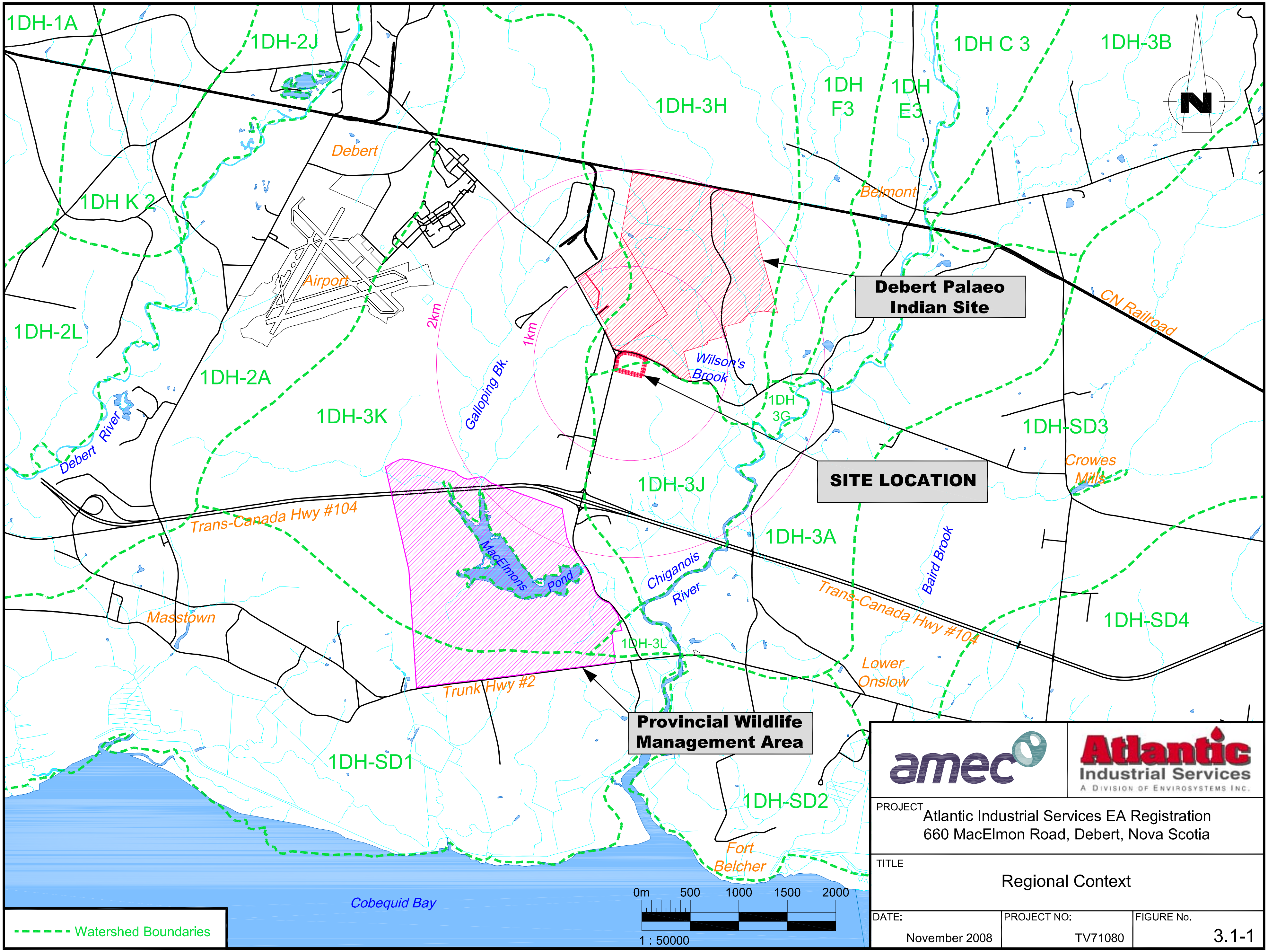
The regional landscape around the Facility provides a wide range of terrestrial, aquatic and intertidal habitats. The fauna of the region includes a number of opportunistic species associated with agricultural areas, such as fox and skunk (NS Museum 2007a). The mudflats, salt marshes and dykelands are important breeding and staging areas for waterfowl and migratory shorebirds. A wildlife management area is located near Debert and a population of American Wigeon and several other waterfowl species use this wetland in the fall (Figure 3.1-1). The protected wildlife area is discussed further in Section 3.2.1. Typical freshwater fishes include Creek Chub and Brook Trout. Atlantic Salmon also enter most Cobequid rivers.

Based on information from NSDOFA (J. Leblanc, Inland Fisheries Division, verbal communication 2008) the Chiganois River and Wilson's Brook may have both resident and sea-run speckled trout and various forage fish such as chub, killifish and dace. The rivers could also have runs of smelt, gaspereaux and perhaps striped bass. No information exists in the Fisheries Division of Nova Scotia data base that confirms the fish community of these rivers.

Information on birds known to breed in the Study Area was obtained from the Maritime Breeding Bird Atlas (MBBA 2008). The MBBA compiles survey data collected in designated 10 x 10 km squares in order to determine the distribution and abundance of bird species that breed in the Maritime Provinces. The Study Area lies within the atlas square 20MR62.

A total of 92 species were identified in the 10x 10 square containing project area between 2006-2008, including 8 raptors, 2 owls and 5 species at risk (MBBA 2008). All raptors and owls are protected under the Nova Scotia Wildlife Act. All migratory birds are protected under the *Migratory Birds Convention Ac*t. This legislation provides migratory birds protection from hunting and capture during sensitive periods, and prohibits the deposit of oil, oil wastes, or other substances harmful to migratory birds or in any area frequented by birds. The species at risk identified in near the study area include the Common Loon, Canada Warbler, Bobolink, Common Nighthawk and Barn Swallow. These species are all listed as Nova Scotia Department of Natural Resources general status 'Yellow', indicating they are sensitive to human activities or natural events (NSDNR 2007).

As mentioned above, the highly developed character of the existing site provide little to no habitat to wildlife including birds. The service expansions will all take place within the existing fence line and mostly within the existing infrastructure. No wildlife habitat will be affected.



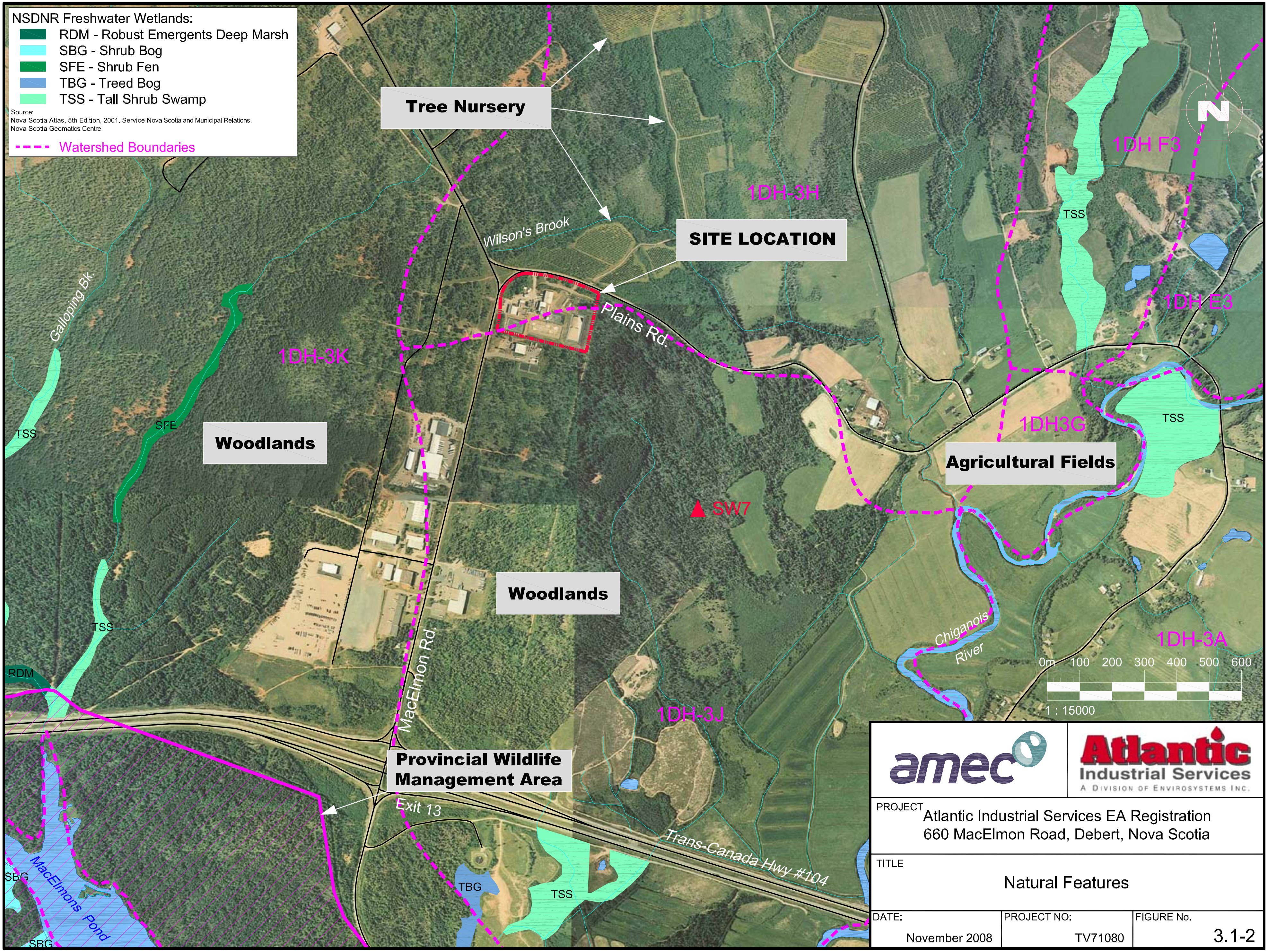
amec

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE Regional Context

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	3.1-1



NSDNR Freshwater Wetlands:
RDM - Robust Emergents Deep Marsh
SBG - Shrub Bog
SFE - Shrub Fen
TBG - Treed Bog
TSS - Tall Shrub Swamp
Source:
Nova Scotia Atlas, 5th Edition, 2001. Service Nova Scotia and Municipal Relations.
Nova Scotia Geomatics Centre
Watershed Boundaries
Tree Nursery
SITE LOCATION
Woodlands
Woodlands
Agricultural Fields
Provincial Wildlife Management Area
Wilson's Brook
Galloping Bk.
Plains Rd.
MacElmon Rd.
Exit 13
Trans-Canada Hwy #104
Chiganois River
MacElmons Pond
1DH-3K
1DH-3H
1DH F3
1DH E3
1DH3G
1DH-3A
1DH-3J
SW7
TSS
SFE
RDM
SBG
TBG
N
0m 100 200 300 400 500 600
1 : 15000
amec
Atlantic Industrial Services
A Division of Envirosystems Inc.
PROJECT
Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia
TITLE
Natural Features
DATE:
November 2008
PROJECT NO:
TV71080
FIGURE No.
3.1-2

3.2 SOCIO-ECONOMIC ENVIRONMENT

3.2.1 Existing and Planned Land Uses

Existing Land Uses
The existing facility is located in the Debert Industrial Park proximate to privately and provincially owned land. Land use features at and near the site are shown in Figure 3.2-1. To the south, the neighbouring property is a licensed hazardous waste transfer facility (Clean Harbors Canada Inc.). Nova Scotia Department of Natural Resources owns land to the northeast of the site which includes the Debert Paleo-Indian site. The land to the east and west of the Facility is currently undeveloped. Predominant land use is forestry. A tree nursery is located to the northeast. The nearest private property dwelling is 0.75 km from the Facility (Figure 3.2-1).

Planned Land Uses
At this time there is no zoning in place in the Debert region of Colchester County. This means no specified or restricted land uses, specific lot sizes, set backs or buffers currently exist.

The village of Debert has announced plans to develop and preserve about 1600 hectares (4000 acres) surrounding the existing AIS Facility. The development of the Debert Industrial Park aims to make Debert a major connector for the proposed Atlantic Gateway. Maps accompanying the Debert Industrial Parks Concept Plan (January 2007) indicate plans to develop lands along the south and southeastern boundaries of the existing Facility into industrial lots (Figure 3.2-2).

