Biomedical Waste Treatment Facility, Registration and Environmental Assessment

August 10, 2005

Medical Waste Management Inc.

Submitted by:

Dillon Consulting Limited

REGISTRATION OF THE MEDICAL WASTE MANAGEMENT BIOMEDICAL WASTE TREATMENT FACILITY PROJECT

This document represents formal registration of the Biomedical Waste Treatment Facility (the Project) by Medical Waste Management Inc. (MWM) to meet the requirements of the Nova Scotia *Environmental Assessment Regulations*, as defined under Section 9 of the Regulations.

Name of Undertaking

Biomedical Waste Treatment Facility.

Location of the Undertaking

45 Wright Avenue, Burnside Industrial Park, Dartmouth, Nova Scotia.

Proponent

Medical Waste Management Inc.
95 Deerhurst Drive
Brampton, Ontario
L6T 5R7
Telephone: (905) 789-6660
Facsimile: (905) 789-6661

Chief Executive Officer

Dr. Jeffrey Kerbel
Chief Executive Officer

Signing Officer and Contact Person

Mr. Daniel Kennedy
President, C.O.O.

Signature of Signing Officer:

Date: August 10, 2005

Nature of the Undertaking

The term "undertaking" is defined in the *Environment Act* as:

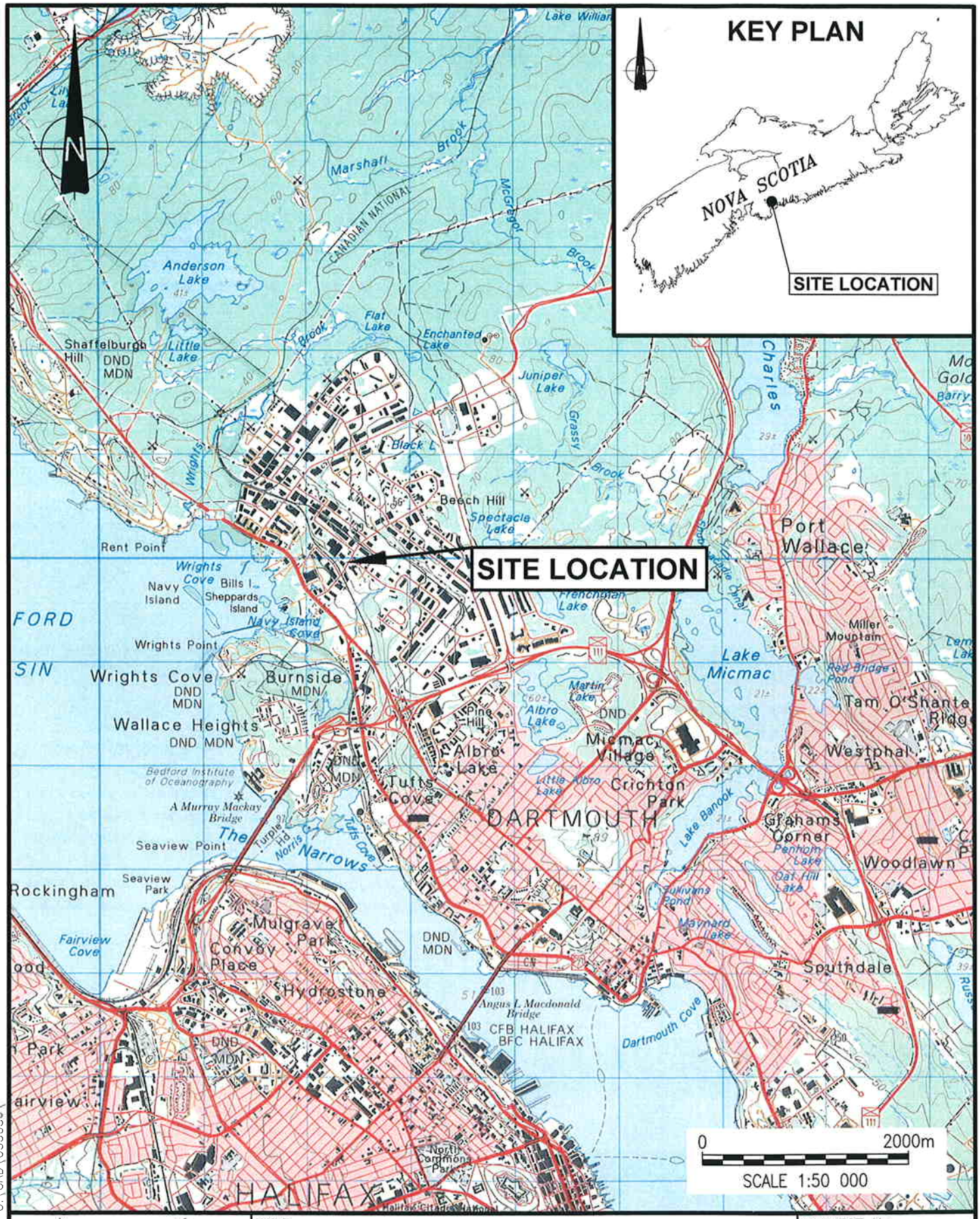
> "...an enterprise, activity, project, structure, work or proposal and may include, in the opinion of the Minister, a policy, plan or program that has an adverse effect or an environmental effect and may include, in the opinion of the Minister, a modification, extension, abandonment, demolition or rehabilitation, as the case may be, of an undertaking".

The project consists of the installation of an autoclave treatment system for the treatment of "yellow bag" biomedical wastes and non-hazardous health care wastes within an existing building at 45 Wright Avenue, Dartmouth, Halifax Regional Municipality (HRM) and the storage of "red bag" (anatomical) pharmaceutical and cytotoxic wastes at the site prior to shipment off-site for incineration. The project includes transportation of the waste to the facility, transportation of the treated waste to an existing approved disposal site and transportation of red bag waste out of Nova Scotia for approved incineration. The site location is shown on Figure *i*.

Background

Medical Waste Management Inc. (MWM) plans to construct and operate a biomedical waste treatment and storage facility for biomedical wastes generated in Nova Scotia. In June 2005, Medical Waste Management Inc. was awarded a conditional contract to pick-up, transport, treat and dispose of biomedical waste, province-wide, on behalf of Nova Scotia Department of Health. The facility will also process non-hazardous health care wastes.

The proposed facility will be constructed on a developed lot and within the footprint of an existing building. The operations area of the facility will include a receiving and segregation area for wastes, a refrigerated storage area for anatomical (red bag) wastes, a secure storage area for pharmaceutical and cytotoxic wastes, a storage area for yellow bag waste (i.e., microbiology laboratory waste, human blood and body fluid waste, waste sharps and miscellaneous non-hazardous waste), an autoclave treatment system for yellow bag waste, a shredder and compactor for autoclaved yellow bag waste, and a reusable container wash area. Red bag, pharmaceutical and cytotoxic wastes will be stored on site and will be shipped to Ontario for incineration at regular intervals.



DILLON CONSULTING	TITLE: **SITE LOCATION**	PROJECT No.: **05-5036-0100**
DATE: **AUGUST 2005**	PROJECT: **MEDICAL WASTE MANAGEMENT BIOMEDICAL WASTE TREATMENT FACILITY REGISTRATION AND ENVIRONMENTAL ASSESSMENT**	FIGURE No.: **i**

FIGi.dwg
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The proposed facility will also house administration functions for the operation and will be fenced. The fence will be locked when the site is unoccupied. Security cameras will be in place outside the building and in operations areas inside the building.

The construction of the facility proposed by MWM falls within the definition of a Class I undertaking under the *Environmental Assessment Regulations* pursuant to the Nova Scotia *Environment Act*. An undertaking of this type requires the submission of a Registration to the Minister of Environment for Nova Scotia, upon which the project will be evaluated under the review requirements set out in the *Environmental Assessment Regulations*. MWM believes that the undertaking poses no significant risk of adverse environmental impacts that cannot be mitigated, and that it should be approved by the Minister of Environment, subject to applicable and appropriate Conditions of Approval. In order to support this position, MWM has prepared an Environmental Assessment (EA) to accompany its Registration, and has conducted a neighbourhood and stakeholder consultation program in order to obtain comments from neighbouring businesses and stakeholder groups concerning environmental aspects of the proposed project.

Purpose and Need for the Undertaking

The purpose of the undertaking is to treat biomedical wastes generated in the Province of Nova Scotia. Management of biomedical wastes generated in the province is regulated by Nova Scotia Environment and Labour (NSEL). As well, the facility will be equipped to treat other non-hazardous health care wastes.

Biomedical wastes in the province are currently disposed at the Cape Breton Regional Municipality (CBRM) incinerator, located in Sydney, Nova Scotia. The incinerator is scheduled to close on December 31, 2005 and this alternative will no longer be available for management of biomedical wastes. There are currently no other biomedical waste treatment and/or disposal facilities available within Nova Scotia.

Approximately 93 percent of the biomedical waste stream is yellow bag waste, which will be treated in the proposed facility (autoclave, shredder, compactor) and the residuals disposed in an approved second generation municipal solid waste landfill. The remaining seven percent of the waste stream comprises anatomical, hazardous pharmaceutical and cytotoxic waste, which will

be stored at the proposed facility and transported to Ontario for incineration at an approved facility.

Alternatives

As noted above, biomedical waste from Nova Scotia is currently incinerated at the CBRM incinerator in Sydney. As this incinerator is scheduled to close, the continued use of the existing facility is not an option. Other technologies and/or facilities that may be considered include:

- Hydroclaving, shredding and compaction of yellow bag waste, with ultimate disposal at an approved landfill and out of province incineration of red bag, cytotoxic and pharmaceutical waste;
- Hammermill shredding of yellow bag waste prior to disinfection with sodium hypochlorite, with ultimate disposal at an approved landfill and out of province incineration of red bag, cytotoxic and pharmaceutical waste;
- Out of province processing including autoclaving, shredding and compaction of yellow bag waste, with ultimate disposal at an approved landfill, and incineration of red bag, cytotoxic and pharmaceutical waste; and,
- Out of province incineration of all biomedical waste.

The proponent was awarded a conditional contract to manage biomedical wastes on behalf of Nova Scotia Department of Health following a competitive Request for Expressions of Interest process, followed by a resulting Request for Proposals process, and based on a proposal as defined in this Registration. Other alternatives, as illustrated above, may have been available but were determined to not be economically viable and/or environmentally acceptable through this formal process.

Proposed Construction and Operation Schedules

When the required approvals and permits are received, MWM plans to begin installation of equipment in October 2005, with the intent to begin operations on or before December 21, 2005, prior to the scheduled closure of the Sydney Incinerator on December 31, 2005. The proposed schedule is presented graphically in Figure *ii*.

Description of the Undertaking

The project involves the redevelopment of an existing building at 45 Wright Avenue, Dartmouth, as a biomedical waste treatment and storage facility, and operation of the facility for wastes generated within Nova Scotia.

Medical Waste Management Inc. will install and operate an autoclave, shredder and compactor to treat yellow bag waste. Refrigerated storage for red bag waste and secure storage for pharmaceuticals and cytotoxic waste will also be installed and operated for these wastes prior to transport off-site for treatment. Other, non-hazardous health care wastes may be processed on site as well.

The footprint of the existing building will not be modified by this project. A fence will be installed along the perimeter of the property.

Approvals Required and Other Forms of Authorization

The following approvals and other forms of authorization are anticipated for the project.

- Municipal Development Permit, HRM – Municipal approval of undertaking at proposed site; review of all licenses and/or permits which are required to operate this type of facility.

- Occupancy Permit, HRM – Municipal approval prior to occupying structure.

- Municipal Construction Permit, HRM – Required for renovations to the existing structure.

- Industrial Approval, NSEL – post-construction and prior to operation; various requirements, including compliance with conditions attached to Permit to Construct.

- Interprovincial Movement of Hazardous Wastes and Transportation of Dangerous Goods Regulations – require that hazardous wastes and dangerous goods meet minimum requirements for transport, including manifests and other minimum safety requirements. These specific requirements have been confirmed through Ms. Marie-Josee Sirois at Environment Canada's Nova Scotia District Office.