Protected Areas
The Wilderness Areas Protection Act, administered by the Nova Scotia Department of Natural Resources, designates protected wilderness areas in the province. The Debert Wildlife Management Area, 1.7km from the existing Facility, was established as a sanctuary in 1962 and changed to a wildlife management area in 1973 (Figures 3.1-1 and 3.2-1). The provincially owned management area is approximately 350 hectares, and includes areas of forested land, wetlands, barren and developed land. The management area includes MacElmons Pond, an important breeding and staging habitat for a variety of waterfowl species. Adjacent to the wildlife management area is MacElmons Pond Provincial Park (Figures 3.1-1 and 3.2-1), which consists of a picnic area and short walking trail.

The Debert Paleo-Indian site is designated a Special Place under the Special Places Protection Act and a National Historic Site of Canada. This 130 ha site is located in the Debert Industrial Park, immediately north of Plains Road, one of existing facility's frontage roads (Figure 3.1.-1 and 3.2-1). This site is generally recognized as the oldest site of human presence in the region, aged at approximately 11,000 years, and several artifacts have been recovered from the area. The existing Facility is not considered an archaeologically sensitive area and no artifacts were uncovered during the site development.

First Nations
The nearest Mi'kmaq reserve is located in Millbrook, 12 km southeast of the AIS facility. Millbrook is the main reserve of the Millbrook Band which also includes other satellite reserves (Table 3.2-1). The population of the Millbrook Band as of December 2006 was 1,345 with 55% of Band members living on a reserve (INAC 2008).

Table 3.2-1: Millbrook Band Reserve Information

Reserve Name and Number	Size (ha)	Location	Date Established
Millbrook (#27)*	300.4	8 km east of Truro	1886
Beaver Lake (#17)	49.4	78.4 km southeast of Halifax	1867
Truro (#27a)	16.7	Adjoins Truro city limit	1904
Truro (#27b)	16.4	Adjoins Truro 27a on south	1907
Truro (#27c)	9.5	Adjoins Truro 27b on south	1909
Cole Harbour (#30)	18.6	9.6 km east of Halifax	1880
Sheet Harbour (#36)	32.7	110 km northeast of Halifax	1915

* Main reserve of Millbrook Band

3.2.2 Community Profile

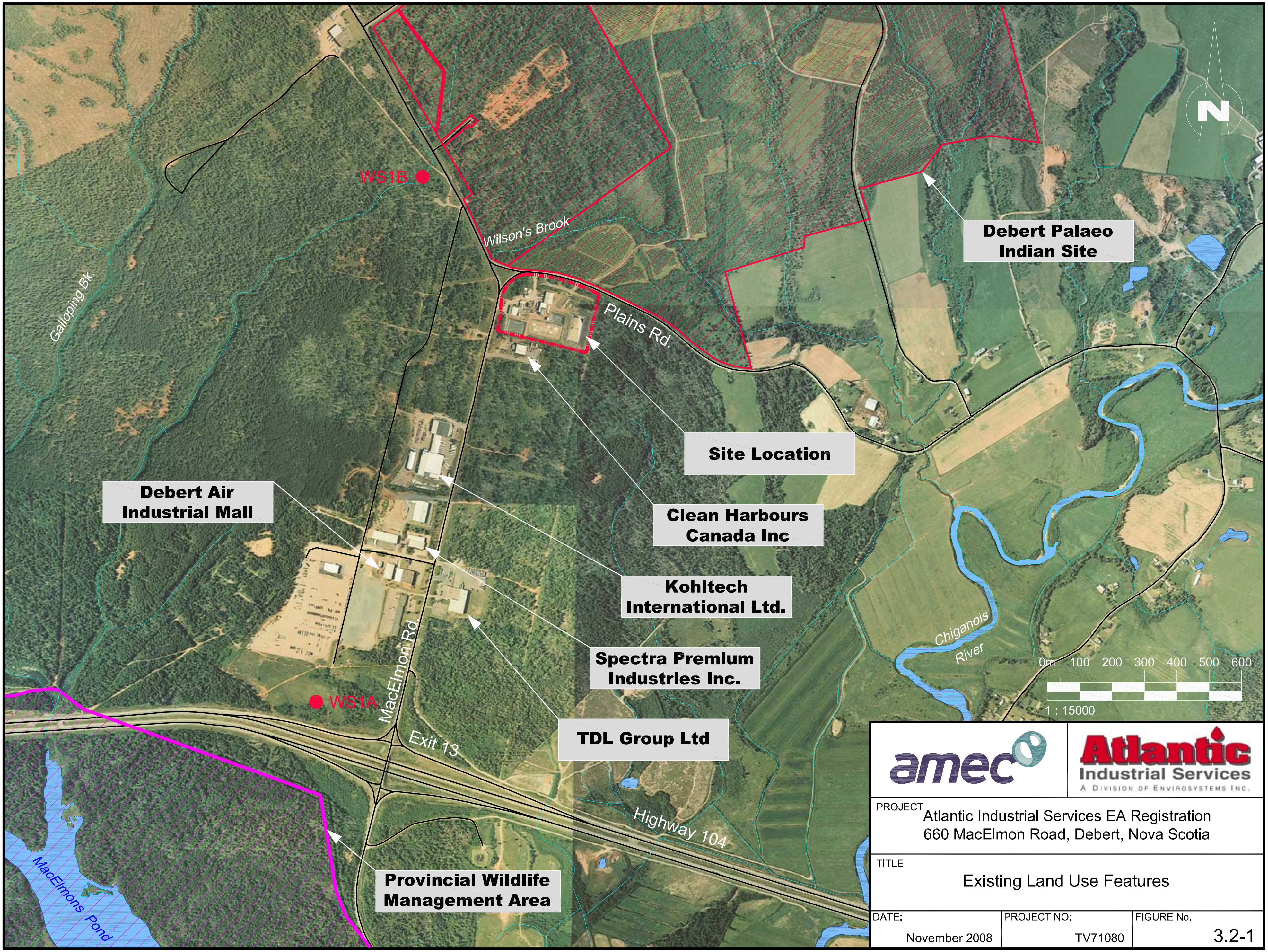
Demographics

Provincial Censuses indicate that Nova Scotia's population was up 5,455 from 2001 to a total of 913,462 in 2006. Much of the population increase is due to smaller losses in migration exchanges with other Provinces.

The population count for Colchester County in the 2006 Census was 50,023, up 1.5% from 2001 (StatsCan 2006). Colchester County is divided into three Subdivisions (Figure 3.2-3. The existing Facility and the village of Debert are located in Subdivision B (North Colchester) where the population grew 3.7% from 2001 to a population of 19,297 in 2006.

Regional Age Trends

Age distribution trends for Colchester County Subdivision B show a decline of 8% in the future working age population (Figure 3.2-4). This trend is particularly evident in the 0-14 age group and is likely a result of declining birth rates. The 65+ age group has grown by 20% while other age groups show population stability 2001 and 2006.



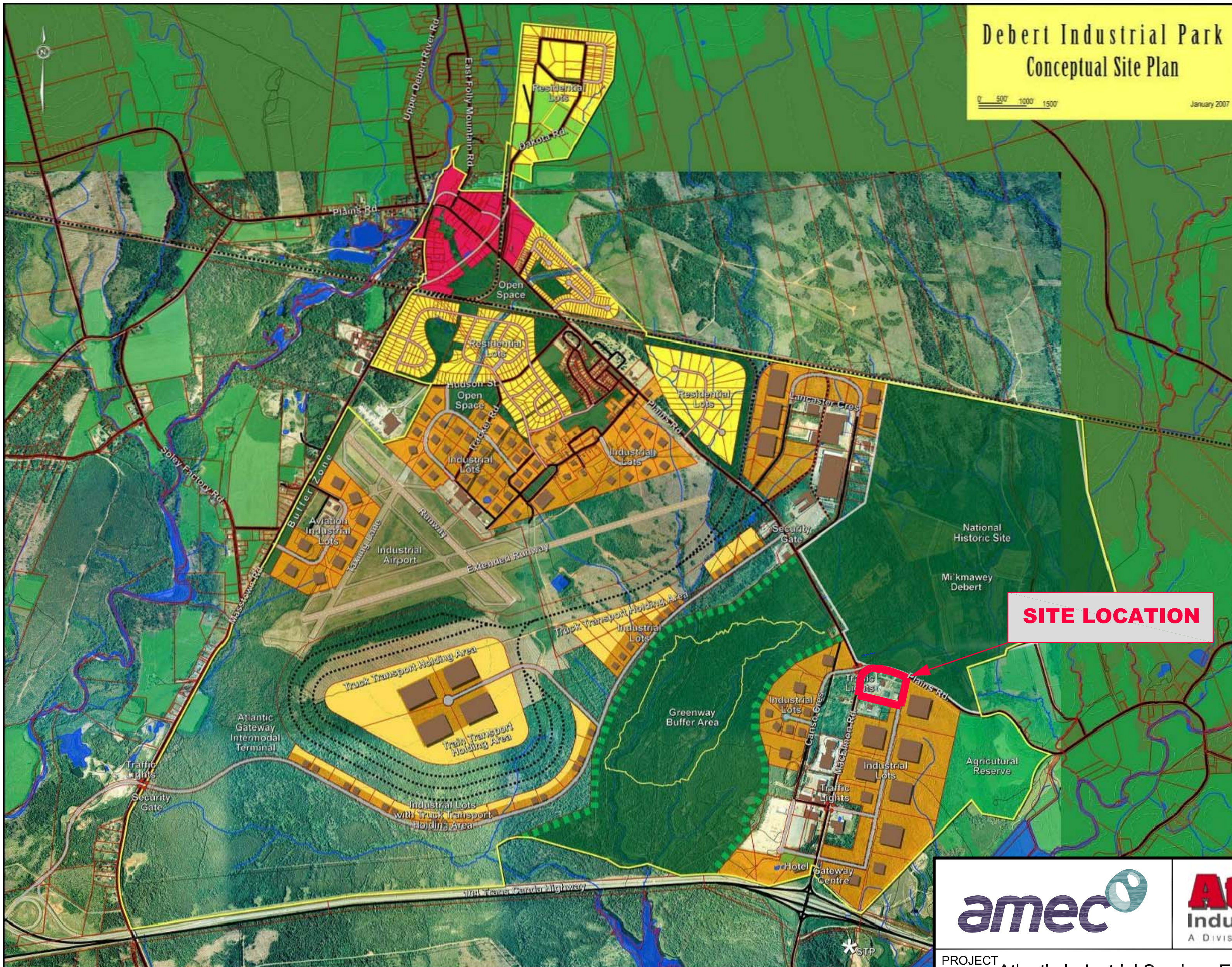
amec

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE Existing Land Use Features