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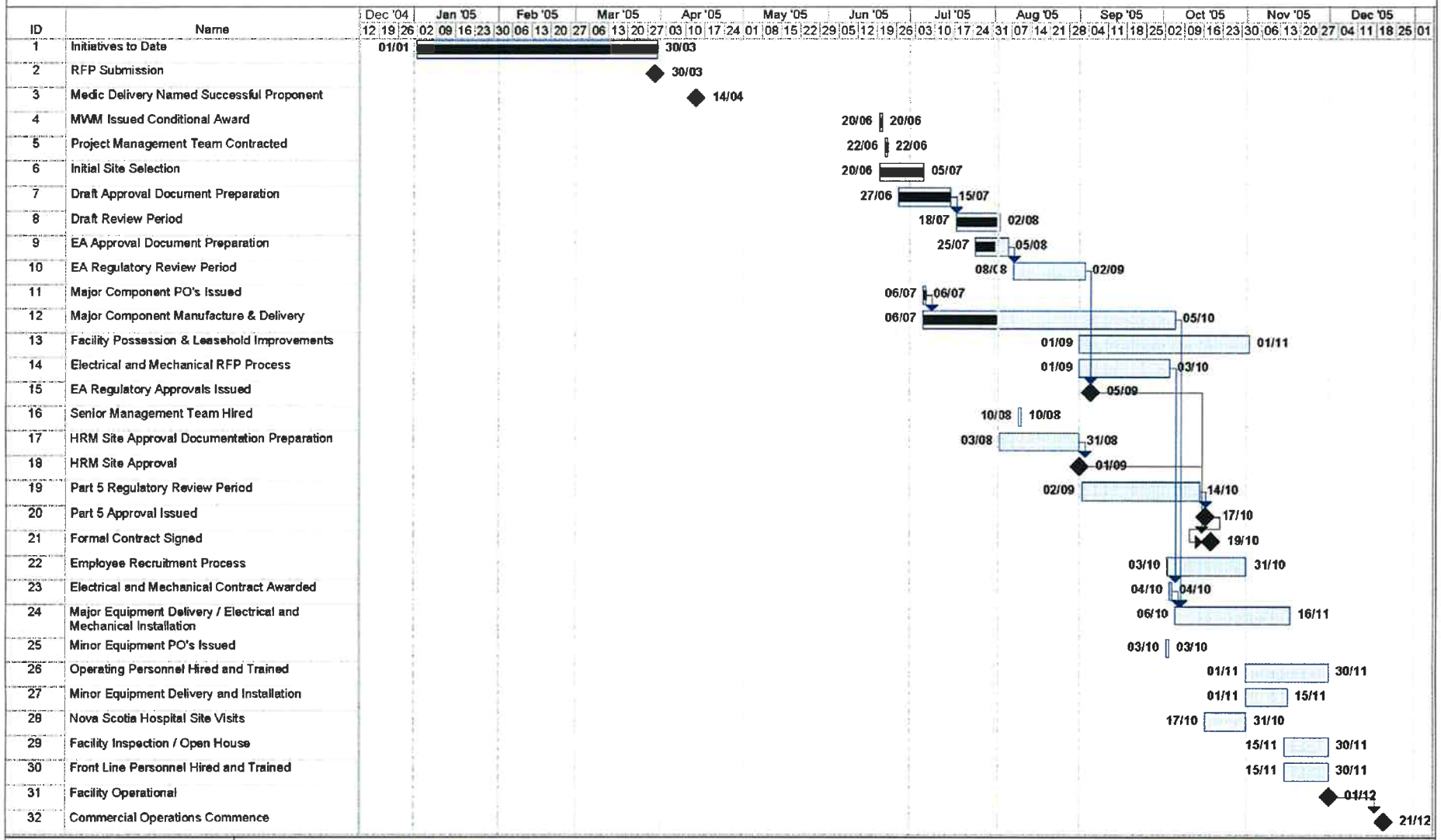
Nova Scotia Tender Number: 60125841 - Appendix B - Technical Submission Requirements Tab #3 Implementation Plan: Schedule



Project: Tender #60125841
Date: Wed 30/03/05

DILLON CONSULTING

DATE AUGUST 2005

TITLE
CONSTRUCTION AND PERMITTING SCHEDULE

PROJECT
MEDICAL WASTE MANAGEMENT
BIOMEDICAL WASTE TREATMENT FACILITY
REGISTRATION AND ENVIRONMENTAL ASSESSMENT

PROJECT No.
05-5036-0100

FIGURE No.
ii

Issues of Concern

Issues of concern have been scoped by the MWM EA study team through:

- reviewing applicable provincial and federal environmental laws and regulations;
- meeting with provincial and municipal regulatory agencies;
- meeting with provincial and municipal elected representatives for the area;
- meeting with neighbouring businesses;
- reviewing records of public consultation for similar projects in the study area;
- considering the existing extensively developed and industrial/commercial nature of the study area;
- considering available environmental literature and references;
- incorporating the experience of the EA study team in conducting environmental assessments in Nova Scotia and elsewhere in Canada; and,
- considering the experience and suggestions about autoclave technology operation and maintenance elsewhere in Canada and from other knowledgeable team members and associates.

The Issues of Concern identified by the study team and addressed in the accompanying EA include:

- air quality;
- liquid discharges;
- traffic;
- noise; and,
- accidents and malfunctions.

Sources of Public Funding

MWM is a private company and does not plan to use any public funding for this project.

Summary of Concordance with Factors Relevant to the Minister's Decision

This section presents the concordance of the following EA with the factors that the Minister of the Environment must consider when formulating a decision following the registration of a Class I Undertaking. It is intended to provide a summary of the EA, as a convenience to the Minister in making that decision, and is based on the registration document and the specific commitments of, and studies and consultations carried out by MWM.

The following is an extract from the *Environmental Assessment Regulations* made under Section 49 of the *Environment Act*, S.N.S. 1994-95, c.1, O.I.C. 95-220, N.S. Reg. 26/95, as amended by O.J.C. 2003-67 (February 28, 2003), N.S. Reg. 44/2003.

Factors relevant to the Minister's decision.

The following information shall be considered by the Minister in formulating a decision following review of the registration documents for a Class I undertaking:

(a) *The location of the proposed undertaking and the nature and sensitivity of the surrounding area;*
(b) *The size and scope of the proposed undertaking;*
(c) *Concerns expressed by the public about the adverse effects or the environmental effects of the proposed undertaking;*
(d) *steps taken by the proponent to address environmental concerns expressed by the public;*
(e) *potential and known adverse effects or environmental effects of the technology to be used in the proposed undertaking;*
(f) *project schedules where applicable;*
(g) *planned or existing land use in the area of the undertaking;*
(h) *other undertakings in the area; and*
(i) *such other information as the Minister may require.*

Each of the nine factors listed has been addressed below. The notes following each of the nine factors provide both a summary of key points detailed in the EA and the sections that address these factors in the EA.

1. The location of the proposed undertaking and the nature and sensitivity of the surrounding area:

The project is located within the Burnside Industrial Park, in an existing building (Figure i).

MWM has selected as its preferred location a developed commercial/industrial property within a well-established and developed industrial park, avoiding a greenfield location and potential issues related to water supply, sensitive habitat, wetlands and watercourses.

2. *The size and scope of the proposed undertaking:*

The project consists of the installation of systems including and supporting an autoclave unit within an existing structure, requiring no new construction and involving simple retrofitting.

3. *Concerns expressed by the public about the adverse effects or the environmental effects of the proposed undertaking:*

MWM has identified potential neighbourhood and stakeholder concerns about the potential adverse environmental effects of the project. Neighbourhood and stakeholder consultation was undertaken, as set out in Section 3 of the accompanying EA. Specific issues raised by the stakeholders have related to demonstration of compliance with municipal by-laws. Neighbours have welcomed MWM as Burnside-based business and have not expressed any environmental concerns regarding the project during meetings or during an open house. One neighbour noted that redevelopment of the property may cease the informal use of the property by trucks delivering goods to his business. MWM has modified its parking area layout in order to facilitate its neighbour's continued use of the site. In addition, the expert knowledge and experience of the authors of this report have been focused on identifying potential environmental effects, particularly adverse ones, which may result from the project. As documented herein, public concerns regarding adverse effects of similar projects in the study area and applicable to this project have been minimal and are considered mitigable.

4. *Steps taken by the proponent to address environmental concerns expressed by the public:*

As summarized in Section 4 of the accompanying EA, the environmental effects of the project are minimal, and are mitigable. Monitoring data from the proponent's biomedical waste operation in Ontario is presented to demonstrate expected compliance with requirements for emissions. In addition, the proponent has agreed to conduct random monthly monitoring of sanitary sewer discharges during the first year of operation to confirm compliance with municipal by-law requirements.

5. *Potential and known adverse effects or environmental effects of the technology to be used in the proposed undertaking:*

The potential adverse and beneficial environmental effects of the technology to be used in this project are well known and are considered not significant.

6. *Project schedules where applicable:*

Project scheduling for construction is not a particularly important consideration from an environmental perspective for this project, which involves the retrofit and installation of systems within an existing building. However, the project is proposed as an alternative to incineration of biomedical wastes at the Cape Breton Regional Municipality incinerator, which will be decommissoned as of December 31, 2005. Therefore, identifying an acceptable alternative for management of biomedical wastes in the province in a timely manner is important.

7. *Planned or existing land use in the area of the undertaking:*

Existing land use in the project area consists predominantly of commercial and industrial uses, which are similar to and compatible with the proposed use.

8. *Other undertakings in the area:*

The Medic Delivery biomedical waste transfer facility has been operating at 47 Mosher Drive, Dartmouth, Nova Scotia for the past 5+ years. A proposed biomedical waste treatment and storage facility at 93 Gloria McCluskey Drive, Dartmouth, Nova Scotia was registered with NSEL on July 8, 2005.

9. *Such other information as the Minister may require:*

MWM has planned the project and prepared this document and the accompanying EA in recognition of the environmental issues particular to waste treatment facilities in Nova Scotia. Through its discussions with regulatory and other stakeholders, MWM does not anticipate that the Minister will require additional information. However, MWM is prepared to provide more information should it be required by the Minister.

Environmental Assessment

Table of Contents

Page

List of Figures:

List of Tables:

Appendices:

1.0 Introduction

1.1 Project Overview

Medical Waste Management Inc. (MWM) plans to construct and operate a biomedical waste treatment and storage facility for biomedical wastes generated in Nova Scotia. In June 2005, Medical Waste Management Inc. was awarded a contract to pick-up, transport, treat and dispose of biomedical waste, province-wide, on behalf of Nova Scotia Department of Health.

The proposed facility will be constructed on a developed lot and within the footprint of an existing building. The operations area of the facility will include a receiving and segregation area for wastes, a refrigerated storage area for anatomical wastes (red bag), a secure storage area for pharmaceutical and cytotoxic wastes, a storage area for yellow bag waste (i.e., microbiology laboratory waste, human blood and body fluid waste, waste sharps and miscellaneous non-hazardous waste), an autoclave treatment system for yellow bag waste, a shedder and compactor for autoclaved yellow bag waste, and a reusable container wash area. Red bag, pharmaceutical and cytotoxic wastes will be stored on site and will be shipped to Ontario for incineration at regular intervals. Non-hazardous health care waste will also be received at the facility.

The proposed facility will also house administration functions for the operation and will be fenced.

1.1.1 Need for the Project

The purpose of the undertaking is to treat biomedical wastes generated in the province of Nova Scotia. Management of biomedical wastes generated in the province is regulated by Nova Scotia Environment and Labour (NSEL).

Biomedical wastes in the province are currently disposed at the Cape Breton Regional Municipality (CBRM) incinerator, located in Sydney, Nova Scotia. The incinerator is scheduled to close on December 31, 2005 and this alternative will no longer be available for management of biomedical wastes. There are currently no other available biomedical waste treatment and/or disposal facilities available within Nova Scotia.

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1.1.2 Elements of the Project

The project involves the redevelopment of an existing building at 45 Wright Avenue, Dartmouth, as a biomedical waste treatment and storage facility and the operation of the facility for wastes generated within Nova Scotia.

Medical Waste Management Inc. will install and operate an autoclave, shredder and compactor to treat yellow bag waste. Refrigerated storage for red bag waste and secure storage for pharmaceuticals and cytotoxic waste will also be installed and operated for these wastes prior to transport off-site for treatment.

The footprint of the existing building will not be modified by this project. A fence will be installed along the perimeter of the property. The fence will be locked when the facility is unoccupied and security cameras will be in place inside operations areas and outside the building.

1.2 Alternatives

As noted above, biomedical waste from Nova Scotia is currently incinerated at the CBRM incinerator in Sydney. As this incinerator is scheduled to close, the continued use of the existing facility is not an option. Other technologies and/or facilities that may be considered include:

- Hydroclaving, shredding and compaction of yellow bag waste, with ultimate disposal at an approved landfill and out of province incineration of red bag, cytotoxic and pharmaceutical waste;
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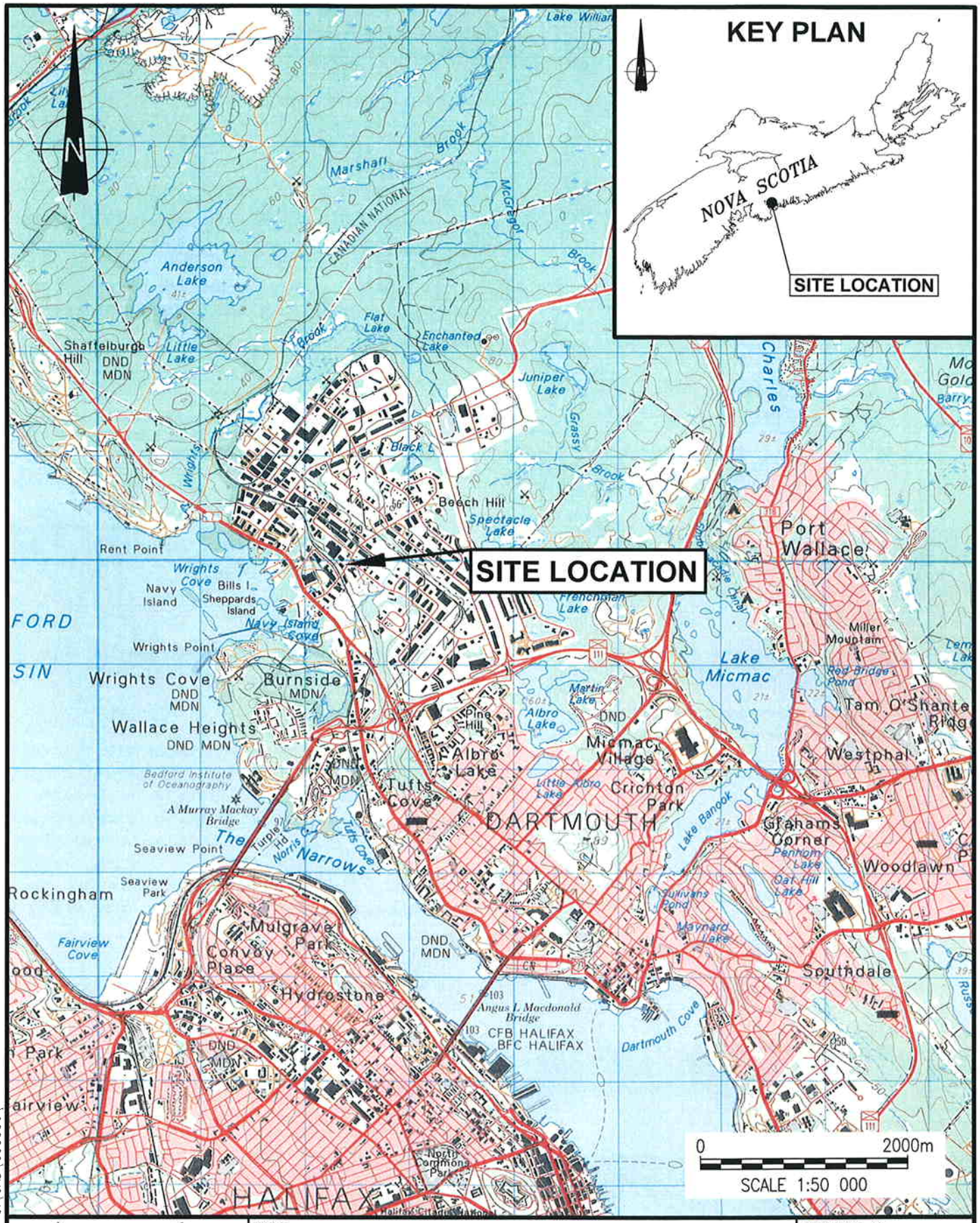
The proponent was awarded a conditional contract to manage biomedical wastes on behalf of Nova Scotia Department of Health following a competitive Request for Expressions of Interest process, followed by a resulting Request for Proposals process, and based on a proposal as defined in this Registration. Other alternatives, as illustrated above, may have been available but were determined to not be economically viable and/or environmentally acceptable through this formal process.