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	3.2-1



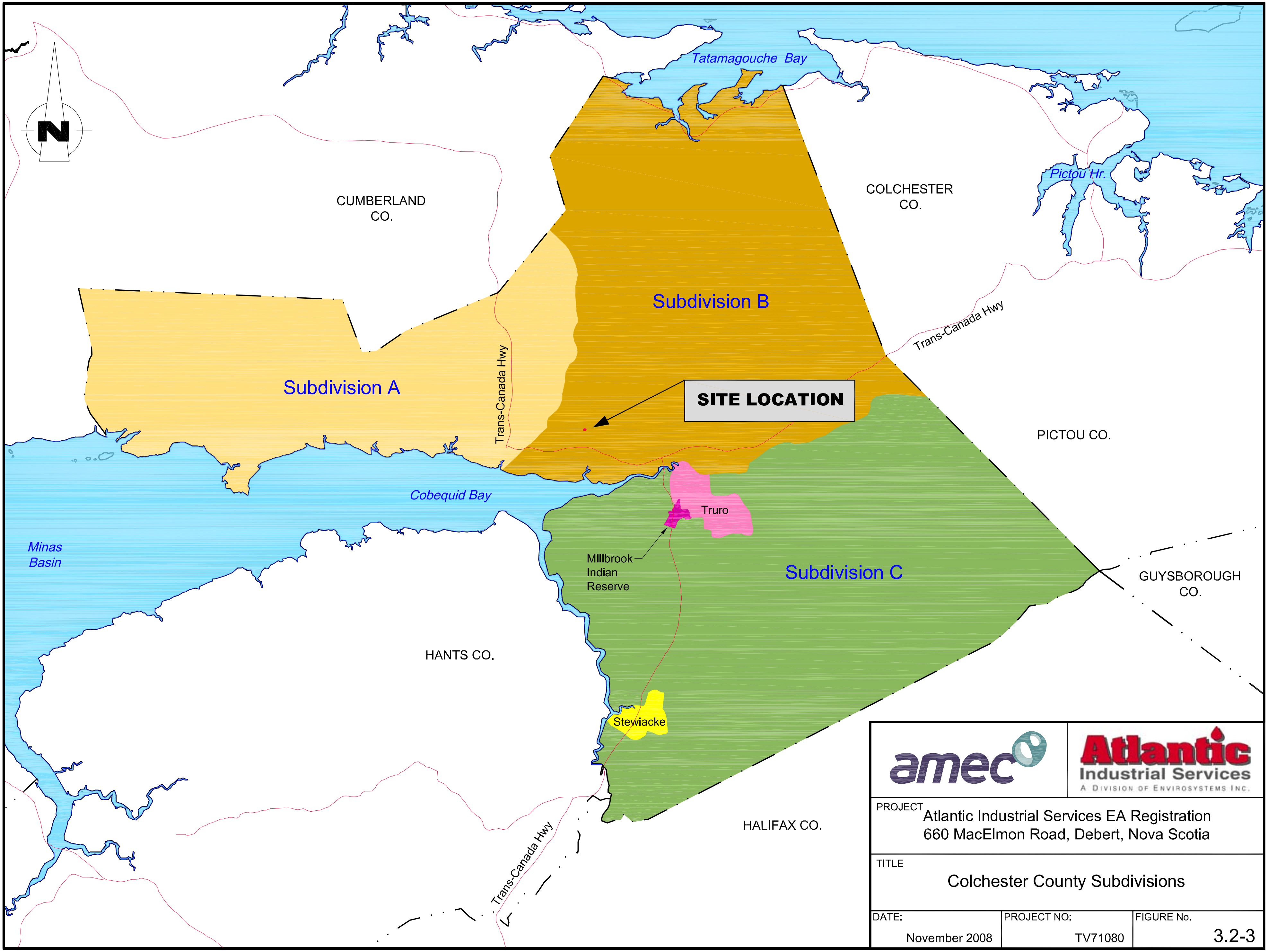
Source:
Debert Industrial Parks Concept Plan
November 2006
Final Report By:
Ekistics Planning & Design

amec

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT	Atlantic Industrial Services EA Registration 660 MacElmon Road, Debert, Nova Scotia
TITLE	Future Land Use: Debert Industrial Park

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	3.2-2



amec | Atlantic Industrial Services — A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration 660 MacElmon Road, Debert, Nova Scotia		
TITLE Colchester County Subdivisions		
DATE: November 2008	PROJECT NO: TV71080	FIGURE No. 3.2-3

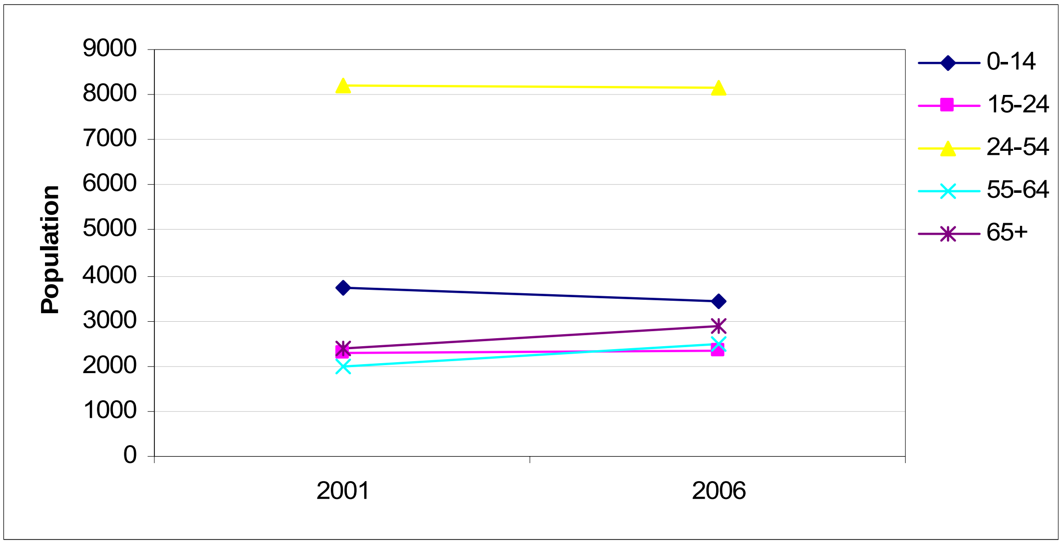


Figure 3.2-4: Age Distribution for Colchester County Subdivision B (Source: StatsCan, AMEC interpretation)

Diversity

Over 90% of residents in Nova Scotia and in Colchester County Subdivision B are Canadian-born (Table 3.2-2). Foreign-born residents account for 4.4% provincially and 3.0% regionally. Of the regional foreign-born population, 83% immigrated before 1991. The vast majority of the population, both provincially and regionally, speaks English only (Table 3.2-3).

Table 3.2-2: Immigration Characteristics (Source StatsCan, AMEC interpretation)

	Colchester County Subdivision B		Nova Scotia	
	Total	% of Population	Total	% of Population
Canadian-born	17920	93.87	853655	90.92
Foreign-born	580	3.0	41320	4.40
Immigrated before 1991	480	2.5	31030	3.30
Immigrated between 1991-2001	100	0.5	10285	1.10
Non-permanent residents	10	0.53	2595	0.28

Table 3.2-3: Knowledge of Official Languages (Source StatsCan, AMEC interpretation)

	Colchester County Subdivision B		Nova Scotia	
	Total	% of Population	Total	% of Population
English Only	17790	92.7	805690	89.2
French Only	0	0	1000	0.11
English and French	1405	7.3	95010	10.5
Neither English nor French	0	0	1385	0.15

Employment
Labour market data are made available by municipality and census Subdivision. Data from the 2006 Census has not yet been released, therefore the results from 2001 are presented in Table 3.2-4 below. Unemployment rates in Colchester County Subdivision B are slightly lower than provincial unemployment rates at 9.3% and 10.9% respectively (Table 3.2-4).

As shown in Figure 3.2-5, the majority of people (22%) employed in Colchester County Subdivision B work in the manufacturing and construction trade, followed by 20% in the wholesale and retail trade (Target Nova Scotia 2006). The leading employers in Debert are Kohltech International Limited with between 200-499 employees, followed by Home Hardware with 100-199 employees and Newmac Manufacturing and Watkins Products with 50-99 employees.

Table 3.2-4: 2001 Labour Force Indicators (Source StatsCan 2001, AMEC interpretation)

	Colchester Sub. B			Nova Scotia		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**
Participation rate	64.7	70.3	59.2	61.6	68.0	55.8
Employment rate	58.6	63.9	53.5	54.9	60.3	50.0
Unemployment rate	9.3	9.0	9.7	10.9	11.3	10.4

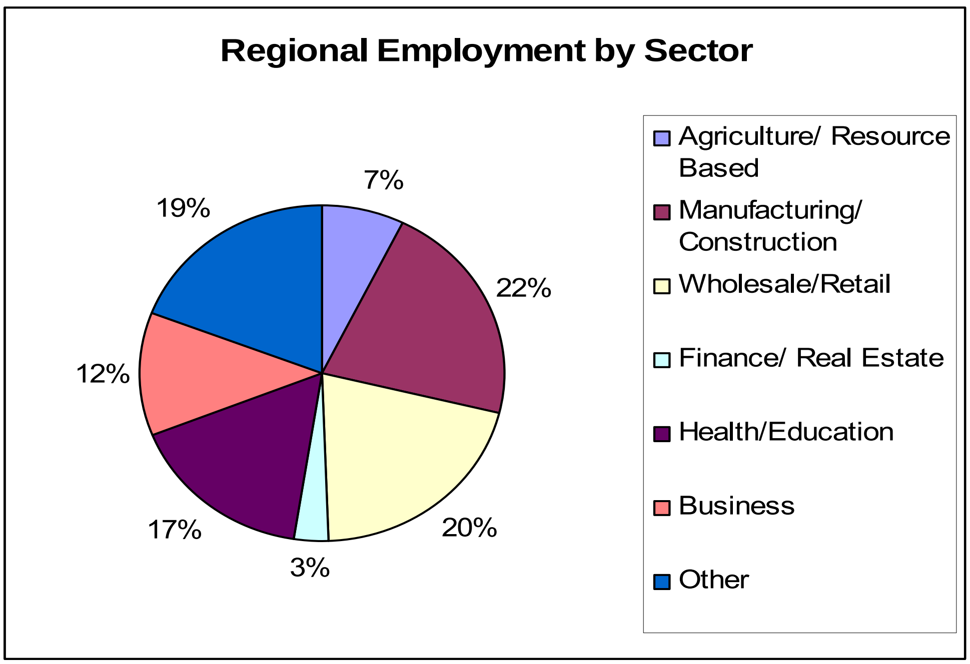


Figure 3.2-5: Employment by Sector in Colchester County Subdivision B (StatsCan 2001, AMEC interpretation).

3.2.3 Transportation

Roads
The principal highway connecting to the existing Facility is Trans-Canada Highway 104. As a provincial collector, it has two-lanes and unlimited access. The existing Facility can be accessed from MacElmon Road, Exit 13 off of Highway 104. The north side of the Facility is bounded by Plains Road (Figure 1.2-1).

The nearest commercial airport is the Halifax International Airport, 62 km south of Truro on Highway 102. The Debert Industrial Park, located 14.5 km west of Truro, is a civilian airport containing 3 asphalt runways. The Debert Industrial Park Concept Plan recommends an expansion of runway. The Concept Plan also suggests that a large area of land immediately south of the airport should be reserved for development as an inland road and rail terminal.

A Via Rail Canada station is located in Truro with the main line going south to Halifax, and a branch line running east to Sydney. This also serves as the station for Acadian Bus Lines.

4.0 POTENTIAL ENVIRONMENTAL EFFECTS AND MITIGATION

4.1 PROJECT-ENVIRONMENT INTERACTIONS, VECS

In order to focus on the environmental effects assessment on key issues and concerns, Valued Environmental Components (VECs) have been identified. The identification and selection of VECs is presented in the following section.

VECs are attributes or elements that have scientific, ecological, social, cultural, economic, historical, archaeological or aesthetic significance or importance. VECs are specific to the environmental setting in which a project or activity takes place. In order to be selected, there needs to be a reasonable possibility that the VEC will be affected by the proposed Project works and activities. The preliminary impact matrix, which lists Project components and potential VECs, is presented in Table 4.1-1.

Project components were identified as having a potential positive effect (P), potential negative effect (N) or not having an effect (blank). The environmental components for which a potential for interaction with Project works and activities is identified represent VECs. The VECs are discussed in detail in subsequent sections, where impacts to the VECs are evaluated in conjunction with mitigation measures.

Table 4.1-1: Environmental Effects Matrix

VECs	**Bio-physical**												**Socio-Economic**						
Project Activities	**Surface Water/ Hydrology**	**Ground Water**	**Soils**	**Air Quality**	**Noise/Vibration**	**Terrain/Topography**	**Vegetation**	**Wetlands**	**Fish and Fish Habitat**	**Wildlife/Habitat**	**Migratory Birds**	**Species at Risk /Habitat of Special Concern**	**Heritage/Archaeology**	**Aboriginal Use of Traditional Lands/Resources**	**Land Use**	**Human Health and Safety**	**Economic**	**Transportation**	**Other**
Construction/ Site Development Activities		N		N	N					N						N	P	N	
Operation Activities	N	N	N	N						N					P	N	P	P	
Malfunctions/ Accidents	N	N	N	N	N		N	N	N	N	N	N				N		N	

P= potential positive project-environment interaction
N= potential negative project-environment interaction
Blank = Absence of project-environment interaction

As demonstrated in Table 4.1-1, likely interactions have been identified between a number of VECs and the activities associated with the Facility expansion. The primary source of potential negative environmental interactions is associated with malfunctions and accidental spills. These scenarios are of concern primarily to groundwater, surface water quality, and soils. Off-site wildlife, vegetation and human health could also be potentially adversely affected via groundwater and surface water pathways.

4.2 POTENTIAL EFFECTS ON BIOPHYSICAL ENVIRONMENT AND MITIGATION

The following discussions of effects, mitigation, residual effects and monitoring/follow-up measures address the effects of the activities for which likely interactions with VECs have been identified. The significance of the residual effects has been evaluated based on the consideration of the magnitude of the anticipated effect, its geographic extent, duration/frequency, reversibility, and ecological/socio-cultural context.

4.2.1 Construction Phase

The proposed Facility expansion will be implemented entirely within the property boundary of the existing Debert Facility (Section 2.2.2). The new Facility components will be developed with a minimum of excavation work. The fenced-in area is fully developed with no natural habitat. All new buildings and features will be at grade level and earthworks will be limited to site grading and foundation structures. The potential for interaction with the environment is therefore very limited and may relate to groundwater, air quality (dust), noise, and transportation related effects. The socio-economic environment may also be affected. This however, would be considered mostly a beneficial effect (see discussion below).

4.2.1.1 Groundwater

The construction activities include earthworks for site grading and excavations for foundations. This could potentially lead to an interaction with local groundwater sources. Maximum excavation depths however is proposed to remain above groundwater levels. On-site groundwater monitoring shows that groundwater levels are at 4 to 5m below grade. A direct interaction with groundwater sources is therefore not expected. Any potential adverse effects would be limited to effects from malfunctions and accidents (e.g., a spill during refueling of construction equipment) (see discussion in Section 4.4).

4.2.1.2 Air Quality and Noise

At and near the existing Facility, increased noise and dust levels may be experienced for the duration of the construction activities. Given the short duration of the work, the absence of large earthworks, the use of paved roads on- and off-site and the distance to the nearest sensitive receptors (resident located at about 0.9km off site), no significant adverse effects are expected.

4.2.1.3 Wildlife and Habitat

All construction activities are confined to within the existing Facility boundaries and therefore will not affect habitat and associated wildlife. Effects on habitat and wildlife along the transport route are also expected to be not significant. The construction phase will be of short duration and will involve no export of excavation material and limited truck delivery of equipment and building material (import of approximately 50 truck loads of clean fill and similar quantity of gravel). Most deliveries are anticipated to be made via Hwy 104. The highway is in close proximity (less than 2 km) to the Facility and trucks would typically travel along MacElmon Road with extensive commercial and industrial developments (Debert Industrial Park).

4.2.2 Operation Phase

4.2.2.1 Surface Water

The surface water from the loading and unloading pads is currently routed to an API separator. The API separator discharges into the on-site stormwater management pond. Upon completion of the Facility expansion the storm water management pond will be the current wastewater holding pond # 6. The new pond will operate in the same way as the current stormwater pond and will use the same discharge point, i.e., water will be discharged to the roadside ditch alongside of Plains Road. This is an intermittent road side ditch and water gradually infiltrates along the road side environment and adjacent woodland without discharge into an open receiving water body or wetland (see Section 3.1.4).

AIS currently test the water quality of the stormwater pond every time water is discharged. The existing system has been successfully operated for many years. The operation of the system will continue upon implementation of the proposed Facility expansion. As described in Section 2, the wastes received under the proposed new operating permit will be stored in designated holding tanks and a designated drum storage building area respectively. Both systems will be designed with containment features to prevent the release of contaminated water into the site's stormwater management system. Exterior containment areas will be equipped with a controlled drainage system for the release of collected uncontaminated rain water to the stormwater pond. As an additional precautionary measure, AIS is currently monitoring surface water quality at an off-site monitoring station downgradient from the Project site (Figure 3.1.2). This quarter-yearly monitoring will continue following the proposed facility expansion.

Taking into account the above design and operating features, plus the characteristics of the receiving environment (intermittent ditch, no discharge to open water or wetland) the stormwater run off is not expected to cause significant adverse effects on the surface water environment. Potential adverse effects on the surface water environment and wetlands associated with malfunctions and accidents of the stormwater management system are discussed in Section 4.4.

During operation, all wastewater streams from the various waste treatment processes will be directed to the Facility's biological treatment ponds. With the Facility expansion in place, these ponds will continue to discharge after ultrafiltration to the municipal sewer for further treatment at the municipal water treatment plant. The effluent quality will continue to be routinely monitored to ensure that the effluent quality meets the Facility's existing permitted discharge criteria. The on-site treatment and subsequent municipal treatment of the AIS Facility effluent ensure the adverse effects on the final receiving surface water environment are not significant.

4.2.2.2 Groundwater, Soils

Given the existing and proposed storage facilities and associated containment features, an interaction of the proposed Facility with soils and ground water environment is highly unlikely. Should they occur, any such interaction is considered to be related to malfunctions (e.g., leaks in containment system) or accidents (e.g., spills). As a precautionary measure, eight monitoring well locations currently ring the Debert Facility to monitor for ground water contamination. This groundwater monitoring takes place every three months and will continue following the proposed Facility expansion. Under normal operations, and with the precautionary monitoring system in place, adverse effects from routine operation on the groundwater environment are not expected to be significant.

As discussed under 4.2.2.1 (Surface Water), stormwater collected within the Facility is discharged to an off-site intermittent drainage ditch through which it infiltrates into the roadside environment. This provides the potential for contaminants contained in the storm water discharge to infiltrate into the groundwater environment. Given the on-site API oil separator, the pre-discharge stormwater water quality monitoring, discharge of contaminated stormwater is considered an unlikely event that would be associated with a malfunction and/or accident scenario. This is discussed in Section 4.4.

4.2.2.3 Air Emissions

As noted in Section 2.3.8.1, there are a number of unit operations employed at the AIS Facility, as well as a number of holding ponds and a biological treatment pond (aeration basin) for wastewater treatment. The typical configuration of these units is designed to contain any off-gases, either by venting back to storage, or through minimal venting with carbon adsorption to remove volatile contaminants. However, the holding ponds, as well as the biological treatment pond will lead to fugitive off-gases, and a two-step modeling exercise was performed in order to assess the impacts which these fugitive gases would have on the environment.

Emissions to the atmosphere at the wastewater treatment system of the AIS Debert Facility were modeled using the U.S. Environmental Protection Agency-developed Water9 Version 2 model (AMEC 2008a).

The Water9 modeling included 13 volatile organic compounds (VOCs), 7 of which are referred to separately herein as 3 alcohols and 4 glycol compounds. The compounds were all found in the waste streams based on a sampling program conducted in August 2008. Details on the model, model inputs and assumptions (e.g., wastewater characteristics, process configuration) are described in Appendix G.

4.2.2.3.1 Emission Estimates

The Water9 model is useful in predicting the fate of compounds in wastewater treatment systems in the following pathways:

- Air Emissions
- Biological degradation
- Adsorption to solids in sludge, and
- In final effluent

The potential impacts of the air emissions are of interest for this discussion, and two scenarios were examined for purposes of dispersion modeling (see 2.3.5), these being:

- Scenario 1: Summer conditions – Existing plus new waste streams enter the holding basin

  Winter conditions – Existing plus new waste streams enter the holding basin
- Scenario 2: Summer conditions – Existing flow to holding basin and new waste streams direct to aeration basin

  Winter conditions – Existing flow to holding basin and new "produced waste" direct to aeration basin. There is no Frac Fluid flow for this condition.

Scenario 2 was examined as a possible operating procedure to mitigate against VOC emissions associated with storage of the new waste streams in the holding ponds. Process schematics of Scenario 1 and 2 are presented in Figure 4.2-1 and 4.2-2 respectively.

Table 4.2-1 indicates the model results from the examination of Scenario 1. As shown by the model, both the VOCs and the alcohols, as a percent of total influent load, have the greatest air emission impact from the holding basin; whereas the emissions from the aeration basin are relatively insignificant. The glycols are less volatile, and are mainly consumed in the biodegradation process in the aerated basin. It should be noted that the model assumes sufficient dissolved oxygen levels for the biodegradation process, and, in order for the results to be meaningful, steps will be taken with the influx of new waste in order to ensure sufficient aeration capacity.

Table 4.2-1: Predicted Air Emissions with New Waste Streams Treated – Scenario 1
(All wastes added to the Holding Basin)

Parameter Class	Air Emissions from Holding Basins (percent of total influent load)	Air Emissions from Aeration Basin (percent of total influent load)
VOCs	17-59	1
Alcohols	66-77	0.1
Glycols	0-8	0.01

The results of Scenario 2 are shown in Table 4.2-2, and as can be seen, the major difference is that the alcohol emissions decrease significantly, since a substantial portion of the influent alcohol content goes directly to the aeration pond, and is captured in the biological activity process before it can volatilize.

Table 4.2-2: Predicted Air Emissions with New Waste Streams Treated - Scenario 2
(New waste streams directly to the Aeration Basin)

Parameter Class	Air Emissions from Holding Basins (percent of total influent load)	Air Emissions from Aeration Basin (percent of total influent load)
VOC's	17-60	1
Alcohols	2-80 (41 avg.)	0.1
Glycols	0-11	0.01

The results of the Water9 calculations were converted to usable inputs for the running of the atmospheric dispersion model which is discussed below in Section 4.2.2.3.2.

4.2.2.3.2 Air Dispersion Modeling

As indicated above, the most significant air emissions for the AIS facility in Debert result from volatile gases being emitted from both the holding basins (L-3, L-4, and L-5), as well as the aeration basin (L-2) as shown in Figure 2.1-3 above. The emissions data which were calculated by the use of Water9 were then used as input to the U.S. Environmental Protection Agency approved air dispersion model ISCST3 (industrial Source Complex – Short Term), a steady-state Gaussian plume model which can be used to assess pollutant concentrations from a wide variety of sources, including the multiple area sources under consideration. The dispersion model was run for 10 VOCs including 3 Alcohols and 1 Glycol based on the air emission results predicted by the Water9 model.

For the purposes of assessing the impacts of the pollutants of concern, comparisons must be made with existing regulatory standards/objectives/guidelines. While Nova Scotia does not have ambient air quality objectives for these particular pollutants, a common practice is to review the data in terms of other known criteria. For this assessment, the air quality standards and criteria utilised by the Province of Ontario (OMOE, 2008) are considered appropriate, and Table 4.2-3 lists these. Only benzene and tetrachloroethylene do not have criteria available from the Ontario Ministry of the Environment. As will be seen below in Sections 4.2.2.3.4 and 4.2.2.3.5 (Tables 4.2-8 and 4.2-11), the expected maximum air quality concentrations from these latter two compounds are very low.

Table 4.2-3: Summary of Ontario MOE Standards and Ambient Air Quality Criteria (AAQC)

Contaminant	24 hour Standards ($\mu g/m^3$)	1 hour AAQC ($\mu g/m^3$)	24 hour AAQC ($\mu g/m^3$)
Benzene	-	-	-
Ethyl Benzene	1000 (Health)	-	-
Methylene Chloride	220 (Health)	-	220
Tetrachloroethylene	-	-	-
Toluene	-	-	2000 (odour) TBU
Xylene	730 (Health)	-	-
Ethanol	-	19000 (odour) TBU	-
Isopropanol	7300 (Health)	-	2400
Methanol	4000 (Health)	-	-
Ethylene Glycol	-	-	12700 (Health)

Source: OMOE 2008

4.2.2.3.3 Air Dispersion Model Input Parameters

The model requires that long-term (5 year) meteorological data be provided as input, and includes wind velocities and direction, temperature, atmospheric stability, and mixing layer depth. The hourly meteorological data for the period 1995 through 1999 was obtained from the Halifax International Airport station, as this was the closest station having such records. Additionally, upper air sounding data was obtained from the Sable Island Meteorological station (Latitude 43^o 55.800' N, Longitude 60^o 0.600 W).

The receptor grid consisted of a 2 km x 2 km Cartesian surrounding the AIS Facility property, with receptors spaced 100 m apart. In addition, discrete receptors, as depicted in Figure 4.2-3 were placed at the property line (N, S, E, and W directions) as well as at a neighbouring commercial building located immediately South of the AIS property. Table 4.2-4 is a list of the discrete receptors discussed.

Table 4.2-4: List of Discrete Receptors

Receptor Location	Coordinates (X in metres, Y in metres)
West Property Receptor	(0,30)
South Property Receptor	(50,0)
East Property Receptor	(280,60)
North Property Receptor	(250,188)
Neighbouring Industrial Building Receptor	(50,-15.2)

In order to calculate the cumulative air quality impacts from the four area sources of concern (ponds L-2, L-3, L-4, and L-5), the physical parameters and grid locations had to be determined. These parameters are shown in Table 4.2-5. Then the mass emission rates were calculated from the results of running the Water9 model, and input appropriately into the air quality dispersion model.