DILLON CONSULTING	TITLE **SITE LOCATION**	PROJECT No. **05-5036-0100**
DATE **AUGUST 2005**	PROJECT **MEDICAL WASTE MANAGEMENT BIOMEDICAL WASTE TREATMENT FACILITY REGISTRATION AND ENVIRONMENTAL ASSESSMENT**	FIGURE No. **1-1**

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2.0 Project Description

This section provides a detailed description of the Biomedical Waste Treatment Facility project (the Project). The project was conceptually defined in the 2005 proposal by MWM to the Nova Scotia Department of Health (NSDOH). This description presents a refinement and elaboration of the project as presented to the NSDOH, with reference to the components that make up the registered undertaking.

The Project description is presented in sufficient detail that reviewers can understand the potential environmental impacts of the project and the methods that will be applied to avoid or mitigate environmental effects. An overview of standard environmental management and protection measures are integrated with the project description.

2.1 Setting and Land Use

General

The project site is located in a well-established and developed area of the Burnside Industrial Park, at 45 Wright Avenue, approximately 450 m from the intersection of Wright Avenue and Windmill Road. The proposed facility will be located within the existing stand alone, two-storey building on the property. A parking/loading bay area is located along west side of the building. The site is located in an area serviced with municipal water and sanitary and storm sewers.

Natural Environment

In terms of natural environment, there are no watercourses on the property and no habitat of significance. The nearest downgradient stormwater sewer entry point is approximately 30 metres south of the south edge of the property driveway. It is assumed to discharge to Bedford Basin, to the southwest.

Geology and Hydrogeology

The native soils are assumed to glacial till, consisting of brown, silty sand and gravel. The bedrock in the area is identified as mainly quartzite with greywacke and minor black shale of the Meguma Group, Goldenville Formation (Province of Nova Scotia, 1994). Bedrock is generally

encountered at depths ranging from 1.0 to 4.0 metres from grade, depending upon the amount of backfill used during construction activities. Backfill material, usually consists of locally derived sand and gravel and abundant cobbles and boulders.

The water table in the area is typically 1.0 to 3.5 metres below grade, near the soil bedrock interface. Groundwater flow is assumed to be towards Bedford Basin, approximately 800 metres to the southwest.

According to the NSEL Provincial Well Database (Appendix A), the closest municipal or drinking water well is at 389 Windmill Road, Dartmouth, which is approximately 2.3 kilometres south of the site. The closest industrial/commercial well is at 180 Joseph Zatzman Drive, in Burnside, approximately 1 kilometre north of the site. Another commercial/industrial well is located 80 Gloria McCluskey Drive, in Burnside, which is approximately 2.3 kilometres north of the site. Both wells in Burnside are topographically upgradient of the site, and the domestic well is cross-gradient. Given the proximity of the project to water supplies, the nature of the undertaking and the availability of municipal water service, no significant impacts to these water supplies is anticipated as a result of the project.

Archaeological Potential

Previous work completed by Cultural Resource Management Group (Appendix B) determined that Burnside has "No Archaeological Potential" and, based on a cursory review, that 45 Wright Avenue also has "No Archaeological Potential".

Land Use

Adjacent and nearby land uses are primarily warehousing and commercial (wholesale and retail). Adjacent the property to the northwest is an industrial operation run by Maritime Paper Products. East Coast Specialty Hardwood operates a warehouse and retail outlet for wood building supplies adjacent the property to the north. Immediate neighbours include Parts for Trucks, Happy Harry's Affordable Building Center and Bebbington Industries (cleaning product supplier), across Wright Avenue, and Guildford's (building materials supplier) to the southwest and across the CNR rail line and McCurdy Avenue. Other nearby properties support asphalt and concrete manufacturing (McAsphalt Industries on McCurdy Avenue and Dartmouth Ready-Mix on MacDonald Avenue), and more warehousing and commercial uses including Atlantic Industrial Cleaners, JWR Construction Ltd., LB Stevens Construction Ltd., Coastal Transport,

and Lumber Mart. The nature of the land use in the area of the site is shown on the aerial photograph presented as Figure 2-1.

The property, as well as most of Burnside, is zoned I-2, General Industrial, which permits industrial enterprises as well as commercial uses, warehouses and distribution uses permitted in C-1, C-2 and C-3 – Business Zones.

2.2 Waste Stream

Biomedical waste, as defined by CCME, 1992, refers to waste that is generated by:

- Human or animal health-care facilities;
- Medical or veterinary research and teaching establishments;
- Health care teaching establishments;
- Clinical testing or research laboratories; and,
- Facilities involved in the production or testing of vaccines.

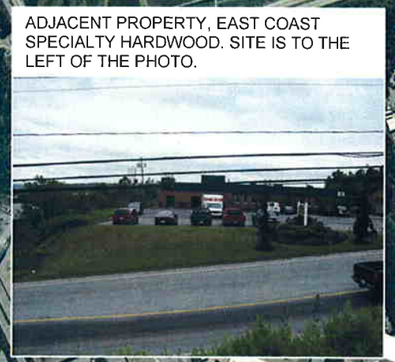
This definition does not apply to microbiology laboratory waste, human blood and body fluid waste or waste sharps after these wastes have been disinfected or decontaminated. Biomedical waste includes:

- Human anatomical waste;
- Animal waste;
- Microbiology laboratory waste;
- Human blood and body fluid waste; and,
- Waste sharps.

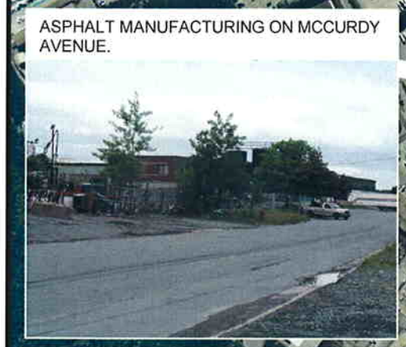
As outlined in the request for proposal from the Nova Scotia Department of Health (March 10, 2005), the proposed undertaking will transport, process and dispose of the following types of waste and their by-products:

a) Human Anatomical Waste

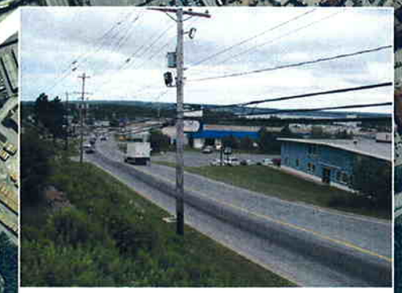
This consists of human tissues (including placenta), organs and body parts, but does not include teeth, hair and nails. This waste stream is referred to as red bag waste.



ADJACENT PROPERTY, EAST COAST SPECIALTY HARDWOOD. SITE IS TO THE LEFT OF THE PHOTO.



ASPHALT MANUFACTURING ON MCCURDY AVENUE.



FROM WRIGHT AVENUE. PROPOSED SITE IS AT RIGHT OF PHOTO. GUILDFORD'S INC. (BRIGHT BLUE BUILDING) IS SHOWN IN BACKGROUND.

SITE FROM WRIGHT AVENUE SHOWING SIDE PARKING AND LOADING AREA. MARITIME PAPER IS IN BACKGROUND.

THE SITE FROM WRIGHT AVENUE.

BACK OF PROPOSED SITE (BLUE BUILDING) WITH RAIL LINE AND MCCURDY AVENUE ON THE RIGHT. MARITIME PAPER IS IN THE FOREGROUND.

Wright Ave

CNR Rail Line

PROPOSED SITE

McCurdy Ave

Windmill Road

APPROXIMATE SCALE: 1:10 000

DILLON CONSULTING

DATE: AUGUST 2005	TITLE: LAND USE PLAN	PROJECT No.: 05-5036-0100
	PROJECT: MEDICAL WASTE MANAGEMENT BIOMEDICAL WASTE TREATMENT FACILITY REGISTRATION AND ENVIRONMENTAL ASSESSMENT	FIGURE No.: 2-1

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b) Microbiology Laboratory Waste

This consists of laboratory cultures, stock or specimens of micro-organisms, live or attenuated vaccines, human or animal cell cultures used in research and laboratory material that comes in contact with these. This waste stream is referred to as yellow bag waste.

c) Human Blood and Body Fluid Waste

This consists of human body fluids, blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood, and body fluids removed for diagnosis during surgery, treatment (including suction waste) or autopsy. This does not include urine or feces. This is considered yellow bag waste.

d) Waste Sharps

Waste sharps are clinical and laboratory materials consisting of needles, syringes, blades, or laboratory glass capable of causing punctures or cuts. This is referred to as rigid container waste.

e) Cytotoxic Wastes

This may consist of cytotoxics, which are hazardous pharmaceuticals used in patient treatment or diagnosis. This term is commonly used to refer to pharmaceuticals used in treating cancer (e.g., anti-neoplastics or chemotherapy agents). Cytotoxics can cause direct irritant or allergic reaction and may present a hazard due to their mutagenic, carcinogenic, or teratogenic properties.

f) Pharmaceutical Waste

This includes expired or non-useable medications (excluding cytotoxic material and narcotics).

g) Miscellaneous Waste (Non Hazardous)

This consists of soiled dressings, sponges, surgery drapes, lavage tubes, casts, catheters, disposable pads, disposable gloves, specimen containers, lab coats and aprons, and dialysis wastes. This is considered yellow bag waste.

This may also consist of paper towels, coffee cups, packaging, and other organic and inorganic waste streams, which have been inadvertently moved into the hazardous waste stream. Once this material has been introduced into the hazardous wastes stream, these materials must be treated as general biomedical (yellow bag) waste.

The NSDOH RFP states that these miscellaneous wastes may be currently found with biomedical waste in facilities, but will be subject to reduction as waste management techniques improve over time.

The proposed facility will be capable of receiving and storing red bag, yellow bag, rigid container, cytotoxic and pharmaceutical waste, as well as non-hazardous health care wastes. Red bag waste will be stored in a refrigerated storage area within the facility prior to transhipment to an Ontario Ministry of the Environment approved incinerator in Ontario. As well, cytotoxic and hazardous pharmaceutical waste will be stored at the facility prior to transhipment an Ontario Ministry of the Environment approved incinerator in Ontario. Yellow bag waste and non-hazardous pharmaceutical waste will be treated at the facility and treated residuals disposed at a second-generation municipal solid waste landfill in Nova Scotia.

In addition, there is facility capacity beyond Department of Health requirements for specific health care facilities. Therefore, as markets are developed, biomedical wastes from other sources maybe received at the facility. Wastes from doctors, dentists, pharmacies, teaching institutions, funeral homes and veterinary clinics will be managed in the same way as wastes from health care facilities. Regardless of source, wastes in each category (e.g., red bag, yellow bag) will be managed in a similar manner. Non-hazardous wastes received from health care facilities are processed as yellow bag wastes.

It is planned that point sources of mercury, such as dental amalgam from dentists' offices, will not be accepted at this facility. However, if so required, MWM would be prepared to introduce its Dental Amalgam recycling program in Nova Scotia, but only if a suitable Nova Scotia-based mercury recycling company can be located before hand.

Approximately 2,200 tonnes of biomedical waste is generated in Nova Scotia annually (NSDOH, 2005). Of this, approximately 2,050 tonnes of waste is considered yellow bag waste, which will be treated at the proposed facility. Residues from treated yellow bag waste will be disposed at an

approved, second-generation municipal solid waste landfill in Nova Scotia. Remaining red bag biomedical wastes (approximately 150 tonnes) that have been segregated will be shipped to Ontario for incineration at an Ontario Ministry approved incinerator.

2.3 Project Components

2.3.1 Building and Grounds

The proposed biomedical waste treatment, storage and transhipment facility will be located at 45 Wright Avenue, Dartmouth, within an existing building, which will be modified to address the specific operational needs of MWM. (Note: signed offer to lease is available if required). The building is a slab on-grade construction with an approximate area of 1425 m^2 (15,360 ft^2). The building exterior is steel cladding. The majority of the site is asphalt-paved and there is a small, grassed area bordering Wright Avenue on the southwest side of the property.

The following modifications to the building exterior, interior, and grounds are planned as part of this undertaking:

- Extension of an existing chain link fence to surround the perimeter of the property.
- Installation of four (4) dock level overhead doors, complete with dock levellers.
- Installation of one (1) grade level overhead door (oversized).
- Complete resurfacing of roof structure with a membrane.
- Complete parking area resurfacing with asphalt.
- Installation of natural gas service to building and electrical upgrade.
- Refurbishment and/or replacement of offices.
- Complete painting of building exterior.
- Installation of security cameras.