Table 4.2-5: Source Parameters for Biological Treatment Pond and Holding Ponds

Parameter	X Coordinate[1] (m)	Y Coordinate[1] (m)	Length (m)	Width (m)
L-2 Biological Treatment Pond	144	64	44	31.7
L-3 West Pond	22	6	51	35
L-4 East Pond	212	12	90	45.4
L-5 Northeast Pond	232	110	33.5	31

4.2.2.3.4 Air Quality Impacts – Scenario 1 – Present Flow Configuration

The total annual mass emission rates and the summer/winter daily rates for Scenario 1 are indicated in Table 4.2-6, and represent the total contributions for each of the relevant compounds as derived from Water9. Table 4.2-7 further shows the calculated g/s-m^2 (i.e. the grams per second per square metre of surface area for each type of pond) for each compound under consideration, for both summer and winter. In this way, the data can be input for each individual pond, which allows the multi-source ISCST3 model to calculate downwind cumulative impacts on air quality.

Table 4.2-6: Annual Emission Estimate – Present Flow Configuration
(includes present and new average waste loads)

Parameter	Summer (kg/d)	Winter (kg/d)	Cumulative Annual (kg/year)
Benzene	0.0015	0.0031	0.83
Ethyl Benzene	0.0017	0.0033	0.92
Methylene Chloride	0.0016	0.0021	0.68
Tetrachloroethylene	0.00029	0.00043	0.13
Toluene	0.010	0.020	5.5
Xylene (total)	0.012	0.022	6.2
Ethanol	168	166	61,000
Isopropanol	1.6	0.18	320
Methanol	160	3.6	29,900
Ethylene Glycol	25	5.7	5,600

Note: Estimate assumes 365 operating days per year.

Table 4.2-7: Emission Rates for Present Configuration
(includes present and new average waste loads)

Parameter	Holding Ponds		Aeration Pond	
	Summer ($g/s\text{-}m^2$)	Winter ($g/s\text{-}m^2$)	Summer ($g/s\text{-}m^2$)	Winter ($g/s\text{-}m^2$)
Benzene	2.51E-09	5.19E-09	5.39E-12	1.11E-11
Ethyl Benzene	2.85E-09	5.53E-09	3.15E-11	6.14E-11
Methylene Chloride	2.68E-09	3.52E-09	4.03E-11	5.31E-11
Tetrachloroethylene	4.86E-10	7.2E-10	2.32E-11	3.73E-11
Toluene	1.68E-08	3.35E-08	9.96E-11	1.99E-10
Xylene (total)	2.01E-08	3.69E-08	4.4E-11	8.05E-11
Ethanol	0.000281	0.000278	0	0
Isopropanol	2.68E-06	3.02E-07	7.97E-09	8.96E-10
Methanol	0.000268	6.03E-06	1.8E-07	4.07E-09
Ethylene Glycol	4.19E-05	9.55E-06	0	0

The resulting maximum air quality impacts for both summer and winter conditions at the discrete receptors are shown in Table 4.2-8, as well as the Ontario criteria. It should be noted that both the concentrations and the criteria for ethanol are for a one-hour averaging period, whereas the other pollutants reflect 24-hour averaging and criteria. As expected, the maximum predicted concentrations for the alcohols are smaller in the winter primarily due to the fact that the Frac Fluid is not processed during winter months as well as the volatility/temperature seasonal relationship. More importantly, all of the impacts are below the relevant criteria. It is also interesting to note the dramatic decrease of pollutant concentration with distance from the facility, as exemplified by the 46% drop in methanol concentration from the property boundary (South Property Receptor: 50,0) to the neighbouring commercial receptor (50, -15.2), a distance of only some 15 metres. Although the dispersion of the other compounds would not reflect an exact linear relationship to the methanol concentrations due to the differing impacts of two types of sources (i.e. holding basin and aeration basin), the decrease with distance from the property line would be expected to be similar.

Table 4.2-8: Dispersion Model Results–Maximum Ground Level Concentrations–Scenario 1
(Influent Flows Enter Holding Pond)

Parameter	Location (x in metres, y in metres)	Summer 24-hour Predicted Results ($\mu g/m^3$)	Winter 24-hour Predicted Results ($\mu g/m^3$)	OMOE 24-hour Standards or AAQC ($\mu g/m^3$)
Benzene	South Property Receptor (50,0)	0.037	0.1	-
Ethyl Benzene	South Property Receptor (50,0)	0.04	0.1	1000
Methylene Chloride	South Property Receptor (50,0)	0.04	0.07	220
Tetrachloroethylene	South Property Receptor (50,0)	0.007	0.013	-
Toluene	South Property Receptor (50,0)	0.25	0.63	2000(3)
Xylene	South Property Receptor (50,0)	0.30	0.69	730
Ethanol	Southeast Property Receptor (220,0)	17327(1)	14762(1)	19000(2)
Isopropanol	South Property Receptor (50,0)	40	5.7	7300

Table 4.2-8: Dispersion Model Results–Maximum Ground Level Concentrations–Scenario 1
(Influent Flows Enter Holding Pond)

Parameter	Location (x in metres, y in metres)	Summer 24-hour Predicted Results (µg/m³)	Winter 24-hour Predicted Results (µg/m³)	OMOE 24-hour Standards or AAQC (µg/m³)
Methanol	West Property Receptor (0,30)	2187	46	4000
	South Property Receptor (50,0)	3959	1.3	
	East Property Receptor (280,60)	2713	80	
	North Property Receptor (250,188)	1158	24	
	Neighboring Industrial Facility Receptor (50,-15.2)	2140	70	
Ethylene Glycol	South Property Receptor (50,0)	619	179	12700

Note (1): Predicted results are for a one hour averaging period.
(2): AAQC is for a 1-hour averaging period.

4.2.2.3.5 Air Quality Impacts – Scenario 2 – New Waste Direct to Aeration Pond

For this Scenario, the total annual mass emission rates and maximum summer/winter daily rates are shown in Table 4.2-9, and represent the total contributions of the relevant compounds as derived from the Water9 model. Table 4.2-10 shows the calculated grams per second per square metre of surface area for each type of basin., for each compound, for both summer and winter.

Table 4.2-9: Annual Emission Estimate – New Wastes Direct to Biological Treatment Pond
(includes present and new average waste loads)

Parameter	Summer (kg/d)	Winter (kg/d)	Cumulative Annual (kg/year)
Benzene	0.0018	0.0031	0.89
Ethyl Benzene	0.0017	0.0033	0.91
Methylene Chloride	0.0016	0.0021	0.68
Tetrachloroethylene	0.00029	0.00043	0.13
Toluene	0.010	0.020	5.5
Xylene (total)	0.012	0.022	6.2
Ethanol	176	169	63,000
Isopropanol	0.21	0.18	72
Methanol	3.7	3.3	1,300
Ethylene Glycol	35	6.3	7,500

Note: Estimate assumes 365 operating days per year.

Table 4.2-10: Emission Rates for New Waste Direct to Biological Treatment Pond
(includes present and new average waste loads)

Parameter	Holding Ponds		Biological Treatment Pond	
	Summer ($g/s\text{-}m^2$)	Winter ($g/s\text{-}m^2$)	Summer ($g/s\text{-}m^2$)	Winter ($g/s\text{-}m^2$)
Benzene	3.02E-09	5.19E-09	1.62E-11	2.78E-11
Ethyl Benzene	2.85E-09	5.53E-09	3.15E-11	6.12E-11
Methylene Chloride	2.68E-09	3.52E-09	2.69E-11	3.52E-11
Tetrachloroethylene	4.86E-10	7.2E-10	1.33E-11	1.96E-11
Toluene	1.68E-08	3.35E-08	9.96E-11	1.99E-10
Xylene (total)	2.01E-08	3.69E-08	4.4E-11	7.92E-11
Ethanol	0.000295	0.000283	0	0
Isopropanol	3.52E-07	3.02E-07	7.97E-08	6.85E-08
Methanol	6.2E-06	5.53E-06	3.6E-06	3.21E-06
Ethylene Glycol	5.86E-05	1.06E-05	0	0

The maximum air quality concentrations predicted for each compound are shown at the location (receptor) at which they are found. As in Table 4.2-11 above, the averaging period and criteria are both one-hour for ethanol rather than the 24-hour period for the other compounds. Again, the predicted maximum concentrations are all less than the relevant criteria. In addition, the methanol and isopropanol concentrations for the summer period are dramatically less than that for Scenario 1, due to the fact that these compounds biodegrade very quickly, thus decreasing the quantities available for volatilization.

Table 4.2-11: Dispersion Model Results-Maximum Ground Level Concentrations – Scenario 2
(New Waste Direct to Biological Treatment Pond)

Parameter	Location (x metres, y metres)	Summer 24-hour Predicted Results ($\mu g/m^3$)	Winter 24-hour Predicted Results ($\mu g/m^3$)	OMOE 24-hour Standards or AAQC ($\mu g/m^3$)
Benzene	South Property Receptor (50,0)	0.04	0.1	-
Ethyl Benzene	South Property Receptor (50,0)	0.04	0.12	1000
Methylene Chloride	South Property Receptor (50,0)	0.04	0.07	220
Tetrachloroethylene	South Property Receptor (50,0)	0.007	0.013	-
Toluene	South Property Receptor (50,0)	0.25	0.63	2000
Xylene	South Property Receptor (50,0)	0.30	0.69	730
Ethanol	Southeast Property Receptor (220,0)	18190(1)	15027(1)	19000(2)
Isopropanol	South Property Receptor (50,0)	4.6	5.7	7300
Methanol	South Property Receptor (50,0)	92	104	4000
Ethylene Glycol	South Property Receptor (50,0)	866	199	12700

Note (1): Predicted results are for one hour averaging period
(2): AAQC is for a 1-hour averaging period

As a result of the outcome from the Water9 modeling as well as the ISCST3 air quality dispersion modeling, it can be concluded that the predicted maximum air quality concentrations, resulting from off-gases from the holding and aeration basins for both scenarios, for all of the compounds considered fall below accepted criteria, and that the concentrations drop significantly within a short distance from the site. Consequently, the effects of the proposed

Facility expansion on air quality are not considered significant. In addition, the protocol developed provides a useful methodology to evaluate new waste streams.

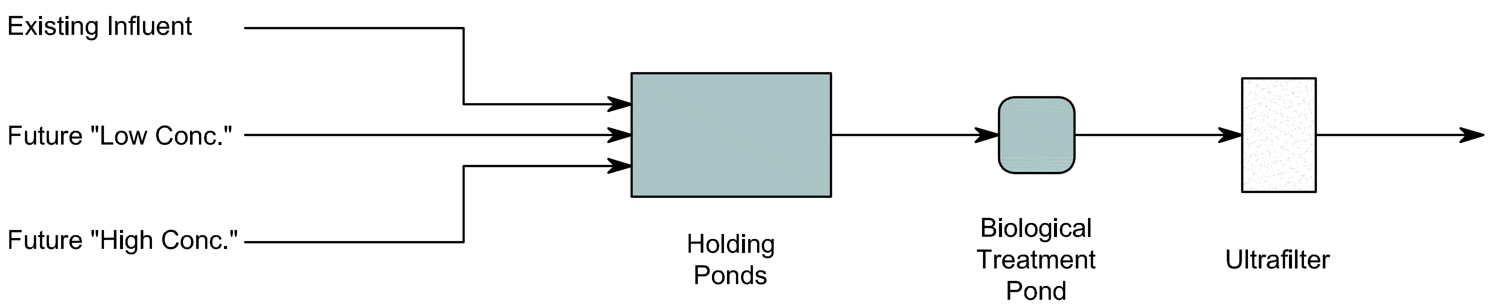
Other fugitive sources, such as vents from holding vessels, would likely be minor in regard to downwind impacts; however, these emissions will ordinarily be directed back to containment, or captured using appropriate treatment.

4.2.2.4 Wildlife and Habitat

The proposed Facility expansion is associated with an increase in waste transported to the Facility by approximately 25%. The export of materials for third party disposal will increase by less than 5% of the amount currently trucked from the Facility (Section 2.3.9). In total, it is anticipated that the additional truck traffic will increase by about 10%. It is estimated that this will translate to about one additional truck per day for the export of recovered materials and solid wastes. Facility related truck traffic is expected to almost exclusively use MacElmon Road to travel to and from Hwy 104, a distance of less than 2 km with extensive commercial and industrial developments (Debert Industrial Park).