2.3.2 Equipment and Building Interior

The building interior will be modified to best suit the needs of MWM in terms of operational efficiencies. A processing facility layout, including an outline of anticipated equipment, is presented in Figure 2-2. There will be no regulated petroleum storage at the facility. Chemical storage will be limited to water treatment chemicals for the boiler and the wash system disinfectant (see Section 2.7.4).

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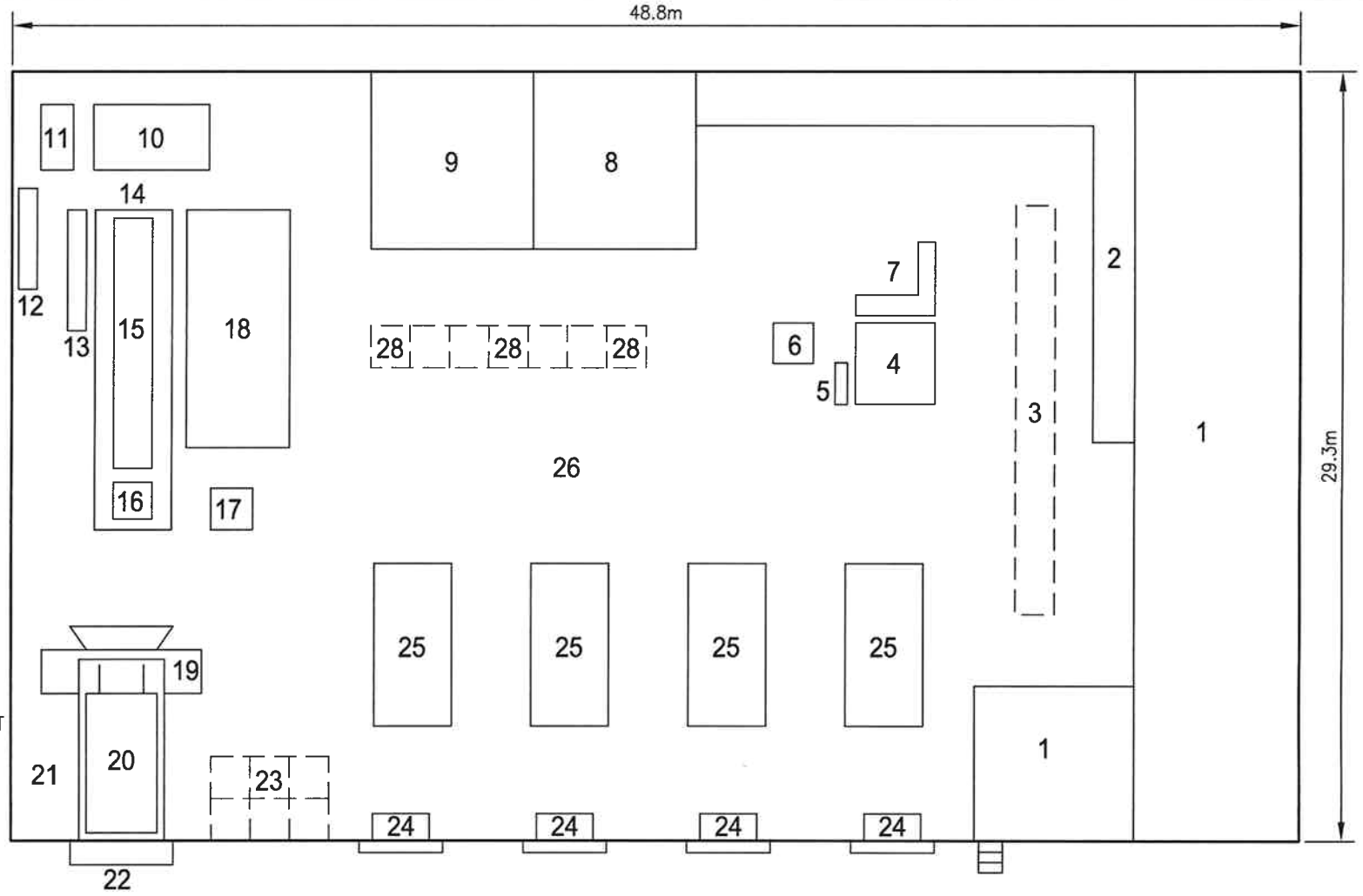

LEGEND:

1 OFFICE AREAS
2 SUPPLY RACKING
3 SPARE BIN STORAGE
4 PLANT SUPPLY STORAGE
5 RADIATION DETECTION
6 FLOOR SCALE
7 WASTE SCANNING
8 CYTOTOXIC/PHARMACEUTICAL STORAGE
9 REFRIGERATION STORAGE
10 BOILER (200 BHP)
11 PRE-HEAT FEED TANK
12 BOILER CHEMICAL TREATMENT
13 AUTOCLAVE VACUUM PUMP
14 AUTOCLAVE PIT (450mm)
15 AUTOCLAVE
16 HYDRAULIC LIFT TABLE
17 AUTOCLAVE CONTROLS
18 CONTAINER WASH STATION
19 SHREDDER
20 COMPACTOR (SELF CONTAINED)
21 COMPACTOR PIT (1220mm)
22 OVERHEAD DOOR (GROUND LEVEL)
23 AUTOCLAVE BIN (PRE-SHRED) STAGING
24 LOADING DOCKS/DOORS
25 OFF-LOADING WASTE STAGING
26 WASTE HANDLING AREA
27 PARKING AREAS (PAVED)
28 AUTOCLAVE BIN (PRE-AUTOCLAVE) STAGING

N.T.S.

DILLON CONSULTING

DATE **AUGUST 2005**

TITLE **PROCESSING FACILITY LAY-OUT**

PROJECT **MEDICAL WASTE MANAGEMENT BIOMEDICAL WASTE TREATMENT FACILITY REGISTRATION AND ENVIRONMENTAL ASSESSMENT**

PROJECT No. **05-5036-0100**

FIGURE No. **2-2**

Key features of the facility are as follows:

- Steam Boiler - a 200 horsepower high output – low volume steam boiler. The high output – low volume design responds more efficiently to the sporadic autoclave steam demand than a conventional boiler. The boiler system will be installed, complete with a water softening system for water treatment. Water will be from the municipal water supply. Natural gas will be used as fuel.

- Autoclave Sterilization Vessel - the autoclave sterilization system is manufactured by Bondtech Corporation and has a capacity of 1.6 metric tonnes (3,500 pounds) of waste per hour. (Photos 1 and 2, Appendix C).

- Shredding System – A ST-75 shredding system manufactured by Shred-Tech of Cambridge, ON, will be used. The shredder will be loaded automatically with a rotor-equipped tow-motor and the unit will be positioned directly over the compactor-charging chamber, to ensure that no employee comes into contact with the waste materials as they are shredded. (Photo 3, Appendix C).

- Waste Compactor - The compaction unit will be a "self-contained" configuration, which means that the compactor is not required to be split from the container for transport. This feature is designed to prevent leakage and spillage during transport, although operationally, it takes more time and handling. The container doors will have a full seal and lock off system, also designed to eliminate leakage. The unit will have a double floor with a corrugated centre to contain any liquids that accumulate inside the container. Any such liquids, the amount of which will be minimal and non-free flowing, will be discharged at municipal landfill with all other container contents. (Photo 3, Appendix C).

- Refrigerated Waste Storage Structure – the unit will occupy 27 m^2 and will be 2.5 m high. The unit will be equipped with a double refrigeration compressor system, each component capable of maintaining a temperature of 4°C or less. The refrigerant will be managed in accordance with the Nova Scotia Ozone Layer Protection Regulations.

2.4 Installation Methods

The site has been previously developed and the building footprint is not expected to change as a result of this project. As previously discussed, MWW will undertake modifications within the building in order to achieve an efficient layout from a waste processing perspective. The floor within the building will be cut and a 3 m x 12 m x 450 mm pit excavated and formed with concrete to facilitate consistent floor level loading of waste materials into the autoclave. Except in specific, controlled areas, there will be no drains in the floor to preclude potential for an accidental release of wastes into the sewer system.

Exterior work will be completed in keeping with typical existing building redevelopment, and will include re-painting, re-roofing with a membrane roof, asphalt repaving of parking area(s) and extending the perimeter fence. Work will be completed using best practices to minimize short-term environmental impacts associated with these activities. As an example, exterior painting will comprise a brush and roller paint application, rather than a spray application.

Wastes generated during modifications to the building will be disposed at an approved construction and demolition debris processing facility. If acid-generating rock is disturbed during construction, it will be managed in accordance with the Nova Scotia Sulphide Bearing Material Disposal Regulations.

2.5 Regulatory Environment

This proposed facility is subject to the following provincial and federal legislation:

Nova Scotia Environment Act, 1995

- Activities Designation Regulations - Apply to the construction, operation or reclamation of a facility for the handling of dangerous goods or waste dangerous goods as defined in the Dangerous Goods Management Regulations.
- Approvals Procedures Regulations – Apply if activity is listed in the Activities Designation Regulations. An approval is required under these Regulations.

- Dangerous Goods Management Regulations – Apply if the project involves a waste dangerous good that is no longer in use for its original purpose or materials which have become waste dangerous goods through handling, including dangerous goods intended for treatment, disposal or recycling under these Regulations. Therefore, these regulations apply for the management of this waste.
- Environmental Assessment Regulations – Apply if a facility will be a permanent commercial facility for the handling of waste dangerous goods.
- Solid Waste-Resource Management Regulations - Apply to owners, operators or persons in care, management or control of a commercial outlet, service outlet, plant, building, facility or thing, who shall not permit the release of litter from the commercial outlet, service outlet, plant, building, facility or thing into the environment.

Dangerous Goods Transportation Act, 1989

- Dangerous Goods Transportation Regulations – Apply to transportation of dangerous goods on the road within Nova Scotia; however, infectious "waste" is no longer regulated by Transport Canada (TDGA Clear Language – August 2003) and, as such, waste manifests are no longer used for transport of biomedical waste within Nova Scotia.

Canadian Environmental Protection Act, 1999

- Interprovincial Movement of Hazardous Waste Regulations – Apply if hazardous waste is shipped out of province for treatment or disposal. Although biomedical "waste" is no longer Transport Canada regulated, the use of waste manifests for the Interprovincial Movement (Nova Scotia to Ontario) of biomedical waste remains in effect.

Canadian Transportation Dangerous Goods Act, 1992

- Transportation of Dangerous Goods Regulations - Detail requirements and provisions for the transportation of waste dangerous goods across provincial boundaries.

Municipal By-Laws

- Municipal by-laws regulate wastewater discharges, solid waste and noise associated with operational issues. Municipal by-laws also regulate planning and development of an area.

2.6 Facility Commissioning and Validation Testing

2.6.1 Process Parameters

The proposed facility is identical, in terms of process equipment, as that operating at MWM's autoclave facility in Brampton, Ontario. Hence, there are well-established procedures and protocols for operating equipment and achieving desired sterilization. These procedures and processes will be implemented at the proposed facility.

Background information and technical data from the autoclave manufacturer is presented in Appendix D. For reference, Certificates of Approval from Ontario Ministry of Environment are presented in Appendix E. (Please note that the Brampton facility operates an incinerator in addition to an autoclave). Commissioning test data from the Brampton autoclave facility are presented in Appendix F.

Commercial biological indicators are commonly used to provide accurate and reliable quality-control verification as to an autoclave's sterilization effectiveness. The routine achievement of sterilization is monitored by placing certified *Bacillus Stearothermophilus* spore ampoules into the waste load to be sterilized. If the spores survive after the incubation period, then the conditions for waste sterilization have not been achieved. If the spores do not survive the incubation period, conditions for waste sterilization have been achieved. Total sterilization is achieved through the inactivation of at least 1,000,000 (commonly referred to as a "6 log reduction") spores of *Bacillus Stearothermophilus* per ampoule.

To evidence sterilization, MWM will use commercially available spore media. The spore media are essentially small glass ampoules that contain 1,000,000+ individual spores (6 log population) of *Bacillus Stearothermophilus*, either suspended in a neutral liquid suspension media, or inoculated on a small strip of litmus paper, which is also suspended in a neutral liquid suspension fluid. The spores are scientifically manufactured under tightly controlled conditions to provide

the required level of sterilization resistance. Only if there is adequate exposure to time/temperature – pressure combinations will the spores be killed, thus confirming sterilization. These biological indicators contain a chemical colour indicator to provide an immediate visual verification of complete sterilization; however, an on-site incubation protocol (forty-eight hours) will also be followed for additional confirmation.

2.6.2 Commissioning Testing Methodology

A total of three (3) test sterilization cycles will be undertaken in one day. Suitable waste materials, consistent with the waste typically received from Nova Scotia hospitals, will be used for each such test. These materials will be packaged in either plastic bags or in plastic bags inside cardboard boxes, which is representative of how medical waste will be received. The waste will then be loaded into the eight metal carts required for one autoclave sterilization cycle.

At the centre of each cart, a metal probe with two (2) biological indicator ampoules attached will be inserted into the waste, such that the ampoules are surrounded by waste. For one of the three (3) test loads, an additional 14 ampoules will be placed inside the autoclave in various areas, representative of the most difficult areas for steam to reach, i.e., top front – centre – back, bottom front – centre – back, middle front – centre – back, around the steam inlets (2), around the steam exhaust (2) and one adjacent to the autoclave door. The loose ampoules will be suspended using wooden rods instead of metal, to protect from false heat sources.

Each ampoule location will be pre-numbered and on extraction, the location number will be recorded. This same procedure will be followed for each ampoule in each of three sterilization cycles. A total of 56 ampoules (+3 control ampoules) will be recorded and removed from the site for independent laboratory analysis. A copy of the independent report will be forwarded to NSEL.

The sterilized waste material will be shredded and loaded into the waste compactor for disposal as municipal solid waste; however, such disposal will not take place until such time as complete sterilization has been independently confirmed.

MWM will not commence operations until such time as NSEL operating approval conditions are met.

2.6.3 *Continuous Validation Testing*

MWM will conduct in-house validation testing of the autoclave performance, every 6th operating day, so as to ensure that the testing parameters account for daily variation in the waste received. Validation testing will be performed in the same manner as the original commissioning testing. Ampoules will then be immediately placed into an approved incubator for the required time period, together with one control ampoule. At the prescribed time, the test results will be analyzed and recorded. All test records will remain on file for a period of two years. In the event of any sterilization test failure, NSEL will be notified immediately and waste processing on site will be suspended until such time as the problem resulting in such failure is identified and corrected.

2.7 Facility Operation

2.7.1 *Overview*

The process flow of biomedical waste material is summarized as follows:

- Pick-up and transport of waste from individual waste generators;
- Physical receipt of waste material, including documentation;
- Segregation of waste types, storage and preparation for autoclave sterilization;
- Transportation of wastes not accepted for autoclave sterilization (i.e., red bag [human anatomical] waste, regulated pharmaceuticals and cytotoxic wastes, and, if present, animal anatomical waste) to an approved incinerator in Ontario;
- Autoclave sterilization of yellow bag waste and continuous monitoring;
- Shredding of sterilized waste and compacting for transport to landfill; and
- Transporting sterilized waste to landfill and completion of documentation.

A detailed description of each of these process steps is provided in the following sections. A copy of the MWM Brampton Operations Manual is presented in Appendix G. This will form the basis of an operations manual to be prepared for the proposed facility.

2.7.2 *Waste Collection and Transport*

MWM will take possession of the existing fibreglass bulk waste bins referenced in original tender documents and will continue to provide an adequate supply of such containers to all NS

hospitals to package yellow bag waste. Acceptable disposable cardboard boxes and liners (plastic pails and waxed fibre drums will also be available) will be supplied to package red bag, cytotoxic and toxic pharmaceutical waste.

MWM will own and operate (or sub-contract) acceptable refrigerated transport vehicles (initially, five straight trucks) to provide pick-up and delivery service to each of the contracted health care facilities and other waste generators. All transport vehicles will comply with the requirements outlined in the CCME Guidelines for Management of Biomedical Waste in Canada (1992). These guidelines identify operating parameters and requirements for separation, containment design, conditions for refrigeration, safety marks and identification. Compliance with federal Transportation of Dangerous Goods Act/Regulations and complementary provincial legislation (Dangerous Goods Transportation Act/Regulations) is also specified.

All company owned/operated vehicles will be properly identified by company name and telephone number, bio-hazard symbol and Transportation of Dangerous Goods safety mark placards, where required.

In addition to managing its own material waste accounts, MWM will accept third party biomedical, pharmaceutical and product destruction waste, from appropriately licensed, waste haulage companies, if required or requested to do so. In this instance, MWM will follow all regulations relating to registered waste receivers, including hazardous waste manifest management, where applicable.

The daily average mass of biomedical waste forecasted for transportation and delivery to MWM via company owned/operated and/or third party vehicles is approx. 11,000 kilograms.

2.7.3 Receipt of Waste Material

When transport vehicles (MWM owned/operated and/or approved third party) arrive at the MWM process site, a company supervisor will instruct the driver to a specific receiving door for unloading. Once in position, the individual waste manifests and/or shipment rosters will be collected by the employee responsible for unloading the waste. As each shipment is unloaded, it will be physically inspected for damage and compared with the documented manifest information, before it is accepted for administrative processing.

Each shipment will be staged separately on the plant floor adjacent to the administrative process area and a copy of the manifest left in an assigned wall mount folder for the corresponding assigned shipment area. At the time of process, a company supervisor will once again check the shipment and manifest for accuracy. At that point, each waste container will be weighed and scanned into the MWM custom computer software program, using a pre-assigned account information code for each separate customer. (Photo 4, Appendix C).

At the point where individual waste units are weighed and scanned, a permanent and automatic "radioactive detection device" will measure levels of radioactivity in each individual unit (the manufacturer of this device calibrates and certifies the settings and provides annual certification). (Photos 7 and 8, Appendix C). In the unlikely event that a waste unit is detected to contain higher than acceptable radioactive levels, an alarm will sound immediately and that waste unit will be removed from the line, repacked in a safe container and arrangements made to have the unit returned to the generator as soon as possible.

Once entered into the MWM computer system, each waste shipment will be tracked by weight through each step of the "stabilization – shredding – disposal" system, or the "storage – transfer" system. With respect to autoclave sterilization, individual waste units will be batched into sterilization cycles and sterilization cycles will be batched into compactor loads. Accumulated shipment weights will then be matched with a municipal landfill receipt to complete the documentation cycle.

With respect to storage – transfer waste materials (red bag waste), individual shipments will be tracked into separate approved storage areas until such time as they are transferred to Ontario for approved incineration. All such waste will be recorded/documented on an individually numbered hazardous waste manifest for each truckload transferred from Nova Scotia to Ontario, identifying MWM as the new waste generator.

2.7.4 Segregation of Waste Types, Storage & Preparation for Autoclave Sterilization

As waste shipments are scanned into the system, they will be segregated by waste type. All anatomical waste will be immediately directed to the MWM refrigeration system, which will be maintained below 4°C at all times. Cytotoxic waste, as well as hazardous pharmaceutical waste, will be immediately directed to a secure non-refrigerated storage compound. As required, but at

regular scheduled intervals, these materials will be transported to an approved incineration facility. MWM operates such a facility in Brampton, Ontario.

All yellow bag biomedical waste will be loaded into large (approx. 1220 mm x 1140 mm x 1220 mm) steel containers for autoclave containment. Large reusable containers will be mechanically emptied, ensuring that contents are shielded to prevent spillage or splashing while contents are being emptied. Smaller reusable containers will be emptied manually. Any yellow bag waste packaged in disposable cartons will be placed directly into the process containers as received. The opening of biomedical waste containers is never permitted.

During this process, waste will be physically inspected to determine if unacceptable materials have been misdirected or if significant amounts of regular non-hazardous waste are contained. If unacceptable materials are identified, they will be safely removed from the large container, re-packaged and directed for incineration. In either case, the waste generator information will be recorded by the process employee and passed on to a company supervisor so that the generator can be contacted as quickly as possible for remedial action. Such information is also recorded within the MWM database as an "exception report" which is then directed to the assigned MWM Client Care manager for facility follow-up.

When the required number of large steel containers are filled, they will be manually rolled inside the autoclave vessel. When loaded to capacity, the autoclave door will be closed and automatically sealed. At that point, the computer controls will be activated and the sterilization cycle will commence.

All empty reusable containers will be directed to the container wash area of the plant. (Photos 5 and 6, Appendix C.) It is noted that all biomedical waste will be packaged in either acceptable biomedical plastic waste liners or reusable containers pre-lined with clear plastic to assist the wash process by ensuring that the waste does not come into direct contact with the containers. The smaller containers and lids (if applicable) will be fed through a manual spray-wash conveyor line and the large containers will be manually washed with a high pressure spray wand. In either case, high temperature – high-pressure wash water will be mixed with a pre-determined amount of a hospital grade, biodegradable, non-organic disinfectant to ensure the reusable containers are sanitized prior to reuse. The material safety data sheet for the planned disinfectant is presented in

Appendix H. Laboratory swabs are maintained onsite to test containers for the presence of pathogens, if there is concern regarding process efficacy.

Once cleaned, all containers will be staged upside down to dry before they are moved back to the container inventory area for reuse. The wash water will be directed to a sanitary sewer drain located in the plant floor. This area is physically separated from the process area to prevent inadvertent release of untreated biomedical waste.

2.7.5 Autoclave Process

Once the autoclave door is sealed shut with the waste safely inside, the computer controls are activated to commence the automatic sterilization cycle. The sterilization is broken down into six technical components, described as follows. The autoclave process is illustrated on Figure 2-3.

i. The first stage is referred to as "pre-vacuum". Prior to treating the medical waste with steam, a high vacuum removes air from the autoclave chamber. During the initial 3-4 minutes of the cycle, the computer controls activate the opening of a large vacuum valve and a 50 HP electric motor. This motor causes the atmosphere inside the autoclave to be pulled out to a vacuum of 24"-28" Hg. At that point, there are virtually no gases left inside the autoclave and the controls cause the vacuum valve and motor to close down and remain shut. The vacuum valve is sealed by a steady flow of cold water, which is then directed to the sanitary sewer system along with all atmosphere pulled from the autoclave.

ii. During the second stage, pressurized steam is introduced when the controls automatically open the steam line valve. Steam is generated by a 200 horsepower, high output – low volume, commercial boiler. Because of the pulled vacuum inside the autoclave, the introduction of pressurized steam causes an internal implosion effect, which immediately forces the steam deep into the waste load, causing complete penetration. The pre-determined internal autoclave temperature and related pressure (300°F @ 50+ psi) is achieved in less than ten minutes. Once the present temperature-pressure is achieved, the steam valve is automatically closed by the controls, and is allowed to open for short steam pulses only, to maintain the temperature and pressure during the next stage.

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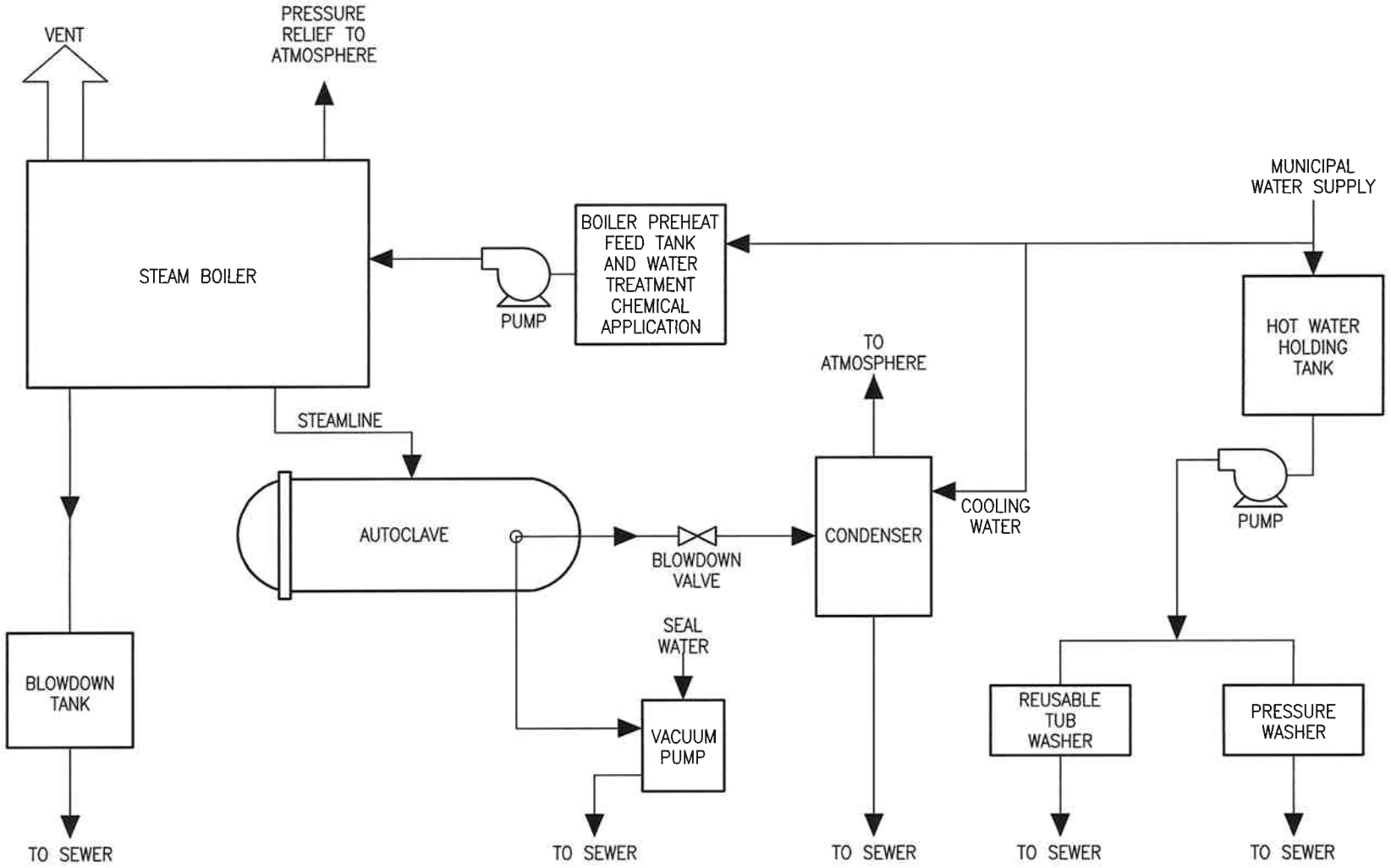

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DILLON CONSULTING	TITLE: **AUTOCLAVE PROCESS FLOW DIAGRAM**	PROJECT No. **05-5036-0100**
DATE: **AUGUST 2005**	PROJECT: **MEDICAL WASTE MANAGEMENT BIOMEDICAL WASTE TREATMENT FACILITY REGISTRATION AND ENVIRONMENTAL ASSESSMENT**	FIGURE No. **2-3**

iii. The third stage is referred to as the "soak" or "cook" phase. The above noted temperature and pressure is held for thirty (30) minutes. This stage is designed to achieve waste sterilization, which is technically referred to as a 6-log reduction of *Bacillus Stearothermophilus* (the acceptable biological indicator for waste sterilization, using steam). It is noted that this temperature (300°F), pressure (50+ psi) and time (30 minutes) exceeds the Ontario Ministry of Environment requirements for this process technology. Computer controls maintain the process temperature at 301+ °F and do not permit removal of the waste until the minimum temperature has been achieved for 30 minutes.

iv. The fourth stage is the blow down of the pressurized steam inside the autoclave. At this point, the controls ensure the steam valve remains closed before activating a high volume spray water flow inside a large system condenser, which is approximately 760mm in diameter by 250mm high.

v. A large blow down valve is then automatically opened and the pressurized steam is forced directly into the condenser by the pressure built up inside the autoclave. As there are no gases inside the autoclave prior to the introduction of steam, only saturated steam and a small amount of effluent is received by the condenser. The steam is condensed by the high volume of cold water constantly sprayed inside the condenser, and the contents are then directed to the municipal sanitary sewer through the condenser drain pipe. The condenser is equipped with an emergency vent to the outside atmosphere. However, due to the high capacity and efficacy of the condenser and under normal operating conditions, there are no measurable emissions from this vent. In the unlikely event that the municipal water supply to the condenser is interrupted and the emergency vent is activated, a steam plume would be visible above the facility roof for a short time (2-4 minutes); however, the steam would be completely sterile at that point and would dissipate quickly.