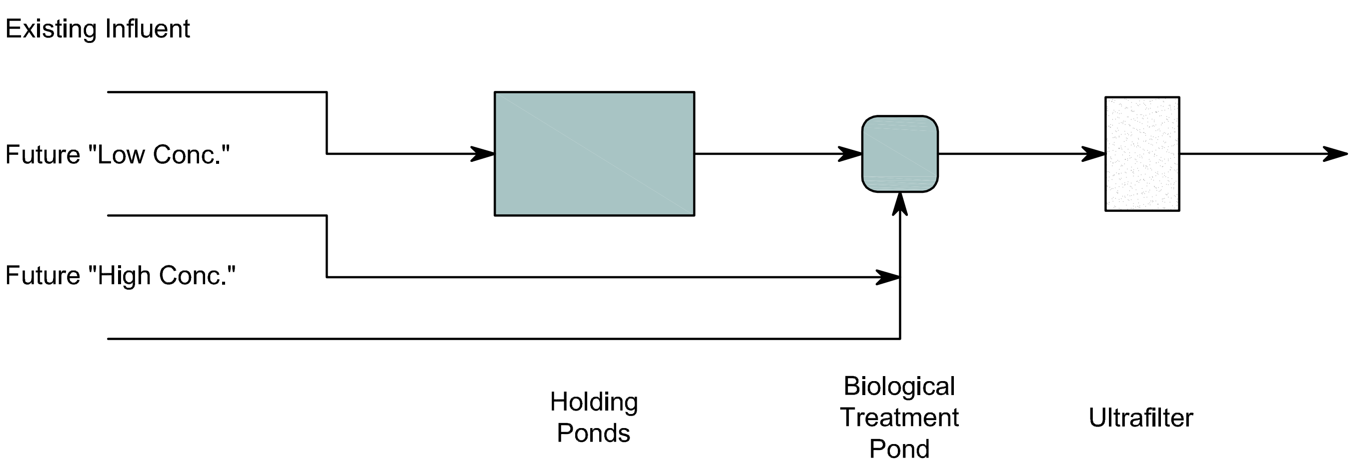
Given the minimal increase in traffic volume and the road characteristics it is not expected that Facility-related traffic will cause significant adverse effects on habitat and associated wildlife (e.g., habitat fragmentation, road kill) (see also 4.3.2.3).

Process Model For WATER9
(New Waste Streams To Holding Ponds)

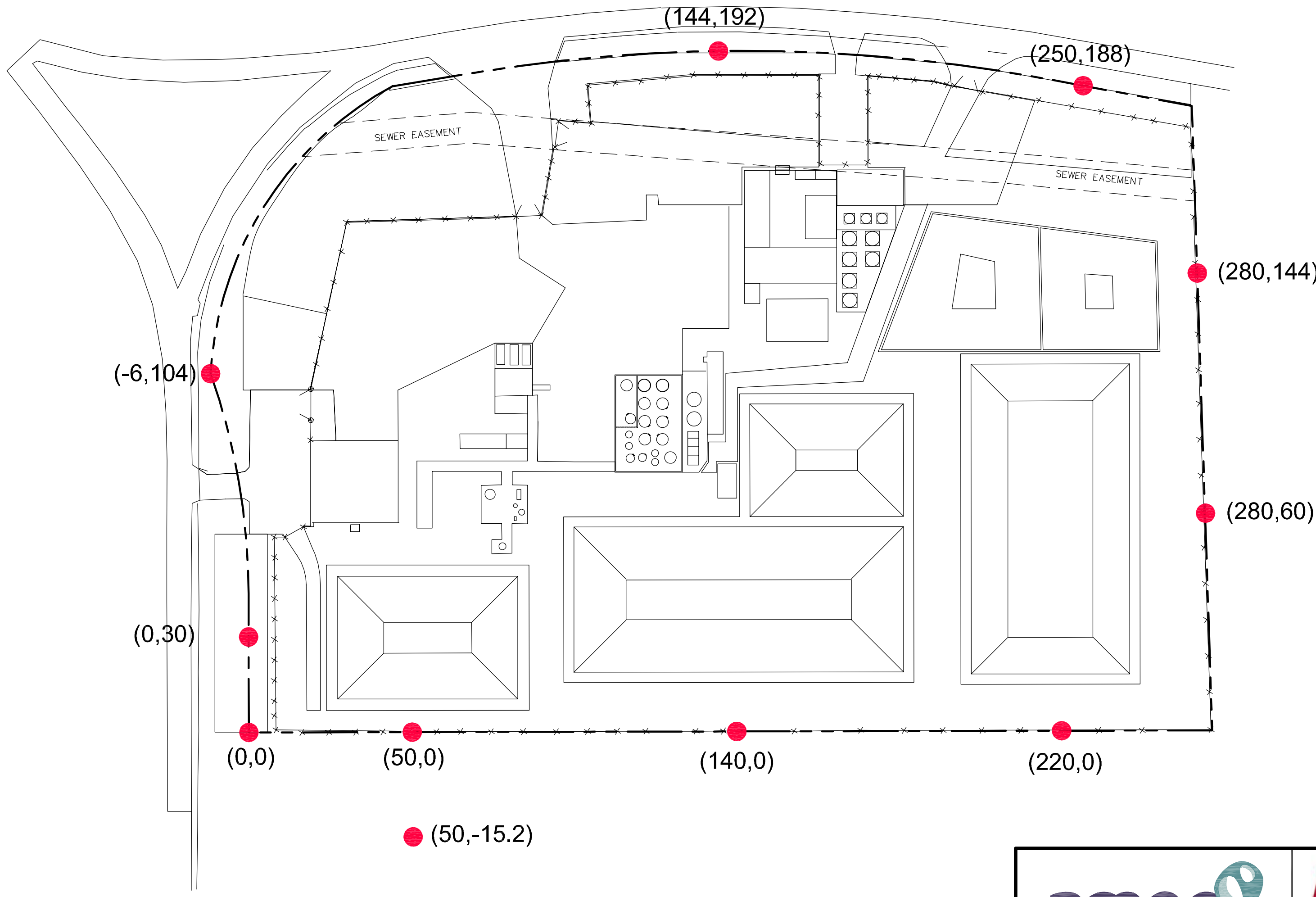


PROJECT	Atlantic Industrial Services EA Registration 660 MacElmon Road, Debert, Nova Scotia	
TITLE	Water 9 Model-Process Schematic Scenario 1	
DATE: November 2008	PROJECT NO: TV71080	FIGURE No. 4.2-1

Process Model For WATER9
(New Waste Streams By-Pass Holding Ponds)

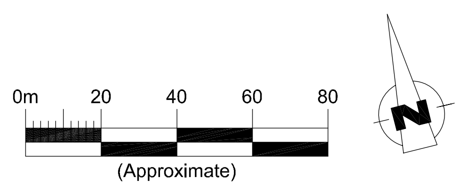


amec	Atlantic Industrial Services A Division of Envirosystems Inc.	
PROJECT Atlantic Industrial Services EA Registration 660 MacElmon Road, Debert, Nova Scotia		
TITLE Water 9 Model-Process Schematic Scenario 2		
DATE: November 2008	PROJECT NO: TV71080	FIGURE No. 4.2-2



Legend:

- Property Boundary
- Fence Line
- Receptor Location With Coordinates



amec

Atlantic Industrial Services
A Division of Envirosystems Inc.

PROJECT Atlantic Industrial Services EA Registration
660 MacElmon Road, Debert, Nova Scotia

TITLE Air Dispersion Model - Receptor Locations

DATE:	PROJECT NO:	FIGURE No.
November 2008	TV71080	4.2-3

4.3 POTENTIAL EFFECTS ON THE SOCIO-ECONOMIC ENVIRONMENT

4.3.1 Construction Phase

4.3.1.1 Archaeology

The existing AIS Facility neighbours the Debert Palaeo-Indian National Historic Site of Canada. AIS is not aware that any archeologically-sensitive materials have been unearthed during the initial site development.

Any Facility extension will occur within the existing property boundary. This area is considered a previously "disturbed" surface area, in that it has undergone site preparation, contouring, and infrastructure development during the initial site development, so that the archaeological potential of the site must be considered minimal.

Nevertheless, should any artifacts or human remains be discovered, the work is to be terminated until a qualified archaeologist assesses the find. If the find is deemed significant, the work will not resume until further steps and protective measures are discussed in consultation with the archaeologist and regulatory authorities.

Given the existing site characteristics and previous disturbance and the AIS commitment to an archaeological assessment upon discovery of artifacts/human remains, the effects of the construction activities on archaeological resources are not likely to be significant.

4.3.1.2 Land Use

The proposed Facility expansion is considered to have beneficial effects on land use in the municipality in that it is supportive of the municipality's land use objectives for the Debert Industrial Park and its expansion. In addition, the Facility is expected to also provide services attractive to existing and future local businesses.

4.3.1.3 Economic

Potential economic impacts associated with the proposed waste Facility expansion are expected to be beneficial. The Project will provide employment opportunities during the construction phase. To the extent possible AIS will purchase goods and services from local markets and suppliers.

4.3.1.4 Transportation

The increase in transportation associated with the construction phase is short-term and too small to cause measurable adverse effects on local transport routes (see also 4.2.1.2).

4.3.1.5 Human Health and Safety

Human health and safety includes two facets of potential adverse effects; public health and safety and worker health and safety. During the construction phase, AIS will require contractors to develop and implement their own health and safety program. In addition all non-AIS workers will be expected to be familiar with the relevant AIS Health and Safety Program provisions established for the Debert Facility (see Section 2.4.3).

4.3.2 Operation Phase

4.3.2.1 Economic

Potential positive economic impacts are associated with the operations phase. The expansion of services at the existing Facility is expected to secure the Facility's economic viability in the long-term and provide new employment opportunities (full time employment) for 6 to 12 persons.

4.3.2.2 Human Health and Safety

As mentioned earlier, human health and safety includes two facets of potential adverse effects; public health and safety and worker health and safety. For the protection of worker health and safety within the Debert Facility a comprehensive Facility-specific Health and Safety Program (Appendix E) will be implemented (see also Section 2.4.3). A key component of the Health and Safety Program is the need for compliance with WHMIS procedures and requirements with respect to all new substances to be handled and processed at the Facility upon implementation of the proposed expansion. This will reinforce the proper handling, storage, and control of hazardous or toxic materials thereby reducing the potential for accidental release and consequently environmental impacts. The Health and Safety Program shall include the following provisions:

- The procedures and requirements of the Workplace Hazardous Materials Information System (WHMIS) program must be in place to protect employees and are generally applicable to the protection of the environment.
- The WHMIS program must be implemented throughout the job site in accordance with the Nova Scotia Occupational Health and Safety Act and regulations put forth by the Workplace Health, Safety and Compensation Commission of Nova Scotia (WHSCC). All employees involved with hazardous materials must be appropriately trained.
- A complete inventory of the hazardous materials is to be maintained according to the WHMIS. This inventory is to be available to regulatory agencies upon request.
- Hazardous materials shall be used only by personnel who are trained and qualified in the handling of these materials and only in accordance with the manufacturer's instruction and government regulations
- Employees must be trained in health and safety protocols (e.g. safe work practices, emergency response).
- Proper safety procedures must be followed during the duration of the Project as per applicable municipal, provincial and federal regulations.
- Material Safety Data Sheets (MSDS) shall be available for all hazardous materials in use or stored on-site.
- The transportation of hazardous materials will be conducted in compliance with the Federal Transportation of Dangerous Goods Act.

The Plan is expected to ensure that adverse effects on workers health and safety during routine Facility operation will be not significant.

4.3.2.3 Transportation

The Facility is less than 2 km from a major 100 series highway (Highway 104) and has therefore excellent road access without having to go through any built up residential areas. It is anticipated that with the implementation of the new waste management services, the truck traffic will increase by about 10%. This translates into about one additional truck per day and therefore no significant adverse impacts on existing road traffic are anticipated.

The proposed Facility expansion will create a positive environmental impact by significantly reducing the transportation of Waste Dangerous Goods to facilities in Quebec or Ontario.

4.4 MALFUNCTIONS AND ACCIDENTS

Malfunctions and accidents that could be experienced at the Debert Facility are identified and discussed in Section 2.3.10 and include:

Construction Phase

- Fuel spills;

Operation Phase

- Fires (including run off associated with fire suppression);
- Spills and leaks;
- Failure in storm water management system (accidental discharge of contaminated storm water);
- Failures in wastewater treatment processes;
- Transport truck accidents including spills; and
- Failures in air emission control systems.