   This blow down stage takes a total of 2-4 minutes, at which time the internal pressure of the autoclave is close to zero (i.e., post-vacuum segment can be safely initiated).

vi. The fifth stage is referred to as "post-vacuum", which operates in a manner identical to the "pre-vacuum". Any residual steam or condensate inside the autoclave is pulled out and directed to the municipal sanitary sewer along with the cold water used to seal the vacuum

valve. This stage takes the same time as for pre-vacuum (i.e., 3-4 minutes). The only difference between the two timed vacuum stages is that the post-vacuum stage also assists in partially cooling the sterilized waste by reducing the internal temperature of the autoclave.

vii. The sixth, and final, stage represents the equalization of pressure inside the autoclave. The controls automatically open a small valve that allows plant atmosphere to enter the autoclave to balance internal and external pressures so that the autoclave door can be opened. This final stage takes less than 1 minute. At that point, the autoclave internal temperature and pressure is at a safe level and the door can be opened and the contents removed, before recommencing the process.

An integrated Honeywell chart recorder will permanently record continuous time, temperature and internal pressure readings throughout the sterilization cycle. These hard copy recordings will be identified as individual and sequential autoclave batch numbers by an MWM supervisor and retained on file for inspection for a minimum of two years.

2.7.6 Shredding Sterilized Waste and Compacting for Transport to Landfill

As the large metal carts are removed from the autoclave, they are manually directed to the shredding area, where they are picked-up and secured to a hydraulic rotator attached to a propane powered tow motor. The bin is lifted into position over the shredder hopper, where the container is then tipped sideways to empty its contents into the shredder. The tow-motor lift is fitted with a mechanical stop to ensure that it is lifted to the specified height every time and the tow motor's rotator is also fitted with mechanical stops to ensure that it rotates only one way and only to the correct position to discharge waste contents directly into the shredder hopper. A heavy metal guide is also fastened to the plant floor adjacent to the shredder to ensure that the tow-motor approaches the shredder with precise alignment. These features ensure that the waste contents are fed directly into the shredder hopper without any spillage.

The shredder is a heavy-duty industrial shredder. It is a double shaft, single stage shredding system, driven by two 30 horsepower electric motors. It is also fitted with a pneumatic ram to force waste onto the shredding knives and prevent any waste bridging. The shredder discharge chute will be positioned directly over the compactor waste container charging chamber to eliminate any further waste handling.

The waste that is directed to this shredding system will be dramatically reduced in volume from its original condition and in a state acceptable for disposal in an approved, second generation municipal solid waste landfill.

The shredded waste will be automatically loaded into the compactor charging chamber and the hydraulic ram will be activated at regular preset timed intervals, to push the waste into the compactor container. This self-contained unit will eliminate potential for release of materials or liquid during transport.

2.7.7 Transport of Sterilized Waste to Landfill & Completion of Documentation

Once the waste compactor is filled to capacity, a licensed waste hauler will load the compactor and transport it directly to an assigned and approved local second generation landfill. Staff at the landfill site will be prepared for the load due to prior company notification. The self-contained container waste contents will be deposited as instructed by landfill personnel and the waste will be immediately covered with other waste or approved landfill cover, to ensure that no other vehicles or landfill personnel accidentally come into contact with this waste. MWM processed waste will be managed at the landfill in accordance with the operating approvals in place at that site. The driver will then return directly to the MWM process facility, with the same container, which will not be used for any other purpose. MWM waste containers will not be assigned to another company or put to any other use. Containers will be permanently marked with the company name and the words "Treated Medical Waste – Non-Hazardous".

It is noted that no biomedical waste will be processed in the autoclave until such time as a formal landfill disposal agreement is in place with an approved second-generation landfill site.

2.7.8 Operational Capacity and Maintenance

MWM will utilize up to 16 metal autoclave process containers, which represent two sterilization cycles. When operating at capacity, one set of eight will be at the loading station or ready for autoclave sterilization and one set of eight will be inside the autoclave or ready for shredding.

The entire plant will be kept clean and the floors and process equipment will be swept and mopped or pressure sprayed regularly. The same disinfectant solution used for reusable containers will be used for vehicle, equipment and floor cleaning. All residue-cleaning liquids

will be directed to the sanitary sewer system through a facility interceptor basin that is already in operation.

MWM will operate up to 24 hours per day, 365 days per year. Individual workdays will be divided into three 8½ hour shifts to provide an adequate overlap between shifts. Starting shifts will then have an opportunity to review the operating status prior to the previous shift's departure.

2.7.9 Contingency Plan

In the event of a process system failure, MWM will continue to transport, receive and administer waste while correcting the system failure. If the time required to rectify the failure is anticipated to exceed 24 hours, pathological waste will be stored in the onsite refrigeration system and other waste will be stored in designated areas. All non-anatomical biomedical waste will be stored in the onsite refrigeration system if the failure exceeds four days. If storage capacities are exhausted or if approved storage provisions are met, regardless of the time line, MWM will remove, on a "first in – first out" priority basis, the amount of waste necessary to remain in compliance with its operating approvals. Removal will consist of loading stored waste onto MWM transport vehicles and transporting the waste to MWM's facilities in Brampton, Ontario. The practice will continue until such time as normal process operations resume. It should be noted that MWM Brampton has not experienced a single day of downtime in its first 6½ operating years.

In the case of extended power failure, wastes requiring refrigeration will be moved to refrigerated vehicles and managed as outlined above.

In the event of a service disruption at the MWM Brampton facility, the MWM Brampton contingency plan will be implemented. Wastes from the MWM facility in Nova Scotia will continued to be processed and shipped for treatment.

Nova Scotia Environment and Labour will be notified as soon as a significant system failure occurs, will be informed of the remedial and contingency actions implemented, and will receive confirmation of resumption of normal operating conditions. The incident details will be recorded and kept on file, with a copy forwarded to the NSEL regional office for their files. For the purposes of reporting, "significant" will be defined as any system failure that cannot be rectified

within twenty-four (24 hours) or that cannot be managed onsite by refrigerating and/or storing received waste to the volume capacity approved through operating approvals.

In the event of a waste diversion requirement, facility documentation including manifest management, will reflect the physical flow of waste through the site to an alternate process facility. The MWM software program will facilitate this alternative in the event that it is required.

2.7.10 Record Keeping

Waste Tracking

The MWM computer based bar code system and associated custom software program will enable the company to automatically track and maintain detailed records relating to each unit of waste received for processing. The system automatically tracks each unit of waste through each step, from point of arrival through to final disposal, whether by on-site treatment or off-site disposal.

Recorded information includes the time and date a waste unit is received, the weight of the unit/shipment, the time it is processed in the autoclave (or stored and transferred, if required), the time it is shredded and compacted, and the time it is taken to landfill for final disposal.

Each customer is assigned a permanent bar code identification number that provides the ability to generate invoices, accounts payable/receivable information, shipping patterns and account profiles. Information regarding waste generation, for the purposes of waste minimization initiatives, will be made available to clients.

Autoclave Process

As previously discussed, process conditions (i.e., time, temperatures and pressures) are recorded for each autoclave cycle.

Also, records of initial and weekly process validation/confirmation testing are also maintained.

Maintenance

Preventive maintenance records for process equipment and vehicles will also be maintained to demonstrate facility preparedness.

2.7.11 Occupational Health and Safety and Staff Training

A copy of the MWM Health and Safety Policy for its Brampton facility is presented in Appendix I. MWM has registered with the Nova Scotia Safety Council and is committed to developing a Health and Safety Program in compliance with Nova Scotia legislation. As part of the program implementation, the Health and Safety Policy will be reviewed for compliance with the Occupational Health and Safety Act and updated to reflect specific Nova Scotia requirements, as appropriate.

Staff training is an important component of MWM's occupational health and safety program. Staff will be provided process-specific training appropriate to their job responsibilities.

Supervisory personnel, such as the Operations Manager, Client Care Managers and Waste Processing Foreman, will be enrolled in a comprehensive four-week training program. Training will be given by senior MWM personnel, which will take place both at MWM Nova Scotia and MWM Ontario operations, where required. Client Care Manager training will also include comprehensive on-site training at Ontario hospitals currently serviced by MWM.

Drivers and waste processors will be enrolled into a comprehensive two-week training program. Training will include as a minimum:

- Occupational health and safety awareness;
- WHMIS
- Standard first aid;
- Standard operating procedures;
- Equipment operating procedures;
- Environmental approvals requirements;
- Transportation of Dangerous training for shippers, receivers and drivers;
- Tow-motor operator Certification;
- Safe propane handling;
- Spill clean-up;
- Emergency response;
- Environmental reporting; and,
- Mandatory personal protective equipment.

All front line employees will be fitted for commercially provided uniforms, safety footwear and PPE. Employees will be required to come to work and leave work in their street clothes, changing into and out of provided uniforms at work only. All company employees will be required to be inoculated/screened for Hepatitis A&B and Tetanus as a condition of employment.

2.7.12 Site Security

The site will be completely fenced and commercial vehicle access will be restricted. When the site is not occupied, the access gate will be locked. Digital security cameras with approximately 30 days storage capacity will be positioned within operational areas of the facility and to monitor key areas of the building exterior.

2.8 Emergency Response Planning

Operational contingency planning is addressed in Section 2.7.9, above.

It is MWM's experience that biomedical waste is typically over packaged when it is contained in disposable packaging and that the standard reusable containers are leak proof, with tight fitting lids guarding against spillage, if accidentally over turned. All MWM owned/operated transport vehicles are also equipped with a double-tiered load containment system to secure all waste containers in an upright position within the cargo containment area. Further, little non-contained liquid is present in medical waste. Consequently, accidental spills rarely occur (not a single spill within any MWM vehicle in 6½+ years of operation) and are minimal in scope when they do occur. Nevertheless, MWM has prepared an emergency spill plan that will be followed in the event of a spill, whether it occurs on an MWM transport vehicle or in the facility.

MWM will include the emergency spill plan in employee training documents so that staff members are familiar with the specific requirements. Members of the safety committee will be responsible for coordinating the clean up of any spill at the facility.

A copy of the MWM Brampton Facility Emergency Contingency Plan is presented in Appendix J. This plan will be updated to reflect the specific requirements of the Nova Scotia Environment and Labour Contingency Planning Guidelines (September 29, 2004).

All MWM transport vehicles will be equipped with a portable spill kit. The facility will have a designated spill kit station, which will be identified and secure. Each kit, portable or on the site, will contain the following clean-up items:

Disposable coveralls	Rubber boots
Rubber gloves	Clear plastic face mask
Broom or brush	Full size or mini shovel
Absorbent material	Disinfectant solution
Paper Towels, cloth	Approved plastic liners
Approved outer packaging	Tape, ties and labels

In the event of spill, the immediate area will be cleared of all personnel who have not been trained in spill remediation. After being fitted with protective clothing, the MWM employee will clean up the spilled materials using the required materials specified above. The spill area will be disinfected with hospital grade disinfectant. The disinfectant will also be wiped up, to ensure the area is dry.

All spilled waste materials and clean-up aids will be repackaged and brought back to the MWM site to be processed as biomedical waste. The clean-up tools will be disinfected prior to being returned to the spill kit or the spill kit will be replenished, as appropriate.

In the event that an individual comes into direct contact with spilled biomedical waste, that individual would be immediately escorted to the nearest hospital for examination. Nova Scotia Department of Health would also be notified and appraised of the situation.

Finally, any incident concerning a spill will be immediately reported to the NSEL. The details of the incident will be recorded and retained on file, with a copy forwarded to the NSEL for their files.

2.9 Decommissioning, Closure and Abandonment

Equipment installed at the facility has a life expectancy of a minimum of 20 years. There are no plans to decommission or abandon the facility. It is expected that if operations at the site were to

cease, the equipment would be removed from the site, and the property and building would be leased to another enterprise.

3.0 Public and Stakeholder Consultation

MWM believes that public and stakeholder communication are an important means of providing information on the project and soliciting input into facility features during the planning stage. Hence, as part of the environmental assessment process, MWM communicated with stakeholders through information bulletins and meetings with municipal and provincial regulators/elected representatives and its nearest neighbours. MWM also hosted an information open house, which provided key stakeholders an opportunity to ask questions and raise issues of potential concern.

3.1 Neighbourhood Consultation

MMW completed two levels of consultation with neighbouring businesses. MWM held scheduled meetings with each the neighbours immediately adjacent to the property or those with potentially sensitive activities (i.e., food distribution) in the immediate area. These neighbours, as well as those in the general vicinity were invited to an open house information session.

A listing of neighbours with whom meetings were held is presented in Appendix K, Table K-1. Each neighbour was provided with an information package, which included a brief description of the undertaking, photographs of the site and MWM's facility in Brampton, letters of reference from neighbours in Brampton, and a CD describing MWM's process in Brampton. A copy of the package (excluding the CD, which is available at MWM's website, www.medwastegroup.com,) is presented in Appendix K. Each of the neighbours welcomed MWM as a new business in Burnside and none expressed environmental concerns. One inquiry was raised by Happy Harry's Affordable Building Centre, as tractor trailers delivering goods to their business have traditionally used the parking area at 45 Wright Avenue in order to properly align the trailers to better approach their receiving area. MWM acknowledged the concern and have modified the positioning of the MWM property fencing to facilitate continued use of the MWM parking lot by tractor trailers delivering to Happy Harry's.

Other neighbours in the vicinity were visited and hand-delivered an invitation to attend an open house information session. These neighbours are documented in Appendix K, Table K-2. A copy of the invitation is presented in Appendix K.

3.2 Open House Information Session

On Thursday, August 4, 2005, MWM hosted an information open house at the Ramada Hotel, Burnside Industrial Park. At the information session, which was open from 10 a.m. to 2 p.m, and from 4 p.m. to 6 p.m., representatives of MWM and its consultant, Dillon Consulting Limited, were available to provide information pertaining to the project and to answer questions.

As noted above, invitations were extended to neighbouring businesses in Burnside Industrial Park as well, provincial and municipal regulators who have been consulted during project development, and provincial and municipal elected representatives. A list of provincial and municipal government invitees is presented in Table K-3.

Four people attended the open house. Attendees are listed in Table 3-1. A copy of the open house sign-in sheet and other documentation is presented in Appendix K.

Table 3-1
Open House Information Session Attendees

Name	Affiliation
Paula Henderson	Nova Scotia Environment and Labour, Executive Assistant to the Minister
Jim Bauld	HRM, Manager of Solid Waste Resources
Steve Westhaver	Nova Scotia Environment and Labour, Central Region
Scott Morash	Nova Scotia Environment and Labour, Central Region

No written comments were received during the open house. A question regarding the quality of liquid effluent to the municipal sanitary sewer was raised. Based on MWM's experience at its facility in Brampton, Ontario, there are no anticipated concerns regarding the ability of the effluent to meet HRM By-law W-101. MWM has committed to installing a manhole for sampling effluent to the sanitary sewer on the 45 Wright Avenue site and to hiring an independent consultant to conduct random monthly samples for one year to demonstrate compliance.

3.3 Municipal and Provincial Elected Officials

Meetings were held with municipal and provincial elected representatives of the area. A summary of comments received from elected officials (with responses in brackets) is provided in Table 3-2.

Table 3-2
Summary of Elected Municipal and Provincial Government Contacts

Name	Affiliation	Comments
Jerry Pye	Member the Legislative Assembly, Dartmouth North	No recommendations made
Jim Smith	HRM Councillor, District 9 - Albro Lake – Harbourview	Requested that HRM staff be consulted to ensure compliance with applicable bylaws (Contact has been made with HRM staff, including Sean Audas and Jim Bauld)

3.4 Public Comments on Other Biomedical Waste Proposals

In preparing this submission, comments received during the EA process for two similar proposals in the Halifax area were reviewed and addressed, where applicable. Comments that were not specific to the sites or processes addressed by those proposals, and which could be considered potentially relevant to this proposal are presented in Table 3-3.

Table 3-3
Public and Stakeholder Comments Received on Recent Similar Projects in Halifax Area

Comment	Project Response	Source
Odour	Odours are minimized as the autoclave is maintained at a negative pressure until such time as the steam from the autoclave has been condensed. Autoclave liners prevent waste from sticking to the inside of the container, thereby mitigating related odours. Continuous plant and equipment housekeeping practices also mitigate any related odours.	EA registration for Proposed Biomedical Waste Treatment and Transfer Facility, July 2005
Health and safety of employees working at the landfill in relation to sharps.	The sterilized waste will be shredded prior to disposal. All compactor loads of non-hazardous sterilized and shredded waste are managed as 'special waste' and is buried immediately upon receipt to prevent access by either landfill personnel or equipment.	

Comment	Project Response	Source
Processing of anatomical waste (body parts)	The facility will not process red bag waste. Red bag waste will be collected, segregated and placed in refrigerated storage at the facility and transferred to an approved incineration facility in Ontario for disposal. Trucks used for transport will also be refrigerated.	
Red Bag (cytotoxic & anatomical waste) and / or low level nuclear medicine waste is improperly disposed of in yellow bags.	All waste entering the facility will be screened for the presence of radioactive materials. Radioactive materials will be returned to the generator for proper handling and future disposal. Waste is visually inspected prior to autoclaving. Inappropriate waste is removed and repackaged as red bag waste.	Letter from Megan Russell regarding proposal by Medic Delivery Services to establish a biomedical waste treatment facility in Mount Uniacke
Waste from dental clinics, veterinary clinics and funeral homes may contain mercury, as well as animal and human waste.	It is not planned that point sources of mercury, such as dental amalgam from dental offices, will be accepted. If so required, MWM would be prepared to introduce its Dental Amalgam recycling program in Nova Scotia, but only if a suitable Nova Scotia based mercury recycling company can be located before hand. Human and animal anatomical waste will be shipped to Ontario for incineration. Wastes that are processed in the autoclave are under negative pressure until the steam is condensed and discharged to sewer. Sewer discharges will be monitored for compliance with by-law.	
Departments of Health and Environment expect that project will meet 1992 CCME guidelines.	The project will meet or exceed the requirements of CCME 1992.	

4.0 Description of the Environment and Environmental Impact Evaluation

This section presents the description of the environment and the environmental impact evaluation in an integrated format. Introductory subsections describe how the impact evaluation was conducted, using an issues-based approach. Each of the issues identified is presented in detail and the impact evaluation is summarized at the end of each subsection.

4.1 Setting and Boundaries

The development of the impact evaluation first requires establishment of the environmental setting and the boundaries of the assessment itself. The establishment of study boundaries and issue scoping have been conducted with a primary focus on the potential effects of the project on the environment. The environmental assessment must also consider the potential effects of the environment on the project. Where applicable, this consideration has been incorporated in the boundaries and the scoping process.

4.1.1 Environmental and Socio-economic Setting

The study area of this project includes the Burnside Industrial Park.

4.1.2 Spatial Boundaries

The boundaries of the assessment vary depending on the issue being addressed. The bounded area within which the project could potentially interact with land uses generally included the study area described above. Occasionally, additional areas outside the study area were included, such as for transportation.

4.1.3 Temporal Boundaries

Temporal boundaries for the impact evaluation cover project phases involving physical activities. Therefore, temporal boundaries encompass installation, operation and maintenance, monitoring, and decommissioning. In effect, these boundaries are 25 years or more.

4.1.4 Regulatory Boundaries

The regulatory boundaries of the project are the laws and regulations of the Province of Nova Scotia, of Canada, and the by-laws of HRM. Federal jurisdiction is not considered as part of the regulatory boundaries of this project for the purposes of the registration under the Nova Scotia *Environmental Assessment Regulations*.

4.2 Issue Scoping

The purpose of scoping in an EA is to identify the key environmental Issues of Concern. Scoping involves defining the project scope; identifying the factors to be considered; and determining the interest of stakeholders in the project and how they can be incorporated. For this project, the project description presented in Section 2 of this report stands as a clear definition of the project scope. The experience of MWM and Dillon has helped to identify factors and the interests of stakeholders. To date this work has included:

- meeting with provincial and municipal elected representatives for the area;
- meeting with neighbouring businesses;
- reviewing records from consultation on similar, recent projects, including documented concerns;
- reviewing applicable provincial and federal environmental laws and regulations;
- meeting with regulatory agencies at provincial and federal levels;
- considering available environmental literature and references;
- considering the extensively developed and industrial/commercial nature of the study area;
- incorporating the experience of the EA study team in conducting environmental assessments in Nova Scotia and elsewhere in Canada; and,
- incorporating MWM's experience with biomedical waste treatment facility installation, operation and maintenance elsewhere in Canada.

Through this scoping exercise, the EA study team developed a methodology for evaluating and presenting issues in this assessment. This methodology and the resulting Issues of Concern are described in the following subsection.

4.3 Method of Assessment

The EA is based on the assessment of *issues* identified through issues scoping and to emphasize the issues in the completion of the effects assessment. This approach is particularly relevant for this project, for which there exists real data on the quality of emissions, previously completed EAs for similar projects within the environment of the Burnside Industrial Park, and well established environmental protection measures that can be used to support the review of potential project effects or a given issue. In this manner, an issue with well-defined mitigation, such as air quality, can be suitably addressed in the Project Description rather than in an effects assessment. This allows the assessment to focus on important project specific issues. The identified issues are reflected within an environmental effects assessment framework.

4.3.1 Impact Significance

The assessment methodology is based on EA study team experience and guidance from recent environmental assessment studies undertaken elsewhere in Nova Scotia and Canada. Determination of significance is based on the consideration of the following results of interactions, as summarized in Table 4-1:

Table 4-1
Assessment of Criteria for Determination of Significance of Effects

Magnitude	Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. It is rated as compared with background conditions, protective standards or normal variability.	
	Small	Small, relative to natural or background levels
	Moderate	Moderate, relative to natural or background levels
	Large	Large, relative to natural or background levels
Reversibility	Reversible	Effect can be reversed
	Irreversible	Effects are permanent
Nature	Positive	Net benefit
	Negative	Net loss or adverse effect
Extent	Immediate	Confined to the easement
	Local	Effects extent beyond the easement but less than regional
	Regional	Effects on a wide scale
Duration	Short Term	Between 0 and 1 year duration
	Medium Term	Between 1 and 7 year duration
	Long Term	Beyond 7 years duration

Confidence in Prediction	Low	Based on limited understanding of cause and effect relationships and/or incomplete data
	Moderate	Based on a good understanding of cause and effect relationships using data from similar cases, or moderately understood cause and effect relationships and good site-specific information
	High	Based on a good understanding of cause and effect relationships and good site-specific information

4.3.2 Issues of Concern

The issues identified through the issues scoping process are documented in Table 4-2. A discussion of issues of concern follows in Section 4.4.

Table 4-2
Issues and Rationale for Inclusion/Exclusion in the EA

No.	Aspect/Source	Issue	Primary Concerns	Location in EA	Included or Excluded from Impact Evaluation
1.	Air Emissions	Effects of emissions from combustion, fugitive losses, air quality	- Dust during construction -Emissions from natural gas-fired boiler -Emissions from autoclave condenser vent -Truck operation	2.4, 4.4.1, 4.4.5, Appendix F, Appendix L	**Included** in impact evaluation. Mitigating factors include: - minimal exterior work during construction and of short duration - natural gas boiler results in low particulate and low sulphur emissions - autoclave condenser vent emissions not measurable at Brampton facility - automatic idle shutoff on trucks, scheduling to avoid peak traffic periods
2.	Soil Erosion	Erosion of soil and sedimentation entering water courses	- Elevated sediment in watercourses	2.4; 4.4.3	**Excluded**, there are no natural watercourses in the vicinity of the facility and the nearest stormwater sewer entry point is approximately 30 metres from the site.
3.	Water quality/ quantity/flow	Effects on surface water or groundwater	-Contaminated surface runoff -Impact on groundwater quality - Discharges to sewer	2.1; 4.4.3; Appendix A; Appendix M	**Included** in the impact assessment. Mitigating factors include: - no nearby surface water course; - groundwater not used for drinking water supply;

No.	Aspect/Source	Issue	Primary Concerns	Location in EA	Included or Excluded from Impact Evaluation
3. cont'd	Water quality/ quantity/flow				- area serviced with municipal water; - waste processing occurs inside a building, minimal potential for groundwater contamination; - no groundwater withdrawal - sanitary discharges at Brampton in compliance with HRM by-law
4.	Acid Drainage	Acidification of surface water and mobilization of metals from disturbance of acid generating rock	- Effects on fish and fish habitat	2.1; 2.4	**Excluded**; excavations limited to fence pole holes and pit for autoclave, hence volumes of rock, if any, will be minimal.
5.	Natural Environment	Disturbance of habitat and/or wetlands; impact to species at risk; migratory birds	-Effects on fish, fish habitat; -Loss of wetland habitat or function; -Species at risk, -Clearing, habitat loss; disturbance; fragmentation	2.1;	**Excluded**, site has been previously developed with a building surrounded by asphalt paving and a landscaped area adjacent to Wright Avenue; surrounding properties also developed
6.	Cultural Resources	Loss or disturbance of archaeological, historical, paleontological or architectural resources	-First Nations resources; -Provincial heritage property; -Archaeological sites	2.1; Appendix B	**Excluded**, no potential for cultural resources.
7.	Noise and Vibration	Increase or change in noise levels	-Elevated noise levels during construction or during operation	4.4.2	**Included** in the impact assessment. Mitigating factors include: - Noise during construction is temporary - Operational processes will occur inside building
8.	Land Use	Effects on use of lands	-Impacts on the uses of surrounding lands	2.1	**Excluded**, land is zoned for commercial/industrial purposes and surrounding land use is compatible.

No.	Aspect/Source	Issue	Primary Concerns	Location in EA	Included or Excluded from Impact Evaluation
9.	Traffic	Effects on traffic in the area	-Negative impacts on traffic patterns	4.4; Appendix N	**Included** in the impact assessment. Mitigating factors include: - Wright Avenue and connecting Windmill Roads are arterial roads - Impact of additional traffic is not considered measurable
10.	Cumulative Effects	Project effects combined with those of other projects	Effects of project may combine with other projects to significantly impact the environment.	-	**Excluded**, no project effects.
11.	Malfunctions or Accidents	Accidents during transportation or operation	-Release of wastes during transport or inside plant prior to treatment; -Malfunctioning of equipment during autoclaving process	2.7.9; 2.7.11; 2.8; 4.4.5; Appendix D	**Included** in the impact evaluation. Mitigating factors include: - Contingency plan for emergencies inside and outside the plant - Automated autoclave process to ensure sterilization is achieved, even during power failure - Potential for release of infectious substances is low.