As shown in Table 4.4-1, these malfunction or accident scenarios can potentially affect a wide variety of VECs including groundwater, surface water, wetlands soils and sediments, and air quality. Once adversely affected, these media could also function as pathways which could cause adverse effects for wetlands, plant and wildlife, birds, aquatic life, and potentially rare species. Further, malfunction and accident scenarios could have adverse effects on worker's health and safety as well as the health of near-by residences.

Construction Phase

During the construction phase, the operation of the machinery may require on-site fuel storage and re-fuelling. In this is the case, to minimize the risk of any fuel spill associated with a spill associated, AIS will require the contractor to undertake re-fuelling in a designated area within the Facility. Any spills would have to be reported immediately to the AIS Facility Manager. The designated refuelling station should have a paved surface and be drained to the on-site API separator. This way, any spilled fuel would be captured on-site and removed before any storm water is released to the environment. This is considered to reduce the risk for adverse effects associated with fuel spills during the construction phase to insignificant levels.

Operation Phase

Focus of the Facility design and operation is on the prevention of any such malfunctions and accident scenarios. Consequently, a comprehensive range of preventative environmental management measures has been developed. These have already been established as part of the existing Facility and will be extended to encompass the proposed new waste management services (see Section 2.4.1.2). The effectiveness of existing preventative design and operation features, is proven by the Facility's 17 years of operation without major malfunction and/or accident.

To ensure that all environmental management measures are performing as required and all regulatory standards are met, existing monitoring programs will continue and be expanded to encompass the new Facility operations. Should any of the above listed accident and malfunction events occur, monitoring of receiving environments will be conducted beyond the routine schedules, if warranted. In particular, surface water sampling in the potential downstream receiving environment will be undertaken in case of an accidental release of contaminated stormwater. If required, decommissioning and follow-up monitoring of the contaminated environments will be undertaken.

For the unlikely event that any of the above scenarios may be experienced, a comprehensive Contingency Plan will be implemented. A Contingency Plan has been in place since AIS commenced with the operation of the Debert Facility. Prior to the provision of the new waste management services (Part I to III components) this plan will be updated to reflect the up-to-date Facility design and operational processes. Local emergency response services will be consulted in the up-dating process. The Plan will outline responsibilities, chain of command protocols, containment and clean up procedures and equipment as well as reporting mechanisms and staff training.

A copy of the Contingency Plan for the existing Facility is included with Appendix F. The Contingency Plan is considered a “living document”, i.e., it will be reviewed and updated on a regular basis and in response to experience with the Facility’s operation and evolving emergency response technologies, approaches, and regulatory requirements. The AIS Contingency Plan has been developed to protect the environment against on-site and transport related malfunctions and accidents.

The Plan includes the containment and clean-up of spills at/or near the Facility with a potential to affect off-site surface waters (e.g., an on-site spill with discharge of contaminated waters to the road-side drainage ditch). To avoid and mitigate adverse effects from such an event on downstream receiving environments the Contingency Plan specifies a response plan that includes equipment, containment, communication and reporting.

In addition, the Plan includes response procedures for off-site transport related spills or leaks of waste goods. All trucks are expected to travel to and from the site via MacElmon Road to Exit 13 of the Trans Canada Highway. This is a distance of approximately 2km and involves no stream crossings. Once the trucks travel on the Trans Canada Highway, truck accidents could theoretically occur at any point along the route of any delivery truck destined for the AIS Facility. To minimize such risks, AIS operates its own haul vehicles that are licensed and operated in accordance with all regulatory standards. All drivers are trained in first aid and emergency response procedures. These practices will continue with the expansion of the Debert Facility and include in particular compliance with all Transport Canada’s waste dangerous goods regulations. Transport of waste goods to and from the Facility by carriers other than AIS will only be contracted to reputable licensed haulers with good safety and transport records.

The new waste treatment processes include the enclosed biological treatment system, the atmospheric distillation unit, and the chemical treatment operations. The detailed design and implementation of these processes will incorporate modern equipment and state-of-the art instrumentation to minimize the potential releases of fugitive emissions to atmosphere. The detailed design and engineering process will include comprehensive process safety and risk management evaluations. This together with appropriate staff training and prescribed operational procedures will make failures in the treatment processes extremely rare events.

Given the extent of preventative design and management features, monitoring programs, and comprehensive emergency response planning, significant adverse environmental effects from malfunctions and accident scenarios are unlikely to occur.

Table 4.4-1: Malfunctions and Accidents and Potentially Affected VECs

VECs > / Malfunction and Accident Scenarios v	Surface Water/ Hydrology	Ground Water	Soils	Air Quality	Noise/Vibration	Terrain/Topography	Vegetation	Wetlands	Fish and Fish Habitat	Wildlife/Habitat	Migratory Birds	Species at Risk /Habitat of Special Concern	Heritage/Archaeology	Aboriginal Use of Traditional Lands/Resources	Land Use	Human Health and Safety	Economic	Transportation
Construction Phase																		
Fuel spills	●	●	●				●	●	●	●						●		
Operation Phase																		
Fires (including run off associated with fire suppression)	●	●	●	●			●	●	●	●						●		
Spills and leaks	●	●	●				●	●	●	●						●		
Failure in storm water management system (accidental discharge of contaminated storm water)	●	●	●				●	●	●	●						●		
Failures in wastewater treatment processes	●	●	●	●				●	●	●						●		
Transport truck accidents including spills	●	●	●	●			●	●	●	●						●		●
Failures in air emission control systems				●												●		

● = potential for adverse effect associated with the proposed expansion

4.5 SUMMARY – ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

Table 4.5-1 summarizes the identified potential effects of the proposed Project works and activities. The mitigation measures developed in the EA are listed and the residual adverse effects are evaluated and rated with respect to their significance. The significance rating assumes the implementation of the listed mitigation measures.

Overall the Project is not likely to cause significant adverse effects. The Project is expected to cause beneficial effects on the local economy and local land use. Further by eliminating the need for long distance haulage of significant quantities of waste dangerous goods, the Facility expansion will result in a net reduction in fuel consumption, greenhouse gas emissions and vehicle operating costs.

Table 4.5-1: Summary of Potential Effects and Significance of Residual Effects

VEC	POTENTIAL EFFECT	MITIGATION	SIGNIFICANCE
Bio-physical environment			
Surface Water Quality /Hydrology	<u>Construction:</u> No interaction identified <u>Operation:</u> There is no discharge to an off-site water course (other than the ditch along Plains Road); however discharge of contaminated surface water could infiltrate into the groundwater and migrate into surface water environments <u>Malfunction and accidents:</u> There is no discharge to an off-site water course (other than the ditch along Plains Road). Contamination resulting from on-site spills and/or leaks could reach surface water environments only through infiltration into groundwater and subsequent migration into surface water environments; transport truck accidents involving spills could directly affect surface waters should this occur where the truck crosses an existing water course.	• On-site stormwater management system with stormwater management pond, controlled release and effluent monitoring • Increased stormwater pond capacity (new pond provides almost double the volume of the existing stormwater pond) • Routine off-site surface water quality monitoring • Contingency plan including o on-site response procedures; containment, clean-up/remediation o off-site emergency response procedures; equipment; containment; clean-up/remediation; off-site groundwater, surface water sampling	Not Significant
Groundwater	<u>Construction:</u> No interaction identified <u>Operation:</u> Contamination from infiltration of contaminated surface water <u>Malfunction and accidents:</u> Contamination resulting from spills and/or leaks or transport truck accidents involving spill	• On-site stormwater management system (see above) • On-and off-site ground water monitoring • Contingency plan including o on-site response procedures; containment, clean-up/remediation o off-site emergency response procedures; equipment; containment; clean-up/remediation; off-site groundwater and surface water sampling	Not Significant

Table 4.5-1: Summary of Potential Effects and Significance of Residual Effects

VEC	POTENTIAL EFFECT	MITIGATION	SIGNIFICANCE
Soils	<u>Construction:</u> No interaction identified <u>Operation:</u> Contamination from contaminated surface water <u>Malfunction and accidents:</u> Contamination resulting from spills and/or leaks or transport truck accidents involving spill	• On-site stormwater management system (see above) • Contingency plan including o on-site response procedures; containment, clean-up/remediation o off-site emergency response procedures; equipment; containment; clean-up/remediation; off-site groundwater, surface water and soil sampling	Not Significant
Air Quality	<u>Construction:</u> No interaction identified <u>Operation:</u> VOC emissions Odours <u>Malfunction and accidents:</u> VOC emissions Odours	• Air emission control systems for storage tanks, distillation system, processing building and designated drum storage area • Ambient air quality monitoring during the treatment process commissioning period • Routine process equipment monitoring and maintenance	Not Significant
Noise/Vibration	<u>Construction:</u> No interaction identified <u>Operation:</u> No interaction identified <u>Malfunction and accidents:</u> Short term increased noise levels in association with response activities	• Contingency plan	Not Significant
Terrain/Topography	<u>Construction:</u> No interaction identified <u>Operation:</u> No interaction identified <u>Malfunction and accidents:</u> No interaction identified	• NA	NA

Table 4.5-1: Summary of Potential Effects and Significance of Residual Effects

VEC	POTENTIAL EFFECT	MITIGATION	SIGNIFICANCE
Vegetation	Construction: No interaction identified Operation: No interaction identified Malfunction and accidents: Contamination resulting from spills and/or leaks and via pathways (stormwater/surface water) or transport truck accidents involving spill	• On-site stormwater management system with stormwater management pond, controlled release and effluent monitoring • Contingency plan including o on-site response procedures; containment, clean-up/remediation o off-site emergency response procedures; equipment; containment; clean-up/remediation; off-site groundwater, surface water and soil sampling	Not Significant
Wetlands	Construction: No interaction identified Operation: No interaction identified; there is no discharge to an off-site wetland or water course (other than the ditch along Plains Road); however discharge of contaminated surface water could infiltrate into the groundwater and migrate into wetland environments; Malfunction and accidents: There are no direct surface water links between the Facility and any wetland environment; wetland habitat is expected in association with intermittent watercourses and drains downgradient from the Facility; contaminants resulting from on-site spills and/or leaks may reach these wetlands via groundwater; transport truck accidents on the TransCanada Highway near Exist 13 could adversely impact wetland environments adjacent to the Highway (Figure 3.1-2)	• Same as above (vegetation, soils and surface water)	Not Significant
Fish and Fish Habitat	Same as above (Surface water, vegetation, wetlands)	• Same as above (vegetation, soils and surface water)	Not Significant

Table 4.5-1: Summary of Potential Effects and Significance of Residual Effects

VEC	POTENTIAL EFFECT	MITIGATION	SIGNIFICANCE
Wildlife/Habitat	<u>Construction:</u> Habitat fragmentation and increased wildlife mortality as a result of increased truck traffic <u>Operation:</u> Same as for 'construction' <u>Malfunction and accidents:</u> Contamination resulting from spills and/or leaks and via pathways (stormwater/surface water and vegetation)	• None required for construction and operation – increase in truck traffic insignificant; effects not expected to be measurable • For malfunctions and accidents – see mitigation for vegetation	Not Significant
Migratory Birds	<u>Construction:</u> No interaction identified <u>Operation:</u> Possibility for water fowl to utilize on-site lagoon system <u>Malfunction and accidents:</u> Contamination resulting from spills and/or leaks and via pathways (stormwater/surface water and vegetation)	• None required for construction phase; • Utilization of lagoons by waterfowl has not been identified as an issue over the past 17 years of operation; should any notable utilization be observed, birds will be discouraged through use of such things as "flutter band" or flagged wire strung above the open ponds. • For malfunctions and accidents – see mitigation for vegetation	Not Significant
Species at Risk/Habitat of Special Concern	<u>Construction:</u> No interaction identified <u>Operation:</u> No interaction identified <u>Malfunction and accidents:</u> Contamination resulting from spills and/or leaks and via pathways (stormwater/surface water and vegetation) or truck accidents along transport route	• None required for construction and operation • For malfunctions and accidents – see mitigation for vegetation, and surface water	Not Significant
Socio-Economic Environment			
Aboriginal Use of Traditional Lands/Resources	<u>Construction:</u> No interaction identified <u>Operation:</u> No interaction identified <u>Malfunction and accidents:</u> If at all, related to effects on bio-physical environment	• Construction and operation phases: None required; proposed operation supports municipal land use objectives • For malfunctions and accidents: all mitigation measures listed for biophysical environment components	Not Significant
Land Use	<u>Construction:</u> No interaction identified <u>Operation:</u> Positive interaction identified; <u>Malfunction and accidents:</u> No interaction identified	• None required; proposed operation supports municipal land use objectives	NA