4.4 Environmental Impact Evaluation

4.4.1 Air Quality

Construction

Redevelopment activities on the site with potential for air emissions include hand painting (brush and roller application – not spray application) of the building exterior and asphalt repaving of the parking lot. These activities will be completed in accordance with best practices to minimize potential for nuisance air emissions and will be of short duration in nature.

Operations

During operations, there are four potential stationary point source emissions from the facility to the atmosphere:

- the stack from the natural gas-fired boiler that supplies steam to the autoclave vents combustion gases to the atmosphere;
- the small stack(s) from the newly installed natural gas radiant heating tubes in the plant area;
- the small stack from the newly installed roof-top HVAC system for the office area; and,
- the autoclave condenser vent.

The boiler is a 200hp, natural gas-fired boiler. Emissions from the boiler, as well as the plant heating systems, are not expected to exceed maximum acceptable ground level concentrations specified in the Nova Scotia Air Quality Regulations, due to the fuel source (i.e., natural gas) and the boiler/heater capacity. Technical specifications and expected concentrations of contaminants in the stack gases are presented in Appendix L. Predicted stack concentrations of carbon monoxide, nitrogen oxides and sulphur oxides are less than 400 ppm, less than 90 ppm and nil, from the boiler, respectively. The boiler and heating systems will be maintained at a manufacturer's recommended schedule to maximum fuel efficiency and minimize contaminant concentrations.

Steam released from the autoclave will be condensed into liquid and drained to the municipal sanitary sewer, resulting in minimal steam flow from the condenser vent to the atmosphere. Monitoring results from commissioning testing at the MWM Brampton facility are provided in Appendix F for reference.

It is noted that the Ontario Ministry of Environment Certificate of Approval for the facility (Appendix E) does not require testing of the condenser vent or the boiler stack. Based on MWM's practical experience at its facility in Brampton, the vent from the autoclave condenser is not a source of odours.

As noted above, airflow from the autoclave condenser stack is nil or minimal. There are potential concerns that this stack may serve as a pathway for pathogens to enter the air. Once treatment in the autoclave commences, steam at a temperature of 300°F is applied to the material. Should

steam be released during the autoclave condenser vent in a failure situation, air borne pathogens would not be expected to be viable at a temperature of 300°F.

The boiler stack and the condenser vent will be located a minimum of 10 metres from the nearest property boundary and 40 metres from the on-site ventilation system.

As outlined in the commissioning report, trace quantities of volatile organic compounds were measured in the *holding tank* vent during commissioning. It is not known where these chemicals originated, but evidence suggests that they were not associated with the autoclave operation. Metal (cast) floor drains will be installed at the proposed facility in Burnside; as such, there is no requirement for a holding tank at this location.

The nature of the emissions is such that National Pollution Release Inventory reporting requirements do not apply to this project.

Mobile sources of air emissions include MWM's trucks, of which there will be five initially. Emissions include carbon dioxide, carbon monoxide, nitrogen oxides, sulphur oxides and particulate Measures to minimize fuel usage, and hence, greenhouse gases and other air pollutants include:

- trucks will be scheduled to depart and enter the facility during non-peak traffic times, when conditions permit, in order to reduce idling time;
- trucks will be equipped with automatic idle shutoff. The factory setting for the automatic idle shut-off is five minutes;
- driver training will include idling awareness and driving styles and behaviours to minimize fuel usage; and,
- truck loading will be optimized to utilize the most energy efficient vehicle that will achieve operational requirements (i.e., it is planned that straight trucks will be used to collect wastes from hospitals in HRM and that all bulk waste containers are double stacked within the vehicle cargo containment areas to maximize loading capacity).

Results:

Magnitude	Small: similar to or better than other boiler emissions.
Reversibility	Irreversible: However, emissions are negligible.
Nature	Negative: However, emissions are negligible.
Extent	Local: Local and ambient air quality objectives will not be exceeded.
Duration	Long-term: However, emissions are negligible.
Confidence in prediction	High

Significance: Not significant. Point source emissions from the project are minor to negligible on a local scale. In addition, greenhouse gas emissions associated with heating will be reduced from the use of natural gas. An idling plan will reduce emissions from trucks.

Residual Impact Statement: No residual long-term impacts on air quality are expected from the project.

4.4.2 Noise

Noise at nuisance levels may be generated during installation. However, noise levels will be generally the same as those for other similar construction activities. Appropriate control measures include continuous maintenance of standard noise suppression on construction equipment and vehicles.

Noise levels are expected to be within NSEL noise guidelines at the property boundary during operations.

Results:

Magnitude	Small: similar to other equipment installation projects and industrial operations in the general area.
Reversibility	Reversible: Noise is temporary.
Nature	Negative: Noise levels are expected to be minimal.
Extent	Immediate: Noise levels will not exceed guidelines beyond the property.
Duration	Short-term: The potential duration of impacts from nuisance noise is confined to the installation period. Long-term noise is negligible.
Confidence in prediction	High

Significance: Not significant. The impacts of nuisance noise are not expected to be significant.

Residual Impact Statement: The residual impacts of nuisance noise are considered not significant. During installation the effects will be mitigated by standard methods. During operation noise levels will not exceed guidelines beyond the property.

4.4.3 Discharges to Municipal Sewers

The site is serviced with municipal sanitary and storm sewers.

The nearest down gradient storm sewer inlet is 30 metres south of the property driveway. Waste will not be stored outside and truck maintenance will not be completed on-site. MWM will exercise good housekeeping practices outside its facilities to minimize the potential for miscellaneous solid waste to enter the storm sewer. Contingency plans will be in place to deal with spills of waste or diesel oil, should an accident occur. No process related wastewater will be discharged to the storm sewer. Hence, stormwater discharges from the site, which likely discharge to the Bedford Basin, are not expected to be changed by this project.

Discharges to the municipal sanitary sewer include condensate from the autoclave, effluent from washing reusable yellow bag containers, and effluent from washing down the facility and truck interiors. Effluent discharged to the municipal sanitary sewer will meet HRM's Wastewater By-law W-101. MWM is committed to retaining an independent firm to conduct monthly random sampling of sanitary sewer discharges during its first twelve months of operation to demonstrate compliance with By-law W-101. A sampling manhole will be installed on-site as part of redevelopment activities to facilitate this sampling. Results will be maintained on-site for regulator reference and notification will be made if By-law W-101 criteria are exceeded.

Assuming that eight sterilization cycles are completed during two eight-hour shifts per day, the volume of effluent from the autoclave process is estimated at 16.3 m^3/day.

For reference, select effluent quality data from MWM's Brampton facility was compared to HRM's W-101 by-law and met HRM's discharge criteria (refer to Table 4-3). Sampling at the Brampton facility is completed by the regional government and sampling is not completed every month. It is noted that the effluent from the Brampton facility also includes discharges from the incinerator's wet scrubber, which is not included in this project. All but one of the effluent samples include incineration discharges. For a more applicable comparison, please refer to the effluent discharge analysis for the June 14th, 2004 sample, at which time only the autoclave

system was operational when the effluent sample was collected. The incinerator was shut down for scheduled maintenance at the time. It is noted that previous experience with autoclave operations in the region had demonstrated consistent compliance with discharge criteria.

Results:

Magnitude	Small. Will meet discharge criteria.
Reversibility	Reversible: if discharge criteria are exceeded, wastewater will be pre-treated on site prior to discharge or collected for disposal at an appropriate facility.
Nature	Negative: Will meet discharge criteria.
Extent	Regional: Will meet discharge criteria.
Duration	Long-term: Will meet discharge criteria.
Confidence in prediction	High. Monitoring will confirm.

Significance: Not Significant. Discharges will meet applicable criteria.

Residual Impact Statement: No residual impacts are expected.

Table 4-3
Wastewater Discharge Monitoring Results
Medical Waste Management Facility
Brampton, Ontario

Parameter	HRM Wastewater Discharge Limit (mg/L)	Sampling Manhole May 10/04	Sampling Manhole June 14/04*	Sampling Manhole Aug. 17/04	Sampling Manhole Sept. 1/04	Sampling Manhole Feb. 14/05	Sampling Manhole May 3/05	Sampling Manhole June 1/05
Biomedical Oxygen Demand	300	-	69.0	293	-	11.4	18.8	41.6
Aluminum	50	0.375	0.073	0.096	1.04	0.28	0.766	1.5
Cadmium	1	0.003	<0.003	0.003	<0.003	0.058	<0.004	0.005
Chromium	2	<0.013	<0.013	<0.013	<0.013	0.016	0.01	0.01
Copper	1	0.057	0.011	0.019	0.013	0.063	0.056	0.06
Iron	50	0.510	0.389	0.360	3.36	0.3	1.13	0.439
Lead	1	0.705	<0.031	<0.031	0.052	0.80	0.346	0.324
Nickel	2	<0.007	<0.007	0.024	<0.007	0.020	0.063	0.016
Zinc	2	2.49	0.105	0.785	0.744	2.4	0.864	1.82
Total Kjeldahl Nitrogen	100	3.56	8.4	37.4	11.0	3.33	1.68	4.23
Total Suspended Solids	300	17.8	71.5	83.3	214	27.0	19.3	38
pH	5.5-9.5	8.1	8.3	6.9	8.2	9.5	8.4	8.1

*Incinerator not in operation at time of sampling.

4.4.4 Traffic

Waste will be transported to the site from generators from around the province. Initially, it is anticipated that five trucks will be used transport wastes from Nova Scotia Department of Health

facilities to 45 Wright Avenue. Biomedical wastes from other sources may be treated at the facility, should markets be identified.

The following outlines anticipated traffic flow in and out of the facility to address initial requirements:

- Four trucks per day entering and exiting the site to service the Halifax area;
- Three trucks per day entering and exiting the site to service the remainder of Nova Scotia;
- Two tractor-trailers per month entering and exiting the site to transport wastes to Ontario; and;
- Up to fifteen (at capacity) employee vehicles per day entering and exiting the site.

The facility is located on Wright Avenue, which is an arterial road (east/west) that intersects Windmill Road, another arterial road (north/south). During peak traffic periods, the existing level of traffic on these roads is significant. Traffic data provided by HRM for 40 Wright Avenue documented Average Annual Weekday Traffic (AAWT) of 15,579. Supporting data are presented in Appendix N. Due to the volume of traffic on these roads, it is anticipated that there will be no measurable impact to traffic volumes (i.e., less than one percent increase in traffic volumes – typically only changes of 10 percent or more can be reliably measured) due to the proposed truck/employee traffic. In addition, for the purposes of operational efficiencies, MWM plan to schedule truck arrivals and departures to coincide with non-peak traffic periods.

Results:

Magnitude	Small: Minor increase in local traffic.
Reversibility	Reversible: Traffic is temporary in terms of its impact.
Nature	Negative: Impacts are negligible.
Extent	Local: Impacts are negligible.
Duration	Long Term: Impacts are negligible.
Confidence in Prediction	High

Significance:	Not significant. The site is on a major arterial route and the projected increase in traffic will not be measurable.
Residual Impact Statement:	No residual impacts are expected.

4.4.5 Accidents and Malfunctions

Accidents and malfunctions that can lead to environmental effects may occur during any phase of the project. Construction outside the building will be limited to construction of a fence, painting of the building, asphalt re-coating of the parking lot area(s) and replacing the roof on the building, with minimal opportunity for environmental impact. Other site preparation activities will occur inside the building. The property is not located in proximity to a watercourse, so there is no potential for direct environmental effects on fish, fish habitat or water quality. The closest storm drain is 30 metres south of the site.

To minimize the likelihood of a spill or other accident during operations, MWM will implement a rigorous training program for staff responsible for waste transport or handling. In the event of a spill, MWM and its contractors will follow the procedures described in an environmental contingency plan.

A copy of the MWM Brampton Emergency Contingency Plan is presented in Appendix J for reference. As part of its commissioning process, MWM will develop an Environmental Contingency Plan, to address the specific requirements of the NSEL Contingency Planning Guidelines (September 29, 2004). This will include consultation with local fire officials to ensure they are cognizant of the facility and materials likely to be encountered in case of a fire. Site specific procedures will be developed, appropriate staff training will implemented and emergency response materials will be maintained onsite and in trucks.

In the case of equipment malfunctions, there are electronic process controls in place to ensure that biomedical waste is subjected to the appropriate temperature and pressure for the required time. Should steam escape through the autoclave condenser vent during condenser malfunction, airborne pathogens are not expected to be viable after contact with steam at 300°F.

Results:

Magnitude	Small
Reversibility	Reversible: Emissions are a result of malfunction are temporary.
Nature	Negative: Impacts are negligible.
Extent	Immediate/Local: Depending upon the type of accident or malfunction, the impacts may be contained or impact other operations.
Duration	Short term: Emergency response plans will be in place to return to normal operations as soon as possible.
Confidence in prediction	High

Significance: Not significant provided appropriate contingency plans are in place to mitigate the impacts of accidental events.

Residual Impact Statement: No residual impacts are expected.

4.5 Environmental Impact Summary

The preceding sections provide a detailed project description, outline environmental protection measures that MWM will follow, and discuss potential impacts resulting from project activities. In summary, environmental impacts and residual impacts associated with the project are considered to be *not significant* as environmentally sensitive areas have been avoided and effects generally can be mitigated through standard measures.

Table 4-4 presents a summary of the identified issues and the determination of significance for each.

Table 4-4
Impact Assessment Summary

Issue (Including Mitigation)	Magnitude	Reversibility	Nature	Extent	Duration	Confidence
Air Quality	S	IRR	NEG	L	LT	H
Noise	S	REV	NEG	I	ST	H
Liquid Discharges	S	REV	NEG	R	LT	H
Traffic	S	REV	NEG	L	LT	H
Accidents and Malfunctions	S	REV	NEG	I/L	ST	H

Key

H	High
I	Immediate
IRR	Irreversible
L	Local
LT	Long Term
M	Moderate
MT	Medium Term
N/A	Not Applicable
NEG	Negative
POS	Positive
R	Regional
REV	Reversible
S	Small
ST	Short Term

References

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