Table 4.5-1: Summary of Potential Effects and Significance of Residual Effects

VEC	POTENTIAL EFFECT	MITIGATION	SIGNIFICANCE
Human Health	Construction: Personal injuries Operation: Personal injuries Malfunction and accidents: Personal injuries; Contamination of surface and/or groundwater resulting from on-site spills and/or leaks or off-site transport truck accident involving spill	• Review and updating of Facility's Health and Safety Program • Implementation of Health and Safety Program (including personal protective equipment, training, emergency response, WHMIS etc.); • Contingency plan including o on-site response procedures; containment, clean-up/remediation o off-site emergency response procedures; equipment; containment; access; clean-up/remediation;	Not Significant
Economic Conditions	Construction: Only positive interaction identified Operation: Only positive interaction identified Malfunction and accidents: No interaction identified	• None required; AIS committed to maximize benefits for local and regional economy through procurement of local/regional goods and services where feasible	NA
Heritage/Archaeology	Construction: No interaction identified Operation: No interaction identified Malfunction and accidents: No interaction identified	• None identified – site is already developed, expansion will take place within Facility boundary • Nevertheless, if artifacts are found during any of the construction phase activities, work will stop immediately so that an archaeological assessment can take place	Not significant
Transportation	Construction: Potential for effects on existing traffic and road safety Operation: Beneficial interaction identified Malfunction and accidents: No interaction identified	• None required for construction phase – increase in truck traffic insignificant • Beneficial interaction during operation phase relates to reduced long-distance haulage of waste materials	Not significant

5.0 ENVIRONMENTAL MONITORING AND REPORTING

As described in Section 2.4.1.4, AIS is currently undertaking at the Debert Facility comprehensive environmental monitoring. This involves a reporting of all sampling results to the NSE Northern Regional Office in Truro and quarter-yearly meetings with NSE to review and discuss monitoring results, Facility performance, compliance and future plans. This monitoring and reporting practice is expected to be continued upon approval of the proposed expansion. Adjustments to the monitoring / reporting schedules will be established in consultation with the regulator and as part of the approval process under Part V of the Nova Scotia Environment Act.

A summary of current and proposed future monitoring practices is provided in Table 5.0-1 below:

Table 5.0-1: Existing and Future Monitoring and Reporting - Summary

MEDIUM	FREQUENCY	LOCATION	PARAMETERS
Stormwater	• Prior to release	Discharge point	General chemistry, metals and organic parameters
Surface water	• Quarterly	Off-site monitoring Station (SW # 7)	General chemistry, metals and organic parameters
Groundwater	• Quarterly	On-and off-site monitoring wells	General chemistry, metals and organic parameters (Appendix G Schedule B)
Treated wastewater (Facility effluent)	• Daily to Weekly	Discharge point	Specific parameters as per Operating Approval (Appendix G Schedule D), and as per Colchester County Municipal Sewer By-law
Wastewater (Holding ponds)	• Bi-annually: May and October	Wastewater pond	General chemistry, metals and organic parameters
Sediments (sediments in stormwater channel)	• Bi-annually: May and November	Discharge channel from storm water pond	Metals and organic parameters
Report: Waste received and exported	• Annually	NA	NA
Air Quality	• Initial monitoring during commissioning of new wastewater processes of the proposed Part I Facility expansion • Go forward monitoring strategy to be established after first round of air quality monitoring and in consultation with regulator	On-site locations; Off-site locations (ambient air)	Commissioning Phase: • VOCs • Sulphur compounds Routine Operation: • TBD following results of monitoring during commissioning

For details on the above existing programs including a detailed listing of parameters refer to Appendix G.

6.0 PUBLIC CONSULTATIONS

6.1 CONSULTATION ACTIVITIES

6.1.1 Government and Stakeholder Consultation

Consultation activities with government and stakeholders are summarized in Table 6.1-1 below.

Table 6.1-1: Government and Stakeholder Consultation

Date	Type of Contact	Contact With	Subject Discussed
19 Dec 2007	Meeting	• NSE, Truro Office, Chris O'Connell	• EA Process • Scope of Undertaking • Progress and Schedule
24 Jan 2008	Meeting including site tour	• Municipal Councilor District 9, Bob White; • Colchester Regional Development Authority (CORDA), Ron Smith and Carl Bowser	• Scope of Undertaking • Progress and Schedule • Existing facility • Potential municipal issues and concerns
8 Feb 2008	Meeting	• Colchester Department of Public Works, Nicole MacDonald	• Scope of Undertaking • Progress and Schedule • Potential municipal issues and concerns related to Facility effluent discharge
30 May 2008	Letter	• NSE, Mr. Peter Geddes, Environmental Assessment Officer; proponent obtained feedback from provincial and federal review team on draft Registration Document via Mr. Geddes.	• Draft Registration Document

6.1.2 Consultation with the Public at Large

6.1.2.1 Public Notice and Web Site

Public Notices were issued in two news papers. One was published in the Truro News on Saturday 28 June 2008 and one in the provincial edition of the Halifax Herald on Wednesday 2 July 2008. The Truro News is distributed locally, the Halifax Herald provincially. In both cases, the text of the Notice was the same. A copy of the Notice is presented in Appendix H.

Objective of the Notice was to inform the public about the proposed Facility expansion and to solicit input with respect to any issues and concerns relevant to the Project. Further, the Notice informed that the AIS is preparing a Registration Document pursuant to the Nova Scotia Environmental Assessment Regulations and provided the proponent's contact information and a Project web address for further information.

The Project web site (www.public-participation.ca; Note: the proposed AIS Project is no longer presented on this site) provided detailed information on

- The proponent;
- Project description;
- The planning and EA process;

- Opportunities for participation;
- Notifications;
- Contact information;
- Draft Registration Document (incl. text and figures for downloads).

The information on the website was available with the publication of the Notices (28 June 2008) and remained open until October 2008. A copy of the text that was presented on the web-site is presented in Appendix H.

6.1.3 Issues and Concerns

Neither the public Notices nor the Project web site generated any feedback or raised any concerns pertaining to the proposed Facility expansion.

A representative of CBC Radio 1 approached AIS shortly after the Notices were published and conducted an interview with Mr. Stephen Handrahan, P.Eng. Senior Vice President of Envirosystems Inc. The interview focused on the AIS expansion proposal and was broadcast during July 2008. No further feedback was obtained.

AIS meetings with representatives of the municipal council and the Colchester Regional Development Authority (CORDA) early in 2008 (Table 6.1-1) involved a tour of the existing Debert Facility and verbal presentation of the proposed expansion. Issues raised referred to development details, implementation schedule and economic opportunities.

With the publication on the Project website, the draft Registration Document was also forwarded to NSE for review and comment. Comments received were reviewed and responses have been incorporated in this Registration Document.

7.0 CONCLUSIONS

The proposed Debert Facility expansion is expected to cause beneficial effects on the local economy. It will secure employment at the existing Facility and support the development of the Debert Industrial Park. In addition, by eliminating the need for long distance haulage of significant quantities of Waste Dangerous Goods, the Facility expansion will result in a net reduction in fuel consumption, greenhouse gas emissions and vehicle operating costs.

The Registration Document examined potential for adverse effects as relating primarily to environmental components such as groundwater, surface water, air quality, vegetation and habitat and road traffic at or near the site. Taking the existing and proposed environmental management features into account, none of the potentially adverse effects are likely to be significant.

During the planning process, AIS informed the public of its proposed undertaking and made Project information and the draft Registration Document available for public review and comment. Feedback on its proposal was solicited via public Notices in two newspapers and via a Project website. No issues and concerns were raised by the general public or stakeholders. Representatives of the local council and the Colchester Regional Development Authority (CORDA) expressed their support in response to AIS verbal presentation and site tour. Government agency comments on the draft Registration Document were reviewed and, where appropriate, the proposal was adjusted and/or edits made to the report.

8.0 REFERENCES

AMEC (n.d.). Groundwater and Surface Water Monitoring at the AIS Debert Facility. Unpublished data reports compiled on a quarterly basis for AIS, Debert.

AMEC 2008a. Predicted Air Emissions from Expanded Wastewater Treatment - Waste Management Facility Debert, NS. Unpublished letter report prepared for AIS Envirosystems.

AMEC 2008b. Air Dispersion Modeling Assessment – AIS Expansion of Waste Management Facility Debert, NS. Unpublished letter report prepared for AIS Envirosystems.

CCME 2007a. Canadian Council of Ministers of the Environment Canadian Water Quality Guidelines for the Protection of Aquatic Life (FWAL), 2007.

CCME 2007b. Canadian Council of Ministers of the Environment Guidelines for Canadian Drinking Water Quality (CDWQ), 2007.

Canadian Legal Information Institute. 2008. Available at: http://www.canlii.org/ca/regu/sor93-55/part259823.html

Coote, D.R., R. Gordon, D.R. Langille, H.W. Rees, and C. Veer (1992). "Water Erosion Risk Maps for Canada." Canada Soil Inventory. Ottawa: Land Resource Research Centre, Research Branch, Agriculture Canada.

Colchester Regional Development Agency. 2004. Colchester Park. In: http://www.targetnovascotia.com/IPPDF/Colchester.pdf

Debert Industrial Parks Concept Plan. 2007. Final Report. Available at: http://www.colchester.ca/Debert/debertreportmar-07.pdf Date accessed: January 2008.

Environment Canada 2004. Canadian Climate Normals 1971-2000. Available at http://climate.weatheroffice.ec.gc.ca/climate_normals. Date accessed January 2008.

Faulkner, Wayne. 2009. Verbal communication. NSE Regional Office. Truro. 21 October 2008.

Hennigar, T. W. 1972. Hydrogeology of the Truro Area, Nova Scotia. Halifax : Dept. of Mines, 1972. Groundwater Section Report 72-1.

INAC (Indian and Native Affairs Canada) 2008. Millbrook Band. Available at http://www.ainc-inac.gc.ca/at/mp/pg27_e.html Date accessed January 2008.

MBBA (Maritime Breeding Bird Atlas), 2008. Maritime Breeding Bird Atlas Data Summaries 2007. Available at http://www.mba-aom.ca/jsp/datasummaries.jsp?lang=en Date accessed: January 2008.

NSDNR 2007. Nova Scotia Department of Natural Resources General Status Ranks of Wildlife Species. Available at http://www.gov.ns.ca/NATR/wildlife/genstatus/ranks.htm

NSDOFA 2008. Anglers Handbook 2008. Nova Scotia Department of Fisheries and Agriculture at: http://www.gov.ns.ca/fish/sportfishing/angling/2008angregs.shtml.

Nova Scotia Museum of Natural History. 2007a. The Natural History of Nova Scotia Theme Regions. Triassic Lowlands.
Available at http://museum.gov.ns.ca/mnh/nature/nhns2/600/600.htm
Date accessed January 2008.

Nova Scotia Museum of Natural History. 2007b. The Natural History of Nova Scotia Theme Regions Tidal Bay. Available at http://museum.gov.ns.ca/mnh/nature/nhns2/600/620.htm
Date accessed: January 2008

Nova Scotia Museum of Natural History. 2007c. The Natural History of Nova Scotia. Nova Scotia's Climate. Available at http://museum.gov.ns.ca/mnh/nature/nhns/t5/t5-2.pdf Date accessed January 2008.

Ontario Ministry of the Environment (OMOE), 2008. Summary of Point of Impingement Standards, Point of Impingement Guidelines and Ambient Air Quality Criteria (AAQCs), http://www.ene.gov.on.ca/envision/gp/2424e.pdf

Porter Dillon 1991. Groundwater and Surface Water Monitoring System Installation For the Inland Oil Refinery site, Debert Air Industrial Park

Statistics Canada. 2006. Community Profiles. Available at:
http://www12.StatsCan.ca/english/census06/data/profiles/community/Index.cfm?Lang=E
Date accessed: January 2008.

Stevenson, I. M. 1958, Truro map area, Colchester and Hants counties, Nova Scotia Geol. Survey Can., Mem. 297, 124 p.

Target Nova Scotia. 2006. Colchester County Community Profile.
Available at: http://www.targetnovascotia.com/csd_colchester.htm
Date accessed: January 2008.

Waterfalls on the Chiganois River and East Branch Chiganois River in Colchester County, Nova Scotia. 2008.
Available at: http://www.pbase.com/smeredith/chiganois_